Miner Slough Bridge Project
SOLANO COUNTY, CALIFORNIA
DISTRICT 4 – SOL – 84 (PM 12.0/12.4)
EA: 0G660/Project ID: 0400000343

Initial Study with
Mitigated Negative Declaration/
Environmental Assessment with Finding of
No Significant Impact

Prepared by the
California Department of Transportation

The environmental review, consultation, and any other action required in accordance with applicable federal laws for this project is being, or has been, carried out by Caltrans under its assumption of responsibility pursuant to 23 U.S.C. 327.

July 2017
Minor South Bridge Project

SOLANO COUNTY, CALIFORNIA

DEPARTMENT OF TRANSPORTATION

MINOR 5 SOUTH

MAY 2008

Environmental Assessment

No significant impact

Prepared by:

California Department of Transportation
General Information about This Document

What's in this document?

The California Department of Transportation (Caltrans), as assigned by the Federal Highway Administration (FHWA), has prepared this Initial Study/Environmental Assessment (IS/EA), which examines the potential environmental impacts of the alternatives being considered for the proposed Miner Slough Bridge Project (project) located in Solano County, California. Caltrans is the lead agency under both the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA).

This document tells you why the project is being proposed, what alternatives we have considered for the proposed project, how the existing environment could be affected by the proposed project, the potential impacts of each of the alternatives, and the proposed avoidance, minimization, and/or mitigation measures. This Final IS/EA is an update of the Draft IS/EA.

Consequential changes made to the Draft IS/EA in response to comments, design refinements, additional conservation measures or clarifications are identified in the text with a vertical line in the margin. All comments received during the 30-day circulation period are included in Chapter 3.0 Comments and Coordination. Responses are provided following each comment.

For individuals with sensory disabilities, this document can be made available in Braille, in large print, on audiocassette, or on computer disk. To obtain a copy in one of these alternate formats, please call or write to Department of Transportation, Attn: Zachary Gifford, Office of Environmental Analysis/Mail Station 8B, Department of Transportation District 4, 111 Grand Avenue, Oakland, CA 94612; (510) 286-6610 (Voice), or use the California Relay Service: 1 (800) 735-2929 (TTY), 1 (800) 735-2929 (Voice), or 711.
Construct a replacement bridge along a new alignment approximately 100 feet west of current alignment, or rehabilitate between post miles (PMs) 12.0 and 12.4 of State Route (SR) 84 in Solano County, California.

Initial Study with Mitigated Negative Declaration/Environmental Assessment

Submitted Pursuant to: (State) Division 13, California Public Resources Code (Federal) 42 U.S.C. 4332(2)(C)

THE STATE OF CALIFORNIA
Department of Transportation


Responsible Agencies: California Transportation Commission, Regional Water Quality Control Board, California Department of Fish and Wildlife, State Historic Preservation Officer, Solano County, U.S. Coast Guard

7-5-17
Date of Approval

Bijan Sarabi
District Director
California Department of Transportation
CEQA/NEPA Lead Agency

The following person may be contacted for more information about this document:

California Department of Transportation
Attn: Zachary Gifford
Office of Environmental Analysis/Mail Station 8B
111 Grand Avenue
Oakland, CA 94612
(510) 286-5610
Initial Study with MND/Environmental Assessment

[Handwritten note: "PG-2"]
CALIFORNIA DEPARTMENT OF TRANSPORTATION
FINDING OF NO SIGNIFICANT IMPACT (FONSI)

FOR THE

Miner Slough Bridge Project

The California Department of Transportation (Caltrans) has determined that the Preferred Alternative will be the replacement alternative, and that this alternative will have no significant impact on the human environment. This FONSI is based on the attached Environmental Assessment (EA) which has been independently evaluated by Caltrans and determined to adequately and accurately discuss the need, environmental issues, impacts of the proposed project, and appropriate mitigation measures. It provides sufficient evidence and analysis for determining that an Environmental Impact Statement is not required. Caltrans takes full responsibility for the accuracy, scope, and content of the attached EA and appended reports.

The environmental review, consultation, and any other action required in accordance with applicable Federal laws for this project is being, or has been, carried-out by Caltrans under its assumption of responsibility pursuant to 23 USC 327.

Date 7-5-17

Bijan Sartipi
District Director
California Department of Transportation,
District 4
CEQA/NEPA Lead Agency
Mitigated Negative Declaration

Pursuant to Division 13: Public Resources Code

Project Description
The California Department of Transportation (Caltrans) proposes to replace the bridge on State Route (SR) 84 over Miner Slough in Solano County.

Determination
The Department has prepared an Initial Study for this project, and following public review, has determined from this study that the proposed project would not have a significant effect on the environment for the following reasons:

- The proposed project would have no effect on land use, growth, coastal zone, wild and scenic rivers, parks and recreational facilities, community character and cohesion, environmental justice, utilities/emergency service systems, air quality, hazards and hazardous materials, noise, or paleontology.

- In addition, the proposed project would have less than significant effects to agricultural and farmlands, community impacts, traffic, visual and aesthetics, cultural resources, hydrology and floodplains, water quality, and geology and soils.

- With the following mitigation measures incorporated, the proposed project would have less than significant effects to biological resources: revegetation and planting; compensatory mitigation for jurisdictional features of wetlands and other waters of the U.S.; compensatory mitigation for delta smelt and longfin smelt; compensatory mitigation for giant garter snake; and compensatory mitigation for Swainson's hawk.

Bijan Sarbini
District Director
District 4
California Department of Transportation
CEQA/NEPA Lead Agency

Date
7-5-17
Summary

The California Department of Transportation (Caltrans) proposed to replace or rehabilitate the existing bridge on State Route (SR) 84 over Miner Slough (the Miner Slough Bridge Project [project]). Two build alternatives and a no build alternative for the bridge were proposed. Alternative 1 (bridge replacement) proposes a new bridge structure, approximately 340 feet long and 43 feet wide. Alternative 1 has two design options: the first design option is to build a new swing-span bridge approximately 100 feet west of the existing alignment, and second is a fixed span bridge design option that was not originally a design option discussed in the Draft Initial Study/Environmental Assessment (IS/EA). Alternative 2 (bridge rehabilitation), proposes to rehabilitate the existing bridge.

The project limits extend from SR 84 post mile (PM) 12.0 to 12.4. The bridge is approximately 30 miles southwest of Sacramento, California, connecting Ryer Island in the Sacramento-San Joaquin River Delta (the Delta) to the mainland, over Miner Slough. SR 84 traverses the Delta area as a levee road. It is a north-south, two-lane conventional highway that runs adjacent to agricultural, as well as limited residential, commercial, and industrial land. Caltrans is the lead agency responsible for preparing this IS/EA in compliance with the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA).

The purpose of the project is to maintain connectivity to and from Ryer Island via the Miner Slough Bridge on SR 84. Alternative 1 and Alternative 2 would improve the seismic, safety, and operational characteristics (roadway geometry and curb correction) of the bridge to meet current design standards; maintain current vehicular capacity; and avoid further deterioration of the existing structure (including bridge pier footings). In addition, the proposed project would reduce maintenance efforts and costs associated with upkeep of the existing bridge. The project is needed to remedy deficiencies in the existing bridge, including cracks in the deck surface and spans and slumping of the levee and roadway fill materials near Abutment 12.

The existing Miner Slough Bridge includes two approach spans and a swing span (i.e., a span that rotates sideways on a central pivot to allow tall watercraft to pass through), and has two 9-foot-wide lanes. The proposed replacement structure would be a bridge consisting of pre-cast/pre-stressed I-girder approach spans and a concrete deck over steel I-beams, all over cast-in-steel-shell concrete piles. The proposed bridge would be similar in appearance to the existing bridge. Under the other Build
Alternative the existing bridge would be rehabilitated by constructing three new approach spans with new foundations, performing substructure work at the center swing span pier, and replacing the bridge deck and wooden stringers. The load rating for the bridge, the characteristics of the existing truss swing span superstructure, and the limited existing bridge width (18 feet 7 inches) would remain unchanged.

This proposed project would not result in impacts to resources related to land use, growth, the coastal zone, wild and scenic rivers, parks and recreational facilities, community character and cohesion, environmental justice, utilities/emergency service systems, air quality, hazards and hazardous materials, noise, or paleontology because the project would repair or replace an existing transportation facility with no new access or expanded capacity.

The proposed project has the potential to impact resources related to agricultural and farmlands, community impacts, traffic, visual and aesthetics, cultural resources, hydrology and floodplain, water quality, geology and soils, and biological resources.

The Draft IS/EA evaluated three Alternatives. The two Build Alternatives are to construct a replacement bridge on a new alignment and demolish the existing bridge (Alternative 1) or to rehabilitate the existing bridge in its current location (Alternative 2). Under the No-Build (No-Action) Alternative, the existing Miner Slough Bridge would continue to operate and Caltrans would continue to maintain the existing structure. After continuing coordination with the general public and appropriate public agencies Caltrans decided to identify Alternative 1, the replacement alternative, as the Preferred Alternative.

Table S-1 summarizes the potential impacts of the three Alternatives. The avoidance, minimization, and/or mitigation measures for the proposed project are summarized below in Table S-1 and in Appendix C. The proposed project would result in a less than significant impact with implementation of mitigation.
<table>
<thead>
<tr>
<th>Table S-1</th>
<th>Summary of Potential Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Resource</strong></td>
<td><strong>Alternative 1 Bridge Replacement</strong></td>
</tr>
<tr>
<td><strong>Human Environment</strong></td>
<td></td>
</tr>
<tr>
<td>Land Use</td>
<td></td>
</tr>
<tr>
<td>Existing and Future Land Use</td>
<td>No conflict</td>
</tr>
<tr>
<td>Consistency with State, Regional, and Local Plans and Programs</td>
<td>Yes consistent</td>
</tr>
<tr>
<td>Coastal Zone</td>
<td>No impact</td>
</tr>
<tr>
<td>Wild and Scenic Rivers</td>
<td>No impact</td>
</tr>
<tr>
<td>Parks and Recreational Facilities</td>
<td>None in project site. Temporary effect to recreational use of Miner Slough</td>
</tr>
<tr>
<td>Growth</td>
<td>Not growth inducing</td>
</tr>
<tr>
<td>Farmlands/Timberlands</td>
<td>6.06 ac of farmland would be acquired</td>
</tr>
<tr>
<td><strong>Community Impacts</strong></td>
<td></td>
</tr>
<tr>
<td>Community Character and Cohesion</td>
<td>No impact</td>
</tr>
<tr>
<td>Relocations and Real Property Acquisition</td>
<td>No relocations; acquisition of portions of three parcels</td>
</tr>
<tr>
<td>Environmental Justice</td>
<td>No impact</td>
</tr>
<tr>
<td>Utilities/Emergency Service Systems</td>
<td>None affected or relocated</td>
</tr>
<tr>
<td><strong>Traffic and Transportation/ Pedestrian and Bicycle Facilities</strong></td>
<td>Temporary impacts during construction. None during operation</td>
</tr>
<tr>
<td>Visual/Aesthetics</td>
<td>None, consistent with existing setting.</td>
</tr>
<tr>
<td><strong>Physical Environment</strong></td>
<td></td>
</tr>
<tr>
<td>Hydrology and Floodplain</td>
<td>Not significant</td>
</tr>
</tbody>
</table>

0G660 State Route 84 Miner Slough Bridge Project
Initial Study with MND/Environmental Assessment xiv
<table>
<thead>
<tr>
<th>Resource</th>
<th>Alternative 1 Bridge Replacement</th>
<th>Alternative 2 Bridge Rehabilitation</th>
<th>No-Build (No-Action) Alternative</th>
<th>Avoidance, Minimization, and/or Mitigation Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Quality and Storm Water Runoff</td>
<td>Less than significant with AMMs</td>
<td>Less than significant with AMMs</td>
<td>No impact</td>
<td>Measure WATER-1: SWPPP</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Measure WATER-2: Stockpile Area.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Measure WATER-3: Temporary Construction Site BMPs.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Measure WATER-4: Waste Management from Bridge</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Removal.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Measure WATER-5: Permanent Treatment BMPs.</td>
</tr>
<tr>
<td>Geology</td>
<td>None expected</td>
<td>None expected</td>
<td>No impact</td>
<td>None</td>
</tr>
<tr>
<td>Soils</td>
<td>None expected</td>
<td>None expected</td>
<td>No impact</td>
<td>None</td>
</tr>
<tr>
<td>Seismic</td>
<td>Less than significant with AMMs</td>
<td>Less than significant with AMMs</td>
<td>No impact</td>
<td>None</td>
</tr>
<tr>
<td>Topography</td>
<td>No impact</td>
<td>No impact</td>
<td>No impact</td>
<td>None</td>
</tr>
<tr>
<td>Paleontology</td>
<td>No impact</td>
<td>No impact</td>
<td>No impact</td>
<td>None</td>
</tr>
<tr>
<td>Hazardous Waste/Materials</td>
<td>No increased risk construction or</td>
<td>No increased risk construction or</td>
<td>No impact</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>operation</td>
<td>operation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air Quality</td>
<td>No impact, exempt from conformity</td>
<td>No impact, exempt from conformity</td>
<td>No impact</td>
<td>Measure AIR-1: Construction Period Best Management</td>
</tr>
<tr>
<td></td>
<td>requirement</td>
<td>requirement</td>
<td></td>
<td>Practices</td>
</tr>
<tr>
<td>Noise</td>
<td>No increase in traffic capacity:</td>
<td>No increase in traffic capacity: no</td>
<td>No impact</td>
<td>None</td>
</tr>
<tr>
<td>Biological Environment</td>
<td></td>
<td>impact</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Natural Communities</td>
<td>Less than significant with AMMs</td>
<td>Less than significant with AMMs</td>
<td>No impact</td>
<td>Measure AIR-1:</td>
</tr>
<tr>
<td></td>
<td>and mitigation</td>
<td></td>
<td></td>
<td>Measures WATER 1, 2, 3 and 4,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Measure BIO-1: ESA Fencing.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Measure BIO-2: Vegetation Control.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Measure BIO-3: Wetland Avoidance and Minimization.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Measure BIO-4: Worker Environmental Awareness</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Training.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Measure BIO-5: Avoidance of Entrapment.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Measure BIO-8: Pre-construction Surveys.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Measure BIO-7: Handling of Listed Species.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Measure BIO-8: Vegetation Removal.</td>
</tr>
</tbody>
</table>
### Table S-1  Summary of Potential Impacts

<table>
<thead>
<tr>
<th>Resource</th>
<th>Alternative 1 Bridge Replacement</th>
<th>Alternative 2 Bridge Rehabilitation</th>
<th>No-Build (No-Action) Alternative</th>
<th>Avoidance, Minimization, and/or Mitigation Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wetlands and Other Waters</td>
<td>Less than significant with AMMs and mitigation</td>
<td>Less than significant with AMMs</td>
<td>No impact</td>
<td>Mitigation Measure BIO-A: Revegetation and Planting. Measures WATER-1, 2, 3 and 4. Measures BIO-1 and 2. Mitigation Measure BIO-B: Compensatory Mitigation for Jurisdictional Features.</td>
</tr>
<tr>
<td>Plant Species</td>
<td>Less than significant with AMMs</td>
<td>Less than significant with AMMs</td>
<td>No impact</td>
<td>Measure AIR-1, Measures WATER 1, 2, 3 and 4. Measures BIO 1, 2, 3, 4, 5, 6, 7, 8 and 9. Measure BIO-10: Pre-construction Surveys for Birds.</td>
</tr>
<tr>
<td>Animal Species</td>
<td>Less than significant with AMMs</td>
<td>Less than significant with AMMs</td>
<td>No impact</td>
<td>Measure AIR-1, Measures WATER 1, 2, 3 and 4. Measures BIO 1, 2, 3, 4, 5, 6, 7 and 8. Measure BIO-10: Pre-construction Surveys for Birds.</td>
</tr>
</tbody>
</table>
Table S-1  Summary of Potential Impacts

<table>
<thead>
<tr>
<th>Resource</th>
<th>Alternative 1 Bridge Replacement</th>
<th>Alternative 2 Bridge Rehabilitation</th>
<th>No-Build (No-Action) Alternative</th>
<th>Avoidance, Minimization, and/or Mitigation Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Invasive Species</td>
<td>Less than significant with AMMs</td>
<td>Less than significant with AMMs</td>
<td>No impact</td>
<td>Measure AIR-1 &lt;br&gt; Measures WATER-1, 2, 3 and 4. &lt;br&gt; Measures BIO-1, 2, 3, 4, 5, 6, 7 and 8. &lt;br&gt; Measure BIO-23: Invasive Species.</td>
</tr>
</tbody>
</table>

Caltrans anticipates needing the following permits to construct this project: a California Department of Fish and Wildlife Section 1602 Lake and Streambed Alteration Agreement and Section 2081 Incidental Take Permit; a Clean Water Act (CWA) Section 404 Nationwide Permit and Section 10 Consultation with the U.S. Army Corps of Engineers; a CWA Section 401 Water Quality Certification from the Central Valley Regional Water Quality Control Board; a Biological Opinion from the U.S. Fish and Wildlife Service; a Biological Opinion from the National Marine Fisheries Service; and a 408 Bridge Permit from the U.S. Coast Guard.
# Table of Contents

General Information About This Document ........................................ iii
Initial Study ...................................................................................... v
Finding Of No Significant Impact .................................................. vii
Mitigated Negative Declaration ....................................................... ix
Summary ......................................................................................... xii
List of Abbreviated Terms ................................................................ xxi

**Chapter 1**  Proposed Project ......................................................... 1-1
  1.1  Introduction ............................................................................ 1-1
  1.2  Purpose and Need ................................................................. 1-2
      1.2.1  Purpose ........................................................................ 1-2
      1.2.2  Need ........................................................................... 1-2
      1.2.3  Independent Utility and Logical Termini ......................... 1-9
  1.3  Project Description ............................................................... 1-9
  1.4  Project Alternatives .............................................................. 1-10
      1.4.1  Build Alternatives ......................................................... 1-10
      1.4.2  No-Build (No-Action) Alternative ................................ 1-27
  1.5  Alternatives Considered but Eliminated from Further Discussion .. 1-30
  1.6  Permits and Approvals Needed .............................................. 1-31

**Chapter 2**  Affected Environment, Environmental Consequences, and Avoidance, Minimization, and/or Mitigation Measures .......... 2-1
  2.1  Human Environment ............................................................ 2-4
      2.1.1  Farmlands/Timberlands ............................................... 2-4
      2.1.2  Community Impacts ..................................................... 2-12
      2.1.3  Traffic and Transportation/Pedestrian and Bicycle Facilities 2-15
      2.1.4  Visual/Aesthetics ........................................................... 2-19
      2.1.5  Cultural Resources ....................................................... 2-22
  2.2  Physical Environment ........................................................... 2-29
      2.2.1  Hydrology And Floodplain .......................................... 2-29
      2.2.2  Water Quality and Storm Water Runoff ......................... 2-36
      2.2.3  Geology/Soils/Seismic/Topography ............................... 2-49
  2.3  Biological Environment ....................................................... 2-55
      2.3.1  Natural Communities ................................................... 2-55
      2.3.2  Wetlands and Other Waters ......................................... 2-66
      2.3.3  Plant Species .............................................................. 2-77
      2.3.4  Animal Species ............................................................ 2-84
      2.3.5  Threatened and Endangered Species ............................. 2-90
      2.3.6  Invasive Species .......................................................... 2-123
  2.4  Cumulative Impacts .............................................................. 2-126
      2.4.1  Regulatory Setting ....................................................... 2-126
      2.4.2  Affected Environment .................................................. 2-127
      2.4.3  Issues with No Cumulative Effect ................................. 2-130
      2.4.4  Issues with the Potential to Contribute to Cumulative Effects 2-131
  2.5  Climate Change ................................................................. 2-132

**Chapter 3**  Comments and Coordination ........................................ 3-1

**Chapter 4**  List of Preparers ....................................................... 4-1

**Chapter 5**  Distribution List ...................................................... 5-1

OG660 State Route 84 Miner Slough Bridge Project
Initial Study with MND/Environmental Assessment
Chapter 6 References Cited ................................................................. 6-1

List of Figures

Figure 1-1 Project Vicinity................................................................. 1-3
Figure 1-2 Project Location............................................................... 1-5
Figure 1-3 Profile Drawings of the Existing and Proposed Bridges ....... 1-7
Figure 1-4 Bridge Replacement Project Components.......................... 1-12
Figure 1-5 Bridge Rehabilitation Project Components......................... 1-14
Figure 2-1 Parcel Acquisitions: Bridge Replacement......................... 2-8
Figure 2-2 Parcel Acquisitions: Bridge Rehabilitation......................... 2-10
Figure 2-3 State Routes and Ferry Crossings in the Project Vicinity ....... 2-17
Figure 2-4 Archaeological and Architectural Areas of Potential Effects .. 2-25
Figure 2-5 Federal Emergency Management Agency Flood Insurance Rate Map ................................................................. 2-32
Figure 2-6 Flow Path from Miner Slough Bridge to the San Joaquin River at the Delta................................................................. 2-42
Figure 2-7 Natural Resource Conservation Service Soils Map ................. 2-51
Figure 2-8 Habitat Types within the Biological study area.................... 2-57
Figure 2-9 Impacts to Potential Wetlands and Other Waters: Bridge Replacement ................................................................. 2-72
Figure 2-10 Impacts to Potential Wetlands and Other Waters: Bridge Rehabilitation ................................................................. 2-74
Figure 2-11 Impacts to Special-status Plant Species: Bridge Replacement ................................................................. 2-79
Figure 2-12 Impacts to Special-status Plant Species: Bridge Rehabilitation ................................................................. 2-81
Figure 2-13 Fisheries Impacts: Bridge Replacement ......................... 2-103
Figure 2-14 Giant Garter Snake Habitat: Bridge Replacement ................ 2-105
Figure 2-15 Fisheries Impacts: Rehabilitation Alternative .................... 2-110
Figure 2-16 Giant Garter Snake Habitat Impacts: Rehabilitation Alternative ................................................................. 2-112
Figure 2-17 California Greenhouse Gas Forecast................................. 2-137
Figure 2-18 Mobility Pyramid........................................................... 2-138

List of Tables

Table S-1 Summary of Potential Impacts ........................................... xiv
Table 1-1 New Bridge Piers and Foundations ...................................... 1-17
Table 1-2 Required Permits and Approvals ....................................... 1-31
Table 2-1 Anticipated Right-of-Way Requirements Under Alternative 1...... 2-14
Table 2-2 Anticipated Right-of-Way Requirements Under Alternative 2 ...... 2-15
Table 2-3 Fault Data ........................................................................ 2-53
Table 2-4 Natural Communities Area of Effects – Alternative 1 ............ 2-60
Table 2-5 Natural Communities Area of Effects – Alternative 2 ............ 2-61
Table 2-6 Plant Species and Habitats of Concern within the study area .... 2-78
Table 2-7 Cumulative Impacts Analysis by Resource Area ................. 2-127
Table 2-8 Cumulative Projects: Past, Present, and Reasonably Foreseeable Projects in the State Route 84 Vicinity ................................................................. 2-129
Table 2-9 Climate Change/CO2 Reduction Strategies ......................... 2-140
Table 3-1 Agency Coordination Meetings and Correspondence ............ 36
# List of Appendices

<table>
<thead>
<tr>
<th>Appendix</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appendix A</td>
<td>CEQA Checklist</td>
</tr>
<tr>
<td>Appendix B</td>
<td>Title VI Policy Statement</td>
</tr>
<tr>
<td>Appendix C</td>
<td>Avoidance, Minimization, and/or Mitigation Summary</td>
</tr>
<tr>
<td>Appendix D</td>
<td>Special-status Plant and Animal Species</td>
</tr>
<tr>
<td>Appendix E</td>
<td>CNDDDB, USFWS, and NMFS Species Lists</td>
</tr>
<tr>
<td>Appendix F</td>
<td>List of Technical Studies</td>
</tr>
<tr>
<td>Appendix G</td>
<td>Layout Plan</td>
</tr>
</tbody>
</table>
List of Abbreviated Terms

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>AASHTO</td>
<td>American Association of State Highway and Transportation Officials</td>
</tr>
<tr>
<td>AB</td>
<td>Assembly Bill</td>
</tr>
<tr>
<td>ac</td>
<td>acre(s)</td>
</tr>
<tr>
<td>AC</td>
<td>asphaltic concrete</td>
</tr>
<tr>
<td>ADA</td>
<td>Americans with Disabilities Act</td>
</tr>
<tr>
<td>AMM</td>
<td>avoidance and minimization measure</td>
</tr>
<tr>
<td>APE</td>
<td>Area of Potential Effects</td>
</tr>
<tr>
<td>APN</td>
<td>Assessor's Parcel Number</td>
</tr>
<tr>
<td>ARB</td>
<td>California Air Resources Board</td>
</tr>
<tr>
<td>BMP</td>
<td>Best Management Practice</td>
</tr>
<tr>
<td>BSA</td>
<td>Biological study area</td>
</tr>
<tr>
<td>Cal/EPA</td>
<td>California Environmental Protection Agency</td>
</tr>
<tr>
<td>(CalSTA)</td>
<td>California State Transportation Agency</td>
</tr>
<tr>
<td>Caltrans</td>
<td>California Department of Transportation</td>
</tr>
<tr>
<td>CASGEM</td>
<td>California Statewide Groundwater Elevation Monitoring</td>
</tr>
<tr>
<td>CCR</td>
<td>California Code of Regulations</td>
</tr>
<tr>
<td>CDFW</td>
<td>California Department of Fish and Wildlife</td>
</tr>
<tr>
<td>CEQ</td>
<td>Council on Environmental Quality</td>
</tr>
<tr>
<td>CEQA</td>
<td>California Environmental Quality Act</td>
</tr>
<tr>
<td>CESA</td>
<td>California Endangered Species Act</td>
</tr>
<tr>
<td>CFGC</td>
<td>California Fish and Game Code</td>
</tr>
<tr>
<td>CFR</td>
<td>Code of Federal Regulations</td>
</tr>
<tr>
<td>Item of Application Type</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>001</td>
<td>Description 1</td>
</tr>
<tr>
<td>002</td>
<td>Description 2</td>
</tr>
<tr>
<td>003</td>
<td>Description 3</td>
</tr>
<tr>
<td>004</td>
<td>Description 4</td>
</tr>
<tr>
<td>005</td>
<td>Description 5</td>
</tr>
<tr>
<td>006</td>
<td>Description 6</td>
</tr>
<tr>
<td>007</td>
<td>Description 7</td>
</tr>
<tr>
<td>008</td>
<td>Description 8</td>
</tr>
<tr>
<td>009</td>
<td>Description 9</td>
</tr>
<tr>
<td>010</td>
<td>Description 10</td>
</tr>
<tr>
<td>011</td>
<td>Description 11</td>
</tr>
<tr>
<td>012</td>
<td>Description 12</td>
</tr>
<tr>
<td>013</td>
<td>Description 13</td>
</tr>
<tr>
<td>014</td>
<td>Description 14</td>
</tr>
<tr>
<td>015</td>
<td>Description 15</td>
</tr>
<tr>
<td>016</td>
<td>Description 16</td>
</tr>
<tr>
<td>017</td>
<td>Description 17</td>
</tr>
<tr>
<td>018</td>
<td>Description 18</td>
</tr>
<tr>
<td>019</td>
<td>Description 19</td>
</tr>
<tr>
<td>020</td>
<td>Description 20</td>
</tr>
<tr>
<td>021</td>
<td>Description 21</td>
</tr>
<tr>
<td>022</td>
<td>Description 22</td>
</tr>
<tr>
<td>023</td>
<td>Description 23</td>
</tr>
<tr>
<td>024</td>
<td>Description 24</td>
</tr>
<tr>
<td>025</td>
<td>Description 25</td>
</tr>
<tr>
<td>026</td>
<td>Description 26</td>
</tr>
<tr>
<td>027</td>
<td>Description 27</td>
</tr>
<tr>
<td>028</td>
<td>Description 28</td>
</tr>
<tr>
<td>029</td>
<td>Description 29</td>
</tr>
<tr>
<td>030</td>
<td>Description 30</td>
</tr>
<tr>
<td>031</td>
<td>Description 31</td>
</tr>
<tr>
<td>032</td>
<td>Description 32</td>
</tr>
<tr>
<td>033</td>
<td>Description 33</td>
</tr>
<tr>
<td>034</td>
<td>Description 34</td>
</tr>
<tr>
<td>035</td>
<td>Description 35</td>
</tr>
<tr>
<td>036</td>
<td>Description 36</td>
</tr>
<tr>
<td>037</td>
<td>Description 37</td>
</tr>
<tr>
<td>038</td>
<td>Description 38</td>
</tr>
<tr>
<td>039</td>
<td>Description 39</td>
</tr>
<tr>
<td>040</td>
<td>Description 40</td>
</tr>
<tr>
<td>041</td>
<td>Description 41</td>
</tr>
<tr>
<td>042</td>
<td>Description 42</td>
</tr>
<tr>
<td>043</td>
<td>Description 43</td>
</tr>
<tr>
<td>044</td>
<td>Description 44</td>
</tr>
<tr>
<td>045</td>
<td>Description 45</td>
</tr>
<tr>
<td>046</td>
<td>Description 46</td>
</tr>
<tr>
<td>047</td>
<td>Description 47</td>
</tr>
<tr>
<td>048</td>
<td>Description 48</td>
</tr>
<tr>
<td>049</td>
<td>Description 49</td>
</tr>
<tr>
<td>050</td>
<td>Description 50</td>
</tr>
<tr>
<td>051</td>
<td>Description 51</td>
</tr>
<tr>
<td>052</td>
<td>Description 52</td>
</tr>
<tr>
<td>053</td>
<td>Description 53</td>
</tr>
<tr>
<td>054</td>
<td>Description 54</td>
</tr>
<tr>
<td>055</td>
<td>Description 55</td>
</tr>
<tr>
<td>056</td>
<td>Description 56</td>
</tr>
<tr>
<td>057</td>
<td>Description 57</td>
</tr>
<tr>
<td>058</td>
<td>Description 58</td>
</tr>
<tr>
<td>059</td>
<td>Description 59</td>
</tr>
<tr>
<td>060</td>
<td>Description 60</td>
</tr>
<tr>
<td>061</td>
<td>Description 61</td>
</tr>
<tr>
<td>062</td>
<td>Description 62</td>
</tr>
<tr>
<td>063</td>
<td>Description 63</td>
</tr>
<tr>
<td>064</td>
<td>Description 64</td>
</tr>
<tr>
<td>065</td>
<td>Description 65</td>
</tr>
<tr>
<td>066</td>
<td>Description 66</td>
</tr>
<tr>
<td>067</td>
<td>Description 67</td>
</tr>
<tr>
<td>068</td>
<td>Description 68</td>
</tr>
<tr>
<td>069</td>
<td>Description 69</td>
</tr>
<tr>
<td>070</td>
<td>Description 70</td>
</tr>
<tr>
<td>071</td>
<td>Description 71</td>
</tr>
<tr>
<td>072</td>
<td>Description 72</td>
</tr>
<tr>
<td>073</td>
<td>Description 73</td>
</tr>
<tr>
<td>074</td>
<td>Description 74</td>
</tr>
<tr>
<td>075</td>
<td>Description 75</td>
</tr>
<tr>
<td>076</td>
<td>Description 76</td>
</tr>
<tr>
<td>077</td>
<td>Description 77</td>
</tr>
<tr>
<td>078</td>
<td>Description 78</td>
</tr>
<tr>
<td>079</td>
<td>Description 79</td>
</tr>
<tr>
<td>080</td>
<td>Description 80</td>
</tr>
<tr>
<td>081</td>
<td>Description 81</td>
</tr>
<tr>
<td>082</td>
<td>Description 82</td>
</tr>
<tr>
<td>083</td>
<td>Description 83</td>
</tr>
<tr>
<td>084</td>
<td>Description 84</td>
</tr>
<tr>
<td>085</td>
<td>Description 85</td>
</tr>
<tr>
<td>086</td>
<td>Description 86</td>
</tr>
<tr>
<td>087</td>
<td>Description 87</td>
</tr>
<tr>
<td>088</td>
<td>Description 88</td>
</tr>
<tr>
<td>089</td>
<td>Description 89</td>
</tr>
<tr>
<td>090</td>
<td>Description 90</td>
</tr>
<tr>
<td>091</td>
<td>Description 91</td>
</tr>
<tr>
<td>092</td>
<td>Description 92</td>
</tr>
<tr>
<td>093</td>
<td>Description 93</td>
</tr>
<tr>
<td>094</td>
<td>Description 94</td>
</tr>
<tr>
<td>095</td>
<td>Description 95</td>
</tr>
<tr>
<td>096</td>
<td>Description 96</td>
</tr>
<tr>
<td>097</td>
<td>Description 97</td>
</tr>
<tr>
<td>098</td>
<td>Description 98</td>
</tr>
<tr>
<td>099</td>
<td>Description 99</td>
</tr>
<tr>
<td>100</td>
<td>Description 100</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Full Form</td>
</tr>
<tr>
<td>--------------</td>
<td>-----------</td>
</tr>
<tr>
<td>CGP</td>
<td>Construction General Permit</td>
</tr>
<tr>
<td>CISS</td>
<td>cast-in-steel-shell</td>
</tr>
<tr>
<td>CNDDDB</td>
<td>California Natural Diversity Database</td>
</tr>
<tr>
<td>CNPS</td>
<td>California Native Plant Society</td>
</tr>
<tr>
<td>CO₂</td>
<td>carbon dioxide</td>
</tr>
<tr>
<td>CTP</td>
<td>California Transportation Plan 2040</td>
</tr>
<tr>
<td>CWA</td>
<td>Clean Water Act</td>
</tr>
<tr>
<td>Delta</td>
<td>Sacramento-San Joaquin River Delta</td>
</tr>
<tr>
<td>DPS</td>
<td>Distinct Population Segment</td>
</tr>
<tr>
<td>DSA</td>
<td>Disturbed Soil Area</td>
</tr>
<tr>
<td>DWR</td>
<td>California Department of Water Resources</td>
</tr>
<tr>
<td>EA</td>
<td>Environmental Assessment</td>
</tr>
<tr>
<td>EFH</td>
<td>Essential Fish Habitat</td>
</tr>
<tr>
<td>EO</td>
<td>Executive Order</td>
</tr>
<tr>
<td>ESA</td>
<td>Environmentally Sensitive Area</td>
</tr>
<tr>
<td>ESU</td>
<td>Evolutionarily Significant Unit</td>
</tr>
<tr>
<td>FESA</td>
<td>federal Endangered Species Act</td>
</tr>
<tr>
<td>ft</td>
<td>foot/feet</td>
</tr>
<tr>
<td>FHWA</td>
<td>Federal Highway Administration</td>
</tr>
<tr>
<td>FMMP</td>
<td>Farmland Mapping and Monitoring Program</td>
</tr>
<tr>
<td>FPPA</td>
<td>Farmland Protection Policy Act</td>
</tr>
<tr>
<td>FSTIP</td>
<td>Federal Statewide Transportation Improvement Program</td>
</tr>
<tr>
<td>GGS</td>
<td>giant garter snake</td>
</tr>
</tbody>
</table>
GHG  greenhouse gas
IS   Initial Study
LOS  Level of Service
MBTA Migratory Bird Treaty Act
mph  miles per hour
MPO  Metropolitan Planning Organization
MS4  municipal separate storm sewer system
NAHC Native American Heritage Commission
NAVD88 North American Vertical Datum of 1988
NEPA National Environmental Policy Act
NES  Natural Environment Study
NHPA National Historic Preservation Act
NHTSA National Highway Traffic Safety Administration
NMFS National Marine Fisheries Service
NPDES National Pollutant Discharge Elimination System
NRC  National Research Council
NRCS Natural Resources Conservation Service
NRHP National Register of Historic Places
PA Programmatic Agreement
PM  post mile
PRC California Public Resources Code
PS&E plans, specifications, and estimates
PQS Professionally Qualified Staff
RAP | Relocation Assistance Program
---|---
RC | reinforced concrete
ROW | right-of-way
RWQCB | Central Valley Regional Water Quality Control Board
SB | Senate Bill
SDC | Seismic Design Criteria
SHPO | State Historic Preservation Officer
SLR | sea level rise
SR | State Route
STRAIN | Structure Replacement and Improvements Needs
SWH | shallow water habitat
SWMP | Storm Water Management Plan
SWPPP | Storm Water Pollution Prevention Plan
SWRCB | State Water Resources Control Board
TMDL | total maximum daily load
TMP | Traffic Management Plan
USACE | United States Army Corps of Engineers
USDOT | United States Department of Transportation
USEPA | United States Environmental Protection Agency
USCG | United States Coast Guard
USFWS | United States Fish and Wildlife Service
USGS | United States Geological Survey
VELB  valley elderberry longhorn beetle
WDR  Waste Discharge Requirement
WSE  water surface elevation
Chapter 1  Proposed Project

1.1 Introduction

The California Department of Transportation (Caltrans) proposed to rehabilitate or replace the Miner Slough Bridge (No. 23-0035) to address deterioration and meet design standards in the Draft IS/EA. The Miner Slough Bridge is part of State Route (SR) 84 in Solano County and connects Ryer Island in the Sacramento-San Joaquin River Delta (Delta) to the mainland, over Miner Slough. The bridge is located in a rural area where crossings of Delta waterways, including Miner Slough, are limited in number and far between. The continued connection of Ryer Island to the mainland via SR 84 is an important component of regional connectivity. The bridge is located approximately 30 miles southwest of Sacramento; the project limits extend from SR 84 post mile (PM) 12.0 to 12.4. Figures 1-1 and 1-2 show the proposed Miner Slough Bridge Project (project) vicinity and location maps, respectively.

Caltrans is the lead agency under both the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA) for this Initial Study/Environmental Assessment (IS/EA). The project is funded by the 2012 State Highway Operation and Protection Program, under the Bridge Rehabilitation Program 201.110. The proposed project is not included in the 2015 Federal Statewide Transportation Improvement Program (FSTIP). The project is included in the Metropolitan Transportation Commissions (MTC’s) Transportation Improvement Program (TIP) Bridge Rehabilitation and Reconstruction-SHOPP Program TIP ID VAR170010. The 2007 Structure Replacement and Improvement Needs (STRAIN) Report recommended replacement of the bridge superstructure.

The existing Miner Slough Bridge includes two approach spans and a swing span (i.e., a span that rotates sideways on a central pivot to allow tall watercraft to pass through), and has two 9-foot-wide lanes. The existing bridge has a soffit elevation (i.e., the height of the underside of the bridge) of 20.3 feet (NAVD88 [North American Vertical Datum of 1988]).

This IS/EA discusses two Build Alternatives and a No-Build Alternative. Two Build Alternatives are proposed to either replace or rehabilitate the Miner Slough Bridge, and the selection of the Preferred Alternative is identified. In the first Build Alternative, Caltrans proposes to replace the existing bridge over Miner Slough with a new bridge approximately 100 feet west of the existing bridge. The replacement
bridge would be approximately 340 feet long and have a soffit elevation of 24.09 feet NAVD88. The second Build Alternative is to rehabilitate the existing bridge by constructing three new approach spans with new foundations, performing substructure work at the center swing span pier, and replacing the bridge deck and wooden stringers. The rehabilitated bridge would have a soffit elevation of 20.22 feet NAVD88. Profile drawings of the existing and proposed bridges are shown in Figure 1-3. Project layout plans for the Build Alternatives are shown in Appendix G.

1.2 Purpose and Need

1.2.1 Purpose
The purpose of the project is to remedy deficiencies of the existing Miner Slough Bridge to maintain connectivity on SR 84 to and from Ryer Island.

1.2.2 Need
The proposed Miner Slough Bridge Project is needed to remedy the following deficiencies:

- The deck surface of all spans contains extensive cracks caused by the differential deflection (change in elevation from one framing member to the adjacent one) of its parallel wooden planks, which deteriorate into spalls (fragments or chips) that create voids in the pavement.

- All spans contain checks (cracks in wood caused by tension) and other cracks which may decrease the weight-carrying capability of the bridge as they expand.

- The levee and roadway fill material are slumping near Abutment 12, exposing timber piles and resulting in roadway settlement.

The 2007 STRAIN report recommended replacement of the bridge superstructure, including replacing the entire timber deck and timber stringers.
**Existing**

**Bridge Replacement**

**Bridge Rehabilitation**

---

**FIGURE 1-3**
Profile Drawings of the Existing and Proposed Bridges
Minner Slough Bridge Project
EA 00565, State Route 84 Post Mile 12.012.4
Solano County, California
1.2.3 Independent Utility and Logical Termini

Federal Highway Administration (FHWA) regulations (23 Code of Federal Regulations [CFR] 771.111[f]) require that the proposed action being evaluated would:

- Connect logical termini and be of sufficient length to address environmental matters on a broad scope;

- Have independent utility or independent significance (be usable and be a reasonable expenditure even if no additional transportation improvements in the area are made); and

- Not restrict consideration of alternatives for other reasonably foreseeable transportation improvements.

The project limits extend from SR 84 PMs 12.0 to 12.4. The Miner Slough Bridge completes the connection of SR 84 over Miner Slough. The proposed project has independent utility in and of itself, would not restrict other reasonably foreseeable transportation improvements nor trigger new transportation projects, and would provide a long-term physically stable segment of SR 84 by replacement or rehabilitation of the Miner Slough Bridge to maintain the SR 84 crossing of Miner Slough.

1.3 Project Description

This section describes the proposed action and the project alternatives that were developed to meet the identified purpose and need of the project, while avoiding or minimizing environmental impacts. Alternative 1 the bridge replacement alternative has currently two design options, one is to build a new swing-span bridge approximately 100 feet west of the existing alignment. The second is a fixed span bridge design option as opposed to the swing span bridge that was originally the design option discussed in the Draft Initial Study/Environmental Assessment (IS/EA). Alternative 2 bridge rehabilitation, and the No-Build Alternative.

In the following section the common design features of the Build Alternatives will be discussed. The unique features of the swing and fixed span options of the replacement alternative will be outlined, and the section will conclude with Alternative 2 the bridge rehabilitation alternative.
Chapter 1 Proposed Project

[Content of the page is not legible due to the quality of the image provided.]
The existing bridge, No. 23-0035 on SR 84 in Solano County, was built in 1933 and is a swing bridge with nonstandard features and very low existing average daily traffic (420 vehicles). The existing bridge is 367 feet long and is composed of three sections with timber plank decks and a 2-inch-thick asphalt concrete (AC) wearing surface. The 191-foot center steel truss swing span is on a reinforced concrete (RC) cylindrical swing pier, with RC rest piers. The two approach spans are made of timber stringers on timber cap-and-pile bents with abutments of RC on timber piles.

1.4 Project Alternatives

1.4.1 Build Alternatives

1.4.1.1 Common Design Features of the Build Alternatives

Temporary Trestles
Two temporary trestles would be installed in Miner Slough to facilitate construction of either build alternative, one next to each end of the bridge (see Figures 1-4 and 1-5). The one on the south end would be approximately 86 feet long, and the one on the north end would be approximately 204 feet long. This would leave an opening of about 85 feet for marine (boat) traffic to navigate between the two trestles. Each trestle would be 35 to 40 feet wide with a superstructure of timber decking, steel stringers, and prefabricated steel bents, as well as a safety railing. The bents would be spaced approximately 25 to 40 feet apart and would be supported by piles varying from 15 to 36 inches in diameter. The piles may be driven by an impact hammer by a vibratory hammer and would be spaced 5 to 10 feet apart. The number of piles is estimated to be 125. Each pile would be approximately 50 to 75 feet long. The elevation of the trestles would be below the soffit of the new bridge at about 18 feet. After construction is complete, the trestle superstructures would be removed by crane and the piles would be removed by a vibratory extraction method or cut 3 feet below the mudline.

Staging Areas
Under both build alternatives staging would occur in the triangular area between the existing and new alignment of SR 84 north of the bridge (see Figures 1-4 and 1-5). This area would be cleared by the construction contractor. Staging would also occur on barges anchored to piers located on the north bank of Miner Slough. Shipping traffic navigates through the slough close to the main channel near the southern bank; therefore, anchoring barges on the northern bank would not block the shipping channel.
A temporary construction easement would be obtained for staging on a 1.59-acre (ac) parcel located southeast of the existing bridge. A portion of this property (large driveway/storage area) would be used for storing materials and equipment for construction of either build alternative. This area is currently used by Caltrans for staging of bridge material for emergency repairs (see Figure 1-4).
Borrow and Disposal
For both build alternatives gravel and rock would be imported for road widening and stored in project staging areas. Any unused portion of these materials would be removed upon completion of the project, and removal and disposal of this material would be implemented through contractors and subcontractors in compliance with Caltrans standard Best Management Practices (BMPs) and the Stormwater Pollution Prevention Plan (SWPPP) that would be prepared for the project. BMPs and SWPPP measures are a standard part of the plans and specifications for the project and would be covered by the Central Valley Regional Water Quality Control Board (Central Valley RWQCB) 401 Water Quality Certification.

1.4.1.2 UNIQUE FEATURES OF BUILD ALTERNATIVES
Alternative 1: Bridge Replacement
Swing Span Option
The first alternative design option is to build a new bridge approximately 100 feet west of the existing alignment. The new bridge would have standard features with a 12-foot-wide lane and 8-foot-wide shoulder in each direction. This Build Alternative would require construction of temporary trestles to be used during construction. There would be a control house structure on the levee to house operating equipment and provide parking for maintenance personnel. A section of SR 84 immediately north of the bridge would be permanently realigned for a stretch of approximately 900 feet north of Holland Road, beyond which it would conform to the existing highway. This section of SR 84 would also be realigned approximately 150 feet to the east of the existing SR 84 alignment. Figure 1-4 shows the existing location of SR 84 north of Miner Slough, and shows the location of the proposed realignment of SR 84 approximately 150 feet east of the existing alignment. Project components are also shown on Figure 1-4.

New Piers with Foundations
The project would construct three steel-reinforced cast concrete piers to support the bridge: one central pivot pier (Pier 3) and two independent piers (Pier 2 and Pier 4) that would support the approach spans and the swing span when the bridge is not in operation. Each pier would be supported through cap-on cast-in-steel-shell (CISS) piles. The cap would be constructed of steel-reinforced cast concrete over a group of CISS piles as summarized in Table 1-1.

For Pier 3, a 44-by-44-foot cofferdam would be constructed to facilitate the pile driving and the construction of caps and the pier. The cofferdam would be
constructed by driving 2-foot-wide section sheet piles 30 feet deep into the streambed using vibratory hammers. The piles would be tall enough so that the tops would reach 5 feet above the surface of the water and be placed adjacent to one another. The area within the cofferdam would then be dewatered and excavated to 2 feet below the footing elevation; water removed from the cofferdam would be discharged into the slough. A 2-foot-deep seal course of poured concrete would be placed at the base of the cofferdam to prevent water leakage. The CISS piles would be driven by impact hammer, with pile drivers situated on the temporary trestles. The material inside each pile would be drilled out using drills situated on the temporary trestles, leaving a plug of native material at the bottom. Then, rebar would be placed in the shell, and the shell would be filled with concrete using pumps operating from the temporary bridge. Forms and rebar would be placed over the pile ends and then filled with concrete to form the cap; the same process would be used to form the pier.

Table 1-1  New Bridge Piers and Foundations

<table>
<thead>
<tr>
<th></th>
<th>Pier 3</th>
<th>Piers 2 and 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of piles</td>
<td>42</td>
<td>4</td>
</tr>
<tr>
<td>Depth of piles</td>
<td>40 feet</td>
<td>40 feet</td>
</tr>
<tr>
<td>Diameter of pile</td>
<td>2 feet</td>
<td>5 feet</td>
</tr>
<tr>
<td>Diameter of pier</td>
<td>18 feet</td>
<td>5 feet</td>
</tr>
<tr>
<td>Diameter of caps</td>
<td>32 feet</td>
<td>8 feet</td>
</tr>
<tr>
<td>Height of caps</td>
<td>8 feet</td>
<td>5 feet</td>
</tr>
<tr>
<td>Height of pier</td>
<td>18 feet</td>
<td>18 feet</td>
</tr>
<tr>
<td>Elevation of top of</td>
<td>24 feet</td>
<td>24 feet</td>
</tr>
</tbody>
</table>

For Pier 2 and Pier 4, CISS piles would be driven without cofferdams into the streambed using impact hammers situated on the temporary trestles, and the pile shells would be drilled out, leaving a plug of native material at the bottom. Rebar would be placed into the shells, which would then be filled with concrete. Forms would be constructed around the top of the shells to construct concrete caps approximately 9 feet wide by 26 feet long by 5 feet high, on which the bridge and abutment sections would rest after construction. Fenders with a 3-foot-wide cap on 2-foot-diameter piles spaced 5 to 8 feet apart would be placed adjacent to Pier 2 and Pier 3 only. The fenders would extend 10 feet past the edge of the deck on the east and west sides, and would then curve for another 20 feet.
Adjacent to Pier 2 and Pier 3 would be a fender system to protect the piers from navigable traffic. The fender system would consist of two 195-foot caps atop the piles. A cofferdam would be placed around the fender footprint, and water would be removed. Piles would be driven and caps would be formed on top of piles. Plastic lumber would be placed vertically around the cap. A design alternative would be to place a minimum of four dolphins (fixed structures that extend above the water level and are not connected to the shore or the bridge), two adjacent to each pier. The type of pier protection would need to be determined in design.

Operator Control House
An operator control house would be constructed approximately 50 ft (feet) north of the abutment on the levee, downslope, facing the slough. This would provide the control house operator a better view of the bridge opening from the bend in the slough on the northern side than one would have from the southern side. The control house structure would consist of a 25-ft-wide by 25-ft-long concrete structure with windows and a metal roof, with its operating floor approximately 25 ft above the levee road. A 20 foot by 30 foot parking area (parking slab) for personnel vehicles would be provided across from the control house on the northern side of Holland Road. Construction of the control house would include driving steel piles into the levee and installing bents. A rebar cage would be placed inside the piles and then the cage would be filled with concrete. A stairway leading to the control house would also be constructed.

The operator control house would be next to the north end of the bridge and would contain the switch gear and generator to be attached to the drive mechanism at Pier 3 via underwater cables. The main drive motor would be below the deck at Pier 3 on a platform near the drive gear machinery. A separate motor and hydraulic pump would be used to operate the end jack mechanisms via hydraulic pipes and hoses extending to both ends of the bridge.

Abutment Foundations
On the levees at the ends of each approach span at elevation 29.25 ft on the north end and 29.42 ft on the south end, and above the high-water elevation (16.84 ft), two rows of 28 2-ft-diameter piles with a 91-ft-long by 8-ft-wide concrete cap would be constructed. The seat abutments would be approximately 16.5 ft high by 89 ft in length. The area would be excavated to a depth of 5 ft for a length of 93 ft to construct an 8-ft-wide trench. In the trench, approximately 40-ft-long CISS piles would be placed in a predrilled hole and would then be driven into the trench, drilled
out, and filled with rebar and concrete. The 91-ft-long by 8-ft-wide by 5-ft-deep cap would be constructed over the tops of the piles to support the abutment, which is an approach span with a 4-to-5-ft abutment stem, either a precast abutment slab or cast in place.

**Bridge Structure**

A swing span, steel girder bridge would make up the superstructure of the proposed new bridge. Continuous steel I-girder beams longitudinally connected by crossframes and diaphragms would provide support from the superstructure down to the piers. The dimensions of the bridge superstructure would consist of two 121.5-ft spans supported by a central pivot pier. The depth of the superstructure would be 7.8 ft at center, and 6.1 ft at the ends.

The bridge would be constructed from prefabricated girders that would be positioned into place using a crane mounted on a temporary trestle, from the edge of the levee, or from the approach structure, on paved or disturbed areas. Larger sections would be assembled in the staging area, while smaller sections would be assembled offsite and brought in by truck. A concrete deck would be poured on top of the girders.

**Approach Structure**

Precast, prestressed concrete I-girders evenly spaced would be mounted on top of all piers to form the lower part of the superstructure. Between the precast I-girders, forms would be placed to lay out the deck reinforcement, and then the forms would be filled with concrete and the curbs would be installed.

From Abutment 1 to Pier 2, the section would flare from approximately 89 to 44 ft wide, with a length of 49.5 ft. From Pier 4 to Abutment 5, the section would flare from approximately 89 to 44 ft wide, with a length of 49.5 ft. This part of the superstructure would be 4.3 ft deep, and the deck would be approximately 9 inches deep.

On the south end of the bridge, the approach slab would conform to the edge of the existing highway. On the north end of the bridge, the approach slab would be higher by 3 ft at the edge of Holland Road.

**Pavement Section**

The bridge deck would have standard RC for the swing span and approach spans. Caltrans standards would be followed for placing AC pavement sections conforming
to the bridge deck. This would include excavating 12 inches of soil, adding a gravel sub-base, compacting, and then placing the AC.

A section of SR 84 immediately north of the bridge would be permanently realigned for a stretch of approximately 900 ft north of Holland Road, beyond which it would conform to the existing highway. This section of SR 84 would also be realigned approximately 150 ft to the east of the existing SR 84 alignment (see Figure 1-4). This realignment would have a standard 12-ft lane with an 8-ft paved shoulder in each direction. The realigned section of SR 84 would be on fill, ranging in depth from 0.25 ft to 15.5 ft, and its footprint from toe-of-fill to toe-of-fill would range from 80 to 160 ft. Before placement of the fill, the project area would undergo vegetation clearing and grubbing, scraping and excavating up to 1 ft below ground surface, compacting of soil, and addition of gravel base. An approximately 250-ft-long section of the existing SR 84 would be widened to conform to the realigned section of SR 84. To achieve this, there would be an approximately 2-to-3-ft excavation within the existing roadway and fill area. After the newly realigned section of SR 84 is open to the public, the old paved section would be scarified, removed, and revegetated.

Holland Road would be repaved for approximately 200 ft on either side of the new bridge, at which point it would conform to the existing Holland Road. The new toe line for fill on this stretch of the road would be 12 ft out from the edge of the existing pavement on the south side (slough side) of the local road, and would vary from 16 to 84 ft on the north side of the road from the edge of the existing pavement.

**Electrical, Including Lighting**

An armored underwater electrical cable would be laid on the bed of the slough to connect the control house with the central span. A generator would be used to run the bridge and the control gates; the generator would fit into the control house. No outside utilities or lighting are anticipated.

**Drainage**

Scuppers (outlets for water drainage) would be used for the concrete barriers on either side of the bridge shoulders. On the new stretch of SR 84 on the north side of the new bridge, cross culverts of up to 24 inches would be installed for maintenance of proper drainage.
Demolition of the Existing Bridge

The trestles described above would be used during demolition of the existing bridge. The barrier rail and posts would most likely be removed by hand. The swing span may need temporary supports to provide stability during the demolition of the truss.

The removal of the beams would require a crane that would be staged on a barge. The deck and concrete would be demolished with a hydraulic breaker; the pieces would be caught on a working platform and removed with a loader, to prevent debris from falling into the water below and introducing pollution to Miner Slough. Steel beams, cross beams, and stringers would be removed by crane, as would the steel plates of the pivot pier. The approach spans’ superstructure would be removed in a similar way.

The existing bents, caps and wood piles would be removed below the channel bed within a cofferdam in a similar manner as described above. Disturbed soil on the levees would be restored to Reclamation District requirements.

The pivot pier would be demolished with a hydraulic breaker, and the RC pieces would be removed from the cofferdam area. The pivot pier would be removed below the mud-sounding elevation. The removed soil would be replaced by hand.

The dolphins (fixed structures that extend above the water level and are not connected to the shore or the bridge) would be removed below the mud elevation. The trestles would be removed from a barge located in Miner Slough.

Fixed Span Design Option

An additional design option of the Alternative 1 has been developed for this project since Draft Environmental Document was released to the public and the completion of this Final Environmental Document. A fixed span bridge design option as opposed to the swing span bridge that was originally the design option discussed in the Draft Environmental Document. Both options have the same environmental study area (environmental footprint) and therefore, selection of either one of these options will not add any new environmental impact to the project. (see Appendix G for layout plans)

The fixed span design option of Alternative 1, proposes to build a new fixed span bridge about 100 feet west of the existing alignment. The new bridge will provide a greater load rating and no vertical clearance restrictions. The new bridge will also provide current design standard features, including a 12 feet wide lane and 8 feet
wide shoulder in each direction. The new vertical clearance over the slough will accommodate the projected sea level rise for this area. SR 84 to the north of Holland Road will be realigned to meet the new bridge by shifting the roadway about 100 feet east for a length of about 900 feet north of Holland Road. The pavement of the existing section of the shifted roadway will be obliterated.

The new bridge will have 12 feet lane with 8 feet shoulder in each direction. The approach spans on both ends of the bridge will be wide enough to allow the turning of Surface Transportation Assistance Act (STAA) standard truck. Accelerated Bridge Construction features are also incorporated in the design, such as steel girders and precast/prestressed concrete girders for the approach spans on both ends of the bridge. In addition, the bridge will have the following features:

**New Piers**
The new replacement bridge will be a 4-span, precast/prestressed concrete I-Girder structure. The central three support piers within the waterway (Pier 2, 3 & 4) will utilize large diameter Cast-in-Steel Shell (CISS) piling. The CISS piling will be cleaned out, sealed and then filled with a rebar cage and concrete. The CISS piling will be casted together with a concrete drop cap, which will support the superstructure I-girders.

**Abutment Foundations**
Abutments will be constructed to support the flared approach spans on both the north and south levees above the high-water elevation. The abutment will be constructed approximately ten feet away from the edge of the levee road within the levee embankment. The footprint of the abutment stem will first be excavated to create a level pad. Small diameter pipe piles (2 ft or 2.5 ft CISS) will be utilized for the foundation. The pipe piles will be driven approximately 40 to 50 feet deep. The abutment stem will be built next and may utilize precast elements or be cast-in-place.

**Bridge Structure**
A fixed span, precast/prestressed concrete I-girder bridge will make up the superstructure of the proposed new bridge. The bridge will be constructed from prefabricated I-girders that will be dropped into place using a crane mounted on a temporary trestle or from the edge of the levee. A cast-in-place concrete deck will be poured on top of the girders.

**Flared Approach Spans**
Spans 1 and 4 will utilize flared approach spans to accommodate truck turning radius on to the levee roads. The flared approach spans will utilize shallower precast/prestressed I-girders in an evenly distributed flared configuration.

**Pavement Section**
The bridge deck will have standard reinforced concrete construction. Asphalt concrete (AC) pavement sections will be placed on roadways at both ends of the bridge to conform to the bridge deck.

**Roadway**
A section of SR 84 immediately north of the bridge will be permanently realigned for a stretch of approximately 900 feet, beyond which it will conform to the existing highway. The alignment of this section is designed for a speed limit of 40 mph. The section will have a standard 12 feet lane with an 8 feet paved shoulder in each direction and will be constructed on fill. After the newly realigned section of SR 84 is open to the public, the old paved section will be scarified, removed, and vegetated.

A section of Holland Road will be raised for approximately 670 feet on the north end of the new bridge. At the south end of the new bridge, Ryer Road will be raised for approximately 170 feet on either side of the bridge. Acquisition of 6.06 acres of right of way will be required together with 1.59 acres of temporary construction easement.

**Drainage**
Scuppers (openings to convey runoff) will be used at the concrete barriers on either side of the bridge shoulders. Several small drainage systems are proposed both north and south of the bridge to intercept runoff and convey it to the toe of slope.

**Demolition of the Existing Bridge**
During the existing bridge and approach span demolition, the dolphins (fixed structures that extend above the water level and are not connected to the shore or the bridge) will be removed 3 feet below the dredge line.

**Utility Relocation**
No utility relocation is anticipated.

**Traffic Management Plan**
Traffic coordination and limited closures of the existing bridge would occur for the construction of the temporary trestles near the abutments and the construction of the new approaches at the abutments. Aside from these limited closures, the existing
bridge would remain open to traffic during new bridge construction and would be closed and removed only after the new bridge is open to traffic.

K-rails (concrete or plastic barriers) would be used as well as changeable message signs to notify motorists of construction zone activities. A Traffic Management Plan (TMP) would be prepared and implemented during construction to minimize or prevent delays and inconveniences to the traveling public.

The need for nighttime and weekend lane closures during off-peak hours (5:00 p.m. to 9:00 a.m.) would be identified during the plans, specifications, and estimates (PS&E) design stage. Coordination with and a permit from the U.S. Coast Guard (USCG) would be required to shut off watercraft access under the bridge during some stages of construction.

**Construction Schedule**

Construction is tentatively scheduled to begin in April 2019 and last approximately 3 years. Out-of-water work would occur for three seasons of each year, typically starting in April and ending in December, if weather permits and permit conditions are met. Work in the water (to include pile driving associated with the temporary trestles and construction of the Pier 3 cofferdam and Piers 2, 3, and 4, as well as demolition of the existing bridge’s Piers 2, 3, 7, 8, 9, 10, and 11 and the abutment of Pier 12) would take place between August 1 and October 31. Foundation and bridge structure work could occur year-round once the trestles, cofferdam, and piers have been constructed. Nighttime and weekend lane closures for roadway realignment of SR 84 north of the bridge could occur to accommodate construction activities.

**Alternative 2: Bridge Rehabilitation**

This project alternative proposes to rehabilitate the existing bridge built in 1933. This alternative comprises three new approach spans with new foundations, and substructure work at the center swing span pier. The load rating for the bridge, the characteristics of the existing truss swing span superstructure, and the limited existing bridge width would remain the same.

**Operator Control House**

The control house for the existing bridge is located on the west side of the swing span and is attached to the edge of deck and side of the truss. No changes to the operator control house would occur during rehabilitation of the existing bridge. Project components are shown on Figure 1-5.
Approach Spans and Abutments
Prior to construction of new approach spans, the existing approach spans would be removed. A temporary platform would be constructed under the existing approach structures. The platform would be attached to the floor beams of the bridge or the existing timber piles. The deck surface would be removed by saw cutting and jackhammering. Then the stringers, floor beams, and platform would be removed.

A new approach span would be constructed on the south end of the bridge from Abutment 1 to Pier 2 and would be 55 ft long, with width varying from 44 ft to 26 ft. On the north end of the bridge the new approach span from Pier 4 to Pier 5 would be 55 ft long with width varying from 26 ft to 50 ft. From Pier 5 to Abutment 6, the span would be 55 ft long with varying widths of 50 to 60 ft.

New abutments for the approach spans would be constructed. The width of the Abutment 1 pile cap would be 44 ft with 6 piles, and the width of the Abutment 6 pile cap would be 60 ft with 8 piles.

New Pier Supports
The existing wooden piers and RC piers would be removed. The existing truss would remain turned open for an extended time. To support the truss, a temporary cable system could be installed. An alternate method to support the truss while open could be two temporary bents positioned adjacent to the existing bridge. The north side holding bent would need to be adjacent to the trestle on the north side of the slough. Each bent would include two driven 5-ft-diameter CISS piles with a steel stringer on top of both. The existing Pier 2 and Pier 4 would be replaced with new piers. All existing bents would be removed. There would be a new Pier 5 between Pier 4 and the abutment on the north end. Each of the three new piers would be supported on three 5-ft-diameter pile extensions with cap. At Pier 2 and Pier 4 mechanical items would be built in each pier to include jack pads (for support of jacks) and center locks (stabilizing devices for movable bridges). New Pier 5 would have four 5-ft-diameter pile extensions with cap. An alternate design for Pier 2 and Pier 4 would be to drive two 5- to 6-ft-diameter CISS piles adjacent to each side of the bent. On top of the pile extensions would be an RC cap. The existing concrete could be chipped down and caught on a platform.

Bridge Structure
Work to be performed on the bridge structure would include placing precast/prestressed I-girders between the new piers. This would be accomplished by use of
cranes located on the trestles. The deck would be built up and the deck and barrier rails would be formed.

On the swing span, the wooden stringers would be removed in the same manner as the approach spans, by use of a platform under the existing approach structures. Steel girders would be placed using a crane and the deck and barrier rails would be built.

Work on the center pier would be performed from the trestles and a barge. A 40-ft by 40-ft cofferdam would be constructed around the pier, and water would be evacuated. CISS piles 2 inches in diameter would be driven around the perimeter of the existing pile cap. A new pile cap would be connected with the existing one by drilling and bonding rebar into the existing cap and then forming the cap on top of the piles. The mechanical system would be upgraded with a new motor.

Pavement Sections
As the profile of the bridge access span on the north side is raised, the Holland Road profile would need to be raised for a length of 500 ft to conform to the bridge access span. The new toe line for fill on this stretch of Holland Road would vary from 2 ft to 36 ft from edge of pavement on the south (slough) side of Holland Road. Along the north side of Holland Road it would vary from 3 ft to 76 ft from edge of pavement.

The profile of Route 84 to the north of Holland Road would also have to be raised for a stretch of 240 ft to conform to the newly paved Holland Road. The new toe line for fill would vary from 2 ft to 5 ft from the edge of pavement on the west side and would vary from 7 ft to 75 ft from edge of pavement on the east side. Before placement of the fill, the project area would undergo vegetation clearing and grubbing, scraping and excavating up to 1 ft below ground surface, and compacting of soil.

Traffic Management Plan
Closure of the existing bridge would be required for a period of approximately 6 months. During bridge closure traffic travelling north or south via SR 84 would be detoured to the west or east of Ryer Island via the Real McCoy Ferry on SR 84, or the J-Mack Ferry on SR 220 (see Figure 2-3 in Section 2.1.3). Holland Road (on the north levee) and SR 84/Ryer Road (on the south levee) would remain available for local traffic; however, for approximately 3 weekends of the construction period these roads would be also closed to traffic for construction activities. During weekend closures local traffic could detour via local roadways north of the levee (Holland...
Road and Oxford Road), and south of the levee (Ryer Road, East Ryer Road and Elevator Road).

The swing span would be accessible (able to open) for passage of boat traffic during the majority of the construction period. However, during rehabilitation of the swing span it would be non-operable. It is estimated that the swing span would be non-operable for a period of approximately 1 week. Coordination with and a permit from the USCG would be required to shut off watercraft access under the bridge during various stages of construction.

A Traffic Management Plan would be prepared and implemented during construction to minimize or prevent delays and inconveniences to the travelling public. Preparation of a TMP would occur as part of the final design phase for the rehabilitation alternative. The need for weekend lane closures on Holland Road and Route 84/Ryer Road would be identified during the PS&E stage.

Construction Schedule
The project is tentatively scheduled to begin in April 2019 and would last approximately 1 year. Rehabilitation of the bridge and construction activities on SR 84 would last for approximately 6 months. Out-of-water and in-water work would occur as discussed under the bridge replacement alternative. Closure of SR 84 over Miner Slough is anticipated to last approximately 6 months. The detour of SR 84 around Miner Slough is further discussed in Section 2.1.3.3. Intermittent closures for raising the profiles of Holland Road and SR 84 would occur for approximately 3 weekends of the construction period.

1.4.1.3 TRANSPORTATION DEMAND MANAGEMENT, TRANSPORTATION SYSTEM MANAGEMENT AND MASS TRANSIT ALTERNATIVES
A discussion of Transportation Demand Management, Transportation System Management and Mass Transit Alternatives is not applicable because the project area is rural in nature and there are no urban centers with a population of over 200,000 nearby.

1.4.2 No-Build (No-Action) Alternative
Under the No-Build Alternative the existing Miner Slough Bridge would continue to deteriorate. The deficiencies in the Miner Slough Bridge that are identified in Section 1.2.2 would not be remedied. Maintenance efforts and costs associated with current upkeep of the existing bridge would continue, however over time continued structure deterioration would eventually lead to loss of service. The No-Build
Alternative serves as the baseline for evaluation of the Replacement and Rehabilitation Alternatives.

1.4.3 Identification of the Preferred Alternative

The Miner Slough Bridge Project Draft IS/EA, was released in November 2015, and a public open forum hearing was held on November 18, 2015, at the Rio Vista Fire Department in the city of Rio Vista. Two Build alternatives were proposed to either replace or rehabilitate the Miner Slough Bridge. In the first Build Alternative, Caltrans proposed to replace the existing bridge over Miner Slough with a new bridge approximately 100 feet west of the existing bridge. The second Build Alternative involved rehabilitation of the existing bridge. A No Build Alternative was also evaluated; however, it was not identified as the Preferred Alternative because, unlike the Build Alternatives, it did not meet the need and purpose of the project.

After the 30 day public circulation period, all of the comments received were reviewed, and the advantages and disadvantages of each Build Alternative were considered. With input from the Project Delivery Team (PDT), regulatory agencies, and the public, Caltrans has decided to identify Alternative 1, the replacement alternative as the Preferred Alternative.

An additional fixed span bridge design option of the Alternative 1 has been developed for this project between the time when the Draft Environmental Document was released to the public and the completion of the Final Environmental Document. A swing span bridge option, as opposed to the fixed span bridge option, was the design option discussed in the Draft Environmental Document. Both options have the same environmental study area (environmental footprint) and therefore, selection of either one of these options will not result in any new environmental impact to the project. The Preferred Alternative will move forward with the fixed span bridge option.

Early and continuing coordination with the general public and public agencies regarding the project design options was a priority for the project team. Caltrans submitted information regarding both Build Alternatives as well as the fixed span design option of Alternative 1 for review and consideration to responsible and cooperating agencies in an effort to fully identify, address, and resolve project-related issues. Please find a comprehensive discussion of project coordination and correspondence in Chapter 3, Comments and Coordination.

The following is a summary of the reasons for supporting the Alternative 1, the replacement alternative:
A primary concern expressed by the public during the public meeting, as well as the majority of comments received during the 30-day public comment circulation period was potential economic hardships that may arise due to extended bridge closures during construction. As a result of the public comments received on the Draft IS/EA regarding potential economic impacts to local agricultural businesses that could result from closure of the existing bridge an economic impact study was conducted for the project.

In Alternative 2, the bridge rehabilitation alternative, the bridge would be closed during construction and traffic would be detoured via ferry service. The results of this study concluded that under the bridge rehabilitation alternative the detours would result in additional transportation costs and time delays for local businesses and workers, and result in a negative economic impact to the community.

In Alternative 1, the bridge replacement alternative the bridge would remain open to traffic, and traffic delays would be limited and short in duration. Because the bridge would remain open to traffic, the results of the study concluded that the impact on the economics of the region with implementation of the bridge replacement alternative would be negligible.

Unreliable detours, bridge closures and traffic delays that would occur during construction of the proposed alternatives was a major concern of the travelling public at both the public meeting and in the written comments received during the during the 30-day public comment circulation period.

In Alternative 1, the existing bridge would remain open during construction of the replacement bridge. The existing bridge would be removed only after the replacement bridge was open to traffic. During construction, traffic delays would occur; however, they would be minimal and limited to single lane closures.

In Alternative 2, closure of the existing Miner Slough Bridge would be required for a period of approximately 6 months. Vehicle users travelling on the detour routes described above and using ferry services could experience travel time increases ranging from approximately 30 minutes up to 1 hour and 20 minutes (including boarding time), depending on the time of day and whether one or both ferries are operational at the time of travel. At the Real McCoy II Ferry, as noted above, traffic can already be delayed at the crossing during the hours of 4 PM to 6 PM; therefore, with implementation of Alternative 2, it is anticipated that an increase in the number of vehicles crossing at the Real McCoy II Ferry could result in further delays.
Additionally, because service on the Real McCoy II Ferry can be unpredictable, further delay could occur if the J-Mack Ferry were the only available access route onto or off of Ryer Island.

Alternative 1 would provide a greater load rating and no vertical clearance restrictions. The new bridge would provide current design standard features, including 12-foot wide lanes and 8-foot shoulders in each direction. The approach spans on both ends of the bridge will be wide enough to allow the turning of large trucks. Accelerated bridge construction features are also incorporated in the design, such as steel girders and precast/prestressed concrete girders for the approach spans on both ends of the bridge.

The new vertical clearance over the slough will accommodate the projected sea level rise for this area. Alternative 2 did not account for future sea level rise (SLR), it did not provide for unlimited vertical clearance, and future maintenance is not well-defined due to difficulties assessing the remaining service life of components of the existing bridge.

1.5 Alternatives Considered but Eliminated from Further Discussion

One other alternative was considered, which was to maintain the existing SR 84 alignment on the north side of the new replacement bridge. This alternative was studied at length and rejected for the following reasons:

- Only a maximum design speed of 14 miles per hour (mph) could be used over the existing roadway alignment north of Miner Slough.

- The superelevation transition would not meet design standards because the runoff lengths would be below standard and would not allow safe distance to transition to the existing roadway. Also, the superelevation transition would need to be accommodated between two reverse curves at very steep transition rates due to the relatively short distance between these curves.

- Locating staging areas under this alternative would be difficult without closure of the existing traffic lanes of the highway for a long duration (up to 1 year).
1.6 Permits and Approvals Needed

The permits, reviews, and approvals required for project construction are summarized in Table 1-2.

### Table 1-2 Required Permits and Approvals

<table>
<thead>
<tr>
<th>Agency</th>
<th>Permit/Approval</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Marine Fisheries Service</td>
<td>Biological Opinion and Incidental Take Permit</td>
<td>06/20/2016</td>
</tr>
<tr>
<td>United States Army Corps of Engineers</td>
<td>Section 404 Nationwide Permit</td>
<td>Pending</td>
</tr>
<tr>
<td></td>
<td>Section 10 Consultation</td>
<td></td>
</tr>
<tr>
<td>United States Fish and Wildlife Service</td>
<td>Biological Opinion</td>
<td>5/01/2017</td>
</tr>
<tr>
<td>California Department of Fish and Wildlife</td>
<td>Section 1602 Lake and Streambed Alteration Agreement, a separate Section 1602 permit would be required for the geotechnical drilling to be conducted to provide geotechnical recommendations for the proposed Miner Slough Bridge Project. Caltrans needs to conduct field geotechnical exploration to collect subsurface information of the site. The information collected from the exploration will be presented in foundation reports and &quot;Logs of Test Borings&quot; (LOTBs). Subsurface exploration will be performed by Caltrans Drilling Services. Two borings are proposed within Miner Slough and it has been determined that a separate 1602 for this activity will need to be obtained in addition to the 1602 for the entire project.</td>
<td>Pending</td>
</tr>
<tr>
<td>California Department of Fish and Wildlife</td>
<td>Section 2081 Incidental Take Permit</td>
<td>Pending</td>
</tr>
<tr>
<td>United States Coast Guard</td>
<td>Bridge Permit under the General Bridge Act of 1946, as amended</td>
<td>Pending</td>
</tr>
<tr>
<td>Central Valley Regional Water Quality Control Board</td>
<td>401 Water Quality Certification</td>
<td>Pending</td>
</tr>
</tbody>
</table>
Chapter 2  Affected Environment, Environmental Consequences, and Avoidance, Minimization, and/or Mitigation Measures

This chapter describes the environmental resources of the project areas and how the resources would be affected by the proposed project. Potential environmental impacts of the proposed project and recommended avoidance, minimization, and/or mitigation measures are discussed. Chapter 2 also addresses issues of concern pursuant to CEQA and NEPA. Please see Appendix A for the CEQA Checklist.

As part of the scoping and environmental analysis carried out for the proposed project, the following environmental issues were considered but no adverse impacts were identified. As a result, there is no further discussion about these issues in this document.

As discussed in Chapter 1 a fixed span bridge design option as opposed to the swing span bridge that was the original design option discussed in the Draft Environmental Document has also been proposed in this Final Environmental Document. These two options are mechanical details of the bridge and each have the same environmental study area (environmental footprint); therefore, selection of either one of these options will not add any new environmental impact to the project.

**Existing and Future Land Uses** – The Miner Slough Bridge is an existing bridge and the proposed project would not conflict with or change existing or planned land uses or zoning codes.

**Consistency with State, Regional, and Local Plans and Projects** – The proposed project is also consistent with state, regional, and local plans and programs. The proposed project is not included in the 2015 FSTIP. The proposed project is consistent with applicable goals and policies (TC.G-1, TC.G-2, TC.P-1, TC.P-8, TC.P-11) in the Transportation and Circulation Element of the Solano County General Plan (Solano County 2008). No impact would occur.

**Coastal Zone** – The project site is located in northeastern Solano County, and outside of the coastal zone.
Chapter 5
Adequate Environmental
Environmental Contamination
and Avoidance, Minimization,
and Mitigation Measures

This chapter discusses the importance of environmental impact assessment and how to
mitigate environmental effects. The focus is on reducing pollution and preserving
natural resources. Effective management practices are necessary to ensure that
environmental degradation does not occur.

Environmental contamination can arise from various sources, including industrial
operations, agricultural practices, and urbanization. It is essential to identify and
address these sources to prevent further damage.

Avoidance and minimization strategies are crucial in reducing environmental
impacts. These methods involve altering processes or technologies to minimize
environmental harm. Mitigation measures, on the other hand, are implemented to
offset any unavoidable environmental impacts.

In conclusion, it is imperative to take a proactive approach in environmental
management to protect our planet for future generations.

References and Further Reading:
- [Environmental Contamination: Causes, Impacts, and Solutions]
- [Mitigation Strategies for Environmental Impact]
- [Avoidance Techniques in Industrial Operations]

Appendices:
- [Case Studies in Environmental Management]
- [Toolkits for Environmental Compliance]

Glossary:
- Environmental Contamination: The introduction of harmful substances into the
environment that can cause harm to human health or ecosystems.
- Mitigation: Measures taken to reduce or offset the adverse impacts of an activity.
- Avoidance: The act of eliminating or preventing the occurrence of a particular
situation, event, or issue.
Wild and Scenic Rivers – The Miner Slough Bridge spans Miner Slough, which is not a designated Wild and Scenic River.

Parks and Recreation Facilities – The proposed project would not introduce any population-generating components such as long-term employment, housing, or commercial development; therefore, the project would not result in any additional demands for public park facilities. No parks or recreational facilities are located within the proposed project area or in the project vicinity. Navigational use along Miner Slough includes small recreational and fishing boats. The horizontal and vertical clearances of either the rehabilitated or replacement bridge would accommodate current and future recreational demand. As described further in Section 2.1.3, Traffic and Transportation/Pedestrian and Bicycle Facilities, construction of the proposed project may temporarily affect recreational use of Miner Slough. However, such effects would occur only during limited stages of construction and coordination with the U.S. Coast Guard would be required. A Traffic Management Plan would be prepared to reduce temporary construction impacts to travelers, including recreational boaters. Therefore, the proposed project would not directly or indirectly affect any parks or recreation facilities.

Furthermore, no public parks and recreation lands, or wildlife and waterfowl refuges that provide opportunities for both active and passive outdoor recreation considered a Section 4(f) resource¹ are located within the project site. The proposed project would not result in permanent or temporary impacts to or constructive use of any park or recreation facilities requiring protection under Section 4(f). The proposed project would not alter the qualities, features, or attributes of a park, recreational facility, wildlife and waterfowl refuge, or historic site.

Growth – The proposed project would not affect growth within Solano County. The project is located in a rural area in unincorporated Solano County. The Solano County General Plan has the goal of focusing growth areas in existing incorporated cities and urban areas and their spheres of influence. Therefore, the project area is not anticipated to experience significant growth in the future. By providing safe traffic flow through the project site, the project would facilitate safe and convenient travel between Rio Vista and Sacramento.

¹ “Section 4(f) resource” refers to the Department of Transportation Act of 1966, which prohibits FHWA from approving the use of land from a publicly owned park, recreation area, wildlife refuge, waterfront, or any significant historic site, unless there are no feasible or prudent alternatives.
Because the proposed project would not change accessibility, would have no influence on growth, and would not result in changes to land uses already planned and considered under the Solano County General Plan, the project would not result in project-related growth. Therefore, no resources of concern would be indirectly affected as a result of the project’s influence on growth.

**Community Character and Cohesion** – The proposed project would replace or rehabilitate an existing bridge in a rural area. The project would continue to serve the region in the same manner as the existing bridge; therefore, no impact to community character and cohesion would occur.

**Environmental Justice** – No residential neighborhoods or employment centers are located in close proximity to the project site; therefore, no impact to environmental justice would occur.

**Utilities/Emergency Service Systems** – No existing utilities or emergency service systems would be affected or relocated as part of the proposed project. Caltrans will be in contact with the California Highway Patrol, Montezuma Fire Department, and emergency medical responders regarding bridge and road closures. Medical response and emergency vehicles will receive priority access during construction activities.

**Paleontology** – According to the *Preliminary Geotechnical Report* (Caltrans 2015a) for this project, many fossils have been found in the area, though none have been found dating to the Holocene epoch, and if found any such fossils would not be considered scientifically significant. Therefore no further paleontological study is necessary.

**Hazards and Hazardous Materials** – The proposed project would not result in any increased hazards or hazardous materials risks during or after construction; any hazardous materials determined to be present in the project area would be encapsulated or disposed of in accordance with applicable federal and state regulations and in coordination with the regulatory agency with jurisdiction.

**Air Quality** – The proposed project is to reconstruct a bridge with no additional travel lanes, and therefore qualifies for an exemption from project-level conformity requirements under 40 CFR 93.126. No air quality study is necessary. Effects to air quality could result during the project’s construction phase, but would be temporary. A measure intended to reduce these temporary effects (Measure AIR-1) has been incorporated into the project and is listed in Appendix C.
Noise – The project would not cause or contribute to a substantial long-term increase in traffic noise or ground vibration levels because there would be no increase in traffic capacity. The project would not add traffic lanes or substantially alter the alignment of the existing roadway. It is not a Type I project as defined in 23 CFR 772. The nearest sensitive receptor is a residence located approximately 1,000 ft to the east of the existing bridge. Direct effects on Delta and longfin smelt resulting from hydro-acoustic noise levels resulting from pile driving are discussed in Section 2.3.5.

The proposed project’s potential impacts to the remaining categories of environmental resources from the CEQA Checklist are discussed in the sections below.

2.1 Human Environment

2.1.1 Farmlands/Timberlands

2.1.1.1 REGULATORY SETTING

The National Environmental Policy Act (NEPA) and the Farmland Protection Policy Act (FPPA, 7 United States Code [U.S.C.] 4201-4209; and its regulations, 7 CFR Part 658) require federal agencies, such as the FHWA, to coordinate with the Natural Resources Conservation Service (NRCS) if their activities may irreversibly convert farmland (directly or indirectly) to nonagricultural use. For purposes of the FPPA, farmland includes prime farmland, unique farmland, and land of statewide or local importance.

The California Environmental Quality Act (CEQA) requires the review of projects that would convert Williamson Act contract land to non-agricultural uses. The main purposes of the Williamson Act are to preserve agricultural land and to encourage open space preservation and efficient urban growth. The Williamson Act provides incentives to landowners through reduced property taxes to discourage the early conversion of agricultural and open space lands to other uses.

2.1.1.2 AFFECTED ENVIRONMENT

The majority of land in Solano County is classified by the California Department of Conservation’s Farmland Mapping and Monitoring Program (FMMP) as farmland, including approximately 147,464 ac (25 percent) designated as Important Farmland.

---

2 Important Farmland is land designated by the Farmland Mapping and Monitoring Program (FMMP) as “Prime Farmland,” “Farmland of Statewide Importance,” “Unique Farmland,” and “Farmland of Local Importance.”
and an additional 209,195 ac designated as "Grazing Land." As of 2013, the County had 280,426 ac of farmland under a Williamson Act Contract (California Department of Conservation 2013), or approximately 78 percent of Agricultural Land in Sonoma County. The project site is surrounded by farmland, with most parcels actively farmed. All farmland in the project vicinity is designated as Prime Farmland under the FMMP and several parcel are under Williamson Act contracts. There are no timberlands in the project vicinity.

Farms in Solano County are used primarily for forage (e.g., hay), vegetables, and wheat.

2.1.1.3 ENVIRONMENTAL CONSEQUENCES

Alternative 1 – Bridge Replacement

Under Alternative 1, approximately 6.06 ac of farmland would be acquired from three parcels abutting SR 84 and converted to transportation use. These lands are not currently in agricultural production. Two of the affected parcels (Assessor’s Parcel Number [APN] 0042-200-200 and 0042-220-020) approximately 2.50 acres are under Williamson Act contract (Solano County Assessor/Recorder 2015). Planned property acquisition would not bisect any parcels; all new right-of-way (ROW) would be acquired along parcel edges. Figure 2-1 shows the location of agricultural land surrounding the project site and the property acquisition that would occur under Alternative 1.

Construction Phase

Acquisition of 6.06 acres of right of way will be required resulting in the indirect conversion of approximately 0.44 ac of land designated as Prime Farmland (APNs 0042-200-140 and 0042-200-200). A temporary construction easement would be obtained for staging at a 1.59-ac property located southeast of the existing bridge. All parcels would remain accessible throughout project construction and post-construction. Farming equipment access to productive agricultural parcels would remain unimpeded.

Operation Phase

Alternative 1 would result in the irreversible and direct conversion of land designated as Prime Farmland (California Department of Conservation 2011) (APNs 0042-200-140 and 0042-200-200) and Williamson Act lands. Direct impacts include the permanent ROW acquisition required for the bridge replacement and roadway.

3 Agricultural Land is the total of land classified as Farmland and Grazing Land.
realignment. The direct impact resulting from the widening of the roadway is considered a permanent impact.

Implementation of Alternative 1 would affect soils designated for various crop production activities defined by the NRCS as having prime agricultural significance. However, these lands are not currently in agricultural production.

While loss in agriculturally productive land is expected from implementing the proposed project improvements, the losses would all occur along the edge of the roadway and are “sliver” losses. These losses occur in a very narrow strip adjacent to the roadway and would not have any substantial effect on the agricultural operations for those affected parcels. No change in productivity related to project impacts is anticipated because the land is not currently in agricultural production.

Caltrans is in ongoing coordination with NRCS and the California Department of Conservation regarding impacts to farmlands from parcel acquisition and temporary construction easements that would occur under Alternative 1. Acreage and parcel acquisition used to determine the loss of agricultural lands would be evaluated based on the NRCS’s Farmland Conversion Impact Rating System (Form AD-1006), and reflected in the final IS/EA. The number of acres of Williamson Act contracted land and/or agricultural preserve land being considered for acquisition, and the findings required under Government Code 51292(a) and 51292(b), would also be reflected in the final IS/EA.

**Alternative 2 – Bridge Rehabilitation**

Under Alternative 2 approximately 1.95 acres of farmland would be acquired from three parcels abutting SR 84 and converted to transportation use. These lands are not currently in agricultural production. One of the affected parcels (APN 0042-200-200) is under Williamson Act contract (Solano County Assessor/Recorder 2015), approximately 0.61 acres of this parcel would be acquired. Planned property acquisition would not bisect any parcels; all new ROW would be acquired along parcel edges. Figure 2-2 shows the location of agricultural land surrounding the project site and the property acquisition that would occur under Alternative 2.

**Construction Phase**

Under Alternative 2, staging and permanent acquisition for construction staging would occur in the same location as discussed above under Alternative 1. All parcels would remain accessible throughout project construction and post-construction.
Farming equipment access to productive agricultural parcels would remain unimpeded.
Operation Phase
Alternative 2 would result in the irreversible direct conversion of land designated as Prime Farmland (California Department of Conservation 2011) (APNs 0042-200-140 and 0042-200-200) and Williamson Act lands. Direct impacts include the permanent ROW acquisition required for the widening of the roadway at the northern bridge approach. The direct impact resulting from the widening of the roadway is considered a permanent impact. Similar to Alternative 1, Alternative 2 would affect soils designated for various crop production activities defined by the NRCS as having prime agricultural significance. However, these lands are not currently in agricultural production.

Loss of agriculturally productive land is expected from implementing Alternative 2; however, the losses would all occur along the edge of the roadway and are “sliver” losses. These losses would occur adjacent to the roadway and would not have any substantial effect on the agricultural operations of those affected parcels. No change in productivity related to project impacts is anticipated because the land is not currently in agricultural production.

Ongoing coordination with NRCS and the California Department of Conservation regarding impacts to farmlands from partial parcel acquisition and temporary construction easements that would occur with implementation of Alternative 2 would be the same as discussed above under Alternative 1.

No-Build Alternative
Under the No-Build Alternative existing farmland operations would continue and no effect would occur.

2.1.1.4 Avoidance, Minimization, and/or Mitigation Measures
Alternatives 1 and 2 are designed to minimize impacts through farmland conversion using the smallest area possible while meeting the project’s purpose and need and fulfilling design and safety requirements.

2.1.2 Community Impacts
2.1.2.1 Relocations and Real Property Acquisition
Regulatory Setting
Caltrans’ Relocation Assistance Program (RAP) is based on the Federal Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (as amended) and Title 49 CFR Part 24. The purpose of the RAP is to ensure that persons displaced as a result of a transportation project are treated fairly, consistently, and
equitably so that such persons will not suffer disproportionate injuries as a result of projects designed for the benefit of the public as a whole.

All relocation services and benefits are administered without regard to race, color, national origin, or sex in compliance with Title VI of the Civil Rights Act (42 U.S.C. 2000d et seq.). See Appendix B for a copy of Caltrans’ Title VI Policy Statement.

Affected Environment
The project vicinity consists primarily of agricultural land, with a small number of farm-associated residences and outbuildings (barns, sheds, equipment storage, etc.). The closest community is Courtland, located approximately 5 miles northeast of the project site. Under Alternative 1 the new bridge would be realigned approximately 100 ft west of the existing alignment, and the highway north of the Slough would shift east, to align with the bridge. Under Alternative 2, the profile of Holland Road would need to be raised for a length of 500 ft to conform to the bridge access span, and the profile of Route 84 to the north of Holland Road would be raised for a stretch of 240 ft to conform to the newly paved Holland Road. Therefore, under either Build Alternative the proposed project would require the partial acquisition of properties to the north of the existing bridge.

Environmental Consequences
Alternative 1 – Bridge Replacement
Construction Phase
Staging would occur in the triangular area between the existing alignment and the new alignment to the north of the bridge. The staging area would be cleared by the construction contractor for use as staging and preparation of the new SR 84 alignment. Caltrans proposes to use a portion (large driveway/storage area) of a private parcel southeast of the existing bridge for storing equipment and materials for emergency repairs (see Figure 2-1). A temporary construction easement (1.59 acres) would be obtained for use of this property prior to construction. An existing house is located on this private property, but no impacts to the residence would result from construction staging in the property’s driveway/storage area. Therefore, no existing residential or agricultural structures would be affected by construction of Alternative 1.

Under Alternative 1, construction of the proposed project would require roadway closures. These closures could result in short-term, temporary impacts to the travelling public during construction. Measures to minimize impacts to the travelling
public during construction are discussed in Section 2.1.3, Traffic and Transportation/Pedestrian and Bicycle Facilities.

Operation Phase
Table 2-1 summarizes the properties that are expected to be affected by Alternative 1, and the acreage of ROW that would be required. Project layout plans, including properties affected, are shown in Appendix G.

<table>
<thead>
<tr>
<th>Solano County Assessor Parcel Number</th>
<th>Address (Type of Property)</th>
<th>Anticipated Right-of-Way Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>0042-200-140</td>
<td>Rio Vista (agriculture)</td>
<td>3.411 acres</td>
</tr>
<tr>
<td>0042-200-200</td>
<td>State Route 84, Rio Vista (agriculture)</td>
<td>1.75 acres</td>
</tr>
<tr>
<td>0042-220-020</td>
<td>State Route 84 (agriculture)</td>
<td>0.886 acres</td>
</tr>
<tr>
<td>0042-220-020</td>
<td>State Route 84 (agriculture)</td>
<td>1.59 acres temporary construction easement</td>
</tr>
</tbody>
</table>

All ROW acquisitions required for Alternative 1 would be partial or “sliver” acquisitions of small portions of land adjacent to the roadway to accommodate the new bridge or highway alignment. Alternative 1 would not require full acquisition of any parcels, nor would it result in the need to relocate residences or businesses. Therefore, RAP services or payments would not be required.

Alternative 2 – Bridge Rehabilitation

Construction Phase
Under Alternative 2, environmental consequences would be the same for the construction phase as discussed above under Alternative 1.

Construction of Alternative 2 would require roadway closures and detours. These closures and detours could result in short-term, temporary impacts to the travelling public during construction. Measures to minimize impacts to the travelling public during construction are discussed in Section 2.1.3, Traffic and Transportation/Pedestrian and Bicycle Facilities.
Operation Phase
Table 2-2 summarizes the properties that are expected to be affected by the rehabilitation alternative and the ROW acreage that would be required. Project layout plans, including properties affected, are shown in Appendix G.

<table>
<thead>
<tr>
<th>Solano County Assessor Parcel Number</th>
<th>Address (Type of Property)</th>
<th>Anticipated Right-of-Way Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>0042-200-140</td>
<td>Rio Vista (agriculture)</td>
<td>1.76 acres</td>
</tr>
<tr>
<td>0042-200-200</td>
<td>Route 84, Rio Vista (agriculture)</td>
<td>0.613 acre</td>
</tr>
</tbody>
</table>

All ROW acquisitions required for the rehabilitation alternative would be partial or “sliver” acquisitions of portions of land adjacent to the roadway to accommodate the northern approach to the bridge or cut and fill adjacent to the existing highway alignment. The rehabilitation alternative would not require full acquisition of any parcels, nor would it result in the need to relocate residences or businesses. Therefore, RAP services or payments would not be required.

No-Build Alternative
Under the No-Build Alternative no changes would occur to the existing community; therefore no impact would occur.

Avoidance, Minimization, and/or Mitigation Measures
The proposed project is designed to minimize the ROW acquisition required for the project, while still meeting the project’s purpose and need, complying with roadway design criteria, and satisfying Caltrans and Solano County roadway design standards. No full parcel acquisitions or relocation of residences or businesses would be required for either Alternative 1 or 2; therefore, no RAP services or payments would be needed and no additional avoidance, minimization, and/or mitigation measures are proposed.

2.1.3 Traffic and Transportation/Pedestrian and Bicycle Facilities
2.1.3.1 Regulatory Setting
Caltrans, as assigned by FHWA, directs that full consideration should be given to the safe accommodation of pedestrians and bicyclists during the development of federal-aid highway projects (see 23 CFR 652). It further directs that the special needs of the
elderly and the disabled must be considered in all federal-aid projects that include pedestrian facilities. When current or anticipated pedestrian and/or bicycle traffic presents a potential conflict with motor vehicle traffic, every effort must be made to minimize the detrimental effects on all highway users who share the facility.

In July 1999, the U.S. Department of Transportation (USDOT) issued an Accessibility Policy Statement pledging a fully accessible multimodal transportation system. Accessibility in federally assisted programs is governed by the USDOT regulations (49 CFR Part 27) implementing Section 504 of the Rehabilitation Act (29 U.S.C. 794). FHWA has enacted regulations for the implementation of the 1990 Americans with Disabilities Act (ADA), including a commitment to build transportation facilities that provide equal access for all persons. These regulations require application of the ADA requirements to federal-aid projects, including Transportation Enhancement Activities.

2.1.3.2 Affected Environment

Roadway Transportation

SR 84 is a north-south route connecting communities from the Peninsula to inland areas of the East Bay and Delta. The route bisects four Bay Area counties and consists of four subsections as identified in the State Route 84 Corridor System Management Plan (Caltrans 2010a). The proposed project is located in the San Joaquin-Sacramento River Delta subsection of SR 84. North of Rio Vista, SR 84 is a north-south two-lane conventional highway that begins at SR 12 and passes via ferry to Ryer Island where it connects to Route 220, continuing north past the Solano/Yolo County line toward Sacramento. This segment of SR 84 traverses a rural area and has low traffic volumes and limited connectivity to the overall State Highway System. As such, this segment of SR 84 will remain a two-lane, conventional highway over the next 25 years (Caltrans 2010a).

According to the Traffic Report (Caltrans 2015c) prepared for the proposed project, the 2013 Annual Average Daily Traffic (AADT) on State Route 84 through the project area was 440 vehicles.

Within the project vicinity, bicyclists share the roadway with motor vehicles. There are no existing Class 1 bicycle paths on SR 84 near the project site, or on the Miner Slough Bridge. Caltrans is not proposing to create Class 1 bicycle paths as part of the proposed project. Surrounding land uses are agricultural. No sidewalks or other pedestrian facilities are located near the project site. This project would not conflict with adopted policies, plans or programs regarding public transit, bicycle, or
pedestrian facilities, or otherwise decrease the performance or safety of such facilities.

**Marine Transportation**
Caltrans operates two ferries in the Sacramento Delta Region, The Real McCoy II and the J-Mack (see Figure 2-3). The Real McCoy II is classified as an extension of Highway 84 and provides service to Ryer Island by crossing the Cache Slough to Rio Vista. The J-Mack Ferry crosses Steamboat Slough connecting Grand Island to East Ryer Island, and is classified as an extension of Highway 220.

Both ferries operate 24 hours a day, 7 days a week and are free of charge (Caltrans 2015d).

**Figure 2-3  State Routes and Ferry Crossings in the Project Vicinity**

![Map showing ferries and routes in the project vicinity](Source: "Delta Region Ferries" website (Caltrans 2015d))
2.1.3.3 ENVIRONMENTAL CONSEQUENCES

Alternative 1 – Bridge Replacement

Construction Phase
Construction work is tentatively scheduled to begin in April 2019 and last approximately 3 years. The proposed construction and improvements would include road work that may require traffic control and limited closures for construction of the temporary trestles near the abutments and construction of the new approaches at the abutments. Nighttime and weekend single-lane closures during off-peak hours (5:00 PM to 9:00 AM) for roadway realignment of SR 84 north of the bridge could occur to accommodate construction activities. The need for nighttime and weekend lane closures would be identified during the PS&E phase of the project. During construction the existing bridge would be open to traffic; it would be removed only after the new bridge was open to traffic.

Operation Phase
Traffic counts indicate that approximately 20 vehicles per hour cross the bridge during the AM peak hour (between 9:00 AM and 10:00 AM) and 31 vehicles per hour pass through the project site during the PM peak hour (between 4:00 PM and 5:00 PM). The existing bridge roadway segments have 9-ft travel lanes in each direction with no shoulders and operate at Level of Service (LOS) C (traffic density becomes noticeable with ability to maneuver limited by other vehicles; minimal delays could occur) during the PM peak hour. Based on the forecasted traffic volumes provided by the Caltrans Forecast Unit on March 15, 2015, a ten percent increase in traffic volumes is expected from the current year (2015) to the construction year (2018) (Caltrans 2015c). The project would widen the roadway to accommodate 12-ft travel lanes in each direction with 8-ft shoulders on each side. Although not part of the purpose and need of the project, implementation of Alternative 1 would improve traffic operations to LOS B (traffic flows freely, but drivers have slightly less freedom to maneuver; no delays are anticipated).

Alternative 2 – Bridge Rehabilitation

Construction Phase
Construction of Alternative 2 is tentatively scheduled to begin in January 2018 and last approximately 1 year (6 months for construction activities). The proposed construction and improvements would include road work that would require traffic detours and traffic control. The Miner Slough Bridge would be closed for the 6-month duration of construction activities. Traffic travelling on SR 84 would be detoured via the Real McCoy Ferry on SR 84, or the J-Mack Ferry on SR 220. The State Routes
and local ferry crossings in the project vicinity are shown on Figure 2-3. The north and south levee roads would have limited closures depending on the phase of construction, but would otherwise be open to traffic travelling east-west on either the north or south levee of Miner Slough.

**Operation Phase**
Alternative 2 would retain the existing lane configurations, and therefore would continue to operate at LOS C during operation.

**No-Build Alternative**
Under the No-Build Alternative, deterioration of the existing bridge structure would continue as described in Section 1.2.2, and would over time result in bridge closure.

### 2.1.3.4 Avoidance, Minimization, and/or Mitigation Measures
Construction of the proposed project would require roadway closures. These closures could result in short-term, temporary impacts to the travelling public during construction. Concrete or plastic barriers would be used to redirect traffic around the construction area, and changeable message signs would notify motorists of detours and construction zone activity. In accordance with Caltrans standard practice, a Traffic Management Plan would be prepared during design and implemented during construction to minimize or prevent delays and inconvenience to the traveling public, including boaters passing through the project area on Miner Slough. To maintain the flow of traffic during construction, the TMP would facilitate accessibility through the project area for vehicles associated with essential services. The TMP would provide for public outreach and may include press releases to notify and inform motorists, boaters, businesses, community groups, local entities, emergency services, and local officials of times and locations of detours and closures. Detouring of traffic would occur under Alternative 2. Coordination prior to and during construction, and a permit from, the U.S. Coast Guard would be required for bridge closures, preventing marine traffic from passing through the channel, during some stages of construction. Preparation of a TMP and coordination with the USCG would minimize project impacts to traffic and transportation and no significant impact would occur.

### 2.1.4 Visual/Aesthetics
#### 2.1.4.1 Regulatory Setting
The National Environmental Policy Act of 1969 as amended (NEPA) establishes that the federal government must “use all practicable means to ensure all Americans safe, healthful, productive, and aesthetically [emphasis added] and culturally pleasing surroundings” (42 U.S.C. 4331[b][2]). To further emphasize this point, the Federal
Highway Administration in its implementation of NEPA (23 U.S.C. 109[h]) directs that final decisions on projects are to be made in the best overall public interest taking into account adverse environmental impacts, including among others, the destruction or disruption of aesthetic values.

The California Environmental Quality Act (CEQA) establishes that it is the policy of the state to take all action necessary to provide the people of the state “with...enjoyment of aesthetic [emphasis added], natural, scenic and historic environmental qualities” (California Public Resources Code [PRC] Section 21001[b]).

2.1.4.2 Affected Environment

A Scenic Resource Evaluation and Visual Impact Assessment Memorandum (Caltrans 2015e) was prepared to assess the proposed project’s potential effects to visual quality and aesthetics in the area.

The proposed project is located on SR 84 in rural Solano County about 30 miles southwest of Sacramento, 10 miles west of Interstate 5, and 9.5 miles north of SR 12. The surrounding land is exclusively agricultural. The landscape in this region is comprised of a patchwork of agricultural fields, with a small number of farm-associated residences and outbuildings. Development is very sparse.

SR 84 in Solano County, including the location of the proposed project, is not part of the State Scenic Highway System. The roadway and surrounding land are flat. South of the bridge the highway is routed along the east bank of Miner Slough and follows its meandering course on a levee approximately 10 to 20 ft higher than the slough and cultivated fields that are east of the highway. People who see the bridge are recreational boaters on the slough and motorists traveling on SR 84. A narrow band of riparian forest occurs along the banks of the slough. Because of the flat topography and presence of the riparian band, the bridge is not visible from long distances. From the highway, the bridge does not come into view until northbound motorists are within approximately 1,000 ft and southbound motorists are within approximately 300 ft of the bridge. A private marina, boat launch, and campground are located off Holland Road on the north/west bank of Miner Slough approximately 0.75 mile west of the bridge. The bridge is not in view from the marina. No other viewpoints of the bridge are publicly accessible.
2.1.4.3 ENVIRONMENTAL CONSEQUENCES

**Alternative 1 – Bridge Replacement**

**Construction Phase**

Construction activities, lighting, equipment, or staging, where visible, could represent an adverse effect to motorists or marine traffic for the duration of construction. Construction staging areas could represent an adverse visual intrusion in the project area for the duration of construction. Visual impacts during construction would be temporary and are therefore considered minimal.

**Operation Phase**

Under Alternative 1, the proposed new bridge would be similar to the existing bridge because it would be a swing-span bridge. The new bridge would be wider than the existing bridge and would include a new operator control house. A total of 43 trees would be removed from within the footprint of the proposed project to allow realignment of the highway and to accommodate the location of the new bridge (see Section 2.3.1.3 for additional details). Trees outside of the project site would not be affected. After the newly realigned section of SR 84 is open to the public, the pavement of the old section would be scarified, removed, and re-vegetated. Holland Road would be repaved for approximately 200 ft on either side of the new bridge, at which point it would conform to the existing county road. The existing swing bridge would be demolished and removed. Changes to the existing visual setting as a result of the proposed project would be noticeable, but not unsightly.

Review of the Alternative 1 site, plans, and other information indicate that the alternative would not result in substantial adverse impacts to the visual environment. The new bridge would not substantially alter the appearance of the highway corridor and would be consistent with the visual quality and character of the existing setting. Alternative 1 would not significantly affect any Designated Scenic Resource as defined by CEQA statutes or guidelines or by Caltrans policy.

**Alternative 2 – Bridge Rehabilitation**

**Construction Phase**

Visual impacts during construction of Alternative 2 would be the same as discussed for Alternative 1.

**Operation Phase**

Alternative 2 would involve repair of various components of the existing bridge, but would leave the bridge in place. The visual character of the bridge would remain unchanged. Repaving and raising of the road profiles of portions of Holland Road and
SR 84 would occur. Alternative 2 would have minimal effect on the appearance of the bridge or its visual setting. Negative visual impacts associated with the rehabilitation alternative would be low to none.

A total of 30 trees would be removed from within the footprint of Alternative 2. Trees outside of the project site would not be affected.

Alternative 2 would not substantially alter the appearance of the highway corridor and would be consistent with the visual quality and character of the existing setting. Alternative 2 would not adversely affect any Designated Scenic Resource as defined by CEQA statutes or guidelines or by Caltrans policy.

**No-Build Alternative**

Under the No-Build Alternative the visual characteristics of the project area would not change.

**2.1.4.4 Avoidance, Minimization, and/or Mitigation Measures**

No avoidance, minimization and/or mitigation measures are proposed.

**2.1.5 Cultural Resources**

**2.1.5.1 Regulatory Setting**

The term “cultural resources” as used in this document refers to all “built environment” resources (structures, bridges, railroads, water conveyance systems, etc.), culturally important resources, and archaeological resources (both prehistoric and historic), regardless of significance. Laws and regulations dealing with cultural resources include:

The National Historic Preservation Act (NHPA) of 1966, as amended, sets forth national policy and procedures for historic properties, defined as districts, sites, buildings, structures, and objects included in or eligible for listing in the National Register of Historic Places (NRHP). Section 106 of the NHPA requires federal agencies to take into account the effects of their undertakings on historic properties and to allow the Advisory Council on Historic Preservation the opportunity to comment on those undertakings, following regulations issued by the Advisory Council on Historic Preservation (36 CFR 800). On January 1, 2014, a Section 106 Programmatic Agreement (PA) between the Advisory Council, Federal Highway Administration, State Historic Preservation Officer (SHPO), and Caltrans went into effect for Caltrans projects, both state and local, with FHWA involvement. The PA implements the Advisory Council’s regulations (36 CFR 800) streamlining the
Section 106 process and delegating certain responsibilities to Caltrans. The FHWA’s responsibilities under the PA have been assigned to Caltrans as part of the Surface Transportation Project Delivery Program (23 U.S.C. 327).

The Archaeological Resources Protection Act (ARPA) applies when a project may involve archaeological resources located on federal or tribal land. The ARPA requires that a permit be obtained before excavation of an archaeological resource on such land can take place.

Historic properties may also be covered under Section 4(f) of the U.S. Department of Transportation Act, which regulates the “use” of land from historic properties.

Historical resources are considered under CEQA, as well as PRC Section 5024.1, which establishes the California Register of Historical Resources. PRC Section 5024 requires state agencies to identify and protect State-owned resources that meet the NRHP listing criteria. It further specifically requires Caltrans to inventory State-owned structures in its rights-of-way. Sections 5024(f) and 5024.5 require State agencies to provide notice to and consult with the SHPO before altering, transferring, relocating, or demolishing state-owned historical resources that are listed on or are eligible for inclusion in the NRHP or are registered or eligible for registration as California Historical Landmarks.

2.1.5.2 AFFECTED ENVIRONMENT
The proposed project’s Areas of Potential Effects (APEs) for archaeological and architectural resources were established by Caltrans Professionally Qualified Staff (PQS) in the Office of Cultural Resource Studies in consultation with the Caltrans Project Manager. An APE is defined as the area where an undertaking may directly or indirectly impact a historic property. The project “footprint,” which includes ROW acquisition and construction staging areas, is within the APE. The APE map for this project, which was established in February 2015 and updated in August 2015, is shown on Figure 2-4. Both the archaeological and architectural APEs include the existing bridge and the new alignment of the proposed bridge replacement, approximately 100 ft to the west. North of the bridge the entire parcels both east and west of the highway from the bridge to PM 12.5 are included within the architectural APE. This area includes the new proposed road alignment of the northern approach to the bridge. The entire parcel south of the bridge is also included in the architectural APE. The smaller archaeological APE extends 200 ft from the project footprint to the north, east, and west of the bridge within the two northern parcels, and south of the
bridge it extends approximately 1,000 ft east and west along SR 84 and Ryer Road (see Figure 2-4).

The cultural resources review consisted of a detailed search of Caltrans records, maps, plans, and an intensive pedestrian survey of the archaeological APE. A record search was conducted at the Northwest Information Center (NWIC) on November 6, 2014 (NWIC #13-0060). A record search for known submerged resources was requested from the California State Land Commission on February 18, 2016. No response was received regarding this request. The Native American Heritage Commission (NAHC) was contacted on October 14, 2014, requesting that they conduct a search of their Sacred Lands file to determine if there were known historically significant sites within or near the APE for the proposed project. No known historically significant sites were identified during the search of the Sacred Lands files. Native American groups and individuals were sent letters with project information and a request for their input on November 12, 2014. Follow-up telephone calls were completed on January 5-9, 2015. A response, dated December 3, 2014, was received from the Yocha Dehe Wintun Nation requesting the results of any archaeological field investigation of the project area. The results of the archaeological survey were transmitted to the Yocha Dehe Wintun Nation.
Archaeological surveys of the archaeological APE were conducted on November 25, 2014 and January 9, 2015 by Caltrans PQS archaeologists. No archaeological resources were identified within the archaeological APE during these surveys.

The architectural APE was reviewed by a Caltrans PQS Architectural Historian. One bridge (the Miner Slough Bridge that would be replaced or rehabilitated by this project) was identified within the project APE. The bridge is listed as Category 5 – not eligible for the NRHP – in the California Historic Bridge Inventory, because while it is non-standard in design, the lack of a central tower was found to be common in California. The Caltrans PQS Architectural Historian’s review for this project confirmed the bridge’s ineligibility for the NRHP. Two historic-era built resources were also identified within the architectural APE. The resources were evaluated and found not eligible for the NRHP and are not considered historical resources for the purposes of CEQA. The Miner Slough Bridge and two historic era built resources located within the APE were also determined not to be eligible for the California Register of Historical Resources. These determinations of ineligibility for the NRHP and California Register received SHPO concurrence on April 14, 2015.

The Caltrans Office of Cultural Resources Studies has prepared the required Historic Property Survey Report, Historic Resource Evaluation Report, and Archaeological Survey Report for the proposed project. These documents have been finalized and their findings summarized in the Section 106 Completion Memo and Addendum (which includes the bridge rehabilitation alternative), for the project (Caltrans 2015f, Caltrans 2015k).

If cultural materials are discovered during construction, all earth-moving activity within and around the immediate discovery area will be diverted until a qualified archaeologist can assess the nature and significance of the find. Ownership and title to all abandoned shipwrecks, archaeological sites, and historic or cultural resources on or in the tide and submerged lands of California is vested in the State and under the jurisdiction of the California State Lands Commission as per PRC Section 6313. The final disposition of archaeological, historical, and paleontological resources recovered on State lands under the jurisdiction of the State Lands Commission must be approved by the Commission.

If human remains are discovered, State Health and Safety Code Section 7050.5 states that further disturbances and activities shall stop in any area or nearby area suspected to overlie remains, and the County Coroner contacted. Pursuant to PRC Section
5097.98, if the remains are thought to be Native American, the coroner will notify the NAHC, which will then notify the Most Likely Descendent (MLD). At this time, the person who discovered the remains will contact the District 4 Office of Cultural Resource Studies Chief so that they may work with the MLD on the respectful treatment and disposition of the remains. Further provisions of PRC 5097.98 are to be followed as applicable.

2.1.5.3 ENVIRONMENTAL CONSEQUENCES

Alternative 1 – Bridge Replacement

For Alternative 1, Caltrans requested concurrence on the eligibility determinations from the State Historic Preservation Officer as part of its NEPA assignment of federal responsibilities by FHWA, effective October 1, 2012 and pursuant to 23 U.S.C. 326 and 327. Caltrans received SHPO concurrence on the determinations of eligibility for the Miner Slough Bridge Project on April 14, 2015. SHPO concurred that neither of the historic-era properties nor the bridge are eligible for the NRHP, and with the Caltrans finding of No Historic Properties Affected (Caltrans 2015f). Alternative 1 would not affect or use any Section 4(f) historic resource because no such properties were identified within the project vicinity.

Alternative 2 – Bridge Rehabilitation

The alternative to rehabilitate the bridge was included as part of the proposed project following SHPO concurrence of Alternative 1. Alternative 2 falls within the original APE boundary; therefore no additional survey work is required. In accordance with the Programmatic Agreement, the HPSR retains the finding of No Historic Properties Affected according to Section 106 PA Stipulation IX.A and 36 CFR 800.4(d)(1) (Caltrans 2015k). Alternative 2 would not affect or use any Section 4(f) historic resource because no such properties were identified within the project vicinity.

No-Build Alternative

The No-Build Alternative would not affect any historic properties.

2.1.5.4 AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES

Caltrans has taken precautions to detect potential archaeological and architectural resources within their respective APEs. However, there always exists the possibility that cultural material or human remains may be discovered during construction of either Alternative 1 or 2. If cultural materials or human remains are discovered during construction, the following avoidance and minimization measures (AMMs) would be implemented:
Measure CUL-1: Unanticipated Discovery of Cultural Resources
In the event of an unanticipated cultural resource discovery during construction, all
ground disturbances within 60 feet of the discovery will be halted or redirected to
other areas until the discovery has been documented by a qualified archaeologist and
its potential significance evaluated in terms of applicable criteria.

Measure CUL-2: Discovery of Human Remains
If human remains are discovered, State Health and Safety Code Section 7050.5
states that further disturbances and activities shall cease in any area or nearby area
suspected to overlie remains, and the County Coroner contacted. Pursuant to Public
Resources Code Section 5097.98, if the remains are thought to be Native
American, the coroner will notify the Native American Heritage Commission
(NAHC) who will then notify the Most Likely Descendent (MLD). At this time,
the person who discovered the remains will contact the District 4 Office of Cultural
Resource Studies Chief so that they may work with the MLD on the respectful
Treatment and disposition of the remains. Further provisions of PRC 5097.98 are to
be followed as applicable.

2.2 Physical Environment

2.2.1 Hydrology And Floodplain

2.2.1.1 REGULATORY SETTING

Executive Order (EO) 11988 (Floodplain Management) directs all federal agencies to
refrain from conducting, supporting, or allowing actions in floodplains unless it is the
only practicable alternative. The FHWA requirements for compliance are outlined in
23 CFR 650 Subpart A.

To comply, the following must be analyzed:

- The practicability of alternatives to any longitudinal encroachments.
- Risks of the action.
- Impacts on natural and beneficial floodplain values.
- Support of incompatible floodplain development.
- Measures to minimize floodplain impacts and to preserve/restore any beneficial
  floodplain values affected by the project.
The base floodplain is defined as “the area subject to flooding by the flood or tide having a one percent chance of being exceeded in any given year.” An encroachment is defined as “an action within the limits of the base floodplain.”

2.2.1.2 AFFECTED ENVIRONMENT

Hydrology and hydraulic information for this section was provided from the Preliminary Hydraulic Report (Caltrans 2014a) and Preliminary Location Hydraulic Study (Caltrans 2015g) prepared for the proposed project.

Miner Slough is one of three distributaries (i.e., a stream that branches off and flows away from a main stream channel) of the Sacramento River in the tidal area on the eastern portion of Solano County, within the Delta of the Sacramento and San Joaquin Rivers. Miner Slough flows in a southwesterly direction and reconnects with the Sacramento River downstream. The Miner Slough watershed covers a tidally influenced slough approximately 7.8 miles long that begins from Sutter Slough at the upstream end to the intersection of the Sacramento Deep Water Ship Channel and Cache Slough, and ends at the Yolo Bypass. The Delta is a low-lying tidal area that consists mainly of agricultural lands that have been reclaimed by levees. SR 84 from the Rio Vista city limits to the Miner Slough Bridge is located on a levee. In a base flood event, SR 84 north of Miner Slough can be overtopped. Within the project site, the elevation of this levee ranges from approximately 26.9 ft to 26.3 ft (NAVD88). Holland Road is also on a levee; within the project site the elevation of this levee ranges from 2 ft to 23.6 ft (NAVD88). The land usage of the surrounding area is primarily agricultural, with very few residences.

The Flood Insurance Rate Map (FIRM) number 06095C0345E, dated May 4, 2009 (Federal Emergency Management Agency [FEMA], 2009), indicates that the base flood inundates the area in the vicinity of the Miner Slough Bridge. Miner Slough is identified as Zone AE with a base flood water surface elevation (WSE) of 17 ft (NAVD88). The area north of Miner Slough is also identified as Zone AE with a base flood WSE of 13 ft (NAVD88). The area south of Miner Slough is identified as Zone A, meaning that no base flood WSE has been determined. The FIRM shows that the proposed project site is located in Zone AE (Figure 2-5).

The Preliminary Location Hydraulic Study (Caltrans 2015g) documents effects of the project on floodplain encroachment and identifies risks and potential impacts of the proposed action on the floodplain. The Summary of Floodplain Encroachment Report (Caltrans 2015h) summarizes the following:
• The proposed action is not a longitudinal encroachment of the base floodplain.

• The risks associated with the implementation of the proposed action are not significant.
FIGURE 2-5
Federal Emergency Management Agency Flood Insurance Rate Map
Miner Slough Bridge Replacement Project
EA 005660, State Route 84 Post Mile 12.0/12.4
Solano County, California
• The proposed action does not support probable incompatible floodplain development.

• There are no significant impacts on natural and beneficial floodplain values.

• No special mitigation measures are necessary to minimize impacts or restore and preserve natural and beneficial floodplain values.

• The proposed action does not constitute a significant floodplain encroachment as defined in 23 CFR, Section 650.105(q).

2.2.1.3 ENVIRONMENTAL CONSEQUENCES

Alternative 1 – Bridge Replacement

Construction Phase

Under Alternative 1 approximately 150 cubic yards of fill would be placed below the base flood elevation of 17 ft (NAVD 88). Minimal fill would be placed within Zone A on the south side of Ryer Road. Approximately 14,800 cubic yards of fill would be placed for the realigned portion of Route 84 below the base flood elevation of 13 ft (NAVD 88). Approximately 612 ft of the new roadway is below the base flood elevation of 13 ft (NAVD 88) (Caltrans 2015g). Alternative 1 would result in approximately 1.67 ac of impervious surface, of which 0.57 ac would be re-worked (removed and replaced) and 1.13 ac would be new impervious surfaces. In a base flood event, SR 84 north of Miner Slough will be overtopped. Although new roadway would be below the base flood elevation, given the extent of the floodplain in the Delta region the amount of fill proposed would not significantly increase the base flood elevation, nor the flow pattern; therefore no significant impact would occur.

Construction and demolition activities associated with the proposed project would not impede or redirect flows; therefore no adverse effects to the area hydrology or floodplain would occur.

Operation Phase

As a result of deposition of fill material at the southern approach as described above under Construction Phase, placement of fill north of the proposed bridge, and the presence of fewer piers compared to the existing bridge, the proposed project could alter the floodplain under Alternative 1. However, the amount of fill would not significantly increase the base flood elevation, nor alter the flow pattern of Miner Slough; therefore no significant impact would occur.
According to the *Preliminary Hydraulic Report* (Caltrans 2014a), the preliminary hydraulic analysis and scour analysis conducted for the proposed project indicate that the bridge replacement would not cause hydraulic or scour-related issues because it was determined that post-project conditions would remain the same as the pre-project conditions.

**Alternative 2 – Bridge Rehabilitation**

*Construction Phase*

Alternative 2 would require approximately 1,880 cubic yards of fill north of Holland Road, below the base flood elevation of 13 ft (NAVD 88). South of Holland Road, there would be approximately 45 cubic yards of fill below the base flood elevation of 17 ft (NAVD 88) (Caltrans 2015g). Alternative 2 would result in approximately 0.62 ac of impervious surface, of which 0.58 ac would be re-worked (removed and replaced) and 0.04 ac are would be new impervious surfaces. In a base flood event, SR 84 north of Miner Slough would continue to be overtopped. Although new roadway would be below the base flood elevation, given the extent of the floodplain in the Delta region the amount of fill proposed would not significantly increase the base flood elevation, nor the flow pattern; therefore no significant impact would occur.

Construction and demolition activities associated with Alternative 2 would not impede or redirect flows; therefore no adverse effects to the area hydrology or floodplain would occur.

*Operation Phase*

As a result of deposition of fill material at the southern approach and placement of fill north of the existing bridge, the road work associated with the proposed bridge rehabilitation could alter the floodplain. The surrounding area in the vicinity of the project is relatively flat. Given the extent of the floodplain in the Delta region, the amount of fill would not significantly increase the base flood elevation, nor alter the flow pattern of Miner Slough; therefore no significant impact would occur.

Bridge rehabilitation would not cause hydraulic or scour-related issues because conditions would remain the same as the pre-project conditions.

**No-Build Alternative**

Under the No-Build Alternative no change to hydrology or floodplains would occur.
2.2.1.4 AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES
No adverse effects would occur to hydrology or floodplains during construction or operation of either Alternative 1 or 2; therefore, no avoidance, minimization and/or mitigation measures are proposed.

2.2.2 Water Quality and Storm Water Runoff
2.2.2.1 REGULATORY SETTING
Federal Requirements: Clean Water Act
In 1972, Congress amended the Federal Water Pollution Control Act, making the addition of pollutants to waters of the U.S. from any point source\(^4\) unlawful unless the discharge is in compliance with a National Pollutant Discharge Elimination System (NPDES) permit. This Act and its amendments are known today as the Clean Water Act (CWA). Congress has amended the CWA several times. In the 1987 amendments, Congress directed dischargers of storm water from municipal and industrial/construction point sources to comply with the NPDES permit scheme. The following are important CWA sections:

- Sections 303 and 304 require states to issue water quality standards, criteria, and guidelines.

- Section 401 requires an applicant for a federal license or permit to conduct any activity that may result in a discharge to waters of the U.S. to obtain certification from the state that the discharge will comply with other provisions of the Act. This is most frequently required in tandem with a Section 404 permit request (see below).

- Section 402 establishes the NPDES, a permitting system for the discharges (except for dredge or fill material) of any pollutant into waters of the U.S. Regional Water Quality Control Boards (RWQCBs) administer this permitting program in California. Section 402(p) requires permits for discharges of storm water from industrial/construction and municipal separate storm sewer systems (MS4s).

- Section 404 establishes a permit program for the discharge of dredge or fill material into waters of the United States. This permit program is administered by the U.S. Army Corps of Engineers (USACE).

\(^4\) A point source is any discrete conveyance such as a pipe or a man-made ditch.
The goal of the CWA is “to restore and maintain the chemical, physical, and biological integrity of the Nation’s waters.”

The USACE issues two types of 404 permits: General and Standard permits. There are two types of General permits: Regional permits and Nationwide permits. Regional permits are issued for a general category of activities when they are similar in nature and cause minimal environmental effect. Nationwide permits are issued to allow a variety of minor project activities with no more than minimal effects.

Ordinarily, projects that do not meet the criteria for a Nationwide Permit may be permitted under one of the USACE’s Standard permits. There are two types of Standard permits: Individual permits and Letters of Permission. For Standard permits, the USACE decision to approve is based on compliance with the U.S. Environmental Protection Agency’s (USEPA’s) Section 404(b)(1) Guidelines (40 CFR Part 230), and whether the permit approval is in the public interest. The Section 404(b)(1) Guidelines (Guidelines) were developed by the USEPA in conjunction with the USACE, and allow the discharge of dredged or fill material into the aquatic system (waters of the U.S.) only if there is no practicable alternative that would have lesser adverse effects. The Guidelines state that the USACE may not issue a permit if there is a least environmentally damaging practicable alternative (LEDPA) to the proposed discharge that would have lesser effects on waters of the U.S. and not have any other significant adverse environmental consequences. According to the Guidelines, documentation is needed that a sequence of avoidance, minimization, and compensation measures has been followed, in that order. The Guidelines also restrict permitting activities that violate water quality or toxic effluent standards, jeopardize the continued existence of listed species, violate marine sanctuary protections, or cause “significant degradation” to waters of the U.S. In addition, every permit from the USACE, even if not subject to the Section 404(b)(1) Guidelines, must meet general requirements (see 33 CFR 320.4).

**State Requirements: Porter-Cologne Water Quality Control Act**

California’s Porter-Cologne Act, enacted in 1969, provides the legal basis for water quality regulation within California. This Act requires a “Report of Waste Discharge” for any discharge of waste (liquid, solid, or gaseous) to land or surface waters that may impair beneficial uses for surface and/or groundwater of the state. It predates the CWA and regulates discharges to waters of the state. Waters of the state include more

---

5 The USEPA defines “effluent” as “wastewater, treated or untreated, that flows out of a treatment plant, sewer, or industrial outfall.”
than just waters of the U.S., like groundwater and surface waters not considered waters of the U.S. Additionally, it prohibits discharges of “waste” as defined, and this definition is broader than the CWA definition of “pollutant.” Discharges under the Porter-Cologne Act are permitted by Waste Discharge Requirements (WDRs) and may be required even when the discharge is already permitted or exempt under the CWA.

The State Water Resources Control Board (SWRCB) and RWQCBs are responsible for establishing the water quality standards (objectives and beneficial uses) required by the CWA and regulating discharges to ensure compliance with the water quality standards. Details about water quality standards in a project area are included in the applicable RWQCB Basin Plan. In California, RWQCBs designate beneficial uses for all water body segments in their jurisdictions and then set criteria necessary to protect these uses. As a result, the water quality standards developed for particular water segments are based on the designated use and vary depending on that use. In addition, the SWRCB identifies waters failing to meet standards for specific pollutants. These waters are then state-listed in accordance with CWA Section 303(d). If a state determines that waters are impaired for one or more constituents and the standards cannot be met through point source or non-point source controls (NPDES permits or WDRs), the CWA requires the establishment of total maximum daily loads (TMDLs). TMDLs specify allowable pollutant loads from all sources (point, non-point, and natural) for a given watershed.

**State Water Resources Control Board and Regional Water Quality Control Boards**

The SWRCB administers water rights, sets water pollution control policy, issues Water Board orders on matters of statewide application, and oversees water quality functions throughout the state by approving Basin Plans, TMDLs, and NPDES permits. RWQCBs are responsible for protecting beneficial uses of water resources within their regional jurisdiction using planning, permitting, and enforcement authorities to meet this responsibility.

**National Pollutant Discharge Elimination System (NPDES) Program**

**Municipal Separate Storm Sewer Systems (MS4)**

Section 402(p) of the CWA requires the issuance of NPDES permits for five categories of storm water discharges, including MS4s. An MS4 is defined as “any conveyance or system of conveyances (roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, human-made channels, and storm drains)
owned or operated by a state, city, town, county, or other public body having jurisdiction over storm water, that is designed or used for collecting or conveying storm water.” The SWRCB has identified Caltrans as an owner/operator of an MS4 under federal regulations. Caltrans’ MS4 permit covers all Caltrans rights-of-way, properties, facilities, and activities in the state. The SWRCB or the RWQCB issues NPDES permits for 5 years, and permit requirements remain active until a new permit has been adopted.

Caltrans’ MS4 Permit (Order No. 2012-0011-DWQ) was adopted on September 19, 2012 and became effective on July 1, 2013. The permit has three basic requirements:

1. Caltrans must comply with the requirements of the Construction General Permit (CGP) (see below);

2. Caltrans must implement a year-round program in all parts of the State to effectively control storm water and non-storm water discharges; and

3. Caltrans storm water discharges must meet water quality standards through implementation of permanent and temporary (construction) best Management Practices (BMPs), to the Maximum Extent Practicable, and other measures as the SWRCB determines to be necessary to meet the water quality standards.

To comply with the permit, Caltrans developed the Statewide Storm Water Management Plan (SWMP) to address storm water pollution controls related to highway planning, design, construction, and maintenance activities throughout California. The SWMP assigns responsibilities within Caltrans for implementing storm water management procedures and practices as well as training, public education and participation, monitoring and research, program evaluation, and reporting activities. The SWMP describes the minimum procedures and practices Caltrans uses to reduce pollutants in storm water and non-storm water discharges. It outlines procedures and responsibilities for protecting water quality, including the selection and implementation of BMPs. The proposed project will be programmed to follow the guidelines and procedures outlined in the latest SWMP to address storm water runoff.

**Construction General Permit**

Caltrans’ Construction General Permit (Order No. 2009-009-DWQ), adopted on September 2, 2009, became effective on July 1, 2010. Amended by 2010-0014-DWQ and 2012-0006-DWQ The permit regulates storm water discharges from construction
sites that result in a Disturbed Soil Area (DSA) of 1 acre or greater, and/or are smaller sites that are part of a larger common plan of development. By law, all storm water discharges associated with construction activity where clearing, grading, and excavation result in soil disturbance of at least 1 acre must comply with the provisions of the CGP. Construction activity that results in soil disturbances of less than 1 acre is subject to this CGP if there is potential for significant water quality impairment resulting from the activity as determined by the RWQCB. Operators of regulated construction sites are required to develop storm water pollution prevention plans; to implement sediment, erosion, and pollution prevention control measures; and to obtain coverage under the CGP.

The 2009 Construction General Permit separates projects into Risk Levels 1, 2, or 3. Risk levels are determined during the planning and design phases, and are based on potential erosion and transport to receiving waters. Requirements apply according to the Risk Level determined. For example, a Risk Level 3 (highest risk) project would require compulsory storm water runoff pH and turbidity monitoring during construction, as well as aquatic biological assessments during specified seasonal windows before and after construction. For all projects subject to the permit, applicants are required to develop and implement an effective Storm Water Pollution Prevention Plan (SWPPP). In accordance with Caltrans’ Standard Specifications, a Water Pollution Control Plan (WPCP) is necessary for projects with DSA of less than 1 acre.

**Section 401 Permitting**

Under Section 401 of the CWA, any project requiring a federal license or permit that may result in a discharge to a water of the United States must obtain a 401 Certification, which certifies that the project will be in compliance with state water quality standards. The most common federal permits triggering 401 Certification are CWA Section 404 permits issued by the USACE. The 401 permit certifications are obtained from the appropriate RWQCB, dependent on the project location, and are required before the USACE issues a 404 permit.

In some cases, the RWQCB may have specific concerns with discharges associated with a project. As a result, the RWQCB may issue a set of requirements known as Waste Discharge Requirements under the State Water Code (Porter-Cologne Act) that define activities, such as the inclusion of specific features, effluent limitations, monitoring, and plan submittals that are to be implemented for protecting or
benefiting water quality. WDRs can be issued to address both permanent and temporary discharges of a project.

2.2.2.2 AFFECTED ENVIRONMENT
A Water Quality Study (Caltrans 2015i) was prepared to assess the proposed project’s potential effects to water quality and storm water management in the area.

The project is located within the Central Valley Regional Water Quality Control Board jurisdiction of Region 5S, which is responsible for implementation and enforcement of state and federal laws and regulations concerning water quality.

The proposed project is located within Hydrologic Sub-Area (HSA) 510.00, specifically the Toe Drain – Cache Slough sub-watershed. From the project site, Miner Slough flows for approximately 6 miles until discharge to the Sacramento River Deep Water Ship Channel (Channel). From there, flows continue along the Channel for approximately 3.8 miles to the confluence with Steamboat Slough, and then an additional 0.5 mile to the confluence with the Sacramento River. Flow within the Sacramento River continues for approximately 14 miles until its confluence with the San Joaquin River at the Delta (see Figure 2-6). Thus, the flowpath from the project site to the Delta is approximately 24 miles. These water bodies are included as part of the CWA Section 303(d) List for Water Quality Limited Segments, though rather than being listed separately, are collectively grouped as “Delta Waterways” (northern portion). This listing includes assigned pollutants/stressors of concern, and associated TMDLs, for the extensive network of water bodies that constitute Delta Waterways (northern portion).

According to the Region 5S Basin Plan (RWQCB 1998), Miner Slough is included with Delta water bodies requiring specific water quality objectives (WQOs) for diazinon and chlorpyrifos, both organophosphate insecticides. Additionally, the Basin Plan lists Miner Slough as part of the Delta Mercury Control Program (Caltrans 2015i).

Beneficial Uses
The Basin Plan (RWQCB 1998) establishes beneficial uses for waterways and water bodies within the Delta which include:

- Municipal and Domestic Supply (MUN)
- Agricultural Supply (AGR)
- Industrial Process Supply (PROC)
- Industrial Service Supply (IND)
- Contact/Non-Contact Water Recreation (REC1/REC2)
- Warm Freshwater Habitat (WARM)
- Cold Freshwater Habitat (COLD)
- Migration of Aquatic Organisms (MIGR)
- Spawning, Reproduction, and/or Early Development (SPWN)
- Wildlife Habitat (WILD)
- Navigation (NAV)

**Figure 2-6  Flow Path from Miner Slough Bridge to the San Joaquin River at the Delta**

In addition, the Basin Plan specifically includes Miner Slough amongst Delta water bodies with Commercial and Sport Fishing (COMM) (recreation) as a beneficial use.
Groundwater

The California Department of Water Resources (DWR) Bulletin 118 has designated the project site as part of the Solano Sub-Basin of the Sacramento Valley Groundwater Basin (Sub-Basin Number 5-21.66) (DWR 2003). The California Statewide Groundwater Elevation Monitoring (CASGEM) Groundwater Basin Prioritization is a statewide ranking of groundwater basin importance that incorporates groundwater reliance and focuses on basins producing greater than 90 percent of California’s annual groundwater. This sub-basin has been ranked as having “Medium” prioritization (DWR 2014).

2.2.2.3 ENVIRONMENTAL CONSEQUENCES

Alternative 1 – Bridge Replacement

Construction Phase

Alternative 1 would result in approximately 3.5 ac of soil disturbance. Construction would include ground disturbance from staging and active construction areas such as grading and earth moving activities; stockpiling of soils; and the loading, unloading, and transport of excavated and fill material. Structural material handling and concrete management would occur over Miner Slough. Heavy metals associated with vehicle tire and brake wear, oil and grease, and exhaust emissions are the primary pollutants associated with transportation corridors. Rainfall could carry loose soils into adjacent waterways, resulting in increased sedimentation and potential effects to water quality, such as an increase in turbidity. To prevent or reduce potential impacts, temporary BMPs would be deployed for general sediment control and material management; these may include, but are not limited to: hydraulic mulch (bonded fiber matrix), cover, fiber roll, limiting construction entrances and exits, concrete wash-out, and street sweeping.

Accidental spills or releases of hazardous materials, such as fuel or water with high pH from concrete work associated with bridge construction, could degrade the quality of storm water runoff that flows into the slough, or flow directly into the slough during dry-weather conditions. This contamination could potentially affect water quality of Miner Slough. With implementation of BMPs and permit requirements, the impact on water quality would be minimal because the potential for accidental spills or releases would be low and, if they did occur, they would be attended to and cleaned up immediately.

The Construction General Permit separates projects into Risk Levels 1, 2, or 3. Risk levels are determined during the planning and design phases, and are based on
sediment and receiving water risks. Requirements apply according to the risk level
determined. Alternative 1 is a Risk Level 1 (lowest risk) based on the potential
sediment risk and the receiving water risk. The requirements for Risk Level 1 projects
are presented in Attachment C of the CGP. Alternative 1 is subject to the CGP and is
required to develop and implement an effective SWPPP, because the disturbed soil
area is greater than 1 ac.

Alternative 1 would require issuance of a Clean Water Act Section 401 certification
from the Central Valley Regional Water Quality Control Board (Region 5S) for
discharge into navigable waters; Caltrans would comply with the permanent storm
water treatment and hydrograph modification (hereafter, “hydromodification”)
mitigation requirements expected to be included as conditions.

With implementation of BMPs and permit requirements, the impact on water quality
would be minimal.

Dewatering may be required during removal of the existing structure and abutment
construction of the proposed structure. If so, effluent may have to be captured, stored,
sampled and, depending on sampling results, hauled off-site. Water stored during
dewatering would be stored and released in accordance with the permit requirements,
and therefore potential impacts would be minimal. Water removed from the
cofferdam would be discharged into Miner Slough.

**Effects to Groundwater**
The surface water elevation at Miner Slough is considered the groundwater level
throughout the project site. If groundwater were encountered during construction,
dewatering would protect groundwater quality. Water stored during dewatering would
be stored and released in accordance with the permit requirements, and therefore
potential impacts would be minimal.

**Operation Phase**

**Surface Water**
Alternative 1 would include new roadway surface from the realignment of SR 84, an
operator control house, and a paved parking area. As noted previously, this alternative
would result in approximately 1.67 ac of impervious surface, of which 0.57 ac would
be re-worked (removed and replaced) and 1.13 ac would be new impervious surfaces.
Impervious surfaces have the potential to cause a permanent impact due to the
deposition and transport of sediment in storm water runoff. To address potential
permanent impacts via sediment transport, soil stabilization and sediment control
BMPs would be incorporated as part of the project design. A 401 Water Quality Certification from the RWQCB would be required. The stormwater treatment goal is expected to be approximately 1.67 acre. The Treatment BMP type would be either biofiltration or bioretention.

Potential long-term impacts to water quality from Alternative 1 are similar to those of the existing bridge: namely, the deposition and transport of sediment and vehicular-related pollutants. Because treatment BMPs would be implemented, and because long-term impacts to existing water quality would be similar to existing conditions, impacts from operation of the project would be minimal.

**Groundwater**

The proposed project would increase the impervious area as a result of the new roadway alignment and thus reduce the available unpaved area that previously allowed runoff to infiltrate into the native soils. The reduction of runoff infiltrating through native soils has the potential to result in loss in volume or amount of water that previously recharged localized aquifers and to reduce regional groundwater volumes. However, the increase in impervious area of 1.10 ac would be minimal because it is not expected to result in a measurable change to groundwater recharge.

**Alternative 2 – Bridge Rehabilitation**

**Construction Phase**

Alternative 2 would result in approximately 3.25 ac of soil disturbance. Construction of Alternative 2 would require similar ground disturbance activities, structural material handling, and primary pollutants associated with transportation corridors as discussed under Alternative 1. BMPs would be deployed for general sediment control and material management, accidental spills or releases of hazardous materials as discussed above under Alternative 1.

Alternative 2 is a Risk Level 1 (lowest risk) based on the potential sediment risk and the receiving water risk. The requirements for Risk Level 1 projects are presented in Attachment C of the CGP. Alternative 2 is subject to the CGP and is required to develop and implement an effective SWPPP, because the disturbed soil area is greater than 1 ac.

This project would require issuance of a Clean Water Act Section 401 certification from the Central Valley Regional Water Quality Control Board (Region 5S) for discharge into navigable waters; Caltrans would comply with the hydromodification mitigation requirements expected to be included as conditions.
With implementation of BMPs and permit requirements, the impact on water quality would be minimal.

Effects to Groundwater
The surface water elevation at Miner Slough is considered the groundwater level throughout the project site. If groundwater were encountered during construction, dewatering would protect groundwater quality. Water stored during dewatering would be stored and released in accordance with the permit requirements, and therefore potential impacts would be minimal.

Operation Phase
Surface Water
Under Alternative 2, the profile of Holland Road would need to be raised for a length of 500 ft to conform to the bridge access span, and the profile of SR 84 to the north of Holland Road would be raised for a stretch of 240 ft to conform to the newly paved Holland Road. As noted previously, Alternative 2 would result in approximately 0.62 ac of impervious surface, of which 0.58 ac would be re-worked (removed and replaced) and 0.04 ac are would be new impervious surfaces. Impervious surfaces have the potential to cause a permanent impact due to the deposition and transport of sediment in storm water runoff. To address potential permanent impacts via sediment transport, soil stabilization and sediment control BMPs would be incorporated as part of the project design. A 401 Water Quality Certification from the RWQCB would be required. The stormwater treatment goal is expected to be approximately 0.62 ac. The Treatment BMP type would be either biofiltration or bioretention.

Potential long-term impacts to water quality from Alternative 2 are similar to those of the existing bridge: namely, the deposition and transport of sediment and vehicular-related pollutants. Because treatment BMPs would be implemented, and because long-term impacts to existing water quality would be similar to existing conditions, impacts from operation of the project would be minimal.

Groundwater
Alternative 2 would increase the impervious area as a result of the new roadway alignment and thus reduce the available unpaved area that previously allowed runoff to infiltrate into the native soils. The reduction of runoff infiltrating through native soils has the potential to result in a diminished volume of water that previously recharged localized aquifers and thus a reduction in regional groundwater volumes.
However, the increase in impervious area of 0.04 ac would be minimal and therefore is not expected to result in a measurable change to groundwater recharge.

**No-Build Alternative**
Currently there are no existing stormwater management features located at the Miner Slough Bridge. Under the No-Build Alternative existing storm water treatment associated with SR 84 would remain unchanged.

**2.2.2.4 AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES**
Under either of the Build Alternatives, the following AMMs would be implemented during project construction and operation to prevent potential water quality effects from occurring.

**Construction Phase**
- **Measure WATER-1: SWPPP.** A Storm Water Pollution Prevention Plan will be developed and implemented and will comply with the Caltrans SWMP, which includes measures to protect sensitive areas and to prevent and minimize storm water and non-storm water discharges. Water quality inspector(s) will inspect construction areas to determine if the storm water BMPs are adequate and adjust them, if necessary. Construction activities for the roadway improvements and bridge replacement and demolition will be regulated under the Construction General Permit. The SWPPP will be prepared by the contractor and approved by Caltrans.

**Measure WATER-2: Stockpile Area**
Stockpile areas for construction materials, equipment, and debris will be placed greater than 150 ft away from Miner Slough, as well as covered to minimize/avoid impacts to Miner Slough.

**Measure WATER-3: Temporary Construction Site BMPs**
These BMPs will be implemented throughout the duration of construction activities to avoid and minimize pollutant loads in potential storm water/non-storm water discharges. Construction Site BMP strategies applicable to this proposed project may include the following:

- Soil stabilization: Temporary fence (Environmentally Sensitive Area [ESA] type); move-in/move-out; hydoseeding; geotextiles, mats, plastic covers, and erosion control blankets; hydraulic mulch
- **Sediment Control**: Fiber rolls, silt fence, sediment trap, gravel bag berm, check dams, storm drain inlet protection

- **Tracking Control Practices**: Temporary construction entrance/exit

- **Wind Erosion Controls**: Temporary covers

- **Non-Storm Water Management**: Dewatering operations, material and equipment use over water

- **Waste Management and Materials Pollution Control**: Concrete waste management, material delivery and storage, material use, stockpile management, spill prevention and control, soil waste management, hazardous waste and/or contaminated soil management, and liquid waste management

A more detailed list of avoidance and minimization measures that were part of the Biological Opinion from USFWS and NMFS can be viewed in Appendix C.

- **Measure WATER-4: Waste Management from Bridge Removal.** Waste from removal of the existing bridge will be conducted in accordance with the Standard Specifications, under Section 13-4.03E(6) entitled: “Structure Removal Over or Adjacent to Water.” The contractor will comply with this standard specification during removal of the existing bridge. All grindings and asphalitic concrete waste will be stored within previously disturbed areas absent of habitat and at a minimum of 150 feet from any culvert or drainage feature.

**Operation Phase**

The project design features to address water quality impacts are a condition of Caltrans’ NPDES permit. These BMPs would be developed and incorporated into the final design of the Build Alternative prior to project construction. Design features would include the following AMM:

- **Measure WATER-5: Permanent Treatment BMPs.** Permanent Treatment BMPs are permanent water quality control measures used to remove pollutants from storm water runoff prior to being discharged from Caltrans’ ROW. Permanent storm water treatment will be provided via biofiltration/bioretention measures (for example, bioretention swale) for the entirety of the new and re-worked impervious surfaces. Hydromodification mitigation is only applicable to
the new impervious surface quantity. The permanent storm water treatment and hydromodification obligations could be achieved within the project limits.

2.2.3 Geology/Soils/Seismic/Topography

2.2.3.1 Regulatory Setting
For geologic and topographic features, the key federal law is the Historic Sites Act of 1935, which establishes a national registry of natural landmarks and protects “outstanding examples of major geological features.” Topographic and geologic features are also protected under CEQA.

This section also discusses geology, soils, and seismic concerns as they relate to public safety and project design. Earthquakes are prime considerations in the design and retrofit of structures. Caltrans’ Office of Earthquake Engineering is responsible for assessing the seismic hazard for Caltrans projects. Structures are designed using Caltrans’ Seismic Design Criteria (SDC; Caltrans 2013a). The SDC provide the minimum seismic requirements for highway bridges designed in California. A bridge’s category and classification will determine its seismic performance level and which methods are used for estimating the seismic demands and structural capabilities. For the proposed project an Ordinary Standard bridge would be constructed. For more information, please see Caltrans’ Division of Engineering Services, Office of Earthquake Engineering, Seismic Design Criteria.

2.2.3.2 Affected Environment
A Preliminary Geotechnical Report (Caltrans 2015a) was prepared for the proposed project. The following information is derived from this report.

Geologic Setting
The project site is covered by Holocene alluvial fan levee deposits. Many of the islands that form the farmlands in the Delta regions have been protected by the Central Valley Project and the 1937 Rivers and Harbors Act. Many of the islands are ringed by a natural levee topped by a manmade levee.

Soils. The project site is covered by Colombia fine sandy loam. The Colombia fine sandy loam consists of nearly level, somewhat poorly drained soils on flood plains. These soils formed from mixed alluvium. This soil is pale-brown and gray, distinctly mottled, stratified sand, loam, and silty clay loam. Included with this soil are small areas of Valdez silt loam, Egbert silty clay loam, and Ryde clay loam. Permeability is moderately rapid. Surface runoff is slow, erosion is not a hazard. Shrink-swell
potential is low, and corrosivity is moderate. Figure 2-7 shows the soils in the project area.

**Faults and Seismicity**
The dominant geologic structure in the area is the Great Valley fault system which consists primarily of northwest-striking, reverse faults. The closest portions of the Great Valley fault system to the project site are the Midland fault which is 8.9 miles south of the project site, and the Gordon Valley and Pittsburg Kirby Hills portions which are more than 17 miles west of the project site. Fault data are shown in Table 2-3.
Table 2-3  Fault Data

<table>
<thead>
<tr>
<th>Fault Name</th>
<th>Distance from Project Site (miles)</th>
<th>Fault ID</th>
<th>Fault Type</th>
<th>Maximum Magnitude (MMax)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Great Valley 06 Midland</td>
<td>8.9</td>
<td>116</td>
<td>Reverse</td>
<td>6.8</td>
</tr>
<tr>
<td>Great Valley 05 Pittsburgh Kirby Hills</td>
<td>17.8</td>
<td>111</td>
<td>Reverse</td>
<td>6.6</td>
</tr>
<tr>
<td>Great Valley 04b Gordon Valley</td>
<td>17.3</td>
<td>104</td>
<td>Reverse</td>
<td>6.7</td>
</tr>
</tbody>
</table>

Source: Preliminary Geotechnical Report for Miner Slough Bridge (Caltrans 2015a)

No known active or potentially active faults cross the project site; therefore, the potential for fault ruptures is low.

**Liquefaction**

Liquefaction is a process whereby strong ground shaking causes loose, saturated, unconsolidated sediments to lose strength and to behave as a fluid. This subsurface process can cause ground deformation at the surface, including lateral spreading and differential compaction or settlement and sand boils. Loss of bearing strength and ground movements associated with liquefaction may result in damage to structures/roadways. Loose, saturated sandy and silty soils are particularly susceptible to liquefaction.

The Preliminary Geotechnical Report (Caltrans 2015a) indicates that a secondary seismic hazard is the susceptibility to liquefaction. Liquefaction susceptibility is very high at the slough banks and moderate approximately 100 ft inland of the project site. In addition, where streams are incised, the Holocene alluvial fan deposits that form the levee and cover the project site could be susceptible to spreading.

**Topography.** The project site is located in the eastern part of Solano County, which is on the floor of the Sacramento Valley. The valley areas of Solano County are level or gently sloping alluvial plains and marshes. They are near sea level along the eastern and southern borders and rise to an elevation of approximately 100 ft at the foot of the Montezuma Hills. The bridge spans across Miner Slough at the northern tip of Ryer Island. The tops of the levees are approximately 15 ft above the slough. Drainage from the roadway is typically sheet flow into the low-lying areas.

**2.2.3.3 ENVIRONMENTAL CONSEQUENCES**

According to the Preliminary Geotechnical Report (Caltrans 2015a) there are no hazardous geotechnical conditions, such as erosion, landslides, slope stability, settlement of the levees, or scour, at the project site. However, there are geologic
constraints that may require special considerations in regard to the potential for seismic activity (ground shaking).

**Alternative 1 – Bridge Replacement**

*Construction Phase*

Construction impacts could include soil movement due to initial settlement of fill. These potential impacts would be addressed in the construction and design requirements for the proposed project. Implementing construction and design requirements reduces the risk of soil movement during construction to a minimal level. The risk would be elevated if an earthquake were to occur during construction, but the likelihood of a large earthquake during construction is considered low because of the relatively short duration of construction relative to the frequency of large earthquakes.

*Operation Phase*

Northern California is within the most tectonically active area of the North American Continent. The proposed project lies within the Delta, which is on the western edge of the San Joaquin/Sacramento Valley. The western side of the valley has a complex system of faults. According to the Alquist-Priolo Earthquake Fault Zone Maps, the proposed project is not located within a special studies zone (Caltrans 2015a). However, given the location of the project ground shaking could occur at this location. Under Alternative 1 the project design would incorporate SDC requirements for an Ordinary Standard bridge. With implementation of design features the potential impacts from ground-shaking are minimal. Because the potential for fault ruptures at the project site is low, it is unlikely that the bridge, or roadway, would be damaged by fault ruptures.

Liquefaction could result in lateral spreading, the settlement and failure of land or structures over the liquefiable soil layers. According to the *Preliminary Geotechnical Report* (Caltrans 2015a), liquefaction susceptibility is very high at the stream banks and moderate approximately 100 ft inland, and the project site could be susceptible to lateral spreading. Lateral spreading could impact project structures such as piers and bridge abutments. The project design would incorporate standard engineering features that would not increase the potential for liquefaction at the project site. For example, the piles for the piers would be driven to an appropriate depth (50 ft deep) to support the superstructure, and the abutments would be designed and constructed to address any structural concerns regarding liquefaction.
Alternative 2 – Bridge Rehabilitation

Under Alternative 2 impacts from construction and operation would be the same as discussed above under Alternative 1.

2.2.3.4 AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES

The following AMM would minimize ground shaking impacts to the proposed project:

Measure GEO-1: Engineering Design

Engineering design of project structures will be carried out in accordance with the latest version of the Caltrans Seismic Design Criteria (Caltrans 2013a). The Caltrans Seismic Design Methodology (Caltrans 2010b) applies to all highway bridges designed in California.

- Fault rupture and ground shaking: Engineering design of the bridge, operator control house, and roadways will be carried out in accordance with Caltrans design standards, which take into account, for example, proximity to a fault. Because of the potential for ground shaking in the project area in the event of a large earthquake, Caltrans will perform a detailed seismic demand analysis and the bridge, embankments, slopes, and roadway will be designed to withstand strong ground shaking. The measures to protect structures from ground shaking may include structural improvements/strengthening, as well as soil improvements.

- Liquefaction: Because of the potential for liquefaction and lateral spreading, there is a potential for the proposed structures to be damaged in a large earthquake. Through the use of appropriate construction and design methods, in accordance with the Caltrans Highway Design Manual (Caltrans 2012) and Caltrans Design Information Bulletins, the proposed project would not increase the potential for liquefaction at the project site. Structural concerns regarding liquefaction will be addressed by incorporating appropriate construction and design methods.

2.3 Biological Environment

2.3.1 Natural Communities

2.3.1.1 REGULATORY SETTING

This section discusses natural communities of concern. The focus of this section is on biological communities, not individual plant or animal species. This section also
includes information on wildlife corridors and habitat fragmentation. Wildlife corridors are areas of habitat used by wildlife for seasonal or daily migration. Habitat fragmentation involves the potential for dividing sensitive habitat and thereby lessening its biological value.

Habitat areas that have been designated as critical habitat under the federal Endangered Species Act (FESA) are discussed in Section 2.3.5, Threatened and Endangered Species. Wetlands and other waters are briefly discussed below and in Section 2.3.2.

2.3.1.2 AFFECTED ENVIRONMENT
Habitat in the study Area supports various common and special-status wildlife species. The Biological study area (BSA) for the proposed project is the same as the study area used to evaluate most other types of resources in this IS/EA; this area is referred to throughout the IS/EA as simply “the study area” (except on the figures in this Biological Environment section, which refer to the BSA). The study area includes the limits of project construction plus a 200-foot buffer and is shown on Figure 1-2; this same area is shown as the BSA in the figures in this section. Field studies were conducted within the limits of the study area. The banks of Miner Slough are dominated by riparian vegetation, including open areas with riprap and an access road adjacent to the bridge along the north bank. Below the edge of the banks the slough has been left in a relatively undisturbed state.

The proposed project is in a sparsely populated area where the majority of the vegetation consists of areas of valley foothill riparian and annual grassland and agriculture. The majority of the vegetation consists of native riparian forest with a mix of native and non-native species in the understory.

Five habitat types/land cover types were found in the approximately 33-acre study area and are discussed briefly below in order of abundance. The natural vegetation types are based on A Manual of California Vegetation (Sawyer et al. 2009). Figure 2-8 depicts the habitat types and related impacts due to project activities.

Aquatic (Wetlands and Other Waters)
The wetlands within the BSA consist of small patches along the north bank of the slough and on the small island within the slough, totaling approximately 0.36 acre (see Figure 2-9 in Section 2.3.2). Two wetland types can be found bordering the north bank of the slough. One is a palustrine tidal wetland; the dominant vegetation within this wetland is white alder (Alnus rhombifolia), red willow (Salix laevigata), curly
FIGURE 2-8
Habitat Types within the Biological Study Area
Miner Slough Bridge Project
EA GG660, State Route 84 Post Mile 12.0/12.4
Solano County, California
dock (*Rumex crispus*), and common rush (*Juncus patens*). The other is a palustrine emergent seasonal wetland; the dominant vegetation within this wetland is white alder, red willow, common rush, and sedge (*Carex* spp.). The National Wetlands Inventory Wetlands Mapper (NWI 2015) classifies the island as shrub scrub wetland.

Other waters within the study area consist of Miner Slough and total approximately 10.3 acre. Miner Slough makes up the riverine habitat in the BSA. Miner Slough provides potential habitat for many fish species, including threatened and endangered species, as described in Section 2.3.5.

**Annual Grassland**

Annual grassland comprises approximately 7.90 acres of the study area. Few native plants were observed in this habitat. It is dominated by introduced annual grasses such as wild oats (*Avena fatua*), soft chess (*Bromus hordeaceus*), ripgut brome (*Bromus diandrus*), wild barley (*Hordeum spp.*), and foxtail fescue (*Festuca myuros*). The annual grassland within the study area also supports several large trees more than four inches diameter at breast height (dbh) in a patch north of the bridge. The grassland areas as a whole likely does not provide quality habitat for wildlife species. The area provides little cover or foraging habitat for small mammals and birds because it is routinely disturbed through maintenance (e.g., mowing) activities and is dominated by nonnative grasses.

**Valley Foothill Riparian**

Valley foothill riparian habitat makes up approximately 7.31 acres of the study area. The valley foothill riparian vegetation type borders both sides of Miner Slough. Two California Native Plant Society (CNPS) rare plants were observed within the riparian habitat of the study area: Sanford’s arrowhead (*Sagittaria sanfordii*; CNPS List 1B.2) and woolly rose-mallow (*Hibiscus lasiocarpus var. occidentalis*; CNPS List 1B.2). This habitat provides potential bird nesting habitat and upland dispersal habitat for the federally endangered giant garter snake (*Thamnophis gigas*).

**Urban/Developed**

These areas are the paved and gravel roads, making up approximately 3.59 acres of the study area including portions of SR 84, Ryer Road, and Holland Road.

**Agriculture**

Agricultural lands make up approximately 3.56 acres of the study area and are located along the northern edge of the study area. This habitat type consists of cropland/pasture that is actively farmed. Agricultural areas typically provide low-
quality foraging habitat for most birds and small mammals, but can provide marginal habitat for some species.

2.3.1.3 ENVIRONMENTAL CONSEQUENCES

Alternative 1 – Bridge Replacement

Construction Phase

Project construction would have permanent and temporary direct impacts to the natural communities listed above in Section 2.3.1.2, Affected Environment. The areas of these effects are shown in Table 2-4.

<table>
<thead>
<tr>
<th>Habitat</th>
<th>Temporary (ac)</th>
<th>Permanent (ac)</th>
<th>Shade (ac)</th>
<th>Total (ac)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>0.032</td>
<td>0.002</td>
<td>0.000</td>
<td>0.034</td>
</tr>
<tr>
<td>Annual Grassland</td>
<td>1.110</td>
<td>0.408</td>
<td>0.042</td>
<td>1.560</td>
</tr>
<tr>
<td>Aquatic (Wetlands and Other Waters)</td>
<td>0.219</td>
<td>0.020</td>
<td>0.216</td>
<td>0.455</td>
</tr>
<tr>
<td>Urban / Developed</td>
<td>0.116</td>
<td>0.101</td>
<td>0.000</td>
<td>0.217</td>
</tr>
<tr>
<td>Valley Foothill Riparian</td>
<td>0.847</td>
<td>0.269</td>
<td>0.103</td>
<td>1.219</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2.324</strong></td>
<td><strong>0.800</strong></td>
<td><strong>0.361</strong></td>
<td><strong>3.485</strong></td>
</tr>
</tbody>
</table>

Alternative 1 would result in the direct conversion of annual grassland and valley foothill riparian habitat due to the new alignment; most of this conversion would be located on the north side of Miner Slough. North of the new alignment, approximately 43 trees with a dbh greater than 4 inches would be removed. These include the following: black walnut (*Juglans nigra*) (approximately 26 trees), acacia (*Acaciae sp.*) (7 trees), English walnut (*Juglans regia*) (2 trees), Fremont cottonwood (*Populus fremontii*) (2 trees), olive (*Olea europaea*) (2 trees), fig (*Ficus carica*) (2 trees), sweet bay (*Laurus nobilis*) (1 tree), and sycamore (*Platanus racemosa*) (1 tree). The removal of trees would result in the loss of foraging habitat for small mammals and some birds and result in the loss of migratory bird nesting habitat.

The new alignment would not likely affect wildlife species that require large contiguous tracts of undeveloped lands for their territories, as the parcel that will be fragmented on the north side of Miner Slough is approximately three acres in size and surrounded by existing roadways and agricultural areas. The agricultural parcels provide little habitat value to wildlife. Impacts to terrestrial habitat would result from
expansion of Holland Road and compaction at the staging area. Construction activities, such as earth-moving or staging, would result in the temporary loss of ground cover. All temporarily disturbed areas, including on the north side of Miner Slough, would be revegetated. Overall, project construction would have minimal effects on the natural communities within the study area and would be further minimized by implementing several natural community-related AMMs, which are described below in Section 2.3.1.4.

**Operation Phase**

Maintenance and operation of the new alignment and bridge are not expected to have effects on natural communities greater than those under existing conditions, as such activities would occur within the paved and developed areas.

**Alternative 2 – Bridge Rehabilitation**

**Construction Phase**

Under Alternative 2, project construction would have permanent and temporary direct impacts on the natural communities listed above in Section 2.3.1.2, Affected Environment. The areas of these effects are shown in Table 2-5.

<table>
<thead>
<tr>
<th>Habitat</th>
<th>Temporary (ac)</th>
<th>Permanent (ac)</th>
<th>Shade (ac)</th>
<th>Total (ac)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>0.032</td>
<td>0.000</td>
<td>0.000</td>
<td>0.032</td>
</tr>
<tr>
<td>Annual Grassland</td>
<td>1.110</td>
<td>0.208</td>
<td>0.000</td>
<td>1.318</td>
</tr>
<tr>
<td>Aquatic (Wetlands and Other Waters)</td>
<td>0.219</td>
<td>0.000</td>
<td>0.216</td>
<td>0.455</td>
</tr>
<tr>
<td>Urban / Developed</td>
<td>0.116</td>
<td>0.054</td>
<td>0.000</td>
<td>0.170</td>
</tr>
<tr>
<td>Valley Foothill Riparian</td>
<td>0.847</td>
<td>0.269</td>
<td>0.000</td>
<td>1.116</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2.324</strong></td>
<td><strong>0.531</strong></td>
<td><strong>0.216</strong></td>
<td><strong>3.091</strong></td>
</tr>
</tbody>
</table>

Alternative 2 would result in the direct conversion of annual grassland and valley foothill riparian habitat on the north side of Miner Slough due to the new alignment, and would also remove approximately 30 trees with a dbh greater than 4 inches. These include the following: black walnut (approximately 16 trees), acacia (8 trees), Fremont cottonwood (1 tree), fig (4 trees), and sweet bay (1 tree). The new alignment would not likely affect wildlife species that require larger contiguous tracts of undeveloped lands for their territories, as this area of impact (on the north side of Miner Slough) is approximately 2.3 acres in size and surrounded by existing
roadways and agricultural areas. Construction activities, such as earth-moving or staging, would have direct temporary effects due to temporary loss of ground cover. The area on the north side of Miner Slough would be revegetated. Impacts to terrestrial habitat would result from expansion of Holland Road and compaction at the staging area. Project construction would have minimal effects on the natural communities within the study area and would be further minimized by implementing natural community-related AMMs, which are described below in Section 2.3.1.4.

**Operation Phase**
Maintenance and operation of the new alignment and bridge are not expected to have effects to natural communities greater than those under existing conditions, as such activities would occur within the paved and developed areas.

**No-Build Alternative**
Under the No-Build Alternative, the proposed project would not be implemented. The No-Build Alternative would not contribute to direct, indirect, or cumulative effects to natural terrestrial and aquatic communities in the study area.

**2.3.1.4 Avoidance, Minimization, and/or Mitigation Measures**
The proposed project has been designed to minimize permanent effects on natural communities to the greatest extent feasible.

Under both Build alternatives all feasible and practical measures would be undertaken to avoid or minimize impacts to all natural areas within the project limits. These include AMMs AIR-1 in Appendix C, and WATER-1 through WATER-4, as described in Section 2.2.2.4, to avoid and/or minimize construction-related impacts. The following AMMs would further minimize the proposed project’s effects on natural communities:

**Measure BIO-1: ESA Fencing**
The final construction plans will show all Environmentally Sensitive Areas (ESAs) (including areas of annual grassland, valley foothill riparian, and areas that may potentially support sensitive species as described in Section 2.3.3 and 2.3.4 below). As first order of work, Caltrans will delineate all ESA’s on the final construction plans. Caltrans will install high-visibility fencing along the boundaries of the project footprint within the riparian zone (i.e., on the levees) of Miner Slough. Fencing will also be installed along the perimeter of the new alignment north of the new bridge and near other environmentally sensitive locations, such as bird nest sites. The features used to identify work boundaries will be removed at the end of construction.
within the given area, or in the bird nest example, when the nest is no longer active. Along the north levee, adjacent to the identified elderberry shrubs, signs will be attached every 50 feet along the high-visibility fencing with the following information: "This area is habitat of the valley elderberry longhorn beetle, a threatened species, and must not be disturbed. This species is protected by the Endangered Species Act of 1973, as amended. Violators are subject to prosecution, fines, and imprisonment." The signs will be clearly readable from a distance of 20 feet, and will be maintained for the duration of construction. Fencing will be installed as a first order of work. The USFWS-approved biological monitor will be onsite to direct the installation of this fencing. High-visibility fencing will then be installed on an as-needed basis such as when bird nests are established.

**Measure BIO-2: Vegetation Control**

The removal of native vegetation will be confined to the minimal area necessary to facilitate construction activities. Temporarily affected areas where vegetation is to be removed, will be re-vegetated (e.g., hydro-seeding and installation of woody plants) with locally appropriate native plant species. Narrow leaved milkweed (Asciepias fascicularius) and/or showy milkweed (A. speciosa) will be added to the seed mix to enhance habitat for the monarch butterfly.

**Measure BIO-3: Seasonal Avoidance**

To the extent practicable, construction will not occur during the wet season. All in-water work (including geotechnical investigation, trestle construction and removal, pile driving, fender installation, and removals) will be conducted between August 1 and October 31 only. To the extent practicable, nighttime construction will be minimized. In-water work will be conducted during daylight hours only to provide fish in the action area with an extended quiet period during nighttime hours for feeding and unobstructed passage.

**Measure BIO-4: Worker Environmental Awareness Training**

Construction personnel will attend a mandatory environmental education program delivered by the USFWS-approved biological monitor(s) prior to any work, vegetation clearing, or construction activities. The program will focus on the conservation measures that are relevant to an employee's personal responsibilities and will include an explanation as how to best avoid take of delta smelt, valley elderberry longhorn beetle, and giant garter snake. At a minimum, the training will include a description of the delta smelt, valley elderberry longhorn beetle, and giant garter snake and how they may be encountered within the action area; their status and
protection; and the relevant conservation measures and terms and conditions of the permits, reviews, and approvals required for project construction. A fact sheet conveying this information will be prepared and distributed to all construction and project personnel. Distributed materials will include cards with distinctive photographs of the delta smelt, valley elderberry longhorn beetle, and giant garter snake, compliance reminders, and relevant contact information. As needed, training will be conducted in Spanish for Spanish-language speakers. Documentation of the training, including sign-in sheets, will be kept on file and made available to the USFWS on request. An outline of the program will be submitted to the USFWS at least twenty (20) working days prior to the first training session. Upon completion of the training program, personnel will sign a form stating that they attended the program and understand all the avoidance and minimization measures and implications of FESA and CESA.

All food-related trash items, such as wrappers, cans, bottles, and food scraps, will be disposed of in closed containers and removed from the entire project site at the end of each workday.

**Measure BIO-5: Avoidance of Entrapment**

To prevent inadvertent entrapment of animals during construction, all excavated, steep-walled holes or trenches more than 1 foot deep will be covered at the close of each working day by plywood or similar materials, or will be provided with one or more escape ramps constructed of earth fill or wooden planks. Before such holes or trenches are filled, they must be thoroughly inspected for trapped animals. All replacement pipes, culverts, or similar structures stored within the project area overnight will be inspected before they are subsequently moved, capped, and/or buried.

**Measure BIO-6: Pre-construction Surveys**

A biologist approved by USFWS and CDFW will conduct pre-construction surveys for federally and state-listed species no more than thirty (30) calendar days prior to ground disturbance. The biologist will be present during construction activities, including vegetation clearing and grubbing when special-status species have the highest likelihood of being harmed or harassed. If at any point any listed species is discovered within the project limits, Federal and State agencies permitting agencies will be contacted on how best to proceed.
Measure BIO-7: Handling of Listed Species
If at any time a listed species is discovered, the resident engineer and the agency-approved biologist will be immediately informed. The agency-approved biologist will determine whether relocating the species is necessary and allowed, and will work with the corresponding agency (USFWS or CDFW) prior to handling or relocating unless otherwise authorized.

Measure BIO-8: Vegetation Removal
Vegetation within the project limits will be impacted by construction activities, and some clearing will be needed. Vegetation will be cleared only where necessary and will be cut above soil level except in areas that will be excavated for roadway construction. This will allow plants that reproduce vegetatively to resprout after construction. All clearing and grubbing of woody vegetation will occur by hand tools or using light construction equipment such as backhoes and excavators. An approved biologist will perform clearance surveys for State and federally listed species immediately prior to initial vegetation removal and ground disturbing activities. See specific measures for the giant garter snake in BIO-16. Swainson’s hawk measures are found in BIO-20, 21, and 22. All cleared vegetation will be removed from the study area to prevent attracting animals to the project site. The contractor will be responsible for obtaining all permits, licenses, and environmental clearances for properly disposing of such materials. All nest avoidance requirements of the Migratory Bird Treaty Act (MBTA) and California Fish and Game Code (CFGC) will be observed.

Mitigation Measure BIO-A: Revegetation and Planting
Upon completion of project construction, mitigation for the loss of valley foothill riparian habitat will be performed on-site within the Caltrans ROW. Approximately 43 trees will be replanted and disturbed areas will be re-contoured to the natural grade and revegetated with native species appropriate for the site conditions. Areas of the footprint, not occupied by hardscape will be graded as needed, relative to the surrounding topography and will be vegetated with appropriate native plants. The success of the restoration will be monitored for at least one year and the restoration plan will be submitted to the USFWS for approval at least 30 days prior to initial groundbreaking. Monitoring reports documenting the restoration efforts will be submitted as appropriate or required by State and Federal permitting agencies, both upon the completion of the restoration implementation and 1 year after the restoration implementation. Monitoring reports will include photo documentation, identification of when restoration was completed, what materials were used, specified plantings,
and justifications of any substitutions to the USFWS-recommended guidelines. If planting cannot be accomplished on-site due to a general lack of suitable planting area, off-site mitigation options will be pursued.

2.3.2 Wetlands and Other Waters
2.3.2.1 Regulatory Setting
Wetlands and other waters are protected under a number of laws and regulations. At the federal level, the Federal Water Pollution Control Act, more commonly referred to as the Clean Water Act (CWA) (33 U.S.C. 1344), is the primary law regulating wetlands and surface waters. One purpose of the CWA is to regulate the discharge of dredged or fill material into waters of the United States, including wetlands. Waters of the United States include navigable waters, interstate waters, territorial seas and other waters that may be used in interstate or foreign commerce. To classify wetlands for the purposes of the CWA, a three-parameter approach is used that includes the presence of hydrophytic (water-loving) vegetation, wetland hydrology, and hydric soils (soils formed during saturation/inundation). All three parameters must be present, under normal circumstances, for an area to be designated as a jurisdictional wetland under the CWA.

Section 404 of the CWA establishes a regulatory program that provides that discharge of dredged or fill material cannot be permitted if a practicable alternative exists that is less damaging to the aquatic environment or if the nation’s waters would be significantly degraded. The Section 404 permit program is run by the USACE with oversight by the USEPA.

SACE issues two types of 404 permits: general and standard permits. There are two types of general permits: regional permits and nationwide permits. Regional permits are issued for a general category of activities when they are similar in nature and cause minimal environmental effects. Nationwide permits are issued to allow a variety of minor project activities with no more than minimal effects.

Ordinarily, projects that do not meet the criteria for a Nationwide Permit may be permitted under one of USACE’s standard permits. There are two types of standard permits: individual permits and letters of permission. For standard permits, USACE’s decision to approve is based on compliance with USEPA’s Section 404(b)(1) Guidelines (USEPA 40 CFR Part 230), and whether permit approval is in the public interest. The Section 404 (b)(1) Guidelines (guidelines) were developed by the USEPA in conjunction with USACE and allow the discharge of dredged or fill material into the aquatic system (waters of the U.S.) only if there is no practicable
alternative which would have less adverse effects. The guidelines state that the USACE may not issue a permit if there is a least environmentally damaging practicable alternative (LEDPA) to the proposed discharge that would have lesser effects on waters of the U.S., and not have any other significant adverse environmental consequences.

The Executive Order for the Protection of Wetlands (EO 11990) also regulates the activities of federal agencies with regard to wetlands. Essentially, this executive order states that a federal agency, such as the Federal Highway Administration and/or Caltrans, as assigned, cannot undertake or provide assistance for new construction located in wetlands unless the head of the agency finds: 1) that there is no practicable alternative to the construction and 2) the project includes all practicable measures to minimize harm.

At the state level, wetlands and waters are regulated primarily by the State Water Resources Control Board, the Regional Water Quality Control Boards, and the California Department of Fish and Wildlife. In certain circumstances, the Coastal Commission (or the Bay Conservation and Development Commission or Tahoe Regional Planning Agency) may also be involved. Sections 1600-1607 of CFGC require any agency that proposes a project that will substantially divert or obstruct the natural flow or substantially change the bed or bank of a river, stream, or lake to notify CDFW before beginning construction. If CDFW determines that the project may substantially and adversely affect fish or wildlife resources, a Lake or Streambed Alteration Agreement will be required. CDFW jurisdictional limits are usually defined by the tops of the stream or lake banks, or the outer edge of riparian vegetation, whichever is wider. Wetlands under jurisdiction of the USACE may or may not be included in the area covered by a Streambed Alteration Agreement obtained from CDFW.

The Regional Water Quality Control Boards were established under the Porter-Cologne Water Quality Control Act to oversee water quality. Discharges under the Porter-Cologne Act are permitted by Waste Discharge Requirements (WDRs) and may be required even when the discharge is already permitted or exempt under the CWA. In compliance with Section 401 of the CWA, the RWQCBs also issue water quality certifications for activities which may result in a discharge to waters of the U.S. This is most frequently required in tandem with a Section 404 permit request. Please see the Water Quality section (Section 2.2.2) for additional details.
2.3.2.2 AFFECTED ENVIRONMENT

As part of project development, a wetland delineation was conducted in March 2014 (Caltrans 2014b). All potentially jurisdictional wetlands and waters of the U.S. were identified and mapped within the study area according to the methods outlined in the USACE’s *Wetland Delineation Manual* (Environmental Laboratory 1987) and the *Arid West Regional Supplement to the 1987 Manual* (USACE 2006). USACE agreed with the findings presented in Caltrans’ wetland delineation report in the form of a preliminary jurisdictional determination on April 6, 2015.

A potentially jurisdictional tidal wetland (0.09 acre) is located on the north side of Miner Slough. The dominant vegetation within the wetland is white alder, red willow, curly dock, and common rush. A potentially jurisdictional emergent seasonal wetland (0.016 acre) was found along the north bank of Miner Slough. The dominant vegetation within the wetland is white alder, red willow, common rush, and sedge. Caltrans biologists were unable to survey the island directly east of the existing bridge for wetlands because it was not easily accessible. The island would not be affected by the proposed project. The NWI Wetlands Mapper (NW1 2014) classifies the island as shrub scrub wetland (0.25 acre). Miner Slough is identified as potentially jurisdictional other waters, and comprises approximately 10.30 acres of the study area.

Please see Figures 2-9 and 2-10 for detailed maps of potentially jurisdictional wetlands and other waters and potential impacts within the project area.

2.3.2.3 ENVIRONMENTAL CONSEQUENCES

**Alternative 1 – Bridge Replacement**

**Construction Phase**

Alternative 1 would result in direct temporary and permanent adverse effects to potentially jurisdictional wetlands and other waters. There are no anticipated permanent or temporary impacts to potentially jurisdictional emergent seasonal wetlands. Temporary indirect impacts to potentially jurisdictional tidal wetlands include 0.016 acre of shading from the temporary north trestle. Permanent indirect impacts to potentially jurisdictional tidal wetlands on the north shore of the Miner Slough include shading of 0.019 acre beneath the new bridge. Approximately 0.2 acre of direct impacts are expected to potentially jurisdictional open water from having the trestles in place for up to three construction seasons (pile driving would be done during the first construction season); although the trestles would be removed following bridge completion, the three-year duration may result in the effect being
defined as a permanent impact to Miner Slough. Permanent direct impacts of approximately 0.02 acre would occur to potentially jurisdictional waters of the U.S. from the new bridge piers.

Temporary adverse effects to potentially jurisdictional wetlands would result from working in areas adjacent to cut-and-fill activities. Work in these areas may result in trampled wetland vegetation or the spread of dust and transported excavated and fill material while constructing the proposed roadway. Installing the proposed cofferdam would have direct temporary effects to Miner Slough. Within Miner Slough, impacts would include disturbance of the bottom substrate through installation of the temporary trestles, which may temporarily increase turbidity from the displacement of sediment. Such indirect impacts could occur during the vibration of piles, and potential drift and settlement outside the project site. Caltrans will implement erosion and dust control BMPs to minimize the temporary adverse effects from these construction activities. Refer to Section 2.2.2.4 for a detailed description of the measures that will be taken to protect water quality affected by the Bridge Replacement Alternative.

Alternative 1 would require obtaining a Section 404 permit (it is anticipated that the proposed project would qualify under the Nationwide Permit program), a Section 401 Water Quality Certification (see also Section 2.2.2, Water Quality and Storm Water Runoff), a WDR from the RWQCB, and a Lake and Streambed Alteration Agreement from CDFW. These permits would be applied for during the design phase of the project.

**Operation Phase**

Maintenance and operation of the new realignment and bridge are not expected to have effects on wetlands and other waters.

**Alternative 2 – Bridge Rehabilitation**

**Construction Phase**

Alternative 2 would result in direct temporary and permanent adverse effects on potentially jurisdictional wetlands and other waters. There are no anticipated permanent or temporary impacts to potentially jurisdictional emergent seasonal wetlands. Temporary indirect impacts to potentially jurisdictional tidal wetlands include 0.011 acre of shading from the temporary north trestle. Approximately 0.2 acre of direct impacts are expected to potentially jurisdictional open waters from having the trestles in place for up to two construction seasons (pile driving would be
done during the first construction season); although the trestles would be removed following bridge repair, the one-year duration may result in the effect being defined as a permanent impact to Miner Slough.

**Operation Phase**

Maintenance and operation of the new realignment are not expected to have effects to wetlands and other waters.

**No-Build Alternative**

Under the No-Build Alternative the bridge would continue to operate under current conditions.

**Least Environmentally Damaging Practicable Alternative**

A detailed discussion of the considerations made in the determination of the LEDPA is included in this section under the Wetlands Only Practicable Finding. The Preferred Alternative encompasses the best possible design, based on traffic conditions and physical features of the area. The Preferred Alternative is the LEDPA and includes measures to reduce harm to wetlands, as described more below.

**Wetlands Only Practicable Alternative Finding**

Executive Order for the Protection of Wetlands (EO 11990) regulates the activities of federal agencies with regard to wetlands. This executive order states that a federal agency, such as the Federal Highway Administration (FHWA) and/or Caltrans, as assigned, cannot undertake or provide assistance for new construction located in wetlands unless the head of the agency finds: 1) that there is no practicable alternative to the construction and 2) the proposed project includes all practicable measures to minimize harm.

Within the existing project corridor, no other build alternatives were deemed viable because of the physical constraints and land uses surrounding the roadways. Other alternatives were considered but eliminated as none were deemed viable because of physical constraints and lack of feasibility, or because they did not meet the projects identified purpose and need (see Section 1.5, Alternatives Considered but Eliminated from Further Discussion). As such, there are no alternatives that would avoid impacts to wetland resources.

With implementation of the Preferred Alternative there would be permanent and temporary effects to wetlands and water features. A Section 404 permit would be obtained for the Preferred Alternative. Because the Preferred Alternative would
require a 404 permit, a 401 Water Quality Certification from RWQCB would also be required as would a Section 1602 Lake or Streambed Alteration Agreement with CDFW is also necessary for the for this project. Geotechnical drilling is proposed within Miner Slough and it has been determined that a separate 1602 for this activity will need to be obtained in addition to the 1602 for the entire project. Geotechnical drilling will need to be conducted to collect subsurface information of the site to establish geotechnical recommendations for the proposed Miner Slough Bridge Project. The information collected from the exploration will be presented in foundation reports and "Logs of Test Borings" (LOTBs).

In addition to the adherence of the permitting requirements stated above, AMMs BIO-1, BIO-2 AND BIO-9, Mitigation Measure BIO-B as well as the AMMs WATER-1 through WATER-4 would ensure that the least amount of impacts to jurisdictional wetlands and other waters would occur upon project implementation. Based on the above considerations, Caltrans has determined that there is no practicable alternative to the proposed construction in wetlands and that the proposed action includes all practicable measures to minimize harm to wetlands that may result from such use.

2.3.2.4 AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES

The proposed project has been designed to use the fewest number of in-water piers/piles as possible, in an effort to minimize permanent effects to the greatest extent feasible. Several AMMs would protect wetlands and other waters to reduce or offset the direct temporary and permanent adverse effects on these features. The potential for adverse effects to water quality would be reduced by implementing
temporary and permanent BMPs outlined in the SWPPP. Caltrans erosion control BMPs will be implemented to minimize any wind- or water-related erosion. Caltrans will implement the AMMs identified previously in Section 2.3.1, Natural Communities, including Measures BIO-1 and BIO-2, as well as the AMMs WATER-1 through WATER-4 described in Section 2.2.2.4 and compiled in Appendix C. The following AMMs would further minimize the proposed project’s effects to wetlands and other waters under the Build Alternative.

**Measure BIO-9: Wetland Avoidance and Minimization**

Caltrans will avoid or minimize adverse effects to wetlands to the maximum extent practicable. The resident engineer will enforce the staging and access plan including the number of access routes, number and size of staging areas, and the total area of the proposed construction footprint limited to that which was described in the January 2016 BA. Routes and boundaries will be clearly demarcated. Movement of heavy equipment to and from the project site will be restricted to established roadways to minimize habitat disturbance. Project-related vehicles will observe a 20-mile-per-hour speed limit within construction areas, except on county roads and state and Federal highways. This is particularly important during periods when the snake may be moving on roadways. All heavy equipment, vehicles, and supplies will be stored in the designated staging area at the end of each work period. Stockpiling of construction materials, portable equipment, vehicles, and supplies will be restricted to the designated construction staging areas identified in the January 2016 BA. Vegetation removal will be limited to the amount necessary to complete project construction.

**Mitigation Measure BIO-B: Compensatory Mitigation for Jurisdictional Features**

Caltrans will mitigate for jurisdictional wetlands and other waters of the U.S. to achieve no net loss of the functions and values of jurisdictional features within the study area. Caltrans will mitigate on-site at a 1:1 ratio by restoring wetlands and other waters as a result of removing the temporary construction trestles and demolishing the existing bridge. For permanent impacts, and through coordination with USACE and RWQCB, Caltrans will mitigate at an approved off-site location at a minimum of a 1:1 ratio, with the final mitigation ratio determined through permitting with USACE and RWQCB. Potential mitigation opportunities include Burke Ranch Conservation Bank and Elsie Gridley Mitigation Bank.
2.3.3 Plant Species

2.3.3.1 REGULATORY SETTING

The U.S. Fish and Wildlife Service and California Department of Fish and Wildlife have regulatory responsibility for the protection of special-status plant species. "Special-status" species are selected for protection because they are rare and/or subject to population and habitat declines. Special status is a general term for species that are provided varying levels of regulatory protection. The highest level of protection is given to threatened and endangered species; these are species that are formally listed or proposed for listing as endangered or threatened under the federal Endangered Species Act and/or California Endangered Species Act. Please see the Threatened and Endangered Species section (Section 2.3.5) in this document for detailed information about these species.

This section of the document discusses all the other special-status plant species, including CDFW species of special concern, USFWS candidate species, and California Native Plant Society (CNPS) rare and endangered plants.

The regulatory requirements for FESA can be found at 16 U.S.C. 1531 et seq. See also 50 CFR Part 402. The regulatory requirements for CESA can be found at CFGC Sections 2050 et seq. Caltrans projects are also subject to the Native Plant Protection Act, found at CFGC Sections 1900-1913, and CEQA, PRC Sections 21000-21177.

2.3.3.2 AFFECTED ENVIRONMENT

Special-status plant surveys were conducted in support of establishing and documenting the environmental baseline of the study area. Surveys were conducted within the study area during the appropriate blooming periods in 2014 (April, June, August, and December) and 2015 (March and April). Two special-status plants were observed during the plant surveys: Sanford's arrowhead and woolly rose-mallow. Both were observed within the potentially jurisdictional tidal wetland along the north bank of Miner Slough (Table 2-6; Figures 2-11 and 2-12). A list of the special-status plant species with a potential to occur in the study area can be found in Table D-1 in Appendix D.
<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Name</th>
<th>Status</th>
<th>Specific Habitat Presence/ Absent</th>
<th>Species Presence/ Absence</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Hibiscus lasiocarpus</em> var. <em>occidentalis</em></td>
<td>Woolly rose-mallow</td>
<td>CNPS 1B.2</td>
<td>P</td>
<td>P</td>
<td>Historic occurrences near proposed project in CNDDDB. Specimens observed during the 2014 rare plant surveys.</td>
</tr>
<tr>
<td><em>Sagittaria sanfordii</em></td>
<td>Sanford’s arrowhead</td>
<td>CNPS 1B.2</td>
<td>P</td>
<td>P</td>
<td>Observed in project site during 2014 rare plant surveys</td>
</tr>
</tbody>
</table>

**Notes:**

1 CNPS California Native Plant Society
2 Plants rare, threatened or endangered in California or elsewhere
3 0.2 Fairly threatened in California (20-80% occurrences threatened / moderate degree and immediacy of threat)
4 P Present—Suitable habitat is present
FIGURE 2-11
Impacts to Special-status Plant Species Bridge Replacement
Miner Slough Bridge Project
EA GG560, State Route 84 Post Mile 12.0/12.4
Solano County, California
Woolly Rose-mallow
Woolly rose-mallow is a rhizomatous perennial herb in the Malvaceae family. It blooms from June through September. The CNPS rates this species as 1B.2 on its inventory of rare and endangered plants. This species is endemic to California and almost always occurs within freshwater marsh and swamp habitats and often along riprap on sides of levees. A population of woolly rose-mallow was found on the north side of Miner Slough on top of a fallen log under the existing bridge. One plant was found in this location and it was in peak bloom. The occurrence overlaps with where the temporary trestle would likely be placed.

Sanford’s Arrowhead
Sanford’s arrowhead is a rhizomatous perennial herb in the Alismataceae family. This species is a 1B.2 plant on CNPS’ inventory of rare and endangered plants. This species is endemic to California and almost always occurs within marshes and swamps in shallow freshwater (CNPS 2015). It blooms from May through November. It is considered extirpated from southern California and is mostly extirpated from the Central Valley. A population of Sanford’s arrowhead was observed along the north side of Miner Slough, on both sides of the existing bridge. Approximately 100 plants were located along 137 feet of shoreline northwest of the existing bridge and 50 plants were found along 31 feet of shoreline on the northeast side of the bridge. During the June 2014 site visit, 75 percent of the plants were blooming. The occurrence lies in an area that would be spanned by the temporary trestles.

2.3.3.3 ENVIRONMENTAL CONSEQUENCES
Alternative 1 – Bridge Replacement
Construction Phase
Installation of the temporary trestle on the north bank would result in temporary indirect impacts due to shading. This would result in impacts to several individual plant species and would directly impact approximately 627 square feet (less than 0.02 acre) of the potentially jurisdictional tidal wetland.

Operation Phase
Maintenance or operation of the new realignment and bridge is not expected to have effects on plant species. The new bridge structure, once built and in operation, would avoid shading of plant species observed, as these populations are outside of the dripline of the new bridge.
**Alternative 2 – Bridge Rehabilitation**

**Construction Phase**
Approximately 348 square feet (less than 0.01 acre) of the tidal wetland both Sanford’s arrowhead and woolly rose-mallow were observed. Installation of the temporary trestle would result in shading impacts and would directly impact several individual plants. This impact estimate would likely be revised prior to a lower figure during construction and would include only the area of individual plants that would be relocated out of the project area. No indirect impacts would occur to these species.

**Operation Phase**
Maintenance or operation of the new realignment is not expected to have effects on plant species.

**No-Build Alternative**
The No-Build Alternative would not result in new direct, indirect, or cumulative effects to special-status plant species.

2.3.3.4 **Avoidance, Minimization, and/or Mitigation Measures**
Caltrans will explore the possibility of relocating these individuals to an area that would not be impacted by project activities, including moving the downed log supporting woolly rose-mallow farther east and outside of the construction area. USFWS, CDFW, and CNPS will be consulted prior to translocating any plants. The water quality AMMs described in Section 2.2.2.4 (WATER-1 through WATER-4), as well as the natural communities (BIO-1, BIO-2) and wetland and other waters AMMs in Sections 2.3.1.4 and 2.3.2.4, respectively, would further minimize project effects to plant species.

2.3.4 **Animal Species**
A Biological Opinion (BO) from the United States Fish and Wildlife Service (FWS) was received on May 1, 2017 (Appendix J). A BO from the National Marine Fisheries Service (NMFS) was received on June 20, 2016 (Appendix K). Please see Appendix E for FWS and NMFS species lists.

2.3.4.1 **Regulatory Setting**
Many state and federal laws regulate impacts to wildlife. The U.S. Fish and Wildlife Service (USFWS), the National Oceanic and Atmospheric Administration’s National Marine Fisheries Service (NMFS), and the California Department of Fish and Wildlife (CDFW) are responsible for implementing these laws. This section discusses potential impacts and permit requirements associated with animals not listed or
proposed for listing under FESA or CESA. Species listed or proposed for listing as threatened or endangered are discussed in Section 2.3.5 below. All other special-status animal species are discussed here, including fully protected species and species of special concern under State law, and USFWS or NMFS candidate species. Federal laws and regulations relevant to wildlife include the following:

- National Environmental Policy Act
- Migratory Bird Treaty Act
- Fish and Wildlife Coordination Act

State laws and regulations relevant to wildlife include the following:

- California Environmental Quality Act
- Sections 1601 – 1603 of the CFCG
- Sections 4150 and 4152 of the CFCG

2.3.4.2 AFFECTED ENVIRONMENT

The following analysis is based on the Natural Environment Study (NES) prepared for the proposed project (Caltrans 2015j) and surveys conducted in support of the proposed project.

Habitats within the study area support common species such as the raccoon (*Procyon lotor*), gopher snake (*Pituophis catenifer*), mockingbird (*Mimus polyglottos*), and California ground squirrel (*Spermophilus beecheyi*). The California Natural Diversity Database (CDFW 2015) and USFWS (2015) species lists were queried for sensitive wildlife species occurring within the Liberty Island U.S. Geological Survey (USGS) 7.5-minute quadrangle and the surrounding eight quadrangles (see Appendix E). This information is presented as a table of special-status animal species with a potential to occur in the study area and can be found in Table D-2 in Appendix D.

**Burrowing Owl**

The burrowing owl (*Athene cunicularia*) is a CDFW State Species of Special Concern. This species prefers open, dry grasslands and nests between February 1 and August 31. Nests are typically located in abandoned rodent burrows, particularly California ground squirrel, which they modify each year. Annual grasslands, agricultural fields, and orchard-vineyard habitat within and adjacent to the study area could provide potentially suitable foraging and nesting habitat for the burrowing owl. While the study area could provide potential habitat for this species, the amount and quality of the habitat is low and this species was not identified in the CNDDB records search for the Liberty Island quadrangle. No burrowing owls have been observed within the study area or surrounding agricultural lands.
White-tailed Kite
The white-tailed kite (Elanus leucurus) is a state fully protected species and is protected under CFGC and MBTA. This species is found in rolling foothills and valley margins with scattered oaks, river bottomlands, and marshes next to deciduous woodlands. The white-tailed kite requires open grasslands or meadows for foraging close to isolated, dense-topped trees for nesting and perching. They are year-round residents in California but migrate in other parts of the U.S.

Song Sparrow (“Modesto” population)
The song sparrow (“Modesto” population) (Melospiza melodia) is a State Species of Special Concern and is protected under MBTA. This species is a resident of brackish-water and freshwater marshes and inhabits areas with cattails (Typha sp.), tules and other sedges, and pickleweed (Salicornia spp). The species is also known to frequent tangles bordering sloughs.

Western Red Bat
Western red bat (Lasiurus borealis) is listed as a State Species of Special Concern by CDFW. This species is a typical tree bat and is closely associated with cottonwoods in riparian areas at elevations below 6,500 feet. Western red bats are also known to roost in orchards, especially in the Sacramento Valley of California. While the study area could provide potential habitat for this species north of the bridge, the amount and quality of the habitat is low and this species was not identified in the CNDDB records search for the Liberty Island quadrangle.

During a field survey it was observed that suitable roosting habitat for bats is present in trees within the study area and marginal night roosting sites are present under the bridge. No day roost locations within the structure of the existing bridge were observed (CH2M HILL 2016).

Structure Roosting Bats
The existing bridge within the study area provides suitable habitat for structure roosting species bat species, such as the Mexican free-tailed bat (Tadarida brasiliensis) and little brown bat (Myotis lucifugus). The study area could provide potential habitat for this species under the existing bridge, although this species was not identified in the CNDDB records search for the Liberty Island quadrangle.

Migratory Birds
The existing bridge within the study area provides suitable habitat for nesting species such as migratory swallows. The cliff swallow (Petrochelidon pyrrhonta) is a fairly
common migratory bird species that forms large nesting colonies on bridges and other man-made structures. Suitable habitat for cliff swallows is widely available around the project area, and there are numerous nesting colonies in the Delta.

During a field survey, several mud and stick nests were observed in a few isolated locations under the bridge, between trusses. Most of the mud nests appeared to be old and consistent with barn swallow (*Hirundo rustica*) nests. One observed stick nest within the steel I-beam framework at the eastern edge of the bridge appeared to be consistent with a rock pigeon (*Columba livia*) nest. On the exterior of the pivot pier and cement bents, several cliff swallow mud nests were observed. A pair of red-tailed hawks (*Buteo jamaicensis*) were observed perched in trees directly adjacent to the bridge; however, no nests were observed. A Cooper’s hawk (*Accipiter cooperii*) was also observed within the same tree as one of the red-tail hawks. A diverse array of avian species typical for the habitat types were observed in and around the bridge and riparian corridor (CH2M HILL 2016).

Other migratory birds, including vegetation nesting species such as black phoebe (*Sayornis nigricans*), have the potential to nest in the project area.

**Western Pond Turtle**

The western pond turtle (*Actinemys marmorata*) is listed as a State Species of Special Concern by CDFW. This species occurs in a variety of permanent and intermittent aquatic habitats, such as ponds, marshes, rivers, streams, sloughs, and ephemeral pools. Pond turtles require suitable basking and haul-out sites, such as emergent rocks or floating logs, which they use to regulate their temperature. In addition to aquatic habitat, western pond turtles require an upland oviposition site in the vicinity of aquatic habitat, often within 500-700 feet. Suitable habitat for western pond turtle is widely available around the project area and vicinity.

Formal surveys have not been conducted for the species listed above. None of these species have been observed in the study area; however, suitable habitat for each species is found within the study area. These species were not identified in the CNDDP records search for the Liberty Island quadrangle.

**2.3.4.3 ENVIRONMENTAL CONSEQUENCES**

**Alternative 1 – Bridge Replacement**

**Construction Phase**

Construction of Alternative 1 would have direct permanent effects to suitable bird nesting habitat and burrowing owl habitat. The project would result in the loss of
potential bird nesting habitat due to the conversion of natural habitat to hardscape, converting a total of 0.27 acre of suitable nesting habitat in annual grassland and valley foothill riparian habitat (see Figure 2-8). Alternative 1 would result in direct temporary effects to suitable habitat for structure nesting/roosting species (e.g., bats and cliff swallows) and western pond turtle. It would also result in temporary effects as a result of temporary trestles and demolition of the existing structure. These effects are considered minimal based on the large area of available habitat surrounding the study area.

Although potentially suitable habitat exists within the study area, it is unlikely these species would occur in the study area. The burrowing owl, white-tailed kite, song sparrow, western red bat, and western pond turtle have not been identified in the Liberty Island quadrangle in CNDDB, nor have these species been observed during field surveys.

Pre-construction nesting surveys would be conducted within the study area prior to the implementation of Alternative 1 and during the breeding season to identify any active nest, burrow, or roost, and establish a construction-free buffer zone until the nest/roost/burrow is no longer active. As a result, direct effects (e.g., nest/roost/burrow abandonment or destruction, or species mortality) to birds, bats, or pond turtles are not expected during project implementation.

Operation Phase
As Alternative 1 is a replacement of an existing bridge, the operation of the bridge is not expected to affect nesting birds, bats, or western pond turtle as use of the new bridge is not expected to reduce the number of nesting locations or disturb these animals in their habitats.

Alternative 2 – Bridge Rehabilitation
Construction Phase
Construction of Alternative 2 would have direct permanent effects to suitable bird nesting habitat and burrowing owl habitat. This alternative would result in loss of potential bird nesting habitat due to vegetation removal, converting a total of 0.46 acre of suitable nesting habitat in annual grassland and valley foothill riparian habitat (see Figure 2-8). Alternative 2 would have direct temporary effects to suitable habitat for structure nesting/roosting species (e.g., bats and cliff swallows) and western pond turtle. It would also result in temporary effects as a result of temporary
trestles. These effects are minimal based on the large area of available habitat surrounding the study area.

Although potentially suitable habitat exists within the study area, it is unlikely these species would occur in the study area. The burrowing owl, white-tailed kite, song sparrow, western red bat, and western pond turtle have not been identified in the Liberty Island quadrangle in CNDDB, nor have these species been observed during field surveys.

Pre-construction nesting surveys would be conducted within the study area prior to project implementation and during the breeding season to identify any active nest, burrow, or roost, and establish a construction-free buffer zone until the nest/roost/burrow is no longer active. As a result, direct effects (e.g., nest/roost/burrow abandonment or destruction, or species mortality) to birds, bats, or pond turtles are not expected during project implementation.

**Operation Phase**
Under Alternative 2, operation of the bridge is not expected to affect nesting birds, bats, or western pond turtle as continued use of the existing bridge is not expected to reduce nesting locations or disturb these animals in their habitats.

**No-Build Alternative**
Under the No-Build Alternative, current conditions would continue. The No-Build Alternative would not result in new direct, indirect, or cumulative effects on nesting birds, bats, burrowing owl, or western pond turtle.

**2.3.4.4 AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES**
The avoidance and minimization efforts described above in Section 2.3.1.4 would reduce potential effects to migratory birds, bats, burrowing owl, and western pond turtle. Additionally, the measure included below would further avoid and minimize effects under Alternatives 1 and 2:

**Measure BIO-10: Pre-construction Surveys for Birds**
Pre-construction nesting surveys will be performed along with nest monitoring and establishment of resource agency recommended buffers by a qualified biologist during the typical bird nesting season (February 1 through August 31). Pre-construction surveys for special-status wildlife species will be conducted by a qualified biologist no more than 72 hours prior to the start of any construction activities. If an active nest is found, a qualified biologist in conjunction with the
resource agencies will determine the appropriate buffer size and delineate the buffer zone using methods such as ESA fencing, pin flags, yellow caution tape, etc. Construction within the buffer zone will be prohibited until the qualified biologist determines the nest is no longer active. If establishment of the buffer around any nest is not feasible, the appropriate resource agencies will be contacted for further guidance on appropriate avoidance and minimization measures.

2.3.5 Threatened and Endangered Species

2.3.5.1 Regulatory Setting

The primary federal law protecting threatened and endangered species is the federal Endangered Species Act of 1973 (FESA) (16 U.S.C. 1531 et seq.; see also 50 CFR Part 402). This Act and subsequent amendments provide for the conservation of endangered and threatened species and the ecosystems upon which they depend. Under Section 7 of this Act, federal agencies, such as the Federal Highway Administration, are required to consult with USFWS and NMFS to ensure that they are not undertaking, funding, permitting, or authorizing actions likely to jeopardize the continued existence of listed species or destroy or adversely modify designated critical habitat. Critical habitat is defined as geographic locations critical to the existence of a threatened or endangered species. The outcome of consultation under Section 7 may include a Biological Opinion with an Incidental Take statement, a Letter of Concurrence and/or documentation of a No Effect finding. Section 3 of FESA defines take as "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect or any attempt at such conduct."

California has enacted a similar law at the state level, the California Endangered Species Act (CESA) (California Fish and Game Code [CFCG] Sections 2050 et seq.). CESA emphasizes early consultation to avoid potential impacts to rare, endangered, and threatened species and to develop appropriate planning to offset project-caused losses of listed species populations and their essential habitats. The California Department of Fish and Wildlife is the agency responsible for implementing CESA.

Section 2081 of CFCG prohibits "take" of any species determined to be an endangered species or a threatened species. Take is defined in Section 86 of CFCG as "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill." CESA allows for take incidental to otherwise lawful development projects; for these actions an Incidental Take Permit is issued by CDFW under Section 2081 (b) of CFCG. For projects requiring a Biological Opinion under Section 7 of FESA, CDFW
may also authorize impacts to CESA species by issuing a Consistency Determination under Section 2080.1 of CFGC.

Another federal law, the Magnuson-Stevens Fishery Conservation and Management Act of 1976, was established to conserve and manage fishery resources found off the coast, as well as anadromous species and continental shelf fishery resources of the U.S., by exercising (1) sovereign rights for the purposes of exploring, exploiting, conserving, and managing all fish within the exclusive economic zone established by Presidential Proclamation 5030, dated March, 10, 1983, and (2) exclusive fishery management authority beyond the exclusive economic zone over such anadromous species, continental shelf fishery resources, and fishery resources in special areas. The Magnuson-Stevens Fishery Conservation and Management Act requires federal agencies such as the FHWA, and Caltrans through NEPA Assignment, to consult with the Secretary of Commerce on any action or proposed action authorized, funded, or undertaken by that agency that may adversely affect essential fish habitat (EFH) as identified under this Act.

2.3.5.2 Affected Environment
The following analysis is based on the NES prepared for the proposed project (Caltrans 2015j), Section 7 consultation with USFWS and NMFS concluding in Biological Opinions with an Incidental Take statements. Surveys were also conducted for the project. Table D-1 in Appendix D provides a list of all special-status plant species, including threatened and endangered species that may occur in the USGS Liberty Island 7.5-minute quadrangle and the eight surrounding quadrangles, as well as their status, habitat requirements, and potential to occur in or adjacent to the project area.

Lists of species that may occur in the Liberty Island and surrounding quadrangles were obtained from NMFS, CDFW, USFWS, and CNPS. The list of federally-listed species only pertains to the Liberty Island quadrangle and immediate project vicinity. Between completion of the Draft Environmental Document for this project and this Final Environmental Document, USFWS started using the IPaC (Information for Planning and Conservation) tool to issue species lists. IPaC was used to obtain the most current list (USFWS 2017). A list of species under NMFS’ jurisdiction that may occur in the Liberty Island quadrangle was obtained directly from NMFS via a Microsoft Excel and Google Earth trial platform (NMFS 2016). CDFW’s CNDDB and CNPS’ online Inventory of Rare, Threatened, and Endangered Plants of
California were used to obtain lists of special-status species in the defined nine-quadrangle area (CDFW 2017, CNPS 2017).

No federal- or state-listed plant species or their critical habitats have been documented within the study area. Because of the lack of suitable habitat within the area and nearby source populations, and because none were found during protocol-level rare plant surveys, neither federal- nor state-listed plant species are expected to occur in the proposed study area.

Table D-2 in Appendix D contains the list of special-status wildlife species with a potential to occur within the study area. This list is based on the USFWS list of federally listed wildlife species and critical habitats, and a review of the CNDDB for the Liberty Island 7.5-minute quadrangle. This table includes the species status, habitat requirements, and potential to occur in or adjacent to the project area.

Several listed species were identified as having a potential to occur within the study area. These species include the following:

- Swainson’s hawk (*Buteo swainsoni*) – state threatened

- Valley elderberry longhorn beetle – federally threatened; Elderberry shrubs (*Sambucus* spp.) with no exit holes were observed within the study area, but Caltrans has assumed presence of the species in the study area.

- Delta smelt (*Hypomesus transpacificus*) – state endangered, federally endangered; Species presence in the study area is inferred.

- Longfin smelt (*Spirinchus thalassium*) – state threatened, federal candidate; Species presence in the study area is inferred.

- Central Valley steelhead (*Oncorhynchus mykiss*), Sacramento River winter-run – no state status, federally threatened; Species is considered present in the study area.

- Central Valley spring-run Chinook salmon (*Oncorhynchus tshawytscha*) – state threatened, federally threatened; The species may occur in the study area during the species’ migration period.

- Green sturgeon (*Acipenser medirostris*) – no state status, federally threatened; Species could occur within the study area.
- Giant garter snake (*Thamnophis gigas*) – state threatened, federally threatened; Species presence within study area is inferred.

- Tricolored blackbird (*Agelaius tricolor*) – state endangered, no federal status; Species has a potential, but is unlikely, to occur in the study area.

The species above are considered present within the study area based on the presence of suitable habitat conditions and CNDDDB records. Caltrans conducted hydroacoustic modeling was performed to analyze potential impacts to aquatic species during pile installation for the temporary trestles (Illingworth & Rodkin 2015). These species are discussed below.

Caltrans has concluded formal section 7 consultation with USFWS to obtain take coverage for the delta smelt, and giant garter snake. Caltrans has also concluded section 7 consultation with NMFS to obtain take coverage for Central Valley steelhead, Sacramento River winter-run and Central Valley spring-run chinook salmon, and green sturgeon. Caltrans will also consult with CDFW for effects to delta smelt, longfin smelt, Sacramento River winter-run and Central Valley spring-run chinook salmon, giant garter snake, and Swainson’s hawk. A Section 2081 Incidental Take Permit will be required and this will be done during the project’s design phase.

**Valley Elderberry Longhorn Beetle**

The valley elderberry longhorn beetle (VELB) (*Drosocerus californicus dimorphus*) is federally listed as a threatened species. The VELB occurs in remnants of riparian and elderberry savanna habitats in the Central Valley and foothill locations. VELB larvae feed solely on elderberry shrubs. The larvae are woodborders and feed internally in the roots and main stems of elderberry. Elderberry shrubs with stems that are greater than 1.0 inch in diameter at ground level are required for the beetle to complete its life cycle. A field assessment conducted in April 2014 found a cluster of four elderberry shrubs along the north bank of Miner Slough, but no beetles or exit holes were observed. The closest CNDDDB record of VELB is approximately 13 miles away. However, because of the presence of elderberry shrubs, the presence of VELB could not be ruled out.

**Delta Smelt**

The delta smelt is federally listed as a threatened species and state listed as endangered. The project area is located within designated critical habitat for delta smelt, and Caltrans has inferred presence of this species within the study area.
Delta smelt are native (endemic) to the upper Sacramento-San Joaquin River Delta (Delta). They occur in the Delta primarily downstream of Isleton on the Sacramento River, downstream of Mossdale on the San Joaquin River, and in Suisun Bay in the western Delta.

Delta smelt inhabit the open surface waters of the Delta and Suisun Bay, where they school. During all life stages, they are found in greatest abundance in the top 6.7 feet of the water column, and usually not in close association with the shoreline. Delta smelt of all sizes are found in the main channels of the Delta and Suisun Marsh and the open waters of Suisun Bay, where the waters are well oxygenated and temperatures relatively cool, usually less than 59° to 68°F in summer. When not spawning, they tend to be concentrated near the zone where incoming salt water and out-flowing fresh water mix.

In most years, spawning occurs in shallow water habitats in the Delta. Spawning is believed to occur from late January through late June or early July, with a peak in late April and early May (Bennett 2005, Wang 1991). Most delta smelt die after spawning, but a small contingent of adults survives and can spawn in their second year (Moyle 2002).

**Longfin Smelt**
Longfin smelt is considered a candidate for listing under FESA and is listed as state threatened. This species is found in a wide range of salinities from fresh water to seawater. They can occupy water as warm as 68°F in summer months, but prefer 59° to 64.4°F waters. The peak breeding season occurs between February and April with larger and older longfin smelt spawning later in the year (Wang 1986, as cited by Moyle et al. 1995). Longfin smelt are rarely found upstream of Rio Vista or Medford Island in the Delta.

No aquatic surveys were conducted in support of the proposed project. CDFW larval smelt survey data indicate that longfin smelt adults, juveniles, and larvae are largely absent from the study area between May and January, and may be present December to June.

**Chinook Salmon (Sacramento River Winter-Run)**
The Sacramento River winter-run Evolutionary Significant Unit (ESU) of Chinook salmon is listed as federally endangered and as state endangered. Critical habitat for winter-run Chinook salmon does not exist within the project area. In California, Chinook salmon Essential Fish Habitat (EFH) includes all water bodies currently or
historically occupied by Chinook salmon. Chinook salmon EFH also includes the estuarine and marine areas extending from the extreme high tide line in nearshore and tidal submerged environments within state territorial waters out to the full extent of the exclusive economic zone north of Point Conception.

Adults migrate through the Delta during the winter and into late spring (May/June) en route to their spawning grounds in the mainstem Sacramento River downstream of Keswick Dam (USFWS 2001, 2003). This generally occurs from December through July, with a peak occurring in March (Moyle 2002). Adults are believed to primarily use the mainstem Sacramento River for passage through the Delta (NMFS 2009).

**Chinook Salmon (Central Valley Spring-Run)**

The Central Valley spring-run ESU is listed as federally threatened and as state threatened. Critical habitat for this ESU includes all river reaches accessible to listed Chinook salmon in the Sacramento River and its tributaries. Also included are adjacent riparian zones, river reaches, and estuarine areas of the Sacramento-San Joaquin River Delta (with the exception of the Sacramento River deep-water ship channel). EFH for Central Valley spring-run Chinook salmon ESU consists of juvenile rearing habitat, juvenile migration corridors, and adult migration corridors within the project area. Spring-run Chinook salmon returning to spawn in the Sacramento River system enter the San Francisco Bay Estuary from the ocean in January to late February, and the Delta and Sacramento River between March and May (Moyle et al. 1995).

**Central Valley Steelhead**

The Central Valley Distinct Population Segment (DPS) of steelhead is listed as federally threatened. Critical habitat is located in Northern California, including Solano County. The Sacramento-San Joaquin River Delta serves as an adult and juvenile migration corridor and as a nursery area for juvenile steelhead (McEwan and Jackson 1996). Based on existing literature and the documented life history characteristics of Central Valley steelhead, adult Central Valley steelhead would be expected to be migrating upstream from the ocean/estuary into freshwater to spawn, in late summer and early fall. Therefore, Central Valley steelhead are assumed to be present in the project area and could be present during the proposed in-water work window.
Green Sturgeon
The Southern DPS of North American green sturgeon is listed as federally threatened. Critical habitat includes all waterways of the Delta and the proposed project area. Green sturgeon is the most widely distributed member of the sturgeon family in North America (NMFS 2007). They are found in rivers from British Columbia south to the Sacramento River, California (Moyle 2002). NMFS has determined that this species consists of two distinct population segments along the west coast of the U.S. and Canada: the Northern DPS and the Southern DPS. The Northern DPS of green sturgeon includes spawning populations from the Rogue River, Oregon and the Eel and Klamath rivers in California (NMFS 2007). The Southern DPS of green sturgeon consists of a single spawning population found in the Sacramento River. The presence of green sturgeon is inferred in the study area.

Giant Garter Snake
The giant garter snake (GGS) is listed as federally and state threatened. GGS occurs in areas with freshwater wetlands, low-gradient streams, and sloughs, ponds, waterways, and adjacent uplands. It has also adapted to human-made habitats, such as drainage canals, irrigation ditches, and rice fields. During the active season, GGS generally remain in close proximity to wetland habitats, but can move at least 800 feet into upland areas. Within the study area, potential GGS habitat consists of the outer levee banks of Miner Slough and the species could forage and seek shelter along the water margins of the slough channel.

Swainson’s Hawk
Swainson’s hawk is a state threatened species that breeds in California and winters in Central and South America. It is a large, broad-winged and broad-tailed hawk with wings that taper noticeably at the tip. Swainson's hawks require large, open grasslands with abundant prey in association with suitable nest trees. Swainson's hawks often nest peripherally to riparian systems of the valley and use lone trees or groves of trees in agricultural fields. During site visits for rare plant surveys in 2014, Caltrans biologists observed an active Swainson’s hawk nest near the project area. The nest is located outside of the proposed project construction limits, but within a 0.25-mile radius of the project area.

Tricolored Blackbird
The tricolored blackbird was listed as state endangered under CESA in December 2014. Tricolored blackbirds breed near fresh water, preferably in emergent wetland habitat containing tall, dense cattails or tules; they also breed in thickets of willow,
blackberry, wild rose, and tall herbs (Zeiner et al. 1990). Formal surveys have not been conducted for tricolored blackbird and it has not been observed in the study area, nor recorded in CNDDB for the Liberty Island quadrangle. The project area may provide marginal foraging habitat, but does not provide appropriate nesting ha Caltrans has assumed responsibilities under the Endangered Species Act of 1973 (16 U.S.C. 1531 et seq) in accordance with 23 U.S.C. 327, as described in the Memorandum of Understanding between the Federal Highway Administration and the California Department of Transportation concerning the State of California’s participation in the Project Delivery Program pursuant to 23 U.S.C. 327 effective October 1, 2012 and codified in 23 U.S.C. 327 (a)(2)(A). Under this authority, Caltrans is authorized to make no effect determinations.

There are species listed on both official species lists from USFWS and NMFS that have not been included in the effects analysis for this project. These are species known to occur within the Liberty Island quadrangle but that do not occur within the project’s study area. Caltrans determined this project will have no effect on these federally listed species. The project’s study area does not provide habitat for these species. These species include: vernal pool fairy shrimp (Branchinecta lynchii), conservancy fairy shrimp (Branchinecta conservation), vernal pool tadpole shrimp (Lepidurus packardi), California red-legged frog (Rana draytonii), California tiger salamander (Ambystoma californiense), and the delta green ground beetle (Elaphrus viridis).

2.3.5.3 ENVIRONMENTAL CONSEQUENCES

As previously discussed in Section 2.3.4, Animal Species, several species listed as endangered or threatened under CESA or FESA have the potential to occur within the study area. The potential direct and indirect effects on threatened and endangered species within the study area under the project alternatives are discussed below.

**Alternative 1 – Bridge Replacement**

**Construction Phase**

Valley elderberry longhorn beetles are unlikely to occur within the project area based on a lack of exit holes observed during the survey in 2014, the lack of other elderberry plants located within the study area, and the location of the closest known CNDDB occurrence being over 10 miles away. There is a stand of elderberry shrubs within 100 feet of construction activities and these would be protected in place through fencing or flagging. Through coordination with USFWS, Caltrans has
determined this project may affect, but is not likely to adversely affect, the VELB during construction.

This project has the potential to result in direct and indirect effects on listed fish that occur in the Delta. This project will also result in the loss of habitat for the delta and longfin smelts. To minimize the potential for direct and indirect effects, in-water work activities would be conducted during the approved work window for the Central Zone of the Delta (August 1 to October 31). Agency representatives have proposed this as the in-water work window and is the time when the least amount of fish are likely to be present. However, the potential for listed fish species to occur during the work window cannot be ruled out.

The delta and longfin smelts, steelhead, Chinook salmon, green sturgeon, and other fish species could be present during in-water work during installation of the trestles, cofferdam installation, pile driving activities, and demolition of the existing bridge. Direct effects on these species may occur during pile driving. Pile driving activities could cause barotrauma, an injury caused by rapid fluctuations of in-water sound level pressures, that may impact auditory and vasculature systems, and may impede normal foraging and predator avoidance behavior. Temporary displacement of listed fish species could also occur during pile driving activities if fish avoid the project site and adjoining areas due to active pile driving activities. The area of possible impact from pile driving is anticipated to be those portions of the water column where peak sound level pressures are above 187 dB SEL.

A qualified fisheries biologist will be onsite to monitor for the presence of and relocate stranded fish in the cofferdam during dewatering activities and for impacts from pile driving. This will reduce the likelihood of fish mortality.

Utilization of the in-water work window (August 1 to October 31) would minimize direct and indirect effects to Sacramento River winter-run Chinook salmon, and would avoid the upstream migration of adult Central Valley spring run Chinook salmon and avoid all but late emigrating juveniles. Given that these emigrating Central Valley spring run Chinook salmon juveniles will pass downstream through the study area during the proposed work window, it is highly unlikely that any individuals would be impacted by the cumulative sound exposure levels over the course of a working day, and injury or mortality would only potentially arise from impacting the piles during proof-testing (final impact from impact hammer on the pile). The proposed avoidance and minimization measures would minimize the
likelihood of potential injury or mortality, but the possibility of take occurring as part of this project cannot be ruled out. Through coordination with NMFS, Caltrans has determined this project may affect, is likely to adversely affect Chinook salmon.

Direct and indirect effects to Central Valley steelhead may occur as a result of project construction. The August 1 to October 31-in water work window overlaps with the upstream migration of adult Central Valley steelhead. Peak and cumulative sound pressure levels associated with proof-testing the piles have the potential to injure or kill migrating adult and juvenile steelhead, though as stated above this is considered unlikely. Harassment of migrating adult and juvenile steelhead from underwater noise, however, is likely to occur. Both peak and cumulative sound levels from pile driving may affect Central Valley steelhead juveniles that may be present during pile driving over the course of a working day. The proposed AMMs (12, 13 and 14) would minimize the likelihood of potential adverse effects including injury and mortalities. Presence of the piles would not appreciably diminish the ability of Central Valley steelhead to migrate upstream or downstream. Through consultation with NMFS, Caltrans has determined this project may affect, is likely to adversely affect steelhead.

Data on southern DPS green sturgeon are insufficient to rule out the potential for post-spawning and juveniles/sub-adults to be present in the study area during the August 1 to October 31 in-water work window. As such, there is the potential for direct effects associated with sound pressure waves from pile driving. However, because green sturgeon are highly mobile, it is unlikely that any individuals will be affected by the 187-decibel (dB) cumulative sound exposure level (SEL) over the course of a working day. Additionally, injury and possibly mortality associated with the 206-dB peak sound levels would arise primarily from pile driving to proof test pile embedment. Injury and possibly mortality would only occur within 100 feet of large diameter in-water driven piles during unattenuated pile-driving activities or within 33 feet for all other attenuated or unattenuated pile-driving. Through coordination with NMFS, Caltrans has determined this project may affect, is likely to adversely affect green sturgeon.

Installation of the temporary cofferdam around Pier 3 may result in fish stranding. It is unlikely that juvenile and sub-adult green sturgeon would be trapped within the cofferdam. However, to minimize potential effects to this and other federally listed fish species, a qualified fisheries biologist will conduct fish rescue and relocation to
collect fish located within the cofferdam. This rescue effort would be implemented during dewatering of the area behind the cofferdam.

Alternative 1 would result in the loss of delta and longfin smelts habitat because of shading and installation of in-water piles from the new bridge and temporary trestles during construction. The shading would result in the loss of shallow water habitat (SWH) used by the smelts for feeding and rearing. Two temporary trestles will be needed for this project so the navigational channel can remain open during construction. These trestles would remain in place throughout the project and would not be taken down between construction seasons but are not being considered a permanent impact based on the BO. Removal of the old bridge will open up 0.12 acre (ac) of shaded SWH, and will offset a portion of the impacted 0.2 ac of shaded SWH associated with the bridge construction (Figure 2-13). The proposed project will result in a net increase of 0.08 acre of shaded SWH, thus Caltrans will purchase 0.24 acre of delta smelt mitigation credits.

The programmatic consultation on Delta smelt considers the replacement of the bridge and construction of the temporary trestles to be activities that would not result in the loss or shading of SWH (USFWS 2004). Removing the old bridge would open up 0.12 ac of shaded SWH, and would offset a portion of the 0.2 ac of shaded SWH associated with replacing the bridge. The proposed project would result in a net increase of 0.08 ac of shaded SWH. Effects to critical habitat as a result of construction and subsequent removal of the trestles would be temporary in nature.

In 2003, a Fisheries Hydroacoustics Workgroup was established to study the effects of underwater sound on fish species (e.g., pile driving). The working group established that maintaining Cumulative SEL below 187 dB and 183 dB is needed to protect fish larger and smaller than two grams, respectively. Injury may occur when fish are exposed to peak levels above 206 dB but this is known to vary depending on site conditions, pile and hammer size and species of fish. Attenuating noise levels to below established thresholds is needed to limit the exposure of fish to injurious sounds. Attenuation measures may be utilized to reduce the amount of take associated with this project and to constrain the extent of pile-driving associated noise.

With attenuation measures such as bubble curtains, pile driving activities could result in the injury of fish species larger than two grams within 650 feet of the bridge as opposed to 2,000 feet without attenuation (Caltrans 2015j). With bubble curtain
attenuation, fish mortality due to pile driving could occur within 33 feet of pile driving activities.

Figure 2-13 depicts impact areas to fisheries and aquatic habitat as a result of activities under Alternative 1.

The giant garter snake habitat located within the project area is marginal according to the survey conducted for the proposed project. Direct effects would occur in areas of upland habitat. The majority of these direct effects would result from the laydown and work areas associated with the proposed project on both sides of Miner Slough. These areas would temporarily affect approximately 0.14 acre of potentially suitable upland habitat within the project site. The realignment of SR 84 and widening of other existing roads could permanently affect approximately 0.10 acre of potentially suitable upland habitat. The total area of upland habitat that would be directly impacted by Alternative 1 is approximately 0.24 acre (see Figure 2-14). No indirect habitat impacts to this species are expected. Through coordination with USFWS, Caltrans has determined this project may affect, is likely to adversely affect the giant garter snake.

Figure 2-14 depicts areas of disturbance under Alternative 1, GGS upland habitat, and impact areas to GGS upland habitat as a result of proposed activities under Alternative 1.

Direct and indirect effects to Swainson’s hawk are expected as a result of the proposed project. A nest was observed in 2014 and was within 0.25 mile of the project area. Direct effects to Swainson’s hawk, such as nest abandonment or displacement, and the removal and conversion of marginal foraging habitat in the area where SR-84 would be realigned could occur as part of project activities. However, abundant foraging and nesting habitat is located directly adjacent to the project area. Caltrans will be consulting with CDFW to obtain a 2081 Incidental Take Permit.

Tricolored blackbirds were not observed in the study area during field surveys, or listed in CNDDDB records for the Liberty Island quadrangle. There is a small amount of potential foraging habitat for this species, but there is not appropriate breeding habitat. It is unlikely this species would occur or be directly or indirectly affected by the proposed project.
Operation Phase
The operation of Alternative 1 is not expected to affect valley elderberry longhorn beetle, delta smelt, longfin smelt, Central Valley steelhead, Sacramento River winter-run and Central Valley spring-run chinook salmon, green sturgeon, giant garter snake, Swainson’s hawk, or tricolored blackbird. The use of the new bridge is not expected to reduce nesting locations or diminish aquatic habitat as it is a replacement of an existing bridge. Removal of creosote contaminated piles, currently supporting the old bridge, from Miner Slough will result in improved overall water quality.

Alternative 2 – Bridge Rehabilitation
Construction Phase
Valley elderberry longhorn beetle effects under Alternative 2 would be similar to those of Alternative 1. Construction may affect, but is not likely to adversely affect, the VELB.

Direct effects to delta smelt and longfin smelt are not expected as a result of Alternative 2 construction. To minimize the potential for direct and indirect effects, in-water work activities would be conducted during the approved work window for the Central Zone of the Delta (August 1 to October 31). This would avoid any direct effects on delta and longfin smelt resulting from hydro-acoustic noise levels resulting from pile driving, as that is the time when both species are not typically present in the study area. Longfin smelt adults, juveniles, and larvae are not expected to be present within the study area during the proposed in-water work window. Because all in-water work activities would be conducted when longfin smelt are absent from the study area, no direct effects are expected during construction.
FIGURE 2.13
Fisheries Impacts
Bridge Replacement
Miner Slough Bridge Project
EA 01600, State Route 84 Post Mile 12.0/12.4
Solano County, California
FIGURE 2.14
Giant Garter Snake Habitat
Bridge Replacement
Miner Slough Bridge Project
EA 00660, State Route 84 Post Mile 12.0/12.4
Solano County, California
Repairing the existing bridge over Miner Slough and constructing temporary trestles would not result in a loss or shading of shallow water habitat for smelt. The programmatic consultation on Delta smelt considers the rehabilitation of the bridge and construction of the temporary trestles to be activities that would not result in the loss or shading of SWH (USFWS 2004). Effects to critical habitat as a result of construction and subsequent removal of the trestles would be temporary in nature.

Direct effects to Sacramento River winter-run Chinook salmon and Central Valley spring-run Chinook salmon may occur as a result of construction. Utilization of the in-water work window (August 1 to October 31) would minimize direct and indirect effects to Sacramento River winter-run Chinook salmon, and would avoid the upstream migration of adult Central Valley spring-run Chinook salmon and avoid all but late-emigrating juveniles. Given that these emigrating Central Valley spring-run Chinook salmon juveniles would simply be passing downstream through the study area during the proposed work window, it is highly unlikely that any individuals would be impacted by the cumulative sound exposure levels over the course of a working day, and injury or mortality would only potentially arise from impacting the piles during proof-testing. The proposed avoidance and minimization measures would minimize the likelihood of potential injury or mortality. No impacts to Sacramento River winter-run or Central Valley spring-run Chinook salmon designated critical habitat would occur. No indirect impacts to winter-run or spring-run Chinook salmon are expected.

Direct and indirect effects to Central Valley steelhead may occur as a result of Alternative 2. The August 1 to October 31 in-water work window occurs during the upstream migration of adult Central Valley steelhead. Peak and cumulative sound pressure levels associated with proof-testing the piles has the potential to injure or kill migrating adult and juvenile steelhead, though as with Chinook salmon this is considered unlikely. Harassment of migrating adult and juvenile steelhead from underwater noise, however, is likely to occur. The peak sound levels from piles being proofed and/or from cumulative sound levels may affect any rearing or migrating Central Valley steelhead juveniles that may be present during pile driving over the course of a working day. The proposed AMMs would minimize the likelihood of potential adverse effects and mortalities in these cases. Presence of the piles would not appreciably diminish the ability of Central Valley steelhead to migrate upstream or downstream.
Direct and indirect effects to the southern DPS of North American green sturgeon may occur as a result of project construction. Data on southern DPS green sturgeon are insufficient to rule out the potential for post-spawning and juvenile/sub-adults to be present in the study area during the August 1 to October 31 in-water work window. As such, there is the potential for direct effects associated with sound pressure waves from pile driving. Indirect effects would result from the temporary loss of aquatic habitat during the installation and use of temporary trestles.

Figure 2-15 depicts the amount of fisheries and aquatic habitat that will be affected by the proposed project: 0.017 acre of permanent impacts due to shade and 0.018 acre of temporary impacts due to shade as a result of the proposed activities under Alternative 2.

Project construction activities may result in the injury or mortality of the giant garter snake during construction if the species is present during construction. Pre-construction surveys and relocation efforts for this species will be conducted to minimize the likelihood of this occurring. Minimal indirect impacts to this species are anticipated and could occur as a result of the snake avoiding the project footprint during construction and being temporarily displaced from portions of its habitat along Miner Slough.

According to the habitat survey done for this project per USFWS protocol, giant garter snake habitat located within the project area is considered marginal. The species has not been documented as occurring in Miner Slough, but it has been found in similar habitat elsewhere. This project would directly affect suitable upland snake habitat through conversion of grassland and riparian habitat to pavement. Staging and access would temporarily affect approximately 0.17 acre of potentially suitable upland habitat within the project site. The realignment of SR 84 and widening of other existing roads would permanently affect 0.02 acre of potentially suitable upland habitat. The total area of upland habitat that would be directly impacted by project activities is approximately 0.19 acre (see Figure 2-16).

Figure 2-16 depicts areas of disturbance under Alternative 2, GGS upland habitat, and impact areas to GGS upland habitat as a result of proposed activities under Alternative 2.

Direct and indirect effects to Swainson’s hawk are expected as a result of the proposed project. A nest was observed in 2014 and is within 0.25 mile of the project area. Direct effects to Swainson’s hawk, such as nest abandonment or displacement,
and the removal and conversion of marginal foraging habitat in the area where SR 84 would be realigned could occur as part of the project. However, abundant foraging and nesting habitat is located directly adjacent to the project area. Depending on the status of the nest in future years, Caltrans will need to consult with CDFW to obtain a 2081 Incidental Take Permit.
FIGURE 2-15
Fisheries Impacts
Rehabilitation Alternative
Miner Slough Bridge Project
EA 006670, State Route 84 Post Mile 12.0/12.4
Solano County, California
Tricolored blackbirds were not observed in the study area during field surveys, or listed in CNDDDB records for the Liberty Island quadrangle. There is a small amount of potential foraging habitat for this species, but there is no appropriate breeding habitat in the project area. It is unlikely this species would occur or be directly or indirectly affected by the proposed project.

**Operation Phase**

Operation of Alternative 2 is not expected to adversely affect the valley elderberry longhorn beetle, delta smelt, longfin smelt, Central Valley steelhead, Sacramento River winter-run and Central Valley spring-run chinook salmon, green sturgeon, giant garter snake, Swainson’s hawk, or tricolored blackbird. The use of the existing bridge is not expected to reduce nesting locations or diminish the amount of aquatic habitat.

**No-Build Alternative**

Under the No-Build Alternative, current conditions would continue.

**2.3.5.4 AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES**

The following avoidance and minimization measures will provide further protection and reduce the amount of adverse effects to special-status and threatened and endangered species. All measures listed below are in compliance with the conservation measures and terms and conditions of the State and Federal permitting agencies. The complete biological opinions of USFWS and NMFS can be found in appendices J and K.

**Measure BIO-11 Biological Monitoring**

An approved, qualified biological monitor shall be assigned to the proposed project. The names and qualifications of the proposed biological monitor(s) will be submitted to USFWS for approval at least 30 calendar days prior to start of construction. Prior to working on the site, the approved biological monitor(s) will submit a letter or email message to USFWS verifying that they possess a copy of the BO and understand the terms and conditions. The biological monitor(s) will keep a copy of the BO in their possession when onsite. The approved biological monitor will inspect the project site daily during active construction for compliance with the conservation measures and terms and conditions of the BO. At least 30 calendar days prior to groundbreaking the resident engineer’s name and telephone number will be provided to the USFWS. The resident engineer will send a letter to the USFWS verifying that they possess a copy of the BO and understand its terms and conditions. The resident engineer will maintain a copy of the BO onsite whenever construction is taking place. The biological monitor will be onsite to monitor all initial ground-disturbing activities.
during project construction and restoration activities to ensure that there is no unauthorized take of federally or state listed species or destruction of their habitat. The biologist will perform a clearance survey and mark any active bird nests for avoidance, as feasible. If a giant garter snake is encountered, the biologist shall have the authority through communication with the resident engineer to stop construction in the immediate area until appropriate corrective measures have been completed. Snakes encountered during construction activities shall be allowed to move away from the area on their own volition.

The biologist shall notify the USFWS and CDFW immediately if any listed species are found onsite, and will submit a report, including date(s), location(s), habitat description, and any corrective measures taken to protect the species found. The biologist shall be required to report any take of listed species to the USFWS and CDFW immediately by telephone and by electronic mail or written letter within three working days of the incident.

Materials and equipment left onsite overnight will be inspected by the USFWS-approved biological monitor(s) prior to the beginning of each day's activities.

**Measure BIO-12: In-Water Work Window**

All in-water work, to include pile driving work in Miner Slough, will be restricted to low-flow periods between August 1 and October 31 when fish species in the Central Zone of the Delta are least likely to be present. To the extent practicable, nighttime construction will be minimized. In-water work will be conducted during daylight hours only to provide fish in the action area with an extended quiet period during nighttime hours for feeding and unobstructed passage.

**Measure BIO-13: Dewatering**

During dewatering of the cofferdam for Pier 3, fish rescue and relocation will be conducted by a USFWS-approved Fish Monitor(s). The USFWS-approved Fish Monitor(s) will remain onsite during the entire dewatering process. Fish relocation will be accomplished by seining, dip netting, and/or electrofishing. The USFWS-approved biologist will minimize handling of fish species, and all captured fish will be held in a container with a lid that contains cool, shaded water, adequately aerated water until relocated outside of the cofferdam.

Specific to the NMFS biological opinion: Fish rescue operations will be conducted according to the specifications provided to NMFS and the service-approved supervising biologist(s) will oversee all aspects of dewatering and fish handling.
operations. If they are to occur, all aspects of fish rescue operations shall be supervised by at least one service approved biologist who will be personally on site throughout each phase of the rescue operation. A written plan for a fish rescue operation specific to this project shall be established prior to implementation of the project. The plan shall be thoroughly understood by all individuals that are to be involved and operations shall be conducted in strict accordance with the written plan.

**Measure BIO-14: Underwater Sound Pressure**

During pile driving activities, the Contractor will be required to ensure sound pressure remain within the authorized range (183 decibels [dB] Sound Exposure Level to 206 dB Peak level). Contractor shall use attenuation devices, such as bubble curtains or isolation casing, around in water piles driven with an impact hammer. The contractor will vibrate all piles to the maximum depth possible before using an impact hammer. During impact driving, the contractor will limit the number of strikes per day to the minimum necessary to complete the work, and will limit the total number of hammer strikes to 2,000 strikes per day.

The smallest pile driver and minimum force necessary will be used to complete the work.

During impact driving, Caltrans will require the contractor to use a bubble ring or other device to minimize the extent to which the interim peak and cumulative sound exposure level (SEL) thresholds are exceeded.

Caltrans and/or its construction contractor will develop and implement a hydro acoustic monitoring plan. The monitoring plan will be submitted to the USFWS for approval at least 60 days before the start of project activities. The plan will include the following requirements:

a. Caltrans and/or its construction contractor will monitor underwater noise levels during all impact pile driving activities on land and in water to ensure that peak and cumulative SELs do not exceed 183 decibels (dB). 183 dB is the more conservative sound pressure limit to protect fish less than 2.0 grams, while fish over 2.0 grams have a sound pressure limit of 187 dB.

b. The monitoring plan will describe the methods and equipment that will be used to document the extent of underwater sounds produced by pile driving, including the number, location, distances, and depths of the hydrophones and associated monitoring equipment.
c. The monitoring plan will include a reporting schedule that includes provisions of weekly summaries of the hydroacoustic monitoring results to the resource agencies and more comprehensive report on a monthly basis during the pile driving season.

d. The reports will include the number and size of piles installed per day, the number of strikes per pile, hammer type and size, the interval between strikes, the peak sound pressure level and SEL per strike, and accumulated SEL per day at each monitoring station.

e. Caltrans or its contractors will ensure that a USFWS-approved fish biologist is on site during impact pile driving to document any occurrences of stressed, injured, or dead fish.

Caltrans will require the contractor to monitor turbidity levels in Miner Slough during in water construction activities. Turbidity will be measured using standard techniques upstream and downstream of the construction area to determine whether changes in ambient turbidity levels exceeds 20 percent, the threshold derived from the Sacramento and San Joaquin Rivers Basins Plan (Central Valley Regional Water Quality Control Board 2011). If it is determined that turbidity levels exceed the 20 percent threshold, then Caltrans and/or its contractors will adjust work to ensure that turbidity levels do not exceed the 20 percent threshold.

Specific to the NMFS biological opinion: Acoustic attenuation devices will be implemented to minimize noise generated by pile driving activities. In-water pile driving activities (installation of piers 2 and 3) will be restricted to August 1 to October, 31. No in-water pile driving activity is to extend into the month of November as it may pose a significant disturbance to anadromous fish migration through the north Delta. Acoustic attenuation devices will be routinely inspected for proper installation, operation, and functionality. Sound monitoring shall occur to ensure that sound pressure levels generated by pile driving activities are not exceeding those included in the NMFS incidental take statement in appendix K.

**Measure BIO-15: Reporting Requirements**

In order to monitor whether the amount or extent of incidental take anticipated from implementation of the project is approached or exceeded, Caltrans shall adhere to the following reporting requirements from the UFWS biological opinion.
Notification of living, injured, or dead listed species will be made to the Assistant Field Supervisor of the Endangered Species Division at the San Francisco-Bay Delta Fish and Wildlife Office. When an injured or dead individual of the listed species is found, Caltrans shall follow the steps outlined in the following Disposition of Individuals Taken section. Sightings of any listed or sensitive animal species should be reported to the USFWS and CNDDB (https://www.wildlife.ca.gov/Data/CNDDB/Submitting-Data). Construction compliance reports will be addressed to the Assistant Field Supervisor of the Endangered Species Division at the San Francisco-Bay Delta Fish and Wildlife Office. Caltrans shall submit post-construction compliance reports prepared by the Service approved biologist to the Service within 60 calendar days following completion of each construction season or within 60 calendar days of any break in construction activity lasting more than 60 calendar days. This report shall detail (1) dates that relevant project activities occurred; (2) pertinent information concerning the success of the project in implementing avoidance and minimization measures; (3) an explanation of failure to meet such measures, if any; (4) known project effects on the delta smelt, valley elderberry longhorn beetle, and giant garter snake; (5) occurrences of incidental take of any listed species; (6) documentation of employee environmental education; and (7) other pertinent information. Disposition of Individuals Taken: Injured listed species must be cared for by a licensed veterinarian or other qualified person(s), such as the Service-approved biologist. Dead individuals must be sealed in a resealable plastic bag containing a paper with the date and time when the animal was found, the location where it was found, and the name of the person who found it, and the bag containing the specimen frozen in a freezer located in a secure site, until instructions are received from the Service regarding the disposition of the dead specimen. The Service contact person is the Assistant Field Supervisor of the Endangered Species Division at the San Francisco-Bay Delta Fish and Wildlife Office.

Specific to NMFS BO, Caltrans shall report any incidence of take to NMFS within 24 hours. Caltrans shall record the date, number, and specific location of all listed fish that are relocated for each construction-related activity in the project area in addition to any direct mortality observed during in-water work and relocation. If a listed species is observed injured or killed by project activities, Caltrans shall contact NMFS within 48 hours at 916-930-3600. Notification shall include species identification, the number of fish, and a description of the action that resulted in take. If possible, dead individuals shall be collected, placed in an airtight bag, and refrigerated with the aforementioned information until further direction is received.
from NMFS. Caltrans shall provide a report of project activities to NMFS by December 31 of the construction year. This report shall include a summary description of in-water construction dates and activities, avoidance and minimization measures taken, mitigation credits purchased and any maintenance of restored areas on-site. Updates and reports required by these terms and conditions shall be submitted by December 31 of each year during the construction period.

**Measure BIO-16: Valley Elderberry Longhorn Beetle**

Caltrans and its contractors will implement the following measures to avoid and minimize and/or mitigate potential effects to valley elderberry longhorn beetle:

To enhance riparian habitat for the valley elderberry longhorn beetle, Caltrans will include elderberry and other locally native riparian shrub and tree species in their restoration plan.

Caltrans will delineate all environmentally sensitive areas on the final construction plans. Caltrans will install high-visibility fencing along the boundaries of the project footprint within the riparian zone (i.e., on the levees) of Miner Slough. Fencing will also be installed along the perimeter of the new alignment north of the new bridge and near other environmentally sensitive locations. The features used to identify work boundaries will be removed at the end of construction within the given area. Along the north levee, adjacent to the identified elderberry shrubs, signs will be attached every 50 feet along the high-visibility fencing with the following information: "This area is habitat of the valley elderberry longhorn beetle, a threatened species, and must not be disturbed. This species is protected by the Endangered Species Act of 1973, as amended. Violators are subject to prosecution, fines, and imprisonment." The signs will be clearly readable from a distance of 20 feet, and will be maintained for the duration of construction. Fencing will be installed as a first order of work. The USFWS-approved biological monitor will be onsite to direct the installation of this fencing. Fencing will then be installed on an as-needed. Following construction, damage done to areas within 100 feet of the elderberry plants will be restored with adequate erosion control and re-vegetated with appropriate native plants. No insecticides, herbicides, fertilizers, or other chemicals that might harm the beetle or its host plant will be used within 100 feet of any elderberry plant.

**Measure BIO-17: Giant Garter Snake Habitat**

Caltrans and its contractors will implement the following measures to avoid and minimize and/or mitigate potential effects to Giant Garter Snake:
All construction activity in giant garter snake aquatic and upland habitat within 200 feet of aquatic habitat will be conducted between May 1 and October 1 to coincide with the snake's typical active period. All construction activity is confined to upland habitat (over-wintering and movement habitat), the initial grading and disturbance of the laydown and work areas in GGS habitat will occur during the snake's active season. Once the initial grading occurs, no further ground disturbing activities will occur, and mortality of any individuals during hibernation due to construction activities is not anticipated.

Pre-construction surveys will be conducted by a USFWS-approved biological monitor(s) for the giant garter snake no more than thirty (30) calendar days prior to ground disturbance within 200 feet of aquatic habitat (including grubbing or vegetation removal). The biological monitor will investigate suitable aestivation burrows and other potential refugia for the giant garter snake. Following inspection, all burrows and other refuges that are expected to be disturbed or destroyed as a result of construction activities will be excavated by hand and then carefully collapsed or removed by or under the supervision of the USFWS-approved biological monitor. Exclusion fencing will be installed as stated above around the perimeter following the excavation and collapse of burrows and other refugia.

The USFWS-approved biological monitor(s) will perform a giant garter snake clearance survey immediately prior to initial vegetation removal and ground disturbing activities with special attention given to sensitive locations, such as work areas on the levees.

Safety permitting, the biological monitor will investigate areas of disturbed soil for signs of the giant garter snake within 30 minutes following initial disturbance of that given area.

If a giant garter snake is encountered during construction, the USFWS approved biological monitor will have the authority, through communication with the resident engineer, to stop construction activities within 50 feet until appropriate corrective measures have been completed, or until the USFWS-approved biological monitor has determined the snake is out of harm's way. The priority will be to allow snakes to move away from the area on their own volition.

At most, 24 hours prior to the commencement of construction activities in any given area, the location plus a 50 foot buffer will be surveyed for the giant garter snake by a USFWS approved biologist. The project area will be re-inspected by the USFWS-
approved biologist whenever a lapse in construction activity of two weeks or greater has occurred.

To avoid entrapment of the giant garter snake, thereby preventing injury or mortality resulting from falling into trenches, all excavated areas more than 1 foot deep will be provided with one or more escape ramps constructed of earthen fill or wooden planks at the end of each workday. If escape ramps cannot be provided, then holes or trenches will be covered with plywood or other hard material.

Caltrans will restore temporary work areas and the existing bridge foundations with riparian vegetation and appropriate cover substrate for the listed snake.

Caltrans will continue to work with the USFWS and CDFW to identify on and offsite opportunities to offset adverse effects to the giant garter snake by conserving habitat or otherwise enabling recovery actions within the Delta Region. If a USFWS and CDFW-approved option is not identified by the time of the initial ground breaking, Caltrans will provide a funding assurance letter to demonstrate that they have allocated sufficient funds for an eventual compensation option.

Measure BIO-18: Aquatic Habitat Dewatering GGS
Aquatic habitat that will be disturbed or removed will be dewatered 15 days prior to the initiation of construction activities. If complete dewatering is not possible, potential snake prey (e.g., fish and tadpoles) will be removed so that snakes and other wildlife are not attracted to the construction area.

Measure BIO-19: Erosion Control Materials
Tightly woven fiber netting, and the material will not have mono-filament netting. Material shall be used for erosion control and other purposes within the project limits to ensure that the GGS does not become trapped or entangled. This limitation shall be communicated to the contractor using special provisions included in the bid solicitation package.

Measure BIO-20: Site Restoration
After construction activities are complete, any temporary fill or construction-related debris shall be removed and disturbed areas restored to their pre-project conditions. An area subject to “temporary” disturbance includes any area that is disturbed during the project, but that after project completion will not be subject to further disturbance and has the potential to be re-vegetated. All snake habitat subject to temporary ground disturbances, including storage and staging areas, Caltrans will restore temporary
work areas and the existing bridge foundations with riparian vegetation and appropriate cover substrate for the listed snake.

Caltrans will continue to work with the USFWS and CDFW to identify on and offsite opportunities to offset adverse effects to the giant garter snake by conserving habitat or otherwise enabling recovery actions within the Delta Region. If a USFWS and CDFW-approved option is not identified by the time of the initial ground breaking, Caltrans will provide a funding assurance letter to demonstrate that they have allocated sufficient funds for an eventual compensation option.

**Measure BIO-21: Swainson’s Hawk Work Window**
Caltrans and its contractors will implement the following measures to avoid and minimize and/or mitigate potential effects to Swainson’s hawk:

No construction-related activities will occur between March 1 and September 15 within 0.5 mile of a nesting Swainson’s hawk, or until August 15 if a Management Authorization or an Incidental Take Permit is obtained from CDFW.

**Measure BIO-22: Tree Removal**
Removal of trees known to have supported nesting Swainson’s hawks within the last five years will be avoided unless a Management Authorization is obtained from CDFW and if the removal is conducted between October 1 and February 1.

**Measure BIO-23: Swainson’s Hawk Surveys**
If construction activities are begin after March 1, a preconstruction breeding survey for Swainson’s hawks will be conducted throughout areas of suitable nesting habitat within 0.5 mile of construction. If a Swainson’s hawk nest is observed within 0.5 mile of planned construction activities, CDFW will be contacted to determine whether project-related activities are likely to impact the nesting pair and whether additional avoidance and minimization measures can be established to avoid these impacts.

Additionally, the following mitigation measures will be implemented to mitigate project impacts to a less-than-significant level:

**Mitigation Measure BIO-C: Compensatory Mitigation for Delta Smelt and Longfin Smelt**
Caltrans proposes to compensate for the area of direct impacts to the delta smelt and longfin smelt habitat at a 3:1 ratio by purchasing credit through a USFWS- and CDFW-approved mitigation location. Caltrans will compensate at 3:1 for the net
increase in the shading of delta smelt shallow water habitat. The proposed project will result in a net increase of 0.08 acre of shaded delta smelt SWH, so Caltrans will purchase 0.24 acre of delta smelt mitigation credits.

Mitigation Measure BIO-D: Compensatory Mitigation for GGS
There are no established conservation banks for the giant garter snake that include the action area within their approved service area. Caltrans will restore temporary work areas and the existing bridge foundations with riparian vegetation and appropriate cover substrate for the listed snake. Caltrans will continue to work with USFWS and CDFW to identify on and offsite opportunities to offset adverse effects to the giant garter snake by conserving habitat or otherwise enabling recovery actions within the Delta Region. If an USFWS and CDFW-approved option is not identified by the time of the initial ground breaking, Caltrans will provide a funding assurance letter to demonstrate that they have allocated sufficient funds for an eventual compensation option.

Mitigation Measure BIO-E: Compensatory Mitigation for Swainson’s Hawk
Caltrans will mitigate off-site at a minimum 1:1 ratio for suitable foraging habitat credits from an approved mitigation bank. Credits will be purchased through a CDFW approved mitigation bank.

Mitigation Measure BIO-F: Compensatory Mitigation for CCV steelhead and Southern DPS Green Sturgeon
Caltrans shall conduct onsite and offsite compensatory mitigation for temporary and permanent impacts to designated critical habitat per the NMFS biological opinion. Caltrans shall rehabilitate the construction zone through onsite planting of native riparian vegetation. Caltrans shall purchase mitigation credits at a NMFS approved conservation bank at a 2:1 ratio for temporary losses and 3:1 ratio for impacts to critical habitat in the action area associated with this project. Caltrans shall, to the maximum extent practicable and above the ordinary high water level, mix agricultural grade soil with RSP at a 70:30 ratio (rock: soil), cover the RSP with one foot of soil and plant native riparian shrubs and trees. All onsite riparian vegetation shall be watered and maintained to ensure maximum survival for a three year period following construction.

2.3.6 Invasive Species
2.3.6.1 Regulatory Setting
On February 3, 1999, President William J. Clinton signed Executive Order 13112 requiring federal agencies to combat the introduction or spread of invasive species in
the United States. The order defines invasive species as “any species, including its seeds, eggs, spores, or other biological material capable of propagating that species, that is not native to that ecosystem whose introduction does or is likely to cause economic or environmental harm or harm to human health.” FHWA guidance issued August 10, 1999 directs the use of the state’s invasive species list maintained by the California Invasive Species Council to define the invasive species that must be considered as part of the National Environmental Policy Act analysis for a proposed project.

2.3.6.2 AFFECTED ENVIRONMENT
Moderately invasive species, as ranked by the California Invasive Plant Council, are distributed within the annual grassland areas of the study area (e.g., wild oats, Italian thistle, and dogtail grass). Disposal methods that would not promote the spread of these species would be implemented. No invasive invertebrates or other wildlife species were observed during the biological surveys and are unlikely to be present.

In addition to terrestrial species, there is also the potential for aquatic invasive species to be present in the study area, or to be imported through ballast water or on equipment that is brought into the study area on barges and other vessels. The aquatic invasive species of primary concern that could be imported into the study area include the quagga mussel (*Corbicula fluminea*), zebra mussel (*Dreissena polymorpha*), New Zealand mud snail (*Potamopyrgus antipodarum*), Asian clam (*Corbicula fluminea*), and Chinese mitten crab (*Eriocheir sinensis*).

2.3.6.3 ENVIRONMENTAL CONSEQUENCES

**Alternative 1 – Bridge Replacement**

**Construction Phase**

Construction equipment has the potential to introduce and/or spread new or existing invasive plant species from previous work areas into the study area during project implementation. Construction would result in removing natural community habitat and potentially allowing invasive plant species to spread due to the disturbance event. However, in accordance with Caltrans general BMPs, the contractor would be required to use erosion and sediment controls free of invasive species and to restore the temporarily affected areas with non-invasive hydoseed mix that would promote fast-growing vegetation. Caltrans will also implement truck- and equipment-washing measures when vehicles enter/re-enter the work site.

The proposed project would comply with EO 13112 and include measures to prevent the introduction of invasive species and provide for their control to minimize the
economic, ecological, and human health effects and reduce the spread of invasive, non-native plant species and minimize the potential decrease of palatable vegetation for wildlife species. None of the species on the California list of noxious weeds is currently used by Caltrans for erosion control or landscaping.

**Operation Phase**
The operation of the proposed project is expected to have a minimal effect on the distribution of invasive species within the study area. The area is currently colonized by invasive plant species, and the proposed bridge replacement is not expected to result in the colonization of additional invasive plant species.

**Alternative 2 – Bridge Rehabilitation**
Under Alternative 2, construction and operation would have the same impacts as discussed above under Alternative 1.

**No-Build Alternative**
Under the No-Build Alternative, current conditions would continue.

2.3.6.4 **AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES**
The California State Lands Commission’s Marine Invasive Species Program is intended to prevent the release of nonindigenous species from commercial vessels into California waters (CSLC 2015). The program began in 1999 with the passage of California’s Ballast Water Management for Control of Nonindigenous Species Act. In 2003, the Marine Invasive Species Act (MISA) was passed, reauthorizing and expanding the 1999 Act. Subsequent amendments to MISA and additional legislation has further expanded the scope of the program to include research, management and policy development related to vessel fouling and ballast water treatment technologies.

The avoidance and minimization measures listed in Section 2.3.1.4 would reduce the potential to introduce or spread invasive species during project construction. In addition, the following measures would further reduce the potential for adverse effects related to the spread of invasive species under the Build Alternatives:

**Measure BIO-23: Invasive Species**
In compliance with EO 13112 and guidance from FHWA, the landscaping and erosion control included in the proposed project will not use species listed as invasive. The contractor will be required to inspect construction equipment for plant material and seeds prior to construction, remove and dispose of invasive plants at the project site cautiously, and replant the site with fast-growing native species. In areas
of particular sensitivity (i.e., near drainages), extra precautions will be taken if invasive species are found in or next to the construction areas. These include the inspection and cleaning of construction equipment as well as eradication strategies to be implemented should an invasion occur.

**Measure BIO-24: Ballast Water Management**

If vessels used for the proposed project originate outside of the San Francisco Bay, they must follow the ballast water management procedures established by the California State Lands Commission as part of the Marine Invasive Species Program (CSLC 2015).

**Measure BIO-25: Vessel and Hull, Equipment Cleaning and Decontamination**

If vessels or equipment such as trailers, anchor lines, motors, pumps, sampling equipment, and similar that will be used for the proposed project were last used in waterbodies outside of the San Francisco Bay or Sacramento-San Joaquin River Delta, they must be cleaned prior to entering the study area. For these vessels and equipment, the cleaning and inspection procedures identified in the *Inspection and Cleaning Manual for Equipment and Vehicles to Prevent the Spread of Invasive Species* (U.S. Bureau of Reclamation 2012) must be followed. These procedures may include pre-cleaning methods such as brushing and scrubbing of equipment, and cleaning and decontaminating with high-pressure washers, thermal treatments, desiccation, and/or the use of chemicals.

### 2.4 Cumulative Impacts

#### 2.4.1 Regulatory Setting

Cumulative impacts are those that result from past, present, and reasonably foreseeable future actions, combined with the potential impacts of this proposed project. A cumulative effect assessment looks at the collective impacts posed by individual land use plans and projects. Cumulative impacts can be individually minor but collectively substantial impacts taking place over a period of time.

Cumulative impacts to resources in the project area may result from residential, commercial, industrial, and highway development, as well as from agricultural development and the conversion to more intensive agricultural cultivation. These land use activities can degrade habitat and species diversity through consequences such as displacement and fragmentation of habitats and populations, alteration of hydrology, contamination, erosion, sedimentation, disruption of migration corridors, changes in water quality, and introduction or promotion of predators. They can also contribute to
potential community impacts identified for a project, such as changes in community character, traffic patterns, housing availability, and employment.

California Environmental Quality Act Guidelines Section 15130 describes when a cumulative impact analysis is necessary and what elements are necessary for an adequate discussion of cumulative impacts. The definition of cumulative impacts under CEQA can be found in Section 15355 of the CEQA Guidelines. A definition of cumulative impacts under the National Environmental Policy Act can be found in 40 CFR 1508.7 of the Council on Environmental Quality (CEQ) Regulations.

2.4.2 Affected Environment

Table 2-7 lists the environmental resources that are evaluated for cumulative impacts in this IS/EA and the area that corresponds to the cumulative analysis for each specific resource area. For the purpose of the cumulative impacts analysis this is considered the “resource study area.”

Data for this cumulative impacts analysis were obtained from Solano County Transportation Authority, Solano County Resource Management Building and Safety Division, CEQA (an online environmental database of the State Clearinghouse), agency websites (to include DWR, USACE, Bureau of Reclamation, USFWS, and CDFW), and from review of environmental documents for local projects archived by Caltrans.

<table>
<thead>
<tr>
<th>Table 2-7 Cumulative Impacts Analysis by Resource Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resource Area</td>
</tr>
<tr>
<td>Human Environment</td>
</tr>
<tr>
<td>Farmlands/Timberlands</td>
</tr>
<tr>
<td>Community Impacts</td>
</tr>
<tr>
<td>Traffic and Transportation/ Pedestrian and Bicycle Facilities</td>
</tr>
<tr>
<td>Visual/Aesthetics</td>
</tr>
<tr>
<td>Cultural Resources</td>
</tr>
<tr>
<td>Physical Environment</td>
</tr>
<tr>
<td>Hydrology and Floodplain</td>
</tr>
<tr>
<td>Water Quality/Stormwater Runoff</td>
</tr>
</tbody>
</table>
Table 2-7  Cumulative Impacts Analysis by Resource Area

<table>
<thead>
<tr>
<th>Resource Area</th>
<th>Inclusion in IS/EA Cumulative Analysis</th>
<th>Resource study area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geology/Soils/Seismic/Topography</td>
<td>Yes</td>
<td>study area</td>
</tr>
<tr>
<td>Biological Environment</td>
<td>Yes</td>
<td>Miner Slough vicinity including the study area and extending downstream to the Sacramento Deep Water Ship Channel</td>
</tr>
</tbody>
</table>

Table 2-8 identifies the various past (within 3 years), present, and reasonably foreseeable private and public development projects that comprise the context by which the proposed project’s cumulative impacts (in all resource areas) are evaluated. The project vicinity is largely rural/agricultural and consequently has few development proposals.
<table>
<thead>
<tr>
<th>Project Name</th>
<th>Location</th>
<th>Characteristics</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Private Projects</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical work on an agricultural pump</td>
<td>4868 State Hwy 84, Walnut Grove, CA 95690</td>
<td>Not applicable</td>
<td>Project permitted through Solano County. Work completed in 2014.</td>
</tr>
<tr>
<td><strong>Public Projects</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Miner Slough Levee Repair</td>
<td>SR 84 and Holland Road, located on the west side of Ryer Island</td>
<td>Repair sections of Miner Slough levee by placing rock slope protection and soil mix.</td>
<td>IS/MND completed February 2014. Addendum to the IS/MND completed January 2015. Work anticipated to begin summer/fall 2015. Agency consultation ongoing.</td>
</tr>
<tr>
<td>Prospect Island Tidal Habitat Restoration Project</td>
<td>Prospect Island located between Sacramento Deep Water Ship Canal and Miner Slough</td>
<td>Restore property to freshwater tidal wetland and open water habitats.</td>
<td>Draft EIR released in August 2016. Section 404 and Section 401 pending.</td>
</tr>
<tr>
<td>Antioch Bridge Seismic Retrofit</td>
<td>Route 160 connecting City of Antioch in Contra Costa County to Sherman Island in Sacramento County</td>
<td>Seismic retrofit completed on a two mile bridge crossing</td>
<td>CEQA and NEPA documents and permits approved for the project. Work completed in 2012.</td>
</tr>
<tr>
<td>Delta Region Ferries</td>
<td>Solano County, Ryer Island Ferries Real McCoy II and J-Mack</td>
<td>Maintenance activities and intermittent closures of SR 84 at ferry crossings</td>
<td>Ongoing, intermittent</td>
</tr>
</tbody>
</table>

**Sources:**  
California Department of Water Resources and California Department of Fish and Wildlife, Fish Restoration Program Annual Report at [http://www.water.ca.gov/environmental/Services/IRPC.cfm](http://www.water.ca.gov/environmental/Services/IRPC.cfm)  
Caltrans District 4 Bay Area Projects at [http://www.dot.ca.gov/dist4/projects_list.html#Solano](http://www.dot.ca.gov/dist4/projects_list.html#Solano)  
Solano County Resource Management, Building and Safety Division  
Solano Transportation Authority Countywide Plans & Studies at [http://www.sosta.ca.gov/Content/10055/Countywide_Plans_Studies.html#highwayroad](http://www.sosta.ca.gov/Content/10055/Countywide_Plans_Studies.html#highwayroad)
2.4.3 Issues with No Cumulative Effect

If a project would not result in a direct or indirect adverse effect on a resource, then it would not contribute to a cumulative impact on that resource and does not need to be further evaluated. The proposed project was determined not to have any potential for effects on the following resources, which therefore would not have any cumulative impact from the project:

- Existing and future land use
- Coastal zone
- Wild and Scenic Rivers
- Parks and recreational facilities
- Growth
- Community character and cohesion
- Environmental justice
- Utilities/emergency service systems
- Paleontology
- Hazards and hazardous materials
- Air quality
- Noise

The following resources with the potential for project effects were evaluated in their respective subsections in this chapter. The analysis determined that, with the implementation of the avoidance, minimization, and/or mitigation measures summarized in Appendix C, the proposed project would have no adverse effect and therefore no cumulative impact on these resources:

- Farmlands/timberlands
- Relocations and real property acquisition
- Traffic and transportation/pedestrian and bicycle facilities
- Visual/aesthetics
- Cultural resources
- Hydrology and floodplains
- Water quality/storm water

Certain resources are not susceptible to incremental/cumulative effects. One example is geologic/seismic hazards. Geological/seismic hazards are site-specific and relate to the type of building or structure proposed as well as soil composition and slope on the site. There is no additive effect of the geologic/seismic hazards associated with other
approved or foreseeable development together with the proposed project; therefore, no further cumulative analysis of this resource is warranted.

2.4.4 Issues with the Potential to Contribute to Cumulative Effects

2.4.4.1 Biological Resources

For the cumulative impact analysis, the resource study area for biological resources includes the Miner Slough vicinity from the study area and extending downstream to the Sacramento Deep Water Ship Channel.

2.4.4.2 Natural Communities, Wetlands and Other Waters, Plants, and Animal Species

Of the past, present, and reasonably foreseeable future projects identified in the resource study area, only the Miner Slough Bridge Project has the potential to impact natural communities, wetlands and other waters, plants, and animal species. When viewed in connection with the effects of past, current, and reasonably foreseeable future projects, the potential incremental effects to natural communities, plants, and animals species would not be cumulatively considerable.

Incremental effects to wetlands and other waters by the proposed project, when viewed in connection with effects of past, current, and probable future projects, would not be cumulatively considerable with mitigation incorporated.

2.4.4.3 Threatened and Endangered Species

Project effects to threatened and endangered species are expected to be minimal, and reduced with mitigation incorporated. Projects identified as potentially contributing to cumulative project effects are listed in Table 2-8 above. These projects could affect biological resources, but the net effect would be minor given the limited area affected. Furthermore, each project would be subject to formal Section 7 consultation requirements with the appropriate agencies (USFWS, NMFS, etc.), consultation with CDFW, and required to obtain permits from the appropriate resource agencies (e.g., CDFW, NMFS, RWQCB, USACE, USFWS, etc.) to avoid, minimize, and/or mitigate effects to biological resources. For these reasons, effects to biological resources are not cumulatively considerable.

2.4.4.4 Invasive Species

Development in the vicinity of the proposed project may threaten the landscape with invasive species. However, the projects listed in Table 2-8 are expected to undergo environmental review and/or project permitting that will result in requirements to fully mitigate these effects. Therefore, with the appropriate avoidance and prevention
measures the proposed project is expected to have minimal contributions to cumulative effects from invasive species.

2.5 Climate Change

Climate change refers to long-term changes in temperature, precipitation, wind patterns, and other elements of the earth’s climate system. An ever-increasing body of scientific research attributes these climatological changes to greenhouse gas (GHG) emissions, particularly those generated from the production and use of fossil fuels.

While climate change has been a concern for several decades, the establishment of the Intergovernmental Panel on Climate Change by the United Nations and World Meteorological Organization in 1988 has led to increased efforts devoted to GHG emissions reduction and climate change research and policy. These efforts are primarily concerned with the emissions of GHGs generated by human activity including carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), tetrafluoromethane, hexafluoroethane, sulfur hexafluoride (SF₆), HFC-23 (fluoroform), HFC-134a (1,1,1,2-tetrafluoroethane), and HFC-152a (difluoroethane).

In the U.S., the main source of GHG emissions is electricity generation, followed by transportation. In California, however, transportation sources (including passenger cars, light-duty trucks, other trucks, buses, and motorcycles) make up the largest source of GHG-emitting sources. The dominant GHG emitted is CO₂, mostly from fossil fuel combustion.

There are typically two terms used when discussing the impacts of climate change: “Greenhouse Gas Mitigation” and “Adaptation.” Greenhouse Gas Mitigation is a term for reducing GHG emissions to reduce or “mitigate” the impacts of climate change. Adaptation refers to the effort of planning for and adapting to impacts resulting from climate change (such as adjusting transportation design standards to withstand more intense storms and higher sea levels) (AASHTO 2015).

There are four primary strategies for reducing GHG emissions from transportation sources: 1) improving the transportation system and operational efficiencies, 2) reducing travel activity, 3) transitioning to lower GHG-emitting fuels, and 4) improving vehicle technologies/efficiency. To be most effective, all four strategies should be pursued cooperatively (FHWA 2014).
2.5.1.1 REGULATORY SETTING

This section outlines state and federal efforts to comprehensively reduce GHG emissions from transportation sources.

State

With the passage of several pieces of legislation including State Senate Bills (SBs) and Assembly Bills (ABs) and Executive Orders (EOs), California launched an innovative and proactive approach to dealing with GHG emissions and climate change.

- **Assembly Bill 1493, Pavley, Vehicular Emissions: Greenhouse Gases (2002):** This bill requires the California Air Resources Board (ARB) to develop and implement regulations to reduce automobile and light truck GHG emissions. These stricter emissions standards were designed to apply to automobiles and light trucks beginning with the 2009-model year.

- **Executive Order S-3-05 (June 1, 2005):** The goal of this EO is to reduce California’s GHG emissions to 1) year 2000 levels by 2010, 2) year 1990 levels by 2020, and 3) 80 percent below the year 1990 levels by 2050. In 2006, this goal was further reinforced with the passage of Assembly Bill 32.

- **Assembly Bill 32, Núñez and Pavley, The Global Warming Solutions Act of 2006:** AB 32 sets the same overall GHG emissions reduction goals as outlined in EO S-3-05, while further mandating that ARB create a scoping plan and implement rules to achieve “real, quantifiable, cost-effective reductions of greenhouse gases.”

- **Executive Order S-20-06 (October 18, 2006):** This order establishes the responsibilities and roles of the Secretary of the California Environmental Protection Agency (Cal/EPA) and state agencies with regard to climate change.

- **Executive Order S-01-07 (January 18, 2007):** This order set forth the low carbon fuel standard for California. Under this EO, the carbon intensity of California’s transportation fuels is to be reduced by at least 10 percent by 2020.

- **Senate Bill 97, Chapter 185, Greenhouse Gas Emissions (2007):** This bill required the Governor’s Office of Planning and Research to develop recommended amendments to the CEQA Guidelines for addressing GHG emissions. The amendments became effective on March 18, 2010.
• Senate Bill 375, Chapter 728, Sustainable Communities and Climate Protection (2008): This bill requires the ARB to set regional emissions reduction targets from passenger vehicles. The Metropolitan Planning Organization (MPO) for each region must then develop a “Sustainable Communities Strategy” that integrates transportation, land-use, and housing policies to plan for the achievement of the emissions target for their region.

• Senate Bill 391, Chapter 585, California Transportation Plan (2009): This bill requires the state’s long-range transportation plan to meet California’s climate change goals under AB 32.

Federal

Although climate change and GHG reduction are a concern at the federal level, currently no regulations or legislation have been enacted specifically addressing GHG emissions reductions and climate change at the project level. Neither the U.S. Environmental Protection Agency nor the Federal Highway Administration has issued explicit guidance or methods to conduct project-level GHG analysis. FHWA supports the approach that climate change considerations should be integrated throughout the transportation decision-making process from planning through project development and delivery. Addressing climate change mitigation and adaptation up front in the planning process will assist in decision-making and improve efficiency at the program level, and will inform the analysis and stewardship needs of project-level decision-making. Climate change considerations can be integrated into many planning factors, such as supporting economic vitality and global efficiency, increasing safety and mobility, enhancing the environment, promoting energy conservation, and improving the quality of life.

The four strategies outlined by FHWA to lessen climate change impacts correlate with efforts that the state is undertaking to deal with transportation and climate change; these strategies include improved transportation system efficiency, cleaner fuels, cleaner vehicles, and a reduction in travel activity.

Climate change and its associated effects are also being addressed through various efforts at the federal level to improve fuel economy and energy efficiency, such as the National Clean Car Program and EO 13514:

---

6 To date, no national standards have been established regarding mobile source GHGs, nor has USEPA established any ambient standards, criteria or thresholds for GHGs resulting from mobile sources.
Executive Order 13514, Federal Leadership in Environmental, Energy and Economic Performance (October 5, 2009): This order is focused on reducing greenhouse gases internally in federal agency missions, programs and operations, but also directs federal agencies to participate in the Interagency Climate Change Adaptation Task Force, which is engaged in developing a national strategy for adaptation to climate change.

USEPA’s authority to regulate GHG emissions stems from the U.S. Supreme Court decision in Massachusetts v. EPA (2007). The Supreme Court ruled that GHGs meet the definition of air pollutants under the existing Clean Air Act and must be regulated if these gases could be reasonably anticipated to endanger public health or welfare. Responding to the Court’s ruling, USEPA finalized an endangerment finding in December 2009. Based on scientific evidence it found that six greenhouse gases constitute a threat to public health and welfare. Thus, it is the Supreme Court’s interpretation of the existing Act and USEPA’s assessment of the scientific evidence that form the basis for USEPA’s regulatory actions. USEPA in conjunction with the National Highway Traffic Safety Administration (NHTSA) issued the first of a series of GHG emission standards for new cars and light-duty vehicles in April 2010 (Center for Climate and Energy Solutions [C2ES] 2015).

The USEPA and NHTSA are taking coordinated steps to enable the production of a new generation of clean vehicles with reduced GHG emissions and improved fuel efficiency from on-road vehicles and engines. These next steps include developing the first-ever GHG regulations for heavy-duty engines and vehicles, as well as additional light-duty vehicle GHG regulations.

The final combined standards that made up the first phase of this national program apply to passenger cars, light-duty trucks, and medium-duty passenger vehicles, covering model years 2012 through 2016. The standards implemented by this program are expected to reduce GHG emissions by an estimated 960 million metric tons and 1.8 billion barrels of oil over the lifetime of the vehicles sold under the program (model years 2012-2016).

On August 28, 2012, USEPA and NHTSA issued a joint Final Rulemaking to extend the National Program for fuel economy standards to model year 2017 through 2025 passenger vehicles. Over the lifetime of the model year 2017-2025 standards this program is projected to save approximately four billion barrels of oil and two billion metric tons of GHG emissions.
The complementary USEPA and NHTSA standards that make up the Heavy-Duty National Program apply to combination tractors (semi-trucks), heavy-duty pickup trucks and vans, and vocational vehicles (including buses and refuse or utility trucks). Together, these standards will cut greenhouse gas emissions and domestic oil use significantly. This program responds to President Barack Obama's 2010 request to jointly establish greenhouse gas emissions and fuel efficiency standards for the medium- and heavy-duty highway vehicle sector. The agencies estimate that the combined standards will reduce CO₂ emissions by about 270 million metric tons and save about 530 million barrels of oil over the life of model year 2014 to 2018 heavy duty vehicles.

2.5.1.2 PROJECT ANALYSIS
An individual project does not generate enough GHG emissions to significantly influence global climate change. Rather, global climate change is a cumulative impact. This means that a project may contribute to a potential impact through its incremental change in emissions when combined with the contributions of all other sources of GHGs. In assessing cumulative impacts, it must be determined if a project's incremental effect is "cumulatively considerable" (CEQA Guidelines Sections 15064(h)(1) and 15130). To make this determination, the incremental impacts of the project must be compared with the effects of past, current, and probable future projects. To gather sufficient information on a global scale of all past, current, and future projects to make this determination is a difficult, if not impossible, task.

The AB 32 Scoping Plan mandated by AB 32 includes the main strategies California will use to reduce GHG emissions. As part of its supporting documentation for the draft Scoping Plan, the ARB released the GHG inventory for California (forecast last updated: October 28, 2010) (see Figure 2-17). The forecast is an estimate of the emissions expected to occur in 2020 if none of the foreseeable measures included in the Scoping Plan were implemented. The base year used for forecasting emissions is the average of statewide emissions in the GHG inventory for 2006, 2007, and 2008.

Caltrans and its parent agency, the Transportation Agency, have taken an active role in addressing GHG emission reduction and climate change. Recognizing that

---

7 This approach is supported by the Association of Environmental Professionals: Recommendations by the Association of Environmental Professionals on How to Analyze GHG Emissions and Global Climate Change in CEQA Documents (March 5, 2007), as well as the South Coast Air Quality Management District (Chapter 6: The CEQA Guide, April 2011) and the U.S. Forest Service (Climate Change Considerations in Project Level NEPA Analysis, July 13, 2009).
98 percent of California's GHG emissions are from the burning of fossil fuels and 40 percent of all human-made GHG emissions are from transportation, Caltrans has created and is implementing the Climate Action Program at Caltrans (Caltrans 2006) that was published in December 2006.

**Figure 2-17 California Greenhouse Gas Forecast**

![California Greenhouse Gas Emissions Forecast](http://www.arb.ca.gov/cc/inventory/data/forecast.htm)

**Construction Emissions**

Greenhouse gas emissions for transportation projects can be divided into those produced during construction and those produced during operations. Construction GHG emissions include emissions produced as a result of material processing, emissions produced by on-site construction equipment, and emissions arising from traffic delays due to construction. These emissions will be produced at different levels throughout the construction phase; their frequency and occurrence can be reduced through innovations in plans and specifications and by implementing better traffic management during construction phases.

In addition, with innovations such as longer pavement lives, improved traffic management plans, and changes in materials, the GHG emissions produced during construction can be mitigated to some degree by longer intervals between maintenance and rehabilitation events.
**Greenhouse Gas Reduction Strategies**

Caltrans continues to be involved on the Governor’s Climate Action Team as the ARB works to implement Executive Orders S-3-05 and S-01-07 and help achieve the targets set forth in AB 32. Many of the strategies Caltrans is using to help meet the targets in AB 32 come from then-Governor Arnold Schwarzenegger’s Strategic Growth Plan for California. The Strategic Growth Plan targeted a significant decrease in traffic congestion below 2008 levels and a corresponding reduction in GHG emissions, while accommodating growth in population and the economy. The Strategic Growth Plan relies on a complete systems approach to attain CO₂ reduction goals: system monitoring and evaluation, maintenance and preservation, smart land use and demand management, and operational improvements as shown in Figure 2-18: The Mobility Pyramid.

**Figure 2-18  Mobility Pyramid**

Caltrans is supporting efforts to reduce vehicle miles traveled by planning and implementing smart land use strategies: job/housing proximity, developing transit-oriented communities, and high-density housing along transit corridors. Caltrans works closely with local jurisdictions on planning activities, but does not have local land use planning authority. Caltrans assists efforts to improve the energy efficiency of the transportation sector by increasing vehicle fuel economy in new cars and light- and heavy-duty trucks; Caltrans is doing this by supporting ongoing research efforts at universities, by supporting legislative efforts to increase fuel economy, and by
participating on the Climate Action Team. It is important to note, however, that control of fuel economy standards is held by the USEPA and ARB.

Caltrans is also working towards enhancing the State’s transportation planning process to respond to future challenges. Similar to requirements for regional transportation plans under SB 375 (Steinberg 2008), SB 391 (Liu 2009) requires the state’s long-range transportation plan to meet California’s climate change goals under AB 32.

The California Transportation Plan 2040 (CTP) is a statewide, long-range transportation plan to meet our future mobility needs and reduce GHG emissions. The CTP defines performance-based goals, policies, and strategies to achieve our collective vision for California’s future, statewide, integrated, multimodal transportation system.

The purpose of the CTP is to provide a common policy framework that will guide transportation investments and decisions by all levels of government, the private sector, and other transportation stakeholders. Through this policy framework, the CTP will identify the statewide transportation system needed to achieve maximum feasible GHG emission reductions while meeting the state’s transportation needs.

Table 2-9 summarizes the efforts that Caltrans and other California agencies are implementing to reduce GHG emissions. More detailed information about each strategy is included in the Climate Action Program at Caltrans (Caltrans 2006).

Caltrans Director’s Policy 30 (DP-30) Climate Change (June 22, 2012) is intended to establish a Caltrans policy that will ensure coordinated efforts to incorporate climate change into its decisions and activities.

*Caltrans Activities to Address Climate Change* (Caltrans 2013b) provides a comprehensive overview of activities undertaken by Caltrans statewide to reduce greenhouse gas emissions resulting from agency operations.

The following measures will also be included in the proposed project to reduce the GHG emissions and potential climate change impacts from the project:

1. Landscaping reduces surface warming and, through photosynthesis, decreases CO₂. The proposed project proposes planting in the intersection slopes, drainage channels, and seeding in areas next to frontage roads as well as planting a variety
of different-sized plant material and approximately 43 trees. These trees will help offset any potential CO₂ emissions increase.

2. According to Caltrans’ Standard Specifications, the contractor must comply with all local Air Pollution Control District’s rules, ordinances, and regulations for air quality restrictions.

<table>
<thead>
<tr>
<th>Table 2-9 Climate Change/CO₂ Reduction Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strategy</strong></td>
</tr>
<tr>
<td>---------------</td>
</tr>
<tr>
<td>Smart Land Use</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Operational Improvements &amp; Intelligent Transportation System (ITS) Deployment</td>
</tr>
<tr>
<td>Mainstream Energy &amp; GHG into Plans and Projects</td>
</tr>
<tr>
<td>Educational &amp; Information Program</td>
</tr>
<tr>
<td>Fleet Greening &amp; Fuel Diversification</td>
</tr>
<tr>
<td>Non-vehicular Conservation Measures</td>
</tr>
<tr>
<td>Portland Cement</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>
2.5.1.3 **Adaptation Strategies**

"Adaptation strategies" refer to how Caltrans and others can plan for the effects of climate change on the state's transportation infrastructure and strengthen or protect the facilities from damage. Climate change is expected to produce increased variability in precipitation, rising temperatures, rising sea levels, variability in storm surges and intensity, and the frequency and intensity of wildfires. These changes may affect the transportation infrastructure in various ways, such as damage to roadbeds from longer periods of intense heat; increasing storm damage from flooding and erosion; and inundation from rising sea levels. These effects will vary by location and may, in the most extreme cases, require that a facility be relocated or redesigned. There may also be economic and strategic ramifications as a result of these types of impacts to the transportation infrastructure.

At the federal level, the Interagency Climate Change Adaptation Task Force, co-chaired by the White House Council on Environmental Quality, the Office of Science and Technology Policy, and the National Oceanic and Atmospheric Administration, released its interagency task force progress report on October 28, 2011 outlining the federal government's progress in expanding and strengthening the nation's capacity to better understand, prepare for, and respond to extreme events and other climate change impacts. The report provides an update on actions in key areas of federal adaptation, including: building resilience in local communities, safeguarding critical natural resources such as fresh water, and providing accessible climate information and tools to help decision-makers manage climate risks.

Climate change adaptation must also involve the natural environment as well. Efforts are underway on a statewide-level to develop strategies to cope with impacts to habitat and biodiversity through planning and conservation. The results of these efforts will help California agencies plan and implement mitigation strategies for programs and projects.

On November 14, 2008, then-Governor Arnold Schwarzenegger signed EO S-13-08, which directed a number of state agencies to address California's vulnerability to sea level rise caused by climate change. This EO set in motion several agencies and actions to address the concern of sea level rise.

In addition to addressing projected sea level rise, the California Natural Resources Agency (Resources Agency) was directed to coordinate with local, regional, state and federal public and private entities to develop the 2009 California Climate Adaptation Strategy, which summarizes the best-known science on climate change impacts to
California, assesses California’s vulnerability to the identified impacts, and then outlines solutions that can be implemented within and across state agencies to promote resiliency.

The strategy outline is in direct response to EO S-13-08 that specifically asked the Resources Agency to identify how state agencies can respond to rising temperatures, changing precipitation patterns, sea level rise, and extreme natural events. Numerous other state agencies were involved in the creation of the Adaptation Strategy document, including the Cal/EP A; Business, Transportation and Housing (BT&H); Health and Human Services; and the Department of Agriculture. The document is broken down into strategies for different sectors that include Public Health, Biodiversity and Habitat, Ocean and Coastal Resources, Water Management, Agriculture, Forestry, and Transportation and Energy Infrastructure (California Natural Resources Agency 2009). As data continue to be developed and collected, the state’s adaptation strategy will be updated to reflect current findings.

The National Academy of Sciences was directed to prepare a Sea Level Rise Assessment Report to recommend how California should plan for future sea level rise. The report, titled Sea Level Rise for the Coasts of California, Oregon, and Washington: Past, Present, and Future (National Research Council [NRC] 2012), includes:

- Relative sea level rise projections for California, Oregon and Washington taking into account coastal erosion rates, tidal impacts, El Niño and La Niña events, storm surge and land subsidence rates.

- The range of uncertainty in selected sea level rise projections.

- A synthesis of existing information on projected sea level rise impacts to state infrastructure (such as roads, public facilities and beaches), natural areas, and coastal and marine ecosystems.

- A discussion of future research needs regarding sea level rise.

In 2010, interim guidance was released by The Coastal Ocean Climate Action Team (CO-CAT) as well as Caltrans as a method to initiate action and discussion of potential risks to the state’s infrastructure due to projected sea level rise. Subsequently, CO-CAT updated the Sea Level Rise guidance to include information presented in the NRC (2012) study.
All state agencies that are planning to construct projects in areas vulnerable to future sea level rise are directed to consider a range of sea level rise scenarios for the years 2050 and 2100 to assess project vulnerability and, to the extent feasible, reduce expected risks and increase resiliency to sea level rise. Sea level rise estimates should also be used in conjunction with information on local uplift and subsidence, coastal erosion rates, predicted higher high water levels, storm surge, and storm wave data.

All projects that have filed a Notice of Preparation as of the date of EO S-13-08, and/or are programmed for construction funding from 2008 through 2013, or are routine maintenance projects may, but are not required to, consider these planning guidelines.

Executive Order S-13-08 also directed BT&H to prepare a report to assess vulnerability of transportation systems to sea level rise affecting safety, maintenance and operational improvements of the system, and economy of the state. Caltrans continues to work on assessing the transportation system vulnerability to climate change, including the effect of sea level rise.

Currently, Caltrans is working to assess which transportation facilities are at greatest risk from climate change effects. However, without statewide planning scenarios for relative sea level rise and other climate change effects, Caltrans has not been able to determine what change, if any, may be made to its design standards for its transportation facilities. Once statewide planning scenarios become available, Caltrans will be able review its current design standards to determine what changes, if any, may be needed to protect the transportation system from sea level rise.

Climate change adaptation for transportation infrastructure involves long-term planning and risk management to address vulnerabilities in the transportation system from increased precipitation and flooding, the increased frequency and intensity of storms and wildfires, rising temperatures, and rising sea levels. Caltrans is an active participant in the efforts being conducted in response to EO S-13-08 and is mobilizing to be able to respond to the NRC’s (2012) Sea Level Rise Assessment Report.

2.5.1.4 Sea Level Rise Impact Assessment

The project site is located in an area vulnerable to sea level rise (SLR). Information for this section was provided from the Sea Level Rise Impact Assessment (assessment) (CH2M HILL 2015) prepared for the project.
In agreement with Caltrans’ SLR guidance (Caltrans 2011), SLR projections developed by the National Research Council (NRC 2012) were used in the assessment. A design life of 20 years was assumed for the existing and rehabilitated bridges (end of bridge life by 2030) and 75 years (e.g., end of bridge life by 2090) for the new bridge. The peak stage at the Miner Slough Bridge of 19.24 feet NAVD88 was used in this assessment and referred to herein as the USACE (1957) design peak stage for the current sea level.

Results from California Department of Water Resources’ DSM2 hydraulic model of the Delta indicated that the design peak stages at Miner Slough Bridge, as a result of SLR, would be between 0.1 and 0.9 ft higher than present in 2035, and between 0.9 and 3.9 ft higher in 2090.

The SLR Impact Assessment (CH2M HILL 2015) included a vulnerability assessment, a risk assessment, and an adaptation assessment, results of which are summarized below.

**Vulnerability Assessment**

The vulnerability assessment evaluated the effect of SLR on river stage at the Miner Slough Bridge. Water levels (river stage) and currents were considered to be the main drivers of processes, which, depending on their severity, could be hazardous to the Miner Slough Bridge. Processes (generally referred to as hazards) driven by water levels and currents that were identified included flooding, inundation, vertical bridge clearance, bank erosion, and pier scour.

The vulnerability assessment indicated that flooding, inundation, bank erosion and pier scour are not hazards for consideration in the SLR impact assessment. The bridges would not be impacted by these hazards as a consequence of SLR. However, flooding is a hazard for the north levee and adjacent landward areas.

Title 23 of the California Code of Regulations (CCR) states, in Section 128, that the soffit elevation of the bridge must be 3 ft above the floodplain (design peak stage). Bridge clearance would be a hazard for both of the bridge alternatives because the clearance required by the CCR would not be satisfied in any of the NRC (2012) SLR scenarios.

**Risk Assessment**

The risk assessment consisted of assessing the likelihood of an event occurring in the future and assessing the magnitude of the consequences if the event were to occur.
The qualitative assessment indicated that for all bridge alternatives the risk of not meeting the CCR's bridge clearance requirements was high, and that flooding was a hazard of medium risk for the north levee adjacent landward areas.

**Adaptation Assessment**

Using the results of the risk assessment, the capacity of the Miner Slough Bridge alternatives and north levee adjacent landward areas to adapt to SLR and associated hazards were assessed, and preliminary adaptation measures identified. The assessment considered that a bridge is a large monolithic structure at a fixed elevation with essentially no adaptation capacity.

For the existing bridge, the risk associated with not complying with the CCR’s 3-foot clearance was assessed as high, and because the bridge is already built its adaptation capacity was assessed as low. For the rehabilitated and new bridges, their soffit elevations would not comply with the CCR requirement in the NRC (2012) SLR scenarios in 2035 and 2090, respectively. Their soffit elevations could simply be revised to comply with the CCR requirement, and this would imply a high adaptation capacity. However, because constructability, cost, site characteristics, and environmental implications of raising the soffit elevations are unknown at this time, their adaptation capacity was assessed as medium.

For the north levee adjacent landward areas, the risk associated with the flooding hazard was assessed as medium. The adaptation capacity of these areas is tied to the adaptation capacity of the levee. Because in 2090 the USACE (1957) design peak stage in the high NRC (2012) SLR scenario is estimated at 23.1 ft NAVD88, only 0.2 foot higher than the levee elevation (22.9 ft NAVD88), the adaptation capacity of the levee, and consequently of the adjacent landward areas, could be assessed as high given the relative ease of increasing the elevation of the levee that small amount. However, given the uncertainties in long-term SLR projections and the unknown length of the stretch of the levee that would require a higher elevation, its adaptation capacity was assessed as medium.

The following adaptation measures are suggested, prioritizing the structures with low adaptation capacity and hazards with high risk:

1. Compliance with the CCR’s 3-foot bridge clearance appears to be the most significant issue for the existing bridge (No-Build) alternative. The possibility of relaxing the CCR bridge clearance requirement should be investigated given that its construction date likely precedes the date of the CCR requirement.
2. Similarly, compliance with the CCR’s 3-ft bridge clearance appears to be the most significant issue for the rehabilitated and new bridges. The possibility of increasing their soffit elevations should be evaluated, in addition to exploring the possibility of relaxing the CCR bridge clearance requirement to 2 ft (applicable to minor streams at sites where significant amounts of stream debris are unlikely).

3. SLR monitoring is recommended to determine whether climate change and corresponding SLR projections materialize, resulting in the need to increase the north levee elevation.

4. While not derived from the SLR impact assessment presented herein, it is recommended to provide bank and pier scour protection, or monitor these and provide remedial action when needed.

**Adaptation Assessment**

Under Alternative 1 the soffit elevation of the replacement bridge would not comply with the required 3-ft clearance for the 100-year peak stage for the current sea level, nor for all expected future NRC (2012) SLR scenarios in 2090. Under Alternative 2 the soffit elevation of the rehabilitated bridge would not comply with the required 3-ft clearance for the 100-year peak stage for the current sea level, nor for all expected future NRC (2012) SLR scenarios in 2035.
Chapter 3 Comments and Coordination

3.1 Comments and Coordination

Early and continuing coordination with the general public and public agencies is an essential part of the environmental process. It helps planners determine the necessary scope of environmental documentation and the level of analysis required, and to identify potential impacts and avoidance, minimization, and/or mitigation measures and related environmental requirements. Agency consultation and public participation for this proposed project have been accomplished through a variety of formal and informal methods, including Project Development Team (PDT) meetings, and agency coordination meetings. This chapter summarizes the results of Caltrans' efforts to fully identify, address, and resolve project-related issues through early and continuing coordination.

3.1.1 Document Coordination

During the preparation of this document, the following agencies were consulted:

**Federal**

- U.S. Army Corps of Engineers
- U.S. Fish and Wildlife Service
- Natural Resources Conservation Service
- National Marine Fisheries Service
- U.S. Coast Guard

**State**

- California Department of Fish and Wildlife
- California Department of Water Resources
- State Historic Preservation Officer
- California Department of Conservation, Division of Land Resource Protection

A list of meetings and correspondence conducted with agency personnel, as well as the dates, is provided in Table 3-1.
Table 3-1  Agency Coordination Meetings and Correspondence

<table>
<thead>
<tr>
<th>Organization/Individual</th>
<th>Date</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. Army Corps of Engineers, California Department of Water Resources</td>
<td>August 13, 2014</td>
<td>Meeting to discuss general design, geotechnical, and hydraulic considerations for the proposed project.</td>
</tr>
<tr>
<td>U.S. Coast Guard</td>
<td>August 18-19, 2014</td>
<td>E-mail correspondence between Caltrans and USCG requesting consultation for the proposed project.</td>
</tr>
<tr>
<td>State Historic Preservation Officer</td>
<td>February 23, 2015</td>
<td>Caltrans initiated consultation with SHPO.</td>
</tr>
<tr>
<td>State Historic Preservation Officer</td>
<td>April 14, 2015</td>
<td>SHPO concurred with Caltrans findings and determinations of eligibility.</td>
</tr>
<tr>
<td>Natural Resources Conservation Service</td>
<td>April 20, 2015</td>
<td>Caltrans sent correspondence to NRCS regarding acquisition of farmland and requested assistance with Form AD-1006.</td>
</tr>
<tr>
<td>California Department of Conservation</td>
<td>April 20, 2015</td>
<td>Caltrans sent correspondence to the Department of Conservation notifying them of public acquisition of Williamson Act land.</td>
</tr>
<tr>
<td>California Department of Conservation</td>
<td>September 26, 2015</td>
<td>Caltrans sent additional correspondence to the Department of Conservation notifying them of public acquisition of farmland for both Build Alternatives.</td>
</tr>
<tr>
<td>U.S. Army Corps of Engineers, Reclamation Districts 501 and 999, US Coast Guard, Central Valley Flood Protection Board</td>
<td>February 24, 2016</td>
<td>Project Coordination Meeting to discuss the preferred alternative, Obtain input/guidance on permitting, and agency coordination.</td>
</tr>
</tbody>
</table>

U.S. Fish and Wildlife Service
Caltrans initiated consultation with USFWS due to the potential to affect a federally listed species. As discussed in Section 2.3, Biological Environment, Caltrans determined that the project is likely to adversely affect the delta smelt, longfin smelt and giant garter snake. Formal consultation with USFWS under the Federal Endangered Species Act was initiated with the submission of a Biological Assessment (BA) prepared for the project in, January, 2016. A Biological Opinion was issued by USFWS on May 1, 2017.

National Marine Fisheries Service
Caltrans also initiated consultation with the National Marine Fisheries Service (NMFS). The project has the potential to affect a federally-listed anadromous fish species or adversely affect designated critical habitat including that of Central Valley steelhead, Sacramento River winter-run and Central Valley spring-run chinook salmon, and green sturgeon. A Biological Opinion was issued by NMFS on June 20, 2016.
California Department of Fish and Wildlife

Caltrans also consulted with CDFW for effects to delta smelt, longfin smelt, Sacramento River winter-run and Central Valley spring-run chinook salmon, giant garter snake, and Swainson’s hawk. A Section 2081 Incidental Take Permit will also be obtained.

A Section 1602 Lake or Streambed Alteration Agreement with CDFW is necessary when a project will alter the flow, bed, channel, or bank of a stream or lake. The project would result in work within the channel of Miner Slough. Therefore, a Section 1602 permit would be required for the Build Alternative.

A separate Section 1602 permit would be required for the geotechnical drilling to be conducted to provide geotechnical recommendations for the proposed Miner Slough Bridge Project. Caltrans needs to conduct field geotechnical exploration to collect subsurface information of the site. The information collected from the exploration will be presented in foundation reports and "Logs of Test Borings" (LOTBs). Subsurface exploration will be performed by Caltrans Drilling Services. Two borings are proposed within Miner Slough and it has been determined that a separate 1602 for this activity will need to be obtained in addition to the 1602 for the entire project.

U.S. Army Corps of Engineers

A Section 404 permit is necessary when a project will result in fill to waters under USACE jurisdiction. A preliminary jurisdictional delineation was submitted to USACE for verification on April 21, 2017. A wetland verification site visit will be conducted during the PS&E phase of the project. The Build Alternative would result in permanent and temporary effects to wetland and water features within the Caltrans right-of-way. A Section 404 permit would be required for the Build Alternative.

A Section 401 Water Quality Certification is necessary when a project requires a Section 404 permit from the USACE, and under other special circumstances. Because the Build Alternative would require a 404 permit, a 401 Water Quality Certification from RWQCB would also be required.

California State Historic Preservation Officer

Caltrans initiated consultation with the California State Historic Preservation Officer (SHPO) on February 23, 2015 in a letter stating that the project would not have any adverse effects to state-owned archaeological sites, landscaped, or non-structural resources that meet the National Register and/or California Historical Landmarks eligibility criteria. SHPO issued a letter of concurrence to this finding on April 14,
2015 (see Appendix I). The Build Alternative has established Environmentally Sensitive Area (ESA) and Testing/Treatment plans to protect known cultural resources within the APE (see Section 2.1.5, Cultural Resources). These plans will be filed with SHPO for concurrence with the protective measures. Issuance of a Finding of No Adverse Effect is dependent on the results of the planned subsurface testing during project construction. Pending their review and approval of completed construction phase testing, SHPO will issue a letter of concurrence for the Finding of No Adverse Effect if no resources are discovered. If resources are discovered during the construction phase subsurface testing, additional protective and/or avoidance plans would be prepared and submitted to SHPO for concurrence.

**United States Coast Guard**

Caltrans initiated consultation with United States Coast Guard to assess the feasibility of constructing the bridge with a fixed span on August 19, 2016.

Caltrans submitted the following information for review and consideration justifying the benefits of a fixed-span bridge:

- Low frequency of bridge openings for vessels. The existing Miner Slough Bridge opens up its swing span upon request to allow boat passages. According to the Department’s bridge opening log dating back to 1943, the annual total number of requests from vessel owners had gradually declined from the late 1960’s to the early 1990’s. In fact, there was only one scheduled opening for a vessel between 1992 and 2016. The rest of the bridge openings were done for routine maintenance and inspection. Eliminating the swing span on the new bridge will significantly reduce the maintenance cost.

- Vessels/barges accessing the Miner Slough for levee work do not require bridge opening. In the event of any levee work along the Miner Slough that necessitates transporting equipment and materials on barges, Dutra Group, a local marine construction company, has identified their preferred route to reach the job site without opening the bridge. Barges will be transported through the Miner Slough if the work is on the west side of the bridge, and through Steamboat Slough if it is on the eastside. Furthermore, Dutra Group confirmed that a fixed-span bridge would not affect their normal operations in that area since they have never requested the bridge to open.
- Major cost differential between the fixed-span and swing-span options. A cost analysis for both options demonstrated significant savings in the fixed span option.

- The fixed-span option causes less environmental impacts. The foundation footprint of the center pier is much smaller for the fixed-span option as compared to the swing-span option. This also results in a shorter construction duration, which in turn translates to less disruption to the environment and to the public.

On January 10, 2017 USCG completed their review of Caltrans' proposal, dated August 19, 2016, to replace the existing SR84 drawbridge, mile 5.5, over Miner Slough, at Ryer Island, Solano County, California with a fixed span bridge. After solicitation of comments from waterway users and other interested parties, the Coast Guard gave preliminary support for the replacement of the existing swing span bridge with a proposed fixed span with the following navigational clearances:

Minimum Vertical Clearance:

At least 18 feet of vertical clearance from the lowest hittable portion of the proposed bridge between piers 2 and 3 to Mean High Water.

Minimum Horizontal Clearance:

At least 85 feet of horizontal clearance, fender to fender normal to the axis of the channel.

3.1.2 Public participation

Notice of Availability of the Draft Environmental Document

The Proposed Initial Study with Proposed Mitigated Negative Declaration/Environmental Assessment was circulated to the public with a 30-day comment period from November 5, 2015 to December 4, 2015.

A Notice of Availability was circulated to the project mailing list and to the various parties listed on the distribution list (see Chapter 5.0, Distribution List). The notice provided information on the project including, a summary of the proposed improvements, where the environmental document could be reviewed, the address to where comments could be sent, and the closing date of the comment period. Sixteen
comments in total were received during the 30-day comment period and are included in Section 3.2 Comments and Response to Comments of this IS/EA.

Newspaper advertisements for the release were placed in the Rio Vista Beacon, and the Sacramento Bee. The newspaper advertisements announced the availability of the Draft IS/EA for review and the upcoming public open forum hearing that would be held on November 18, 2015.

Informational mailers were distributed to owners and residents of all properties as well as local businesses within 5 miles of the project.

The Caltrans environmental documents website posted, the Draft IS/EA and Appendices at (http://www.dot.ca.gov/dist4/envdocs.htm). Additional copies of the document were also made available for review to the public at the Caltrans District 4 office and the Rio Vista and Suisun City Libraries.

Officials and stakeholders including State and Federal Representatives, Suisun City and Rio Vista City Council Members, as well as the mayors and vice mayors of both cities were sent letters inviting them to comment on the Draft IS/EA.

Public Open Forum Hearing A public open forum hearing was held from 6:00 pm to 8:00 pm on November 18, 2015 during the 30-day review period of the IS/EA document. The intent of the public forum was to solicit comments and receive input from the public and agencies on the environmental analyses and conclusions presented in the IS/EA. The public open forum hearing was held at the Rio Vista Fire Department Conference Room, 350 Main Street, Rio Vista, CA 94571. The hearing utilized an open forum format, and six members of the public attended. Sixteen individual comment letters or emails were received during the comment period; within those letters or emails were approximately 54 individual comments expressing an array of concerns regarding the project. Comments were taken into consideration during preparation of this Final IS/EA document.

3.2 Comments and Response to Comments

This section provides comments and the responses to comments received during the public review period for the Draft IS/EA. Included are all the transcribed comment letters that were received during the comment period, with underlined bold red numbers and letters noting individual comments within the letters. The reader can then look in the responses to comments section at the corresponding numbers and
letters to easily identify the responses to their comments. No comments were received after the public review period. Sixteen individual comment letters or emails were received and they are presented below, followed by the responses.
3.2.1 Comments

Comment Letter 1

Edward and Lorelyn Hechtman
Owner of Hechtman Farms
lnfarms@frontiernet.net

Thank you for the opportunity to share our thoughts about the new bridge project. We farm about 2000 acres on Ryer Island. My husband's family has been farming on the island since 1941. There have been times when the bridge was the only way for emergency vehicles to get on and off the island. The bridge is essential to get our crops off the island as they are trucked by doubles. To have the bridge closed for any period as you described would cause the loss of a crop...a season of production. We cannot even rely on the "new" Rio Vista ferry to exit the island by automobile consistently so look to getting off the island when high winter water prevents ferry crossings. A realistic concern is that "intended" or "contracted" closure dates too often require adjusting and 3 months may extent to 6 months "because of...." unforeseen problems. We appreciate the funds being available for the needed building of a new bridge and will trust we will have continued use of the present bridge until the new one is completed. Thank you.

Edward and Lorelyn Hechtman
Owner of Hechtman Farms
59 Bruning Ave, Rio Vista, CA 94571
Partner and operator of Hamilton Hechtman Joint Venture
Comment Letter 2

CALIFORNIA STATE LANDS COMMISSION

100 Howe Avenue, Suite 100-South
Sacramento, CA 95825-8202
Ramos, Jason@SLC <Jason.Ramos@slc.ca.gov>
Subject: Mitigated Negative Declaration (MND) and Environmental Assessment (EA) for Miner Slough Bridge Project, Solano County

Dear Mr. Gifford:

2A

The California State Lands Commission (CSLC) staff has reviewed the subject MND/EA for the Miner Slough Bridge Project (Project), which is being prepared by the California Department of Transportation (Caltrans). Caltrans, as the public agency proposing to carry out a project, is the lead agency under the California Environmental Quality Act (CEQA) (Pub. Resources Code, § 21000 et seq.) and the federal lead agency under the National Environmental Policy Act (NEPA) (42 U.S.C. § 4321 et seq.). The CSLC is a trustee agency for projects that could directly or indirectly affect sovereign lands and their accompanying Public Trust resources or uses. Additionally, because the Project involves work on sovereign lands, the CSLC will act as a responsible agency. CSLC Jurisdiction and Public Trust Lands

The CSLC has jurisdiction and management authority over all ungranted tidelands, submerged lands, and the beds of navigable lakes and waterways. The CSLC also has certain residual and review authority for tidelands and submerged lands legislatively granted in trust to local jurisdictions (Pub. Resources Code, §§ 6009, subd. (c), 6301, 6306). All tidelands and submerged lands, granted or ungranted, as well as navigable lakes and waterways, are subject to the protections of the Common Law Public Trust. As a general background, the State of California acquired sovereign ownership of all tidelands and submerged lands and beds of navigable lakes and waterways upon its admission to the United States in 1850. The State holds these lands for the benefit of all people of the State for statewide Public Trust purposes, which include but are not limited to waterborne commerce, navigation, fisheries, water-related recreation, habitat preservation, and open space. On tidal waterways, the State's sovereign fee ownership extends landward to the mean high tide line, except for areas of fill or artificial accretion or where the boundary has been fixed by agreement or a court. On navigable non-tidal waterways, including lakes, the State holds fee ownership of the bed of the waterway landward to the ordinary low water mark and a Public Trust easement landward to the ordinary high water mark, except where the boundary has been fixed by agreement or a court. Such boundaries may not be readily apparent from present day site inspections. After review of the information contained in the MND/EA, CSLC staff has determined that the waterway, over which the proposed Project will extend, includes State-owned sovereign land, as specified above. The
CSLC currently has an accepted California Streets and Highways Code section 101.5 map on file for the existing bridge structure. However, both the bridge rehabilitation and new bridge project alternatives would require a lease and formal authorization from the CSLC for the construction of a new bridge, all temporary construction platforms, and any components of the temporary construction platforms that may remain after construction on sovereign land. Pursuant to California Streets and Highways Code section 101.5, Caltrans may, in the alternative, submit an application for the approval of an acceptable map by the CSLC. Please contact Nicholas Lavoie, Public Land Manager (see contact information below) for further information on the extent of the CSLC’s jurisdiction and application requirements. Promotion of public access to and use of California’s navigable waters is a mandate of the California Constitution (Article 10, Section 4), a condition of statehood in the Act of Admission (Vol. 9, Statutes at Large, page 452), and a responsibility of State agencies pursuant to the Public Trust Doctrine. Additionally, in this case the Legislature has provided a process to be followed to facilitate and maintain public access to navigable rivers at bridge sites pursuant to California Streets and Highways Code section 84.5. During the design hearing process and prior to CSLC consideration of a bridge project, Caltrans is required to fully consider, and prepare a report on, the feasibility of providing public access to the waterway for recreational purposes and determine whether such public access will be provided.

2B

Project Description

The existing Miner Slough Bridge is part of State Route (SR) 84 in Solano County, and connects Ryer Island in the Sacramento-San Joaquin Delta to the mainland of Solano County, as illustrated in Figures 1-1 and 1-2 of the MND/EA. The existing bridge includes two approach spans and a swing span (a span that swings sideways to allow tall watercraft to pass through), and has two 9-foot wide lanes. The Project area is primarily surrounded by agricultural lands. Caltrans proposes to rehabilitate or replace the existing bridge to address deterioration and meet design standards. The Project meets Caltrans’ objectives and needs as follows:

- The Project meets the State’s Bridge Rehabilitation Program for funding purposes.
- The Project is needed to remedy deficiencies with the existing bridge to maintain connectivity of SR 84 to and from Ryer Island. From the Project description, CSLC staff understands that the MND/EA for the Project would include two Action Alternatives and a No Project Alternative, as illustrated in Figures 1-4, 1-5, and Appendix G, with the following components:

0G660 State Route 84 Miner Slough Bridge Project
Initial Study with MND/Environmental Assessment
Alternative 1: New Relocated Bridge

- Replace the existing bridge over Miner Slough with a new four-span bridge approximately 100 feet west of the existing bridge consisting of two precast/prestressed I-girder approach spans (Spans 1 and 4) and a concrete deck over steel 1-beams for the swing span (which consists of Spans 2 and 3 on either side of the pivoting pier), over cast-in-steel-shell concrete piles.

- The replacement bridge would be approximately 220 feet long and have a soffit elevation of 24.09 feet North American Vertical Datum of 1988 (NAVD88).

- Two temporary trestles would be installed in Miner Slough to facilitate construction next to each end of the bridge (see Figures 1-4 and 1-5). This would allow marine traffic to navigate in between the trestles during construction. Each trestle would include timber decking, steel girders, and safety railings, and be supported by approximately 125 pilings varying from 15 to 36 inches in diameter. After construction, the trestle superstructures would be removed by crane and the piles removed by a vibratory extraction method or cut 3 feet below the mud line.

- A 44-foot by 44-foot cofferdam would be constructed around the center pier location. The area within the cofferdam would be dewatered and excavated to 2 feet below the footing elevation. Water removed from the cofferdam would be discharged into the slough.

- The trestles described above would be used for demolition of the existing bridge. Existing pilings would be removed below the channel bed within a cofferdam.

- Staging would occur in the triangular area between the existing and new alignment of SR 84 north of the bridge (see Figures 1-4 and 1-5). Staging would also occur on barges anchored to piers located on the north bank of Miner Slough.

- Temporary closure of the existing bridge would occur during construction of the temporary trestles. Otherwise, the existing bridge would remain open during new bridge construction.

- Project construction is tentatively expected to begin in January 2018 and last approximately 3 years.

Alternative 2: Rehabilitation of Existing Bridge

- Rehabilitate the existing bridge by constructing three new approach spans with new foundations, performing substructure work at the center swing span pier, and replacing the bridge deck and wooden stringers.

- The rehabilitated bridge would have a soffit elevation of 20.22 feet NAVD88.
• The following features would be the same as explained for Alternative 1 installation of two temporary trestles for construction, construction of a cofferdam for the central pier, and staging area.

• Closure of the existing bridge would be required for approximately six months. Detour routes would be available via nearby ferries.

• Project construction is tentatively expected to begin in January 2018 and last approximately 1 year.

2C
Environmental Review

CSLC staff requests that Caltrans consider the following comments on the Project's MND/EA.

Aesthetics

1. The MND/EA should include a photo simulation of the new bridge to show how the bridge will fit in with the visual landscape of the river corridor and surrounding land uses. A full disclosure of all exterior lighting and building materials with potential to introduce new temporary or permanent sources of glare must also be provided.

2D
Air Quality

2. The MND/EA indicates the Project will have no impact on air quality and is exempt from conforming with applicable air quality standards, but provides no apparent explanation for these determinations. The Project description clearly indicates that diesel-fueled heavy equipment, vehicles, and barges will be used for Project construction, which will produce Project-related air emissions for construction of temporary and permanent structures. The air quality analysis is incomplete without a comprehensive analysis of Project-generated air emissions. The MND/EA should provide a comprehensive assessment of all activities with potential to cause air quality impacts within the applicable air district of the Project area. The assessment should include, but not be limited to the following:

• Identify all diesel-fueled construction equipment, vehicles, and watercraft proposed for the Project;

• Identify all ground-disturbing activities and their anticipated extent and duration;

• Identify the air quality management district (AQMD) within the Project area and discuss consultation and recommendations from the district, including identification of thresholds of significance for criteria pollutants;
• Provide an assessment of Project emissions against AQMD thresholds and California and National Ambient Air Quality Standards for criteria pollutants, and include mitigation measures to reduce emissions within threshold levels;

• Incorporate best management practices from AQMDs for all construction activities; and

• Assess hazardous and toxic air pollutants, at-risk receptors, and applicable local,

State, and federal regulations.

As a responsible CEQA agency, the CSLC will need to use this MND/EA for approval of a lease for the Project. Therefore, please include the requested information in the MND/EA to avoid complications and delays with CSLC processing of a lease for the Project.

2E

Biological Resources.

3. Please add to the biological resources section of the MND/EA more baseline information on species that are known to inhabit the existing bridge (e.g., birds, bats, etc.), which is proposed for removal or rehabilitation.

4. Invasive Species: One of the major stressors in California waterways is introduced on-indigenous species. Therefore, the MND/EA should consider the Project’s potential to encourage the establishment or proliferation of aquatic invasive species (AIS) such as quagga and zebra mussels, New Zealand mud snail, Asian Clam, invasive aquatic plants, and other non-indigenous invasive species, including terrestrial plants. For example, barges and construction equipment and materials brought in from long stays at distant projects may transport non-indigenous species to the Project area via biofouling, wherein marine and aquatic organisms attach to and accumulate on the submerged parts of the equipment and materials. Potential AIS minimization and avoidance measures include contracting and use of construction equipment and materials from nearby the Project area, or requiring contractors to clean equipment and materials prior to contact with Project area waters. The California Department of Fish and Wildlife’s Invasive Species Program could assist with this analysis, as well as with the development of appropriate mitigation (information at www.dfg.ca.gov/invasives/).
Climate Change

5. Greenhouse Gases: Although Section 2 of the MND/EA provides programmatic information regarding State and federal efforts to reduce greenhouse gas (GHG) emissions, the MND/EA does not analyze GHG emissions attributable to the Project, and simply dismisses GHG considerations as a global phenomenon with no specific regulatory direction to guide a project level analysis. As required by Appendix G of the State CEQA Guidelines, Section VII, Greenhouse Gas Emissions, a GHG emissions analysis consistent with the California Global Warming Solutions Act (Assembly Bill [AB] 32) is required in the MND/EA. This analysis should identify a threshold for significance for GHG emissions, calculate the level of GHGs that will be emitted as a result of construction and ultimate build-out of the Project, determine the significance of the impacts of those emissions, and, if impacts are significant, identify mitigation measures that would reduce them to the extent feasible. Please consult with the jurisdictional AQMD for direction on an applicable threshold of significance and potential mitigation measures to reduce emissions.

As explained in the air quality section, the CSLC will need to use this MND/EA for approval of a lease for the Project. Therefore, please include the requested information in the MND/EA to avoid complications and delays with CSLC processing of a lease for the Project.

Cultural Resources

6. Submerged Resources: The MND/EA should evaluate potential impacts to submerged cultural resources in the Project area. The CSLC maintains shipwrecks database that can assist with this analysis. CSLC staff requests that Caltrans contact Assistant Chief Counsel Pam Griggs (see contact information below) to obtain shipwrecks data from the database and CSLC records for the Project site. The database includes known and potential vessels located on the State’s tide and submerged lands; however, the locations of many shipwrecks remain unknown. Please note that any submerged archaeological site or submerged historic resource that has remained in State waters for more than 50 years is presumed to be significant.

7. Title to Resources: The MND/EA should also mention that the title to all abandoned shipwrecks, archaeological sites, and historic or cultural resources on or in the tideland submerged lands of California is vested in the State and under the jurisdiction of the CSLC (Pub. Resources Code, § 6313). CSLC staff requests that Caltrans consult with Assistant Chief Counsel Pam Griggs (see contact information below) should any cultural resources on State lands be discovered during construction of the proposed Project. In addition, CSLC Staff requests that the following statement be included in the MND/EA’s Mitigation and Monitoring Plan: "The final disposition
of archaeological, historical, and paleontological resources recovered on State lands under the jurisdiction of the State Lands Commission must be approved by the Commission."

8. Historic Structure Review: The MND/EA explains the existing Miner Slough Bridge was constructed in 1933. It is unclear within the cultural resources section if the existing bridge was evaluated for historical significance. Please clarify in the cultural resources section if the analysis included the existing bridge.

9. Tribal Cultural Resources: If Caltrans began preparation of the Initial Study for the MND after July 1, 2015, then California Native American Tribal Consultation may be required pursuant to AB 52 (Gatto, Stats. 2014, Ch. 532). AB 52 provides procedural and substantive requirements for lead agency consultation with California Native American tribes and consideration of effects on tribal cultural resources, as well as examples of mitigation measures to avoid or minimize impacts to tribal cultural resources. AB 52 establishes that if a project may cause a substantial adverse change in the significance of a tribal cultural resource, that project may have a significant effect on the environment. Lead agencies must avoid damaging effects to tribal cultural resources, when feasible, and shall keep information submitted by tribes confidential.

21

Hydrology and Water Quality

10. The environmental checklist for the MND indicates the Project will have no impact on altering the drainage pattern of the site, in a manner which would result in flooding on or off-site. However, the hydrology and floodplain analysis section states that both action alternatives have potential to alter the floodplain of the Project area through fill activities, with impacts expected to be less than significant. Please revise this impact on the environmental checklist as less than significant for consistency with the analysis.

21

Recreation

11. Public Access: For Alternative 1, the MND/EA should include a section describing the potential for the Project to affect recreational uses and public access to the subject waterway, particularly in light of the Project’s construction schedule. The MND/EA should discuss the recreational uses and access points in the Project vicinity, whether and to what extent these uses would be temporarily or permanently facilitated or disrupted by the Project, and what, if any, measures could be implemented to reduce any potential negative impacts. This discussion should also identify any safety measures Caltrans will put in place to ensure public safety for recreational activities. Measures could include a public notice and Project area sign age provided in advance of the Project, notifying the public’ of any disruptions or
creation of alternate access points or use areas. Pursuant to California Streets and Highways Code (§ 84.5), during the design hearing process, full consideration of, and a report on, the feasibility of providing public access to the subject waterway is required to be provided. The report should consider the following:

• An assessment of public access needs at the Project location, in addition to benefit analysis of public access alternatives, not alternatives to access;

• A description of existing public access points and facilities in the Project vicinity, including the existing condition of these resources and entity responsible for maintenance;

• An assessment of existing constraints and hazards that could make on-site public access infeasible on a temporary and/or permanent basis;

• A feasibility assessment of proposed on-site public access infrastructure, such as construction of trails, stairs, parking areas, trash cans, restrooms, etc.;

• A feasibility assessment of alternatives, if on-site public access is infeasible, such as improving existing public access in the Project vicinity or creating new public access points that could provide a means to access the subject waterway within the project vicinity;

• Environmental impacts of providing public access; and

• A conclusion on the feasibility of providing public access. If the report determines that public access is feasible, the MND/EA must reflect how public access improvements will be incorporated into the Project and identify any associated environmental impacts. Planning for preparation of the report should occur during the earliest stages of Project planning, and the report should be used to support the environmental impact analysis of the MND/EA.

2J

Transportation

12. For the action alternatives, please provide more information on potential impacts to watercraft navigation during the construction phases of the Project. Additional information should include, but not be limited to, any periods of closed or limited navigation, types of watercraft potentially affected (i.e., recreation, commercial, law enforcement, etc.), public noticing procedures, and any impacts to emergency response watercraft services.

2K

Thank you for the opportunity to comment on the MND/EA for the Project. As a responsible and trustee agency, the CSLC will need to rely on the Final MND/EA for the issuance of any amended/new lease as specified above, and therefore, staff requests that you consider our comments prior to adoption of the MND/EA.
Please send copies of future Project-related documents, including electronic copies of the Final MND, Mitigation Monitoring and Reporting Program (MMRP), and Notice of Determination (NOD) when they become available, and refer questions concerning environmental review to Jason Ramos, Senior Environmental Scientist, at (916) 574-1814 or via e-mail at jason.ramos@slc.ca.gov.

For questions concerning cultural, archaeological, or historic resources under the CSLC's jurisdiction, please contact

Assistant Chief Counsel Pam Griggs at (916) 574-1854 or via e-mail atpamela.griggs@slc.ca.gov. For questions concerning CSLC leasing jurisdiction, please contact Nicholas Lavoie, Public Land Manager, at (916) 574-0452, or via e-mail at

nicholas.lavoie@slc.ca.gov.
Comment Letter 3

DELTA PROTECTION COMMISSION

2101 Stone Blvd., Suite 210
West Sacramento, CA 95691
Phone (916) 375-4800 / FAX (916) 376-3962
www.delta.ca.gov

Ruffolo, Jennifer@DPC <Jennifer.Ruffolo@delta.ca.gov>

RE: Initial Study and Proposed Negative Declaration for Miner Slough Bridge Project (SCH 20151120011)

Dear Mr. Gifford:

3A

The staff of the Delta Protection Commission (Commission) has reviewed the Initial Study with Proposed MND/Environmental Assessment (IS/MND) for the Miner Slough Bridge Project (the project). Although the project falls within the Commission's jurisdiction over development within the Primary Zone of the Delta, the project is not subject to the Commission's Land Use and Resource Management Plan because Caltrans serves as the lead agency (Public Resources Code 29716).

Therefore, we submit these advisory comments for your consideration as you proceed with the project. The Great California Delta Trail Act (Chapter 389, Statutes of 2006) charges the Commission with developing and adopting a program for a continuous regional recreational trail throughout the five Delta Counties. The IS/MND discusses cycling and pedestrian facilities on page 2-15, noting that there are no existing bicycle paths near or on the Miner Slough Bridge, and that Caltrans is not proposing to create bicycle paths as part of the proposed project. In 2012, the Commission adopted resolutions to support adding bicycle lanes in the Delta along State Routes 4, 12, and 160. We are developing concepts for Great Delta Trail segments and increased recreation on other roads in the Delta, possibly along Highway 84. We anticipate that over the next 25 years the Delta will become a more popular destination for car touring and other forms of recreation, including bicycling. These positive developments could lead to increased traffic on Highway 84, as well as increased pedestrian and bicyclist use of the Miner Slough Bridge. Therefore, we encourage Caltrans to consider adding features to the project, such as bicycle lanes, sidewalks, and signs, to enable cyclists and pedestrians to safely cross the bridge. We urge you to take advantage of this bridge replacement as an opportunity to ensure the safety of future cyclists and pedestrians.

Thank you for your consideration of our comments. Please do not hesitate to contact Adele Lagomarsino, our Recreation Planner, for further information at (916) 375-4534 or adele.lagomarsino@delta.ca.gov.
Sincerely, Erik Vink-Executive Director

cc: Skip Thomson, Commission Vice Chair
Comment Letter 4

Mike Coelho
Mike Coelho mcfiash1@aol.com

To who it may concern

4A

My name is Mike Coelho. I am a hay dealer and we haul hay off of Ryer Island approximately eight months per year. I am writing this letter in regards to the Ryer Island Bridge. I understand that Caltrans is talking about updating the Ryer Island Bridge or building a new bridge. If the old Bridge is updated and has to be shut down for six months it would be a hardship on all parties doing business on Ryer island.

The old bridge has a couple safety issues the curves leading up to the bridge from the north has a blind curve and is not safe. The Bridge itself is very narrow not allowing some equipment to use the bridge safely there is not enough room to make the turn onto or off of the bridge which is evident by the guard rails always having to be replaced. On the narrow bridge some people panic even when the oncoming traffic is on their side of the line. A new bridge would fix all of these problems it would be safer traffic would flow better and all equipment would be able to use the bridge safely.

Thank you

Mike Coelho
Comment Letter 5

Patti Jo Scott
Ron Burger
Patti Jo Scott pjs@riverdeltawireless.com

5A
I writing to express my concern over the possibility of the Miner Slough Bridge closing. I have lived on Ryer Island since 1987, and have had to deal with the Real McCoy, Jack Mack, and the bridge.

Should the bridge close, the added stress on the Jack Mack, or the risk of the Jack Mack closing due to high water in the fall, adds to our concern. The Real McCoy II has yet to prove it worthiness; now with this bridge project in the works it could be a definite health risk for us. My husband has had 2 heart attacks, one a 6 artery bypass. His medical team is in Sacramento, at UC Davis medical center. I can't tell you how discerning this is to know our life line may be compromised.

Please, take our concerns into consideration on your decision for the new bridge.

Thank you,
Patti Jo Scott
Ron Burger
916-775-0089
Comment Letter 6

Craig Nakahara
Nakahara Farms
Craig Nakahara euler@ycglobal.net

Dear Mr. Gifford,

6A

After hearing about Cal Trans' proposals for the Minor Slough Bridge project, I would like to make a few comments. The project would greatly affect me in numerous ways as I farm on the north end of Ryer Island and directly on the north side of the Minor Slough Bridge (called Holland Tract), regardless if the project entails retrofitting the current bridge or building a new one. I do overwhelmingly support the construction of a new Minor Minor Slough Bridge.

Some of the farm products I raise are perishable. Tomatoes and cucumbers require that they be harvested and delivered to processors immediately when ripe. The other crops, although not perishable, such as wheat, feed corn, and alfalfa, need to be harvested and shipped in a timely manner. All these crops are transported via semi trucks weighing 80,000 lbs when fully loaded. The only way for these commodities to be transported off Ryer Island is by way of the Minor Slough Bridge. Neither the Real McCoy or the J Mack ferry is an alternative method of leaving the Island for these trucks.

A quick calculation by me indicates that I have about 600 loads of harvested commodities leaving Ryer Island, mainly in the June through October months, and as many as 40 loads in any one day. Because I farm on either side of the bridge, there are farm workers and farm equipment crossing the bridge throughout the day. Detouring around by using the ferries would add 30 minutes for vehicles and 2 hours for tractors to get to the same location versus crossing the bridge. Some of my farm equipment cannot cross by ferries due to weight or size restrictions.

A new bridge with wider lanes and entrances would make for a much safer crossing. Because of the vegetation and angle of entry on both ends of the bridge, the views of oncoming traffic is limited. Trucks or large farm equipment can only cross the bridge singlely. If they happen to enter the bridge at the same time going in opposite directions, one has to reverse itself. This is usually difficult and time-consuming and backs up traffic.

My understanding is that a retrofit of the current bridge would require that it be fully closed to traffic for a very extended period of time and that traffic would be minimally affected by the construction of a new bridge. Any extended closure would be a tremendous economic hardship for my farm business and my employees. After
discussing the bridge proposals with a dozen affected people. Everyone agreed that a new bridge is by far the best option.

Thank you for your time.
Sincerely,
Craig Nakahra
Nakahara Farms
Comment Letter 7

Tom Hester
Islands Inc.
Tom Hester islandsfarmer@hotmail.com

Dear Mr. Gifford

7A

I am Tom Hester the Manager and President of Islands Incorporated. We own and farm approximately 6,000 acres on Ryer Island. Crops on our property consist of pears, apples, cherries, alfalfa, tomatoes, wheat, field corn, grain sorghum, triticale, wheat straw, and safflower. All of these exit the island across the Miner Slough bridge. All but cherries are hauled on truck and trailer carrying 80,000 pound loads. The majority of these crops are harvested and hauled to market from August to November. The weather plays a major factor in when the crops are harvested it's never spread evenly you could have some days with very few loads and some days with anywhere from 50 to 100 loads crossing the bridge. Also some months will have more loads than others this would be impossible to estimate for any type of scheduling it's all up to mother nature. We also start our planting of winter crops in late October then we will bring trucks of seed and fertilizer onto the island.

It was mentioned at the public meeting in Rio Vista that to refurbish the old bridge this would require a continuous closure from August to November. To us, any closure in those months could interrupt harvest and be very damaging. Anything that would stop, slow, or interrupt truck traffic to or from the island in those months would be unworkable for us. To rely on the ferries to supply the island with workers, equipment, and also to haul out the harvested commodities I don't think would even be possible. The new bridge option we were told didn't require these closures of the old bridge and this would be a much better plan.

I appreciate the opportunity to be able to comment on the Miner Slough bridge project. As you can see the bridge is very important to us that farm on Ryer Island. If I can be of further assistance please feel free to contact me.

Sincerely,
Tom Hester

Islands Inc.
3554 State Highway 84
Walnut Grove, CA 95690
916 775 1996
Comment Letter 8

Stacey T. Boyd
Superintendent, RD501
rd501@riverdeltawireless.com
Superintendent of Reclamation District 501

Good Morning, Mr. Gifford:

My name is Stacey Boyd. I am the Superintendent of Reclamation District 501, Ryer Island. I have reviewed the proposed plans for the Miner Slough Bridge Project and wish to give my support with building a new bridge rather than rehabilitating the current Miner Slough Bridge. I have many concerns about a full closure of the existing bridge and the impacts it will have to my island and my residents.

First, as Superintendent I am required to have access to the island at any given time. I do not reside on Ryer Island, I commute from West Sacramento daily via the Miner Slough Bridge. The bridge has been closed three (3) times since I came to the island in 1995 and with the only access from either the J-Mack ferry or the Real McCoy Ferry, it has taken me over an hour or two to get on or off the island in the past. This is unacceptable for me to maintain my island duties. And if the famously unreliable Real McCoy Ferry is out-of-service, it could take even longer. I understand it was suggested that during harvest season, Caltrans may allow smaller harvest loads on and off the island via the ferries, and this would impact the traffic even greater.

Second, if the ferries are backed up with traffic during a full bridge closure, with cars and trucks parked on the levee road awaiting ferry access, this would seriously impede my levee maintenance as I have mowers and other equipment running on the levee. My work season is limited by Department of Water Resources and I cannot lose valuable levee maintenance time.

Lastly, on a more personal level, I am concerned about my island residents and being able to receive medical or fire assistance if the need arises. I have many elderly residents in poor health and any delay in response times could be critical.

Thank you for considering my concerns and please feel free to contact me at any time.

Cordially,

Stacey T. Boyd
Superintendent, RD501
916/775-1411 office
916/270-5370 cell
Comment Letter 9

Carey Chatfield Madill
Chatfield Properties II
Madill carey.madill@gmail.com

All,

9A

Please accept my comments regarding the Initial Study for the Miner Slough Bridge Project.

As a current landowner of nearly 150 acres on Ryer Island, we have serious concerns about the lack of information regarding the economic impact to land owners on the island, caused by bridge closures/repairs, within the study.

As you know, the majority of the acreage on Ryer Island is utilized for agricultural purposes. The land is farmed for several different commodities - none of which have one singular season for farming, and or harvest.

Chatfield Properties II has one commodity on the island - and our whole investment is in wine grapes. We are currently beginning our third year of developing and farming a new vineyard (approx 123 acres) of which we have invested more than $2 million to date.

Our first harvest is scheduled for fall of 2016...however as you know, depending on the climate and other natural conditions, the harvest season can fluctuate by several weeks on either end. Generally we expect harvest to begin any time during the month of August through October.

Unfortunately if the bridge is closed, or impeded, during that timeframe, there are no viable options to haul our ripened and harvested fruit to the destination wineries in a timely manner, as outlined by industry standards and contractual obligations. Expeditious transport is tantamount to the success of harvest. The current ferry system is not a viable means to haul large loaded trucks in this manner.

Loads are hauled out in large trucks - usually 25 tons per load - in a sequential pattern almost immediately as they are removed from the vine. Our harvest forecast for this inaugural harvest year is close to 6.5 tons per acre on average...which would mean roughly 780 tons of wine grapes will need to harvested, and hauled, in a very concise time frame. The fruit has a contractual base price - our two varietals average $725 p/ton. Therefore the economic impact of impeding our harvest is well over $560,000 - for the harvest season alone.

Please take into consideration these concerns while choosing which option you will pursue.
Regards,

Carey Chatfield Madill
Chatfield Properties II
209-920-4110
Comment Letter 10

Email #1 Craig Ledbetter
Vino Farms, LLC
Craig Ledbetter Craig@vinofarms.net

Zachary,

10A

I am contacting you to provide comments on behalf of one of my clients. Attached you will find my comments and concerns about the 1 of the 2 options for the Minor Slough Bridge. I assume you are aware that on Ryer Island there is one viable job supplier and that is agriculture. The potential of the bridge being closed for 6 months for repairs would do unbelievable financial damage to all farmers and land owners on the island. So, closing the bridge from August to November is not an option and I think my comments in the attached document will state that. If you have any questions please contact me via email or phone. I would be happy to speak in further detail if needed.

Thanks,

Craig Ledbetter
Vino Farms, LLC
1377 E. Lodi Ave
Lodi, CA 95240
209-334-6975
Comment Letter 11

Craig Ledbetter, Attachment PDF
Vino Farms, LLC
Craig Ledbetter Craig@vinofarms.net

11A

My name is Craig Ledbetter, I am one of the owners of Vino Farms, LLC. We represent a large landowner as its Vineyard Manager on Ryer Island. Our client owns 374 acres of producing vineyard. I am writing you to make a few comments on the upcoming projects revolving around the potential Miner Slough Bridge Project. We are 100% for a new bridge, we do understand the excess cost is an issue, but due to the time period the bridge would have to be close the repairs just do not line up with agriculture. Below you will find a few bullet points as to why closing the bridge would cause significant financial losses to my client.

- Harvest normally starts in August and runs through Oct.
- Bridge closure will not allow equipment for harvest to get on and off the island
- Loss of income on 2700-3300 tons of grapes
- Income in the range of $1.7-$2.5 million
- Still would have to pay to farm vineyard even if couldn't pick grapes to keep vineyard viable for future years. Farming would cost roughly $1.0-$1.2 million

I hope the bullet points above provide enough info to make the correct decision. My client is just one of many on the island that farms grapes and would be significantly impacted if the bridge were to be close. If you have any questions you can contact via email or phone.

Best Regards,

Craig Ledbetter
Vino Farms, LLC
Craig@vinofarms.net
Comment Letter 12

Scott Kauffman, owner
Hidden Harbor Marina
Scott Kauffman scott_kauffman@me.com

Good Morning,

12A

I'd like to put my vote in for leaving the old bridge in service while a new bridge is being constructed. With the Real McCoy II proving to be extremely unreliable there would be a tremendous traffic load put on the J-Mack in getting on and off Ryer Island. As a business owner on the island, Hidden Harbor Marina, I worry about the impact to our berthers and renters having a reliable way off and on the island if the bridge was removed. It has always been our go to link with the outside world. Please leave it in place while constructing the new bridge. Over the last 30 years I can remember many times it was our only link.

Thanks for considering my viewpoint and addressing my concerns.

Very Truly Yours,

Scott Kauffman, owner
Hidden Harbor Marina
Southern tip of Ryer Island
3100 Ryer Road East
Walnut Grove, Ca 95690
916-775-1313 office
916-997-8446 cell
Comment Letter 13
Chas Chatfield chas.chatfield@icloud.com

Gentlemen...

13A

my name is Chas Chatfield and I am a grape grower on Ryer island...we planted 125 acres of wine grapes two years ago and will be ready to harvest this next year in sept. The good lord willing we will harvest approx. 625 tons which equates to approximately 26 truckloads of grapes that will be taken to various wineries across the bridge in question...

And it also appears that if the state decides to repair our existing bridge we will not be able to use the bridge during harvest season...this would be economic disaster for myself and other growers on the island...it would seem to me that the best option for those of us that farm on Ryer island would have the state build a new bridge that would expedite our ability to get the fruit to the wineries , a bridge that is wider and safer for all to use and one that doesn't cause us economic ruin because we can't get our fruit off the island during harvest season . or at the very least pay us our contract price for our fruit for this coming year so we can survive...I can't be any clearer, we want a new bridge and not a redo that we can't use at the one time we need it most...thank you for giving me a chance to make my concerns a part of the record...

Chas Chatfield

Sent from my iPad
Comment Letter 14

Bradford A. Lange
Vineyard Operations
brad@langetwins.com
LangeTwins Family Winery and Vineyards

Good Afternoon Mr. Gifford,

14A

Our family business manages 555 acres of wine grapes on Ryer Island. The only way for our trucks/trailers on and off of the island is the Miner Slough Bridge. We harvest @5,000 tons of wine grapes between the end of July through most of October. This is @ 225 truckloads each weighing 80,000 lbs. During our harvest nights up to 50 truck/trailers crosses the bridge coming onto and leaving the island. This does not consider the movement of our harvesting equipment from Ryer to our vineyards north in the Clarksburg area. Having Miner Slough Bridge closed would be completely unworkable for us. Being delayed in our trips across the bridge would also create scheduling problems during a critical period of time in our season. Our annual harvest culminates our growing season and represents our “payday”. Having Miner Slough Bridge closed any part of the year makes access to Ryer a difficult situation. Having Miner Slough Bridge closed for repairs during harvest months prevents our fruit from getting to market and is not a solution.

Please don’t hesitate to respond with your comments and questions.

Thank you,

Brad Lange

Bradford A. Lange
Vineyard Operations
brad@langetwins.com
LangeTwins Family Winery and Vineyards
1298 West Jahant Road, Acampo, CA
office. 209.339.4055
fax. 209.339.9014
langetwins.com | facebook.com/langetwins | twitter.com/langetwins
Comment Letter 15

Nicky Suard, Esq.,
Managing Member, Snug Harbor Resorts, LLC
sunshine@snugharbor.net

Dear Mr. Marshall,

15A

Last night there was a meeting about a new bridge on Miner's Slough that Caltrans proposes...right about where DWR may propose a rock barrier which would block boat traffic anyway. Does it make any sense to anyone for Caltrans to propose spending $27 million for a new bridge that open up for maybe 3-8 boats a year, which could be blocked by rocks during the prime time a boat may happen to come by?

When the Caltrans representatives were asked (engineers, planners, computer modelers and environmental people) none knew of the BDCP or its possible impacts on Miners Slough, except one person who said it was a long range project and would not affect planning for the 70-year life span bridge.

Usually, when something doesn't make sense, it means there is missing information or else substantial miscommunication. So what is it we, the public, are NOT being told about the Miner's Slough project? And hopefully connecting the DWR spokesperson for "barriers" which aid conveyance with the Caltrans person for the proposed bridge will help with communication.

Nicky Suard, Esq., Managing Member, Snug Harbor Resorts, LLC
Comment Letter 15

U.S. Department of Homeland Security
United States Coast Guard

U.S. Coast Guard Island, Bldg 50-2
Alameda, CA 94501-5100
Staff Symbol: (dpw)
Phone: (510) 437-3514
Fax: (510) 437-5836
16591
Minor Slough (5.49)
November 24, 2015

Dear Mr. Gifford:

16A

We have reviewed Caltrans' Draft Environmental Assessment (DEA) for the proposed replacement of the Miner Slough Bridge, mile 5.5, over Miner Slough, 10 mile north of the City of Rio Vista, Solano County, California.

The General Bridge Act of 1946, as amended, requires the location and plans for bridges over navigable waters of the United States be approved by the Commandant, U.S. Coast Guard prior to commencing construction. Miner Slough is considered to be a navigable waterway of the United States for bridge administration purposes at the proposed bridge site. The bridge permit will apply to the bridge and its appurtenances, from abutment to abutment, or from where the approaches break grade. The proposed replacement bridge, at a minimum, should provide navigational clearances equal to or exceeding the clearances provided for by the existing Miner Slough Drawbridge. The existing drawbridge provides the following clearances:

Closed Position:
Horizontal: 72 feet fender to fender normal to the axis of the channel.
Vertical: 17 feet from Mean High Water to lowest hittable portion of the bridge.

Open Position:
Horizontal: 72 feet fender to fender normal to the axis of the channel.
Vertical: Unlimited.

Applications for bridge permits should be addressed to Commander (dpw), Eleventh Coast Guard District, Building 50-2, Coast Guard Island, Alameda, CA 94501-5100, Attn: Bridge Section. The application must be supported by sufficient information to permit a thorough assessment of the impact of the bridge and its immediate
approaches on the environment. A Coast Guard Bridge Permit Application Guide is available online at: https://www.uscg.mil/hq/cg5/cg551/CP 16591 3C.pdf

We agree to serve as a Cooperating Agency for the project from a navigational standpoint. We recommend the impacts of constructing cofferdams, sand islands, and falsework bents, etc., proposed for the construction of the bridge be discussed. The EA should also contain data on the number, size, and types of vessels currently using the waterway. This information should be compared with past and future trends on the use of the waterway.

16B

We recommend the following additions to the DEA document:

a. Section 1.1 Introduction What navigational clearances does the replacement bridge provide in the closed and open position? Provide horizontal clearances fender to fender normal to the axis of the channel. Provide vertical clearance, in the closed position, from Mean High Water to the lowest hittable portion of the swing span in both navigational channels. Provide vertical clearance, in the open position, from mean high water to the lowest hittable portion of the bridge.

16C

b. Section 1.4.1.2

Alternative 1: Bridge Replacement Traffic Management Plan: Vehicular traffic is discussed but not vessel traffic. Will the existing swing span open for vessels during construction? What are the sizes and types of vessels that use the waterway? Is there an alternative route for emergency response vessels, barges conducting emergency levee repairs? Discuss the time period between the installation of the replacement bridge deck and the removal of the existing bridge deck and the effects on vessel traffic during that time.

16D

c. Section 1.6 Permits and Approvals Needed

United States Coast Guard - Bridge Permit under the General Bridge Act of 1946, as amended.

16E

d. Section 2.1.3.2 Affected Environment

Marine Transportation

Please include a discussion on the sizes and types of commercial and recreational vessel traffic that uses that portion of the waterway. Discuss the number of times the bridge opens on average per year using bridge tender logs averaging the last 5 years.
e. Section 2.2.2 Water Quality and Storm Runoff; 2.2.2.1 Regulatory Setting

Section 401 Permitting

"The most common federal permits triggering 401 certification are CW A section 404 permits issued from the USACE and Bridge Permits, under the General Bridge Act of 1946, as amended, issued by the USCG." We look forward to working with you on this important transportation project. You may contact Mr. Carl Hausner, Project Manager, at (510) 437-3515 if you have any questions regarding our comments or requirements.

Sincerely,

DAI H. SULOUFF
Chief, Bridge Section
Eleventh Coast Guard District
By direction of the District Commander
Copy: USACE, Sacramento District, Regulatory Division
James Hsiao, P.E., Caltrans, District 4
USCG Sector San Francisco, Waterways
3.2.2 Responses to Comments

**Comment Letter 1, Hetchman Farms – Edward and Lorelyn Hetchman**

**Response to comment 1A**

Caltrans would like to thank you for taking the time to participate in the public outreach process. This comment expresses support for the bridge replacement alternative (Alternative 1).

**MASTER RESPONSE 1 – Selection of Preferred Alternative**

Caltrans has selected the bridge replacement alternative as the preferred alternative for the proposed project. During construction of the replacement bridge the existing bridge would remain open to traffic. Traffic delays would occur; however, they would be minimal and limited to single lane closures. The public would be informed of anticipated traffic delays and single lane closures.

**MASTER RESPONSE 2 – Economic Impact Study**

As a result of the public comments received on the Draft IS/EA regarding the potential economic impact to local agricultural businesses that would result from closure of the existing bridge, an economic impact study has been conducted for the project. Under the bridge replacement alternative (Alternative 1), the bridge would remain open to traffic, and traffic delays would be limited and short in duration. Because the bridge would remain open to traffic the results of the study concluded that the impact on the economics of the region with implementation of the bridge replacement alternative would be negligible. Under the bridge rehabilitation alternative (Alternative 2) the bridge would be closed during construction and traffic would be detoured via ferry service. It was concluded that under the bridge rehabilitation alternative, the detours would result in additional transportation costs and time delays for local businesses and workers, therefore resulting in an economic impact. To address public concern regarding economic impact to local businesses, Caltrans has chosen bridge replacement as the preferred alternative for the proposed project.

**Comment Letter 2, CA State Lands Commission – Jason Ramos**

**Response to comment 2A**
Caltrans would like to thank you for taking the time to participate in the public outreach process and appreciates receiving this information regarding the CSLC jurisdiction and responsibilities with regard to this project.

Caltrans will continue to coordinate with the CSLC to determine the appropriate actions regarding lease and formal authorization from the CSLC for construction of a new bridge and/or submittal of an application for the approval of an acceptable map by the CSLC.

Response to comment 2B

Caltrans would like to thank you for taking the time to participate in the public outreach process and appreciates receiving this information regarding the CSLC jurisdiction and responsibilities with regard to this project.

Response to comment 2C

A visual simulation is currently in development for the Preferred Alternative, Caltrans submitted the most recent project information for review and consideration justifying the benefits of a fixed-span bridge August 19, 2016. The need for lighting installation. Lighting warrants / justifications are being discussed at this time and will be developed further in the design phase of the project. Caltrans will continue to coordinate with the CSLC to determine the appropriate actions.

Response to comment 2D

The purpose of the Project is to maintain connectivity to and from Ryer Island via the Miner Slough Bridge on SR 84. Rehabilitation or replacement of the bridge would improve the seismic, safety, and operational characteristics of the bridge to meet current design standards; maintain current vehicular capacity; and avoid further deterioration of the existing structure (including bridge pier footings).

Transportation conformity is required under the Federal Clean Air Act to ensure that federally supported transportation activities are consistent with a state's State Implementation Plan. It requires that new transportation projects, programs, and plans will not cause new air quality violations of the National Ambient Air Quality Standards (NAAQS), worsen existing air quality violations, or delay timely attainment of the relevant air quality standards. Transportation conformity applies in areas that either do not meet (nonattainment) or previously have not met
(maintenance) the NAAQS for ozone, carbon monoxide (CO), particulate matter (PM), or nitrogen dioxide.

The EPA has classified the Bay Area Air Basin as nonattainment area for 8 hour ozone and for PM2.5 NAAQS. The Bay Area is also classified as a maintenance area for CO. Transportation conformity requirements, therefore, apply to projects in this region. Federally funded or approved highway and public transportation projects subject to conformity determination are required to meet both the regional and project-level conformity requirements. However, certain types of projects that are neutral for air quality purposes are exempt from the conformity determinations, as stipulated in Table 2 of 40 CFR 93.126. According to Table 2, the proposed project is exempt from the conformity requirement since it is either to reconstruct (Alternative 1) or to rehabilitate (Alternative 2) an existing bridge with no addition of travel lanes. Project-level air quality analyses are not required for exempt projects.

The proposed project is not a land development; it is not a new roadway or a roadway widening project. The project is not a new source of emissions and would have no effects on land use or the area’s growth. It would not result in increases in traffic volumes; it would not generate additional diesel truck traffic. This project is not considered a project of air quality concern under the final rule on PM2.5 conformity. It would not adversely affect air quality when compared with the CEQA baseline (existing) condition from the standpoint of project operation.

During construction, short-term degradation of air quality is expected from the release of particulate emissions (airborne dust) generated by excavation, grading, hauling, and other activities. Emissions from construction equipment powered by gasoline and diesel engines are also anticipated and would include CO, NOX, VOCs, directly emitted PM10 and PM2.5, and toxic air contaminants (TACs). These emissions would be temporary and limited to the immediate area surrounding the construction site, which is mostly farmland with a small number of farm-associated residences and outbuildings. The closest community is Courtland, located approximately 5 miles northeast of the project site and will not be affected by the project. The Bay Area Air Quality Management District (BAAQMD) generally defines a sensitive receptor as a facility or land use that houses or attracts members of the population, such as children, the elderly, and people with illnesses, who are particularly sensitive to the effects of air pollutants.
According to conformity regulation 40 CFR 93.123(c)(5), construction related emissions need not be considered in the project-level analysis for construction period that would last less than 5 years. Due to the existing court order on the BAAQMD adopted 2010 CEQA Thresholds of Significance, the Air District cannot recommend specific thresholds of significance with regard to construction emissions. The BAAQMD considers any project’s construction-related impacts to be less than significant if the appropriate dust- and combustion-control measures are implemented. Caltrans’ Standard Specification, Section 14-9.02 Air Pollution Control, requires work performed under contract to comply with all applicable air quality laws and regulations including local and air district ordinances and rules. Implementation of additional measures will be considered during development of the project’s Plans, Specifications, and Estimates. Caltrans’ contract Standard Specifications also include the requirement to minimize or eliminate dust through the application of water or dust palliatives. Because project construction activities would be short-term and would comply with Caltrans and BAAQMD requirements for minimizing emissions, construction-related emissions are not quantified and are expected to be less than significant.

In comparison, the No-Build Alternative would have no construction emissions but require frequent maintenance of the existing facility. It can be speculative to estimate the emissions associated with the maintenance activities in keeping an ageing bridge in operation but, over the long run, it may well be comparable to the short-term emissions generated during construction of either Build Alternatives.

**Response to comment 2E**

A focused field survey for bird and bat species presence within the study area was conducted in February 2016. Observations from the survey have been included in Section 2.3.4, Animal Species, of the IS/EA. Section 2.3.4.3, Environmental Consequences, discusses the anticipated effect to bird and bat species as a result of the project alternatives.

Section 2.3.6, Invasive Species, has been updated to include discussion of aquatic invasive species, and the potential for these species to be present or imported into the study area. Avoidance and Minimization Measures BIO-24: Ballast Water Management and BIO-25: Vessel and Hull, Equipment Cleaning and Decontamination have been added to the IS/EA.

**Response to comment 2F**
Because this is not a capacity increasing project, this would have been a qualitative analysis.

The purpose of the Project is to maintain connectivity to and from Ryer Island via the Miner Slough Bridge on SR 84. Rehabilitation or replacement of the bridge would improve the seismic, safety, and operational characteristics of the bridge to meet current design standards; maintain current vehicular capacity; and avoid further deterioration of the existing structure (including bridge pier footings).

Transportation conformity is required under the Federal Clean Air Act to ensure that federally supported transportation activities are consistent with a state’s State Implementation Plan. It requires that new transportation projects, programs, and plans will not cause new air quality violations of the National Ambient Air Quality Standards (NAAQS), worsen existing air quality violations, or delay timely attainment of the relevant air quality standards. Transportation conformity applies in areas that either do not meet (nonattainment) or previously have not met (maintenance) the NAAQS for ozone, carbon monoxide (CO), particulate matter (PM), or nitrogen dioxide.

The EPA has classified the Bay Area Air Basin as nonattainment area for 8 hour ozone and for PM2.5 NAAQS. The Bay Area is also classified as a maintenance area for CO. Transportation conformity requirements, therefore, apply to projects in this region. Federally funded or approved highway and public transportation projects subject to conformity determination are required to meet both the regional and project-level conformity requirements. However, certain types of projects that are neutral for air quality purposes are exempt from the conformity determinations, as stipulated in Table 2 of 40 CFR 93.126. According to Table 2, the proposed project is exempt from the conformity requirement since it is either to reconstruct (Alternative 1) or to rehabilitate (Alternative 2) an existing bridge with no addition of travel lanes. Project-level air quality analyses are not required for exempt projects.

The proposed project is not a land development; it is not a new roadway or a roadway widening project. The project is not a new source of emissions and would have no effects on land use or the area’s growth. It would not result in increases in traffic volumes; it would not generate additional diesel truck traffic. This project is not considered a project of air quality concern under the final rule on PM2.5 conformity. It would not adversely affect air quality when compared with the CEQA baseline (existing) condition from the standpoint of project operation.
During construction, short-term degradation of air quality is expected from the release of particulate emissions (airborne dust) generated by excavation, grading, hauling, and other activities. Emissions from construction equipment powered by gasoline and diesel engines are also anticipated and would include CO, NOX, VOCs, directly emitted PM10 and PM2.5, and toxic air contaminants (TACs). These emissions would be temporary and limited to the immediate area surrounding the construction site, which is mostly farmland with a small number of farm-associated residences and outbuildings. The closest community is Courtland, located approximately 5 miles northeast of the project site and will not be affected by the project. The Bay Area Air Quality Management District (BAAQMD) generally defines a sensitive receptor as a facility or land use that houses or attracts members of the population, such as children, the elderly, and people with illnesses, who are particularly sensitive to the effects of air pollutants.

According to conformity regulation 40 CFR 93.123(c)(5), construction related emissions need not be considered in the project-level analysis for construction period that would last less than 5 years. Due to the existing court order on the BAAQMD adopted 2010 CEQA Thresholds of Significance, the Air District cannot recommend specific thresholds of significance with regard to construction emissions. The BAAQMD considers any project's construction-related impacts to be less than significant if the appropriate dust- and combustion-control measures are implemented. Caltrans' Standard Specification, Section 14-9.02 Air Pollution Control, requires work performed under contract to comply with all applicable air quality laws and regulations including local and air district ordinances and rules. Implementation of additional measures will be considered during development of the project's Plans, Specifications, and Estimates. Caltrans' contract Standard Specifications also include the requirement to minimize or eliminate dust through the application of water or dust palliatives. Because project construction activities would be short-term and would comply with Caltrans and BAAQMD requirements for minimizing emissions, construction-related emissions are not quantified and are expected to be less than significant.

In comparison, the No-Build Alternative would have no construction emissions but require frequent maintenance of the existing facility. It can be speculative to estimate the emissions associated with the maintenance activities in keeping an ageing bridge in operation but, over the long run, it may well be comparable to the short-term emissions generated during construction of either Build Alternatives.
Response to comment 2G

A record search for known submerged resources was requested from the California State Land Commission on February 18, 2016. No response was received regarding this request. Clarifying text has been included in the IS/EA.

The requested text has been added to the IS/EA.

Text has been added to the IS/EA clarifying that the bridge as well as two historic era built resources located within the Area of Potential Effects were evaluated and determined not eligible for the National Register of Historic Places or the California Register of Historical Resources.

Text now clarifies that Native American groups and individuals were sent letters and telephone calls were completed per AB52 requirements. Results of the outreach effort are also included. Also, text has been added to the IS/EA regarding contact with the NAHC, and that no known historically significant sites were identified during the search.

Response to comment 2H

Appendix A, CEQA Checklist, has been updated as requested; item d) under Section IX. Hydrology and Water Quality has been changed to “Less than Significant Impact.”

Response to comment 2I

MASTER RESPONSE 3 – Recreational and Public Access to the Waterway

The bridge replacement alternative (Alternative I) has been selected as the Preferred Alternative for this project. Construction of the proposed project may temporarily affect recreational use of Miner Slough. Miner Slough will be accessible to watercraft during construction; however, during some stages of construction of the new bridge, public access to the waterway would be shut-off for limited periods of time (see
Section 1.4.1.2, Alternative 1: Bridge Replacement Traffic Management Plan and Chapter 2, Parks and Recreation Facilities).

Caltrans will coordinate with and obtain a permit from the U.S. Coast Guard (USCG) regarding watercraft access to Miner Slough during construction of the project. The USCG will be notified of any closures and duration of closures. The USCG would notify the public of waterway closures.

A member of the Caltrans Project Team will be assigned to provide the USCG Miner Slough closure information related to the construction project. That person may also be assigned to contact local emergency responders and local city and county government.

During regular daily operations, Caltrans Bridge Maintenance Staff in Rio Vista will continue to regularly communicate with the USCG regarding any scheduled or emergency closure of Miner Slough which may affect ship and boat traffic. Maintenance also contacts local emergency responders.

In addition, Caltrans District 4 Public Affairs will provide information regarding any significant construction related activities to the media, additional local government agencies and the general public. Means of communicating this information will include Traffic Advisories, project website postings on the Caltrans District 4 website and Twitter and Blog posts on Caltrans District 4 accounts. Major work affecting the region may be mailed to local residents and businesses via mailed printed flyers and electronically. Other work with less significance may be emailed and posted on social media without mailed printed flyers.

Preparation of a Traffic Management Plan (TMP) and coordination with the USCG would minimize project impacts to both roadway and waterway traffic. The TMP will identify any safety measures Caltrans will put in place to ensure public safety for recreational boating activities in Miner Slough.

Bridge replacement would not prohibit access to the waterway during operation of the bridge following construction in excess of operations that currently occur with operation of the existing Miner Slough Bridge.

**Response to comment 2.1**

The TMP that will be prepared for the project will include information regarding periods of closure for waterway traffic, public noticing procedures, and emergency response procedures during project construction.

Response to comment 2K

Thank you for your comments.

Comment Letter 3, Delta Protection Commission – Erik Vink

Response to comment 3A

Caltrans would like to thank you for taking the time to participate in the public outreach process.

The Preferred Alternative is the bridge replacement (Alternative 1). The new bridge will have 12-ft-wide lanes and 8-ft-wide shoulders in each direction. Although Caltrans is not proposing bicycle paths, sidewalks or signs as part of this project, please note that the new bridge will accommodate pedestrians and bicyclists and provide a wider space than the existing bridge for access to these users.

Comment Letter 4, Mike Coelho

Response to comment 4A

Caltrans would like to thank you for taking the time to participate in the public outreach process. This comment expresses support for the bridge replacement alternative (Alternative 1).

See Comment 1A: MASTER RESPONSE 1 – Selection of Preferred Alternative

See Comment 1A: MASTER RESPONSE 2 – Economic Impact Study

Both the replacement and rehabilitation alternatives would improve the seismic, safety, and operational characteristics of the bridge to meet current design standards. Under the Preferred Alternative the existing bridge will be removed following construction of the replacement bridge.

Comment Letter 5, Patti Jo Scott and Ron Burger

Response to comment 5A
Caltrans would like to thank you for taking the time to participate in the public outreach process. This comment expresses support for the bridge replacement alternative (Alternative 1).

See Comment 1A: MASTER RESPONSE 1 – Selection of Preferred Alternative

MASTER RESPONSE 4 – Emergency Medical Response

During construction, Caltrans will be in contact with the California Highway Patrol, Montezuma Fire Department, and emergency medical responders regarding traffic delays and lane closures. Medical response and emergency vehicles will receive priority access through the project area during construction activities.

Comment Letter 6, Nakahara Farms – Nakahara

Response to comment 6A

Caltrans would like to thank you for taking the time to participate in the public outreach process. This comment expresses support for the bridge replacement alternative (Alternative 1).

See Comment 1A: MASTER RESPONSE 1 – Selection of Preferred Alternative

See Comment 1A: MASTER RESPONSE 2 – Economic Impact Study

Both the replacement and rehabilitation alternatives would improve the seismic, safety, and operational characteristics of the bridge to meet current design standards. Under the Preferred Alternative the existing bridge will be removed following construction of the replacement bridge.

Comment Letter 7, Islands Inc. – Hester

Response to comment 7A

Caltrans would like to thank you for taking the time to participate in the public outreach process. This comment expresses support for the bridge replacement alternative (Alternative 1).

See Comment 1A: MASTER RESPONSE 1 – Selection of Preferred Alternative

See Comment 1A: MASTER RESPONSE 2 – Economic Impact Study
Comment Letter 8, Reclamation District 501 – Stacy Boyd

Response to comment 8A

Caltrans would like to thank you for taking the time to participate in the public outreach process. This comment expresses support for the bridge replacement alternative (Alternative 1).

See Comment 1A: MASTER RESPONSE 1 – Selection of Preferred Alternative

See Comment 1A: MASTER RESPONSE 2 – Economic Impact Study

See Comment 5A: MASTER RESPONSE 4 – Emergency Medical Response

Because the Miner Slough Bridge will remain open to traffic during construction of the replacement bridge, it will not be necessary to transport harvest loads by ferry and delays at the ferry crossings as a result of project implementation would not occur.

Comment Letter 9, Chatfield Properties II – Carey Chatfield Madill

Response to comment 9A

Caltrans would like to thank you for taking the time to participate in the public outreach process. This comment expresses support for the bridge replacement alternative (Alternative 1).

See Comment 1A: MASTER RESPONSE 1 – Selection of Preferred Alternative

See Comment 1A: MASTER RESPONSE 2 – Economic Impact Study

Comment Letter 10, Vino Farms – Craig Ledbetter

Response to comment 10A

Caltrans would like to thank you for taking the time to participate in the public outreach process. This comment expresses support for the bridge replacement alternative (Alternative 1).

See Comment 1A: MASTER RESPONSE 1 – Selection of Preferred Alternative

See Comment 1A: MASTER RESPONSE 2 – Economic Impact Study
Comment Letter 11, Vino Farms – Craig Ledbetter

Response to comment 11A

Caltrans would like to thank you for taking the time to participate in the public outreach process. This comment expresses support for the bridge replacement alternative (Alternative 1).

See Comment 1A: MASTER RESPONSE 1 – Selection of Preferred Alternative

See Comment 1A: MASTER RESPONSE 2 – Economic Impact Study

Comment Letter 12, Hidden Harbor Marina – Scott Kauffman

Response to comment 12A

Caltrans would like to thank you for taking the time to participate in the public outreach process. This comment expresses support for the bridge replacement alternative (Alternative 1).

See Comment 1A: MASTER RESPONSE 1 – Selection of Preferred Alternative

Comment Letter 13, Chas Chatfield

Response to comment 13A

Caltrans would like to thank you for taking the time to participate in the public outreach process. This comment expresses support for the bridge replacement alternative (Alternative 1).

See Comment 1A: MASTER RESPONSE 1 – Selection of Preferred Alternative

See Comment 1A: MASTER RESPONSE 2 – Economic Impact Study

Comment Letter 14, Vineyard Operations – Brad Lang

Response to comment 14A

Caltrans would like to thank you for taking the time to participate in the public outreach process. This comment expresses support for the bridge replacement alternative (Alternative 1).
See Comment 1A: MASTER RESPONSE 1 – Selection of Preferred Alternative

See Comment 1A: MASTER RESPONSE 2 – Economic Impact Study

**Comment Letter 15, Snug Harbor – Nicky Suard**

**Response to comment 15A**

Caltrans would like to thank you for taking the time to participate in the public outreach process. Thank you for your comment.

The BDCP is a Habitat Conservation Plan (HCP) and Natural Community Conservation Plan (NCCP) was developed in compliance with the federal Endangered Species Act (ESA) and the California Natural Community Conservation Planning Act (NCCPA). It is a planning document, to be implemented possibly over 50 years, that describes the proposed actions to conserve and protect habitat and species in the Delta, reduce adverse effects of water diversions, and provide a more reliable water supply. Development of the BDCP is consistent with state and federal environmental protection laws associated with operation of the State Water Project (SWP) and Central Valley Project (CVP). The BDCP is still in its environmental review, as of now Alternative 4A is proposed as the new preferred alternative. It is not anticipated to have a significant impact to the facilities, design, and project area of the Miner Slough Bridge Project.

**Comment Letter 16, U.S. Coast Guard – David Sulouff**

**Response to comment 16A**

Caltrans would like to thank you for taking the time to participate in the public outreach process and appreciates receiving information regarding the USCG permit requirements and process with regard to this project.

A Project Coordination meeting with Caltrans and participating agencies including USCG was held on 2/24/2016 to discuss the proposed project and to discuss the comments submitted by the USCG on the Draft IS/EA.

Caltrans decided to initiate consultation with United States Coast Guard to assess the feasibility of constructing a bridge with a fixed span Aug 19, 2016.
Caltrans submitted information for review and consideration justifying the benefits for a fixed-span bridge. Information provided by Caltrans to the USCG at that time, and summarized is in Chapter 3 Comments and Coordination section.

The Preferred Alternative will provide navigational clearances equal to or exceeding the clearances provided for by the existing Miner Slough Bridge. The Preferred Alternatives vertical clearance will be at least 18 feet from the lowest hittable portion of the proposed bridge between piers 2 and 3 to Mean High Water. At least 85 feet of horizontal clearance, fender to fender normal to the axis of the channel.

During construction the temporary navigable traffic opening will be a minimum of 75’.

Response to comment 16B

The replacement bridge will provide the same or higher vertical clearance than the existing Miner Slough Bridge.

The Preferred Alternatives vertical clearance will be at least 18 feet from the lowest hittable portion of the proposed bridge between piers 2 and 3 to Mean High Water. The Permanent horizontal clearance (navigable traffic opening) from fender/dolphin to fender/dolphin is 85’. During construction the temporary navigable traffic opening will be a minimum of 75’. There is only one side used for navigation as the other side a craft may hit ground and there is the small island in the way.

Response to comment 16C

Please see response to Comment 16A regarding information provided by Caltrans to the USCG.

The Traffic Management Plan will include a discussion regarding vessel traffic and emergency response vessels using Miner Slough. Operation of the swing span at the existing Miner Slough Bridge will continue throughout construction of the replacement bridge. Refer to Section 1.4.1.2 of the IS/EA regarding construction schedule for the project.

Response to comment 16D

Text has been inserted in Section 1.6 as requested

Response to comment 16E
Please see response to Comment 16A regarding information provided by Caltrans to the USCG.

Response to comment 16F

Thank you for your comment. Comment noted.
Chapter 4  List of Preparers

CALIFORNIA DEPARTMENT OF TRANSPORTATION

Project Management
Osama Elhamshary, Project Manager

Environmental Analysis
Stefan Galvez-Abadia
Wahida Rashid, Branch Chief
Zachary Gifford, Associate Environmental Planner

Environmental Engineering
Brian Rowley, Associate
Shiang Yang, Associate

Cultural Resource Studies
Helen Blackmore, Architectural History
Elizabeth Krase Greene, Branch Chief, Built Resources/Architectural History
Kristina Montgomery, Archaeology
Kathryn Rose, Branch Chief, Archaeology

Hazardous Waste
Chris Wilson, Branch Chief

Landscape Architecture
Jeanne Gorham, Office Chief
Susan Lindsay, Branch Chief
Tom Packard, Landscape Associate

Biological Sciences and Permits
Eric Schwab, Associate
Christopher States, Branch Chief

Hydraulic Engineering
Kathleen Reilly, Branch Chief

Geotechnical Design
Matthew Gaffney, Associate
Tim Pokrywka, Office Chief
North County Design
Roni Boukhalil, Senior
Pawan Gupta, Associate

CH2M HILL (DRAFT ENVIRONMENTAL DOCUMENT)
Chris Archer, Geographic Information System (GIS)
Bryan Bell, Technical Editor
Clarice Ericsson, Publications Technician
Claudio Fassardi, Engineer, Sea Level Rise
Chris Herbst, Biological Resources
Karin Lilienbecker, Senior Reviewer
David Lundgren, Project Manager, Planner
Julie Petersen, Environmental Scientist
David Rasmussen, Biologist
Kyle Winslow, Technologist, Sea Level Rise

LSA ASSOCIATES, INC. – HUMAN ENVIRONMENT
Environmental Planning
Shanna Guiler, AICP, Senior Planner
Laura Laffer, Principal, Planning
Steven Ross, Associate, Planning
# Chapter 5  Distribution List

## FEDERAL AGENCIES
- Environmental Protection Agency, Region IX
- Federal Activities Office, CMD-2
- 75 Hawthorne Street
- San Francisco, CA 94105-3901

- Natural Resources Conservation Service
- Dixon Service Center
- 1170 N Lincoln Street
- Dixon, CA. 95620-4001

- National Marine Fisheries Services
- Joe Heublein
- 777 Sonoma Avenue Room 325
- Santa Rosa, CA 95404

- U.S. Army Corps of Engineers, Sacramento District
  - ATTN: Regulatory Branch
  - 1325 J Street, Room 1480
  - Sacramento, CA 95814

- U.S. Fish and Wildlife Service
  - 2800 Cottage Way W-2605
  - Sacramento, CA 95825

- U.S. Coast Guard
  - David H. Sulouff
  - Chief, Bridge Section Eleventh Coast Guard District
  - Coast Guard Island, Bldg 50-7
  - Alameda, CA 94501

## STATE AGENCIES
- State Clearinghouse, Executive Officer
- 1400 Tenth Street, Room 156
- P.O. Box 3044
- Sacramento, CA 95812-3044

- Bay Area Air Quality Management District
- Jack Broadbent
- Chief Executive Officer
- 939 Ellis Street
- San Francisco, CA 94109

- California Air Resources Board
  - Executive Officer Richard Corey
  - 1001 I Street
  - P.O. Box 2815
  - Sacramento, CA 95812

- California Department of Conservation
  - Director Mark Neehodom
  - 801 K Street, MS 24-01
  - Sacramento, CA 95814

- California Department of Fish & Wildlife
  - Region 3
  - Regional Manager Scott Wilson
  - 7329 Silverado Trail
  - Napa, CA 94558

- California Highway Patrol,
  - Special Projects Section
  - P.O. Box 942898
  - Sacramento, CA 92298
Chapter 2

Distribution List

[Text content in the image is not legible and cannot be transcribed.]
California Office of Historic Preservation
1416 Ninth Street, Room 1442
Sacramento, CA 95814

California Public Utilities Commission
Executive Director Paul Clanon
505 Van Ness Avenue
San Francisco, CA 94102

California Transportation Commission
1120 N Street, MS-52
Sacramento, CA 95814

Department of Toxic Substances Control
1001 I Street
Sacramento, CA 95814-2828
P.O. Box 806
Sacramento, CA 95812

Native American Heritage Commission
Executive Secretary
1550 Harbor Blvd, Suite 100
West Sacramento, CA 95691

Regional Water Quality Control Board District 2
1515 Clay Street, Suite 1400
Oakland, CA 94612

California Department of Housing and Community Development
Director
2020 West El Camino
Sacramento, CA 95833

State Mining & Geology Board
801 K Street, Suite 2015
Sacramento, CA 95814

San Francisco Public Utilities Commission
525 Golden Gate Avenue
San Francisco, CA 94102

California Office of Emergency Services
3650 Schriever Avenue
Mather, CA 95655

REGIONAL AND LOCAL AGENCIES
Association of Bay Area Governments
Kenneth Kirkey
Planning Director
101 Eighth Street, P.O. Box 2050
Oakland, CA 94604-2050

Metropolitan Transportation Commission
Doug Kimsey
Planning Director
101 Eighth Street – Metrocenter
Oakland, CA 94607

Reclamation District No. 501
3554 State Highway 84
Walnut Grove, CA 95690

Reclamation District No. 999
38563 Netherlands Road
Clarksburg, CA 95612

Solano Transportation Authority
Bicycle Advisory Committee (BAC)
One Harbor Center, Suite 130
Suisun City, CA 94585
FEDERAL AND STATEWIDE ELECTED OFFICIALS
The Honorable Barbara Boxer
United States Senate
70 Washington Street, Suite 203
Oakland, CA 94607

The Honorable Dianne Feinstein
United States Senate
1 Post Street #2450
San Francisco CA 94104

The Honorable Bill Dodd
California State Assembly, District 4
725 Main Street, Suite 206
Woodland, CA 95695

The Honorable John Garamendi
United States Congress, 3rd District
1261 Travis Boulevard, Suite 130
Fairfield, CA 94533

The Honorable Jim Frazier
California State Assembly, District 11
1261 Travis Boulevard, Suite 110
Fairfield, CA 94533

SOLANO COUNTY BOARD OF SUPERVISORS
The Honorable Skip Thompson
Solano County Board of Supervisors, 5th District
675 Texas Street, Suite 6500
Fairfield, CA 94533

Chairwoman Erin Hannigan
Solano County Board of Supervisors

401 Amador Street
Vallejo CA 94590

Supervisor James Spering
Solano County Board of Supervisors
675 Texas Street, #6500
Fairfield CA 94533

Vice-Chairman John Vasquez
Solano County Board of Supervisors
675 Texas Street, #6500
Fairfield CA 94533

Supervisor District 2, Linda Seifert
Solano County Board of Supervisors
675 Texas Street, #6500
Fairfield CA 94533

CITY OF RIO VISTA
The Honorable Norman Richardson
Mayor, City of Rio Vista
One Main Street
Rio Vista CA 94571

David Hampton, Vice-Mayor
City of Rio Vista
One Main Street
Rio Vista CA 94571

Constance Boulware, Councilmember
City of Rio Vista
One Main Street
Rio Vista CA 94571

Ronald Kott, Councilmember
City of Rio Vista
One Main Street
Rio Vista CA 94571
Jim McCracken, Councilmember
City of Rio Vista
One Main Street
Rio Vista CA 94571

Tim Chapa, City Manager
City of Rio Vista
One Main Street
Rio Vista CA 94571

LIBRARIES
Suisun City Library
333 Sunset, Suite 280
Suisun City, CA 94585

Courtland Library
170 Primasing Ave. P.O. Box 536
Courtland, CA 95615

Rio Vista Library
44 South Second St.
Rio Vista CA 94571
Chapter 6 References Cited


Chapter 6

References Cited

[References and citations related to the chapter content]

[Further details and notes related to the chapter content]


2015f. Completion of Section 106 for the Miner Slough Bridge Replacement Project along State Route 84 in Solano County, Memorandum. April 17.


2015k. Addendum to include bridge rehabilitation for the Miner Slough Bridge Replacement Project along State Route 84 in Solano County. August 27.


http://www.slc.ca.gov/Programs/MISP/Rulemaking/InfoShts/BWMngmnt.pdf
August 3, 2013.


U.S. Fish and Wildlife Service (USFWS). 1996a. Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate Plants. Available online at:


. 2014. NWI Wetlands Mapper. Available online at:
http://www.fws.gov/wetlands/Data/Mapper.html.

. 2015. Online endangered species database for Solano County and Liberty Island quadrangle and the eight surrounding quadrangles, Sacramento Fish and Wildlife Office. Available online at:

. 2016. List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project. ECOS-IPac. Obtained on June 17, 2016.
Appendix A  CEQA Checklist
CEQA Environmental Checklist
04-SOL-84  PM 12.0/12.4  0G660
Dist.-Co.-Rte.  P.M/P.M.  E.A.

This checklist identifies physical, biological, social and economic factors that might be affected by the proposed project. In many cases, background studies performed in connection with the projects indicate no impacts. A NO IMPACT answer in the last column reflects this determination. Where there is a need for clarifying discussion, the discussion is included either following the applicable section of the checklist or is within the body of the environmental document itself. The words "significant" and "significance" used throughout the following checklist are related to CEQA, not NEPA, impacts. The questions in this form are intended to encourage the thoughtful assessment of impacts and do not represent thresholds of significance.

<table>
<thead>
<tr>
<th></th>
<th>Potentially Significant Impact</th>
<th>Less Than Significant with Mitigation</th>
<th>Less Than Significant Impact</th>
<th>No Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. AESTHETICS: Would the project:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Have a substantial adverse effect on a scenic vista?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
</tr>
<tr>
<td>b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
</tr>
<tr>
<td>c) Substantially degrade the existing visual character or quality of the site and its surroundings?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
</tr>
<tr>
<td>d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
</tr>
</tbody>
</table>

II. AGRICULTURE AND FOREST RESOURCES: In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Dept. of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment Project; and the forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board. Would the project:

a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use? | ☐ | ☐ | ☒ | ☐ |

b) Conflict with existing zoning for agricultural use, or a Williamson Act contract? | ☐ | ☐ | ☒ | ☐ |
<table>
<thead>
<tr>
<th>Potentially Significant Impact</th>
<th>Less Than Significant with Mitigation</th>
<th>Less Than Significant Impact</th>
<th>No Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
</tr>
<tr>
<td>d) Result in the loss of forest land or conversion of forest land to non-forest use?</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
</tr>
<tr>
<td>e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
</tr>
</tbody>
</table>

**III. AIR QUALITY:** Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. Would the project:

a) Conflict with or obstruct implementation of the applicable air quality plan? | ☐ | ☐ | ☒ | ☐ |

b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation? | ☐ | ☐ | ☒ | ☐ |

c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)? | ☐ | ☐ | ☒ | ☐ |

d) Expose sensitive receptors to substantial pollutant concentrations? | ☐ | ☐ | ☒ | ☐ |

e) Create objectionable odors affecting a substantial number of people? | ☐ | ☐ | ☒ | ☐ |

**IV. BIOLOGICAL RESOURCES:** Would the project:

a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service? | ☐ | ☒ | ☐ | ☐ |

b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Wildlife or U.S Fish and Wildlife Service? | ☐ | ☒ | ☐ | ☐ |
c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?

  ☐ Potentially Significant Impact  ☒ Less Than Significant with Mitigation  ☐ Less Than Significant Impact  ☐ No Impact

d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?

  ☐ Potentially Significant Impact  ☐ Less Than Significant with Mitigation  ☒ Less Than Significant Impact  ☐ No Impact

e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?

  ☐ Potentially Significant Impact  ☐ Less Than Significant with Mitigation  ☒ Less Than Significant Impact  ☐ No Impact

f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?

  ☐ Potentially Significant Impact  ☐ Less Than Significant with Mitigation  ☒ Less Than Significant Impact  ☐ No Impact

V. CULTURAL RESOURCES: Would the project:

a) Cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?

  ☒ Potentially Significant Impact  ☐ Less Than Significant with Mitigation  ☐ Less Than Significant Impact  ☐ No Impact

b) Cause a substantial adverse change in the significance of an archeological resource pursuant to §15064.5?

  ☒ Potentially Significant Impact  ☐ Less Than Significant with Mitigation  ☐ Less Than Significant Impact  ☐ No Impact

c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

  ☐ Potentially Significant Impact  ☐ Less Than Significant with Mitigation  ☒ Less Than Significant Impact  ☐ No Impact

d) Disturb any human remains, including those interred outside of dedicated cemeteries?

  ☐ Potentially Significant Impact  ☐ Less Than Significant with Mitigation  ☒ Less Than Significant Impact  ☐ No Impact

VI. GEOLOGY AND SOILS: Would the project:

a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:

  ☒ Potentially Significant Impact  ☐ Less Than Significant with Mitigation  ☐ Less Than Significant Impact  ☐ No Impact

  i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42?

  ☒ Potentially Significant Impact  ☐ Less Than Significant with Mitigation  ☐ Less Than Significant Impact  ☐ No Impact

  ii) Strong seismic ground shaking?

     ☐ Potentially Significant Impact  ☐ Less Than Significant with Mitigation  ☒ Less Than Significant Impact  ☐ No Impact

  iii) Seismic-related ground failure, including liquefaction?

     ☐ Potentially Significant Impact  ☐ Less Than Significant with Mitigation  ☒ Less Than Significant Impact  ☐ No Impact
<table>
<thead>
<tr>
<th>iv) Landslides?</th>
<th>Potentially Significant Impact</th>
<th>Less Than Significant with Mitigation</th>
<th>Less Than Significant Impact</th>
<th>No Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>b) Result in substantial soil erosion or the loss of topsoil?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
</tr>
<tr>
<td>c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
</tr>
<tr>
<td>d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
</tr>
<tr>
<td>e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
</tr>
</tbody>
</table>

VII. GREENHOUSE GAS EMISSIONS: Would the project:

   a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment? ☐ ☐ ☐ ☒

   An assessment of the greenhouse gas emissions and climate change is included in the body of the environmental document. While Caltrans has included this good faith effort in order to provide the public and decision-makers as much information as possible about the project, it is Caltrans determination that in the absence of further regulatory or scientific information related to GHG emissions and CEQA significance, it is too speculative to make a significant determination regarding the project’s direct and indirect impact with respect to climate change. Caltrans does remain firmly committed to implementing measures to help reduce the potential effects of the project. These measures are outlined in the body of the environmental document.

VIII. HAZARDS AND HAZARDOUS MATERIALS: Would the project:

   a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials? ☐ ☐ ☐ ☒

   b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment? ☐ ☐ ☐ ☒

   c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school? ☐ ☐ ☐ ☒
<table>
<thead>
<tr>
<th></th>
<th>Potentially Significant Impact</th>
<th>Less Than Significant with Mitigation</th>
<th>Less Than Significant Impact</th>
<th>No Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>d) Be located on a site which is included on a list of hazardous</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>materials sites compiled pursuant to Government Code Section</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>65962.5 and, as a result, would it create a significant hazard</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>to the public or the environment?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e) For a project located within an airport land use plan or,</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>where such a plan has not been adopted, within two miles of a</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>public airport or public use airport, would the project result</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>in a safety hazard for people residing or working in the</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>project area?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f) For a project within the vicinity of a private airstrip,</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>would the project result in a safety hazard for people</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>residing or working in the project area?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>g) Impair implementation of or physically interfere with an</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>adopted emergency response plan or emergency evacuation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>plan?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>h) Expose people or structures to a significant risk of loss,</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>injury or death involving wildland fires, including where</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>wildlands are adjacent to urbanized areas or where</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>residences are intermixed with wildlands?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

IX. HYDROLOGY AND WATER QUALITY: Would the project:

<table>
<thead>
<tr>
<th></th>
<th>Potentially Significant Impact</th>
<th>Less Than Significant with Mitigation</th>
<th>Less Than Significant Impact</th>
<th>No Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Violate any water quality standards or waste discharge</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>requirements?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) Substantially deplete groundwater supplies or interfere</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>substantially with groundwater recharge such that there</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>would be a net deficit in aquifer volume or a lowering of</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>the local groundwater table level (e.g., the production rate</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>of pre-existing nearby wells would drop to a level which</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>would not support existing land uses or planned uses for</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>which permits have been granted)?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) Substantially alter the existing drainage pattern of the</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>site or area, including through the alteration of the</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>course of a stream or river, in a manner which would result</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>in substantial erosion or siltation on- or off-site?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d) Substantially alter the existing drainage pattern of the</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>site or area, including through the alteration of the</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>course of a stream or river, or substantially increase the</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>rate or amount of surface runoff in a manner which would</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>result in flooding on- or off-site?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e) Create or contribute runoff water which would exceed the</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>capacity of existing or planned stormwater drainage systems</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>or provide substantial additional sources of polluted</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>runoff?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f) Otherwise substantially degrade water quality?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potentially Significant Impact</td>
<td>Less Than Significant with Mitigation</td>
<td>Less Than Significant Impact</td>
<td>No Impact</td>
<td></td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-------------------------------------</td>
<td>-----------------------------</td>
<td>-----------</td>
<td></td>
</tr>
<tr>
<td>g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
<td>☐</td>
</tr>
<tr>
<td>h) Place within a 100-year flood hazard area structures which would impede or redirect flood flows?</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
<td>☐</td>
</tr>
<tr>
<td>i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
<td>☐</td>
</tr>
<tr>
<td>j) Inundation by seiche, tsunami, or mudflow</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
<td>☐</td>
</tr>
</tbody>
</table>

**X. LAND USE AND PLANNING:** Would the project:

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Physically divide an established community?</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
</tr>
<tr>
<td>b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
</tr>
<tr>
<td>c) Conflict with any applicable habitat conservation plan or natural community conservation plan?</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
</tr>
</tbody>
</table>

**XI. MINERAL RESOURCES:** Would the project:

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
</tr>
<tr>
<td>b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
</tr>
</tbody>
</table>

**XII. NOISE:** Would the project result in:

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
</tr>
<tr>
<td>b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
</tr>
<tr>
<td>c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
</tr>
<tr>
<td>d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?</td>
<td>Potentially Significant Impact</td>
<td>Less Than Significant with Mitigation</td>
<td>Less Than Significant Impact</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**XIII. POPULATION AND HOUSING:** Would the project:

<table>
<thead>
<tr>
<th>a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?</th>
<th>Potentially Significant Impact</th>
<th>Less Than Significant with Mitigation</th>
<th>Less Than Significant Impact</th>
<th>No Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**XIV. PUBLIC SERVICES:**

<table>
<thead>
<tr>
<th>a) Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services?</th>
<th>Fire protection?</th>
<th>Police protection?</th>
<th>Schools?</th>
<th>Parks?</th>
<th>Other public facilities?</th>
</tr>
</thead>
</table>

---

OG660 State Route 84 Miner Slough Bridge Project
Initial Study with MND/Environmental Assessment
### XV. RECREATION:

<table>
<thead>
<tr>
<th>Potentially Significant Impact</th>
<th>Less Than Significant with Mitigation</th>
<th>Less Than Significant Impact</th>
<th>No Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?  

[ ]  [ ]  [ ]  [x]  

b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?  

[ ]  [ ]  [x]  [ ]

### XVI. TRANSPORTATION/TRAFFIC: Would the project:

<table>
<thead>
<tr>
<th>Potentially Significant Impact</th>
<th>Less Than Significant with Mitigation</th>
<th>Less Than Significant Impact</th>
<th>No Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a) Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?  

[ ]  [x]  [ ]  [ ]

b) Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?  

[ ]  [x]  [ ]  [ ]

c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?  

[ ]  [x]  [ ]  [ ]

d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?  

[ ]  [x]  [ ]  [ ]

e) Result in inadequate emergency access?  

[ ]  [x]  [ ]  [ ]

f) Conflict with adopted policies, plans or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?  

[ ]  [x]  [ ]  [ ]

### XVII. TRIBAL CULTURAL RESOURCES: Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:

<table>
<thead>
<tr>
<th>Potentially Significant Impact</th>
<th>Less Than Significant with Mitigation</th>
<th>Less Than Significant Impact</th>
<th>No Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or  

[ ]  [x]  [ ]  [ ]

---

0G660 State Route 84 Miner Slough Bridge Project  
Initial Study with MND/Environmental Assessment
b) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.

<table>
<thead>
<tr>
<th>XVIII. UTILITIES AND SERVICE SYSTEMS: Would the project:</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?</td>
</tr>
<tr>
<td>b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?</td>
</tr>
<tr>
<td>c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?</td>
</tr>
<tr>
<td>d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?</td>
</tr>
<tr>
<td>e) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?</td>
</tr>
<tr>
<td>f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?</td>
</tr>
<tr>
<td>g) Comply with federal, state, and local statutes and regulations related to solid waste?</td>
</tr>
</tbody>
</table>
### XIX. MANDATORY FINDINGS OF SIGNIFICANCE

<table>
<thead>
<tr>
<th>Potentially Significant Impact</th>
<th>Less Than Significant with Mitigation</th>
<th>Less Than Significant Impact</th>
<th>No Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?

b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?

c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?
March 2013

NON-DISCRIMINATION POLICY STATEMENT

The California Department of Transportation, under Title VI of the Civil Rights Act of 1964 and related statutes, ensures that no person in the State of California shall, on the grounds of race, color, national origin, sex, disability, religion, sexual orientation, or age, be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity it administers.

For information or guidance on how to file a complaint based on the grounds of race, color, national origin, sex, disability, religion, sexual orientation, or age, please visit the following web page: http://www.dot.ca.gov/hq/bep/title_vi/t6_violated.htm.

Additionally, if you need this information in an alternate format, such as in Braille or in a language other than English, please contact the California Department of Transportation, Office of Business and Economic Opportunity, 1823 14th Street, MS-79, Sacramento, CA 95811. Telephone: (916) 324-0449, TTY: 711, or via Fax: (916) 324-1949.

MALCOLM DOUGHERTY
Director

"Caltrans improves mobility across California"
NON DISCRIMINATION POLICY STATEMENT

The Commission, in accordance with Title VI of the Civil Rights Act of 1964, as amended, Title II of the Federal Civil Rights Act of 1968, and Section 504 of the Rehabilitation Act of 1973, as amended, and in accordance with the requirements of the Americans with Disabilities Act of 1990, as amended, hereby states that the Commission does not discriminate on the basis of race, color, national origin, sex, age, or disability in its employment policies and practices, nor does it discriminate against any individual in the receipt of its services, programs, or activities.

The Commission is committed to providing a work environment that is free from discrimination and harassment. The Commission provides equal opportunity to all individuals who work for or visit the Commission.

The Commission is committed to providing a workplace that is safe, free from violence, and free from discrimination.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassment.

The Commission is committed to providing a workplace that is free from discrimination and harassed
Appendix C  Avoidance, Minimization, and/or Mitigation Summary
### Table C-1  Avoidance, Minimization, and/or Mitigation Summary

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
</table>
| **Air Quality**                   | **AIR-1: Construction Period Best Management Practices**  
Short term air quality effects during the proposed project’s construction period will be addressed by Caltrans Special Provision and Standard Specification 14-9.02. Trucks and construction equipment emit hydrocarbons, oxides of nitrogen, carbon monoxide and particulates. Most project-related pollution during construction would consist of wind-blown dust generated by excavation, grading, hauling and various other activities. The effects from these activities would vary from day to day as construction progresses. The Special Provisions and Standard Specifications include requirements to minimize or eliminate dust during construction through the application of water or dust palliatives. |
| **Cultural Resources**            | **CUL-1: Unanticipated Discovery of Cultural Resources**  
In the event of an unanticipated cultural resource discovery during construction, all ground disturbances within 60 feet of the discovery will be halted or redirected to other areas until the discovery has been documented by a qualified archaeologist and its potential significance evaluated in terms of applicable criteria. |
| **CUL-2: Discovery of Human Remains** | If human remains are discovered, State Health and Safety Code Section 7050.5 states that further disturbances and activities shall cease in any area or nearby area suspected to overlie remains, and the County Coroner contacted. Pursuant to Public Resources Code (PRC) Section 5097.98, if the remains are thought to be Native American, the coroner will notify the Native American Heritage Commission (NAHC) who will notify the Most Likely Descendant (MLD). At this time, the person who discovered the remains will contact the District 4 Office of Cultural Resource Studies Chief so that they may work with the MLD on the respectful treatment and disposition of the remains. Further provisions of PRC 5097.98 are to be followed as applicable. |
| **Water Quality and Stormwater Runoff** | **WATER-1: SWPPP**  
A Storm Water Pollution Prevention Plan (SWPPP) will be developed and implemented and will comply with the Caltrans Storm Water Management Plan, which includes measures to protect sensitive areas and to prevent and minimize storm water and non-storm water discharges. Water quality inspector(s) will inspect construction areas to determine if the storm water BMPs are adequate and adjust them, if necessary. Construction activities for the roadway improvements and bridge replacement and demolition will be regulated under the Construction General Permit. The SWPPP will be prepared by the contractor and approved by Caltrans. |
| **WATER-2: Stockpile Area**       | Stockpile areas for construction materials, equipment, and debris will be placed greater than 150 ft away from Miner Slough, as well as covered to minimize/avoid impacts to Miner Slough. |
### Table C-1  Avoidance, Minimization, and/or Mitigation Summary

**WATER-3: Temporary Construction Site Best Management Practices (BMPs)**

These BMPs will be implemented throughout the duration of construction activities to avoid and minimize pollutant loads in potential stormwater/non-stormwater discharges. Construction Site BMPs strategies applicable to this project may include the following:

- **Soil Stabilization**: Temporary Fence (Type ESA); Move-In/Move-Out; Hydroseeding; Geotextiles, Mats, Plastic Covers, and Erosion Control Blankets; Hydraulic Mulch
- **Sediment Control**: Fiber Rolls, Silt Fence, Sediment Trap, Gravel Bag Berm, Check Dams, Storm Drain Inlet Protection
- **Tracking Control Practices**: Temporary Construction Entrance/Exit
- **Wind Erosion Controls**: Temporary covers
- **Non-Stormwater Management**: Dewatering Operations, Material and Equipment Use Over Water
- **Waste Management and Materials Pollution Control**: Concrete Waste Management, Material Delivery and Storage, Material Use, Stockpile Management, Spill Prevention and Control, Soil Waste Management, Hazardous Waste and/or Contaminated Soil Management, and Liquid Waste Management

A spill plan will be in place and implemented for the geotechnical boring operation. The drilling will follow Caltrans Drilling Services Best Management Practices for Geotechnical Investigations. Caltrans standard BMPs will be implemented to control erosion and sedimentation during construction and post-construction. These are required by Caltrans' statewide National Pollutant Discharge Elimination System permit, which also includes measures for storm water management.

A Storm Water Pollution Prevention Plan (SWPPP), and erosion control BMPs will be developed and implemented to minimize wind and water related erosion. They will also be in compliance with the requirements of the Regional Water Quality Control Board and standards outlined in Caltrans' 8MP Guidance Handbook. At a minimum, protective measures will include:

1. Disallowing any discharging of pollutants from vehicle and equipment cleaning into any storm drains or watercourses.
2. Keeping vehicle and equipment fueling and maintenance operations at least 50 feet away from watercourses, except at established commercial gas stations or established vehicle maintenance facilities.
3. Collecting and disposing of concrete wastes in washouts and water from curing operations. Neither will be allowed into watercourses.
4. Maintaining spill containment kits onsite at all times during construction operations and/or staging or fueling of equipment.
5. Using water trucks and dust palliatives to control dust in excavation and fill areas, covering temporary access road entrances and exits with rock (rocking), and covering of temporary stockpiles when weather conditions require.
6. Protecting graded areas from erosion using a combination of silt fences, fiber rolls along toes of slopes or along edges of designated staging areas, and erosion control netting (such as jute or coir) as appropriate on sloped areas.
7. Establishing permanent erosion control measures such as bio-filtration strips and swales to receive storm water discharges from the highway, or other impervious surfaces will be incorporated to the maximum extent practicable. Materials containing possible contaminants, such as fuels, lubricants, oils, or solvents, will be stored offsite or in sealable containers at designated locations per applicable permits and Caltrans requirements.

**WATER-4: Waste Management from Bridge Removal**

Waste from removal of the existing bridge will be conducted in accordance with the Standard Specifications, under Section 13-4.03E(6) entitled: "Structure Removal Over or Adjacent to Water." The contractor will comply with this standard specification during removal of the existing bridge. All grindings and asphalitic concrete waste will be stored within previously disturbed areas absent of habitat and at a minimum of 150 feet from any culvert or drainage feature.

**WATER-5: Permanent Treatment BMPs**

Permanent Treatment BMPs are permanent water quality control measures used to remove pollutants from stormwater runoff prior to being discharged from Caltrans' right-of-way (ROW). Permanent stormwater treatment will be provided via biofiltration/bioretention measures (e.g., bioretention swale) for the entirety of the new and re-worked impervious surfaces, or 1.52 acres. Hydromodification mitigation is only applicable to the new impervious surface area, or 1.13 acres. The permanent stormwater treatment and hydromodification obligations could be achieved within the project limits.
## Table C-1  Avoidance, Minimization, and/or Mitigation Summary

<table>
<thead>
<tr>
<th>Geology/Soils/Seismic/Topography</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GEO-1: Engineering Design</strong></td>
</tr>
<tr>
<td>Engineering design of project structures will be carried out in accordance with the latest version of the Caltrans Standard Design Criteria (SDC). The Caltrans seismic design methodology applies to all highway bridges designed in California.</td>
</tr>
<tr>
<td><strong>Fault rupture and ground shaking:</strong> Engineering design of the new bridge, operator control house, and roadways will be carried out in accordance with Caltrans design standards, which take into account, for example, proximity to a fault. Because of the potential for ground shaking in the project area in the event of a large earthquake, Caltrans will perform a detailed seismic demand analysis and the bridge, embankments, slopes, and roadways will be designed to withstand strong ground shaking. The measures to protect structures from ground shaking may include structural improvements/strengthening, as well as soil improvements.</td>
</tr>
<tr>
<td><strong>Liquefaction:</strong> Because of the potential for liquefaction and lateral spreading, there is a potential for the proposed structures to be damaged. Through the use of appropriate construction and design methods, in accordance with the Caltrans Highway Design Manual and Caltrans Design Information Bulletins, the proposed project will not increase the potential for liquefaction at the proposed project site. Structural concerns regarding liquefaction will be addressed by incorporating appropriate construction and design methods.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Biological Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BIO-1: ESA Fencing</strong></td>
</tr>
<tr>
<td>The final construction plans will show all Environmentally Sensitive Areas (ESAs) (including areas of annual grassland, valley foothill riparian, and areas that may potentially support sensitive species as described in Section 2.3.3 and 2.3.4 below). Caltrans will install high-visibility fencing along the boundaries of the project footprint within the riparian zone (i.e., on the levees) of Miner Slough. Fencing will also be installed along the perimeter of the new alignment north of the new bridge and near other environmentally sensitive locations, such as bird nest sites. The features used to identify work boundaries will be removed at the end of construction within the given area, or in the bird nest example, when the nest is no longer active. Fencing will be installed as a first order of work. The Service-approved biological monitor will be onsite to direct the installation of this fencing. Fencing will then be installed on an as-needed basis such as when bird nests are established.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BIO-2: Vegetation Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>The removal of native vegetation will be confined to the minimal area necessary to facilitate construction activities. Temporarily affected areas where vegetation is to be removed, will be re-vegetated (e.g., hydro-seeding and installation of woody plants) with locally appropriate native plant species. Narrow-leaved milkweed (Asclepias fasciulata) and/or showy milkweed (A. speciosa) will be added to the seed mix to enhance habitat for the monarch butterfly. Caltrans will submit a restoration plan to the Service for approval prior to initial ground breaking.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BIO-3: Wetland Avoidance and Minimization</th>
</tr>
</thead>
<tbody>
<tr>
<td>To the extent practicable, construction will not occur during the wet season. All in-water work (including geotechnical investigation, trestle construction and removal, pile driving, fender installation, and removals) will be conducted between August 1 and October 31 only. To the extent practicable, nighttime construction will be minimized. In-water work will be conducted during daylight hours only to provide fish in the action area with an extended quiet period during nighttime hours for feeding and unobstructed passage.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BIO-4: Worker Environmental Awareness Training and Project Site Maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction personnel will attend a mandatory environmental education program delivered by the USFWS-approved biological monitor(s) prior to any work, vegetation clearing, or construction activities. The program will focus on the conservation measures that are relevant to an employee's personal responsibilities and will include an explanation as to how to best avoid take of delta smelt, valley elderberry longhorn beetle, and giant garter snake. At a minimum, the training will include a description of the delta smelt, valley elderberry longhorn beetle, and giant garter snake and how they may be encountered within the action area; their status and protection; and the relevant conservation measures and terms and conditions of the BO. A fact sheet conveying this information will be prepared and distributed to all construction and project personnel. Distributed materials will include cards with distinctive photographs of the delta smelt, valley elderberry longhorn beetle, and giant garter snake, compliance reminders, and relevant contact information. As needed, training will be conducted in Spanish for Spanish-language speakers. Documentation of the training, including sign-in sheets, will be kept on file and made available to the USFWS on request. An outline of the program will be submitted to the USFWS at least twenty (20) working days prior to the first training session. Upon completion of the training program, personnel will sign a form stating that they attended the program and understand all the avoidance and minimization measures and implications of FESA and CESA.</td>
</tr>
</tbody>
</table>
### Table C-1  Avoidance, Minimization, and/or Mitigation Summary

**BIO-5: Avoidance of Entrapment**
To prevent inadvertent entrapment of animals during construction, all excavated, steep-walled holes or trenches more than 1 foot deep will be covered at the close of each working day by plywood or similar materials, or will be provided with one or more escape ramps constructed of earth fill or wooden planks. Before such holes or trenches are filled, they must be thoroughly inspected for trapped animals. All replacement pipes, culverts, or similar structures stored within the project area overnight will be inspected before they are subsequently moved, capped, and/or buried.

**BIO-6: Pre-construction Surveys**
A biologist approved by the U.S. Fish and Wildlife USFWS (USFWS) and California Department of Fish and Wildlife (CDFW) will conduct pre-construction surveys for federally and state-listed species, and the biologist will be present during construction activities including vegetation clearing and grubbing, as required by the resource agencies. If at any point any listed species is discovered within the project limits, the agency-approved biologist, through the resident engineer or his/her designee, will halt all work within 50 ft of the animal and contact the corresponding agency (USFWS or CDFW) to determine how to proceed.

**BIO-7: Handling of Listed Species**
If at any time a listed species is discovered, the resident engineer and the agency-approved biologist will be immediately informed. The agency-approved biologist will determine whether relocating the species is necessary, and will work with the corresponding agency (USFWS or CDFW) prior to handling or relocating unless otherwise authorized.

**BIO-8: Vegetation Removal**
Vegetation within the project limits may be impacted by construction activities, and some clearing will be needed. Vegetation will be cleared only where necessary and will be cut above soil level except in areas that will be excavated for roadway construction. This will allow plants that reproduce vegetatively to resprout after construction. All clearing and grubbing of woody vegetation will occur by hand tools or using light construction equipment such as backhoes and excavators. A qualified biologist(s) will survey for BIO-8 within the area(s) to be disturbed, including a perimeter buffer of 50 ft for passerines and 300 ft for raptors, before clearing activities begin during the nesting season (February 16 through October 31). All nest avoidance requirements of the Migratory Bird Treaty Act (MBTA) and California Fish and Game Code (CFGC) will be observed. All cleared vegetation will be removed from the BSA to prevent attracting animals to the project site. The contractor will be responsible for obtaining all permits, licenses, and environmental clearances for properly disposing of such materials. protected species and is protected under CFGC and MBTA.

**BIO-9: Wetland Avoidance and Minimization**
Caltrans will avoid or minimize adverse effects to wetlands to the maximum extent practicable. The resident engineer will enforce the staging and access plan including the number of access routes, number and size of staging areas, and the total area of the proposed construction footprint limited to that which was described in the January 2016 BA. Routes and boundaries will be clearly demarcated. Movement of heavy equipment to and from the project site will be restricted to established roadways to minimize habitat disturbance. Project-related vehicles will observe a 20-mile-per-hour speed limit within construction areas, except on county roads and state and Federal highways. This is particularly important during periods when the snake or moving on roadways. All heavy equipment, vehicles, and supplies will be stored in the designated staging area at the end of each work period. Stockpiling of construction materials, portable equipment, vehicles, and supplies will be restricted to the designated construction staging areas identified in the January 2016 BA. Vegetation removal will be limited to the amount necessary to complete project construction.

**BIO-10: Pre-construction Surveys for Birds**
Pre-construction nesting surveys will be performed along with nest monitoring and establishment of resource agency recommended buffers by a qualified biologist during the typical bird nesting season (February 1 through October 31). Pre-construction surveys for special-status wildlife species will be conducted by a qualified biologist no more than 72 hours prior to the start of any construction activities. If an active nest is found, a qualified biologist in conjunction with the resource agencies will determine the appropriate buffer size and delineate the buffer zone using methods such as ESA fencing, pin flags, yellow caution tape, etc. Construction within the buffer zone will be prohibited until the qualified biologist determines the nest is no longer active. If establishment of the buffer around any nest is not feasible, the appropriate resource agencies will be contacted for further avoidance and minimization guidelines.
### Table C-1  Avoidance, Minimization, and/or Mitigation Summary

<table>
<thead>
<tr>
<th>BIO-11: Biological monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>A USFWS/CDFW-approved, qualified biological monitor shall be assigned to the proposed project. The names and qualifications of the proposed biological monitor(s) will be submitted to USFWS for approval at least 30 calendar days prior to start of construction. Prior to working on the site, the approved biological monitor(s) will submit a letter or email message to USFWS verifying that they possess a copy of the BO and understand the terms and conditions. The biological monitor(s) will keep a copy of the BO in their possession when onsite. The USFWS approved biological monitor will inspect the project site daily during active construction for compliance with the conservation measures and terms and conditions of the BO. At least 30 calendar days prior to groundbreaking, the resident engineer’s name and telephone number will be provided to the USFWS. The resident engineer will send a letter to the USFWS verifying that they possess a copy of the BO and understand its terms and conditions. The resident engineer will maintain a copy of the BO onsite whenever construction is taking place. The biologist shall notify the USFWS and CDFW immediately if any listed species are found onsite, and will submit a report, including date(s), location(s), habitat description, and any corrective measures taken to protect the species found. The biologist shall be required to report any take of listed species to the USFWS and CDFW immediately by telephone and by electronic mail or written letter within three working days of the incident. The biologist shall notify the USFWS and CDFW immediately if any listed species are found onsite, and will submit a report, including date(s), location(s), habitat description, and any corrective measures taken to protect the species found. The biologist shall be required to report any take of listed species to the USFWS and CDFW immediately by telephone and by electronic mail or written letter within three working days of the incident. Materials and equipment left onsite overnight will be inspected by the USFWS-approved biological monitor(s) prior to the beginning of each day’s activities.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BIO-12: In-Water Work Window</th>
</tr>
</thead>
<tbody>
<tr>
<td>All in-water work (including geotechnical investigation, trestle construction and removal, pile driving, fender installation, and removals) will be conducted between August 1 and October 31 only. When fish species in the Central Zone of the Delta are less likely to be present. To the extent practicable, nighttime construction will be minimized. In-water work will be conducted during daylight hours only to provide fish in the action area with an extended quiet period during nighttime hours for feeding and unobstructed passage.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BIO-13: Dewatering</th>
</tr>
</thead>
<tbody>
<tr>
<td>During dewatering of the cofferdam at Pier 3, fish rescue and relocation will be conducted by qualified fisheries biologist(s). The qualified biologist(s) will remain onsite during the entire dewatering process. Relocation will be accomplished by seining, dipnetting, and/or electrofishing. The biologist will minimize handling of fish species, and all captured fish will be held in a container with a lid that contains cool, shaded, adequately aerated water until relocated outside of the cofferdam. Specific to the NMFS biological opinion: Fish rescue operations will be conducted according to the specifications provided to NMFS and the service-approved supervising biologist(s) will oversee all aspects of dewatering and fish handling operations. If they are to occur, all aspects of fish rescue operations shall be supervised by at least one service approved biologist who will be personally on site throughout each phase of the rescue operation. A written plan for a fish rescue operation specific to this project shall be established prior to implementation of the project. The plan shall be thoroughly understood by all individuals that are to be involved and operations shall be conducted in strict accordance with the written plan.</td>
</tr>
</tbody>
</table>
Table C-1  Avoidance, Minimization, and/or Mitigation Summary

BIO-14: Underwater Sound Pressures

During pile driving activities, the Contractor will be required to ensure sound pressures remain within the authorized range (183 decibels [dB] Sound Exposure Level to 205 dB Peak Exposure Level). Contractor shall use attenuation devices around piles that will be driven in the water with an impact hammer. The contractor will vibrate all piles to the maximum depth possible before using an impact hammer. During impact driving, the contractor will limit the number of strikes per day to the minimum necessary to complete the work, and will limit the total number of hammer strikes to 2,000 strikes per day (i.e., 1,000 hammer strikes per pile, per day).

The smallest pile driver and minimum force necessary will be used to complete the work.

During impact driving, Caltrans will require the contractor to use a bubble ring or other device to minimize the extent to which the interim peak and cumulative sound exposure level (SEL) thresholds are exceeded.

Caltrans and/or its construction contractor will develop and implement a hydro acoustic monitoring plan. The monitoring plan will be submitted to the USFWS for approval at least 60 days before the start of project activities. The plan will include the following requirements:

a. Caltrans and/or its construction contractor will monitor underwater noise levels during all impact pile driving activities on land and in water to ensure that peak and cumulative SELs do not exceed 183 decibels (dB).

b. The monitoring plan will describe the methods and equipment that will be used to document the extent of underwater sounds produced by pile driving, including the number, location, distances, and depths of the hydrophones and associated monitoring equipment.

c. The monitoring plan will include a reporting schedule that includes provisions of weekly summaries of the hydroacoustic monitoring results to the resource agencies and more comprehensive report on a monthly basis during the pile driving season.

d. The reports will include the number and size of piles installed per day, the number of strikes per pile, hammer type and size, the interval between strikes, the peak sound pressure level and SEL per strike, and accumulated SEL per day at each monitoring station.

e. Caltrans or its contractors will ensure that a USFWS-approved fish biologist is on site during impact pile driving to document any occurrences of stressed, injured, or dead fish.

Caltrans will require the contractor to monitor turbidity levels in Miner Slough during in water construction activities. Turbidity will be measured using standard techniques upstream and downstream of the construction area to determine whether changes in ambient turbidity levels exceeds 20 percent, the threshold derived from the Sacramento and San Joaquin Rivers Basins Plan (Central Valley Regional Water Quality Control Board 2011). If it is determined that turbidity levels exceed the 20 percent threshold, then Caltrans and/or its contractors will adjust work to ensure that turbidity levels do not exceed the 20 percent threshold.

Specific to the NMFS biological opinion: Acoustic attenuation devices will be implemented to minimize noise generated by pile driving activities. In-water pile driving activities (installation of piers 2 and 3) will be restricted to August 1 to October 31. No in-water pile driving activity is to extend into the month of November as it may pose a significant disturbance to anadromous fish migration through the north Delta. Acoustic attenuation devices will be routinely inspected for proper installation, operation, and functionality. Sound monitoring shall occur to ensure that sound pressure levels generated by pile driving activities are not exceeding those included in the NMFS incidental take statement in appendix K.
# Table C-1  Avoidance, Minimization, and/or Mitigation Summary

### BIO-15 Reporting Requirements

In order to monitor whether the amount or extent of incidental take anticipated from implementation of the project is approached or exceeded, Caltrans shall adhere to the following reporting requirements.

1. Notification of living, injured, or dead listed species will be made to the Assistant Field Supervisor of the Endangered Species Division at the San Francisco-Bay Delta Fish and Wildlife Office. When an injured or dead individual of the listed species is found, Caltrans shall follow the steps outlined in the following Disposition of Individuals Taken section.

2. Sightings of any listed or sensitive animal species should be reported to the Service and CNDDDB (https://www.wildlife.ca.gov/Data/CNDDDB/Submitting-Data).

3. Construction compliance reports will be addressed to the Assistant Field Supervisor of the Endangered Species Division at the San Francisco-Bay Delta Fish and Wildlife Office.

4. Caltrans shall submit post-construction compliance reports prepared by the Service approved biologist to the Service within 80 calendar days following completion of each construction season or within 60 calendar days of any break in construction activity lasting more than 60 calendar days. This report shall detail (1) dates that relevant project activities occurred; (2) pertinent information concerning the success of the project in implementing avoidance and minimization measures; (3) any explanation of failure to meet such measures, if any; (4) known project effects on the delta smelt, valley elderberry longhorn beetle, and giant garter snake; (5) occurrences of incidental take of any listed species; (6) documentation of employee environmental education; and (7) other pertinent information.

### Disposition of Individuals Taken:

Injured listed species must be cared for by a licensed veterinarian or other qualified person(s), such as the Service-approved biologist. Dead individuals must be sealed in a resealable plastic bag containing a paper with the date and time when the animal was found, the location where it was found, and the name of the person who found it, and the bag containing the specimen frozen in a freezer located in a secure site, until instructions are received from the Service regarding the disposition of the dead specimen. The Service contact person is the Assistant Field Supervisor of the Endangered Species Division at the San Francisco-Bay Delta Fish and Wildlife Office.

Specific to NMFS BO, Caltrans shall report any incidence of take to NMFS within 24 hours. Caltrans shall record the date, number, and specific location of all listed fish that are relocated for each construction-related activity in the project area in addition to any direct mortality observed during in-water work and relocation. If a listed species is observed injured or killed by project activities, Caltrans shall contact NMFS within 48 hours at 916-830-3600. Notification shall include species identification, the number of fish, and a description of the action that resulted in take. If possible, dead individuals shall be collected, placed in an airtight bag, and refrigerated with the aforementioned information, until further direction is received from NMFS. Caltrans shall provide a report of project activities to NMFS by December 31 of the construction year. This report shall include a summary description of in-water construction dates and activities, avoidance and minimization measures taken, mitigation credits purchased and any maintenance of restored areas on-site. Updates and reports required by these terms and conditions shall be submitted by December 31 of each year during the construction period.

### BIO-16: Valley Elderberry Longhorn Beetle

To enhance riparian habitat for the valley elderberry longhorn beetle, Caltrans will include elderberry and other locally native riparian shrub and tree species in their restoration plan.

Caltrans will delineate all environmentally sensitive areas on the final construction plans. Caltrans will install high-visibility fencing along the boundary of the project footprint within the riparian zone (i.e., on the levees) of Miner Slough. Fencing will be installed along the perimeter of the new alignment north of the new bridge and near other environmentally sensitive locations. The features used to identify work boundaries will be removed at the end of construction within the given area. Along the north levee, adjacent to the identified elderberry shrubs, signs will be attached every 50 feet to the high-visibility fencing with the following information: "This area is habitat of the valley elderberry longhorn beetle, a threatened species, and must not be disturbed. This species is protected by the Endangered Species Act of 1973, as amended. Violators are subject to prosecution, fines, and imprisonment." The signs will be clearly readable from a distance of 20 feet, and will be maintained for the duration of construction. Fencing will be installed as a first order of work. The USFWS-approved biological monitor will be onsite to direct the installation of this fencing. Fencing will then be installed on an as-needed basis such as when bird nests are established. No insecticides, herbicides, fertilizers, or other chemicals that might harm the beetle or its host plant will be used within 100 feet of any elderberry plant.
### Table C-1 Avoidance, Minimization, and/or Mitigation Summary

#### BIO-17: Giant Garter Snake (GGS) Habitat Work Window

All construction activity in giant garter snake aquatic and upland habitat within 200 feet of aquatic habitat will be conducted between May 1 and October 1 to coincide with the snake's typical active period. All that all construction activity is confined to upland habitat (over wintering and movement habitat), the initial grading and disturbance of the laydown and work areas in GGS habitat will occur during the snake's active season. Once the initial grading occurs, no further ground disturbing activities will occur, and mortality of any individuals during hibernation due to construction activities is not anticipated.

Pre-construction surveys will be conducted by a USFWS-approved biological monitor(s) for the giant garter snake no more than thirty (30) calendar days prior to ground disturbance within 200 feet of aquatic habitat (including grubbing or vegetation removal. The biological monitor will investigate suitable aestivation burrows and other potential refugia for the giant garter snake. Following inspection, all burrows and other refuges that are expected to be disturbed or destroyed as a result of construction activities will be excavated by hand and then carefully collapsed or removed by or under the supervision of the USFWS-approved biological monitor. Exclusion fencing will be installed as stated above around the perimeter following the excavation and collapse of burrows and other refugia.

The USFWS-approved biological monitor(s) will perform a giant garter snake clearance survey immediately prior to initial vegetation removal and ground disturbing activities with special attention given to sensitive locations, such as work areas on the levees.

Safety permitting, the biological monitor will investigate areas of disturbed soil for signs of the giant garter snake within 30 minutes following initial disturbance of that given area.

If a giant garter snake is encountered during construction, the USFWS approved biological monitor will have the authority, through communication with the resident engineer, to stop construction activities within 50 feet until appropriate corrective measures have been completed, or until the USFWS-approved biological monitor has determined the snake is out of harm's way. The priority will be to allow snakes to move away from the area on their own volition.

At most, 24 hours prior to the commencement of construction activities in any given area, the location plus a 50 foot buffer will be surveyed for the giant garter snake by a USFWS approved biologist. The project area will be re-inspected by the USFWS-approved biologist whenever a lapse in construction activity of two weeks or greater has occurred.

To avoid entrapment of the giant garter snake, thereby preventing injury or mortality resulting from falling into trenches, all excavated areas more than 1 foot deep will be provided with one or more escape ramps constructed of earthen fill or wooden planks at the end of each workday. If escape ramps cannot be provided, then holes or trenches will be covered with plywood or other hard material.

Caltrans will restore temporary work areas and the existing bridge foundations with riparian vegetation and appropriate cover substrate for the listed snake.

Caltrans will continue to work with the USFWS and CDFW to identify on and offsite opportunities to offset adverse effects to the giant garter snake by conserving habitat or otherwise enabling recovery actions within the Delta Region. If a USFWS and CDFW-approved option is not identified by the time of the initial ground breaking, Caltrans will provide a funding assurance letter to demonstrate that they have allocated sufficient funds for an eventual compensation option.

#### BIO-18: Aquatic Habitat Dewatering

Aquatic habitat that will be disturbed or removed will be dewatered 15 days prior to the initiation of construction activities. If complete dewatering is not possible, potential snake prey (i.e., fish and tadpoles) will be removed so that snakes and other wildlife are not attracted to the construction area.

#### BIO-19: Erosion Control Materials

Tightly woven fiber netting or similar material shall be used for erosion control and other purposes within the project limits to ensure that the GGS does not become trapped or entangled. This limitation shall be communicated to the contractor using special provisions included in the bid solicitation package.
### Table C-1  Avoidance, Minimization, and/or Mitigation Summary

**BIO-20: Site Restoration**
After construction activities are complete, any temporary fill or construction debris shall be removed and disturbed areas restored to their pre-project conditions. An area subject to ‘temporary’ disturbance includes any area that is disturbed during the project, but that after project completion will not be subject to further disturbance and has the potential to be re-vegetated. All snake habitat subject to temporary ground disturbances, including storage and staging areas, Caltrans will restore temporary work areas and the existing bridge foundations with riparian vegetation and appropriate cover substrate for the listed snake.
Caltrans will continue to work with the USFWS and CDFW to identify on and offsite opportunities to offset adverse effects to the giant garter snake by conserving habitat or otherwise enabling recovery actions within the Delta Region. If a USFWS and CDFW-approved option is not identified by the time of the initial ground breaking, Caltrans will provide a funding assurance letter to demonstrate that they have allocated sufficient funds for an eventual compensation option.

**BIO-21: Swainson’s Hawk Work Window**
No construction-related activities will occur between March 1 and September 15 within 0.5 mile of a nesting Swainson’s hawk, or until August 15 if a Management Authorization or an Incidental Take Permit is obtained from CDFW.

**BIO-22: Tree Removal**
Removal of trees known to have supported nesting Swainson’s hawks within the last five years will be avoided unless a Management Authorization is obtained from CDFW and if the removal is conducted between October 1 and February 1.

**BIO-23: Swainson’s Hawk Surveys**
If construction activities are planned to begin after March 1, a preconstruction breeding survey for Swainson’s hawks will be conducted throughout areas of suitable nesting habitat within 0.5 mile of construction. If a Swainson’s hawk nest is observed within 0.5 mile of planned construction activities, CDFW will be contacted to determine whether project-related activities are likely to impact the nesting pair and whether additional avoidance and minimization measures can be established to avoid these impacts.

**BIO-24: Invasive Species**
In compliance with Executive Order 13112 and guidance from the Federal Highway Administration, the landscaping and erosion control included in the proposed project will not use species listed as invasive. The contractor will be required to inspect construction equipment for plant material and seeds prior to construction, remove and dispose of invasive plants at the project site cautiously, and replant the site with fast-growing native species. In areas of particular sensitivity (i.e., near drainages), extra precautions will be taken if invasive species are found in or next to the construction areas. These include the inspection and cleaning of construction equipment as well as eradication strategies to be implemented should an invasion occur.

**BIO-25: Ballast Water Management**
If vessels used for the proposed project originate outside of the San Francisco Bay, they must follow the ballast water management procedures established by the California State Lands Commission as part of the Marine Invasive Species Program (CSLCS 2015).

**BIO-26: Vessel and Hull, Equipment Cleaning and Decontamination**
If vessels or equipment such as trailers, anchor lines, motors, pumps, sampling equipment, and similar that will be used for the proposed project were last used in water bodies outside of the San Francisco Bay or Sacramento-San Joaquin River Delta, they must be cleaned prior to entering the study area. For these vessels and equipment, the cleaning and inspection procedures identified in the Inspection and Cleaning Manual for Equipment and Vehicles to Prevent the Spread of Invasive Species (U.S. Bureau of Reclamation 2012) must be followed. These procedures may include pre-cleaning methods such as brushing and scrubbing of equipment, and cleaning and decontaminating with high-pressure washers, thermal treatments, desiccation, and/or the use of chemicals.
Table C-1  Avoidance, Minimization, and/or Mitigation Summary

<table>
<thead>
<tr>
<th>BIO-27: Project Site General Compliance Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Caltrans Construction Support/Compliance Monitor(s) will inspect the project site within one (1) week prior to a forecasted rain event to ensure that adequate storm-water BMPs are properly installed. The USFWS-approved biological monitor(s) will also inspect the site during and/or within two (2) calendar days following the onset of a rain event to ensure that restarting activities would not result in harm to the delta smelt, valley elderberry longhorn beetle, and giant garter snake, and their habitats. No firearms will be allowed on the project site except for those carried by authorized security personnel or local, state, or Federal law enforcement officials. No pets will be allowed on the project site. All food-related trash items, such as wrappers, cans, bottles, and food scraps, will be disposed of in closed containers and removed from the entire project site at the end of each workday. Waste management measures will be implemented to avoid fuel spills and properly dispose of excess concrete, soil, or other materials. All grindings and asphaltic concrete waste will be stored within previously disturbed areas absent of habitat and at a minimum of 150 feet from any culvert or drainage feature.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BIO-28 Prudent Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caltrans shall include language in their contracts that expressly requires contractors and subcontractors to work within the boundaries of the project footprint identified in this BO, including staging and access. If requested, before, during, or upon completion of groundbreaking and construction activities, Caltrans shall allow access by Service personnel into the project footprint to inspect the project and its activities.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mitigation Measure BIO-A: Revegetation and Planting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upon completion of project construction, mitigation for the loss of valley foothill riparian habitat will be performed on-site within the Caltrans ROW. Approximately 43 trees will be replanted and disturbed areas will be re-contoured to the natural grade and revegetated with native species appropriate for the site conditions. Areas of the footprint, not occupied by hardscape will be graded as needed, relative to the surrounding topography and will be vegetated with appropriate native plants. The success of the restoration will be monitored for at least one year and the restoration plan will be submitted to the USFWS for approval at least 30 days prior to initial groundbreaking. Monitoring reports documenting the restoration efforts will be submitted to USFWS, both upon the completion of the restoration implementation and 1 year after the restoration implementation. Monitoring reports will include photo documentation, identification of when restoration was completed, what materials were used, specified plantings, and justifications of any substitutions to the USFWS-recommended guidelines. If planting cannot be accomplished on-site due to a general lack of suitable planting area, offsite mitigation options will be pursued.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mitigation Measure BIO-B: Compensatory Mitigation for Jurisdictional Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caltrans will mitigate for jurisdictional wetlands and other waters of the U.S. to achieve no net loss of the functions and values of jurisdictional features within the study area. Caltrans will mitigate on-site at a 1:1 ratio by restoring wetlands and other waters as a result of removing the temporary construction trestles and demolishing the existing bridge. For permanent impacts, and through coordination with the U.S. Army Corps of Engineers (USACE) and Regional Water Quality Control Board (RWQCB), Caltrans will mitigate at an approved off-site location at a minimum of a 1:1 ratio, with the final mitigation ratio determined through permitting with the USACE and RWQCB. Potential mitigation opportunities include Burke Ranch Conservation Bank and Elsie Gridley Mitigation Bank.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mitigation Measure BIO-C: Compensatory Mitigation for Delta Smelt and Longfin Smelt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caltrans will compensate at 3:1 for the net increase in the shading of delta smelt shallow water habitat (SWH). The proposed project will result in a net increase of 0.08 acre of shaded SWH, so Caltrans will purchase 0.24 acre of delta smelt mitigation credits.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mitigation Measure BIO-D: Compensatory Mitigation for GGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caltrans will continue to work with the USFWS and CDFW to identify on and offsite opportunities to offset adverse effects to the giant garter snake by conserving habitat or otherwise enabling recovery actions within the Delta Region. If a USFWS and CDFW-approved option is not identified by the time of the initial ground breaking, Caltrans will provide a funding assurance letter to demonstrate that they have allocated sufficient funds for an eventual compensation option.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mitigation Measure BIO-E: Compensatory Mitigation for Swainson’s Hawk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caltrans will mitigate off-site at a minimum 1:1 ratio for suitable foraging habitat credits from an approved mitigation bank. Credits will be purchased through a CDFW approved mitigation bank.</td>
</tr>
</tbody>
</table>
Appendix D  Special-status Plant and Animal Species
### Table C-1  Avoidance, Minimization, and/or Mitigation Summary

<table>
<thead>
<tr>
<th>Mitigation Measure BIO-F: Compensatory Mitigation for CCV steelhead and Southern DPS Green Sturgeon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caltrans shall conduct onsite and offsite compensatory mitigation for temporary and permanent impacts to</td>
</tr>
<tr>
<td>designated critical habitat per the NMFS biological opinion. Caltrans shall rehabilitate the construction zone</td>
</tr>
<tr>
<td>through onsite planting of native riparian vegetation. Caltrans shall purchase mitigation credits at a NMFS</td>
</tr>
<tr>
<td>approved conservation bank at a 2:1 ratio for temporary losses and 3:1 ratio for impacts to critical habitat</td>
</tr>
<tr>
<td>in the action area associated with this project. Caltrans shall, to the maximum extent practicable and above</td>
</tr>
<tr>
<td>the ordinary high water level, mix agricultural grade soil with RSP at a 70:30 ratio (rock: soil), cover the</td>
</tr>
<tr>
<td>RSP with one foot of soil and plant native riparian shrubs and trees. All onsite riparian vegetation shall</td>
</tr>
<tr>
<td>be watered and maintained to ensure maximum survival for a three year period following construction.</td>
</tr>
<tr>
<td>Scientific Name</td>
</tr>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td>Astragalus tener var. ferrisiae</td>
</tr>
<tr>
<td>Astragalus tener var. tener</td>
</tr>
<tr>
<td>Atriplex cordulata var. cordulata</td>
</tr>
<tr>
<td>Brasenia schreberi</td>
</tr>
<tr>
<td>Carex comosa</td>
</tr>
<tr>
<td>Cicuta maculata var. bolanderi</td>
</tr>
<tr>
<td>Fritillaria liliacea</td>
</tr>
<tr>
<td>Gratiola heterosepala</td>
</tr>
<tr>
<td>Scientific Name</td>
</tr>
<tr>
<td>-----------------------</td>
</tr>
<tr>
<td><em>Hibiscus lasiocarpus</em> var. occidentalis</td>
</tr>
<tr>
<td>Isocoma arguta</td>
</tr>
<tr>
<td>Lathyrus jepsonii var. jepsonii</td>
</tr>
<tr>
<td>Lepidium latipes var. Heckardii</td>
</tr>
<tr>
<td>Lilaecopsis masonii</td>
</tr>
<tr>
<td>Limosella australis</td>
</tr>
<tr>
<td>Sagittaria sanfordii</td>
</tr>
<tr>
<td>Scientific Name</td>
</tr>
<tr>
<td>----------------------</td>
</tr>
<tr>
<td>Scutellaria lateriflora</td>
</tr>
<tr>
<td>Symphyotrichum lentum</td>
</tr>
<tr>
<td>Trifolium hydrophilum</td>
</tr>
</tbody>
</table>

Notes:
*CNPS Status definitions are as follows:
  1B = Plants rare, threatened or endangered in California or elsewhere
  2B = Plants Rare, Threatened, or Endangered in California, But More Common Elsewhere
  0.1 = Seriously threatened in California (over 80% of occurrences threatened / high degree and immediacy of threat)
  0.2 = Fairly threatened in California (20-80% occurrences threatened / moderate degree and immediacy of threat)
  0.3 = Not very threatened in California (<20% of occurrences threatened / low degree and immediacy of threat or no current threats known)

Source: Reprinted from the Miner Slough Bridge Replacement Project Special-Status Plant Survey (Caltrans 2015; Appendix C).
<table>
<thead>
<tr>
<th>Common Name (Scientific Name)</th>
<th>Federal Status</th>
<th>State Status</th>
<th>Habitat Requirements</th>
<th>Habitat Present/Absent</th>
<th>Potential to Occur within the Project study area</th>
<th>Effect Finding for Federally Listed Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tricolored blackbird (Agelaius tricolor)</td>
<td>--</td>
<td>SE</td>
<td>Nests colonially in large, dense stands of freshwater marsh, riparian scrub, and other shrubs and herbs; forages in grasslands and agricultural fields.</td>
<td>Present</td>
<td>Low. Species is not known to occur near the project area; habitat within project area is of poor quality.</td>
<td>N/A</td>
</tr>
<tr>
<td>Western burrowing owl (Athene cunicularia hypugea)</td>
<td>--</td>
<td>SSC</td>
<td>Nests and forages in open, dry grasslands, deserts, and agricultural fields characterized by low growing vegetation and suitable burrows.</td>
<td>Present</td>
<td>Low. Species is not known to occur near the project area; habitat within project area is of poor quality.</td>
<td>N/A</td>
</tr>
<tr>
<td>Swainson's hawk (Buteo swainsonii)</td>
<td>--</td>
<td>ST</td>
<td>Open, dry annual or perennial grasslands, deserts, and scrublands characterized by low-growing vegetation. Subterranean nester, dependent on burrowing mammals.</td>
<td>Present</td>
<td>Detected. Active nest observed in 2014 within study area. Ground squirrels or their burrow complexes have not been observed in the study area.</td>
<td>N/A</td>
</tr>
<tr>
<td>white-tailed kite (Elanis leucurus)</td>
<td>--</td>
<td>FP</td>
<td>Open grasslands or meadows for foraging close to isolated, dense-topped trees for nesting and perching.</td>
<td>Present</td>
<td>Moderate. Marginally suitable nesting habitat is present within the study area. One CNDDB occurrence records is located within 5 miles of the study area, approximately 4 mi northeast of the project.</td>
<td>N/A</td>
</tr>
<tr>
<td>song sparrow (&quot;Modesto&quot; population) (Melospiza melodia maxillaris)</td>
<td>--</td>
<td>SSC</td>
<td>Brackish-water, freshwater marshes, and tangles bordering sloughs.</td>
<td>Present</td>
<td>Moderate. Marginally suitable nesting habitat is present within the study area. Three CNDDB occurrence records are located within 5 miles of the study area.</td>
<td>N/A</td>
</tr>
<tr>
<td>Common Name (Scientific Name)</td>
<td>Federal Status*</td>
<td>State Status</td>
<td>Habitat Requirements</td>
<td>Habitat Present/Absent</td>
<td>Potential to Occur within the Project study area</td>
<td>Effect Finding for Federally Listed Species</td>
</tr>
<tr>
<td>----------------------------</td>
<td>----------------</td>
<td>--------------</td>
<td>---------------------</td>
<td>-----------------------</td>
<td>-----------------------------------------------</td>
<td>---------------------------------------------</td>
</tr>
<tr>
<td>Fish</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chinook salmon (Oncorhynchus tshawytscha)</td>
<td>FT, CH</td>
<td>ST</td>
<td>Adults spawn in the Sacramento River below Keswick Dam, but not in tributary streams. Requires clean, cold water over gravel beds for spawning.</td>
<td>Present</td>
<td>Moderate. Spawning and rearing of adults only occurs upstream of the study area in the upper reaches of the Sacramento River watershed. Presence in the study area can only be inferred during the upstream migration of adults and the downstream migration of juveniles. The study area is located within designated critical habitat for Chinook salmon ESU and its habitat.</td>
<td>May affect, is likely to adversely affect the Central Valley spring-run Chinook salmon ESU and its habitat. Will not adversely modify or destroy designated critical habitat for this ESU.</td>
</tr>
<tr>
<td>Central Valley spring-run</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chinook salmon (Oncorhynchus tshawytscha)</td>
<td>FE, CH</td>
<td>SE</td>
<td>Adults spawn in the Sacramento River below Keswick Dam, but not in tributary streams. Requires clean, cold water over gravel beds for spawning.</td>
<td>Present</td>
<td>Moderate. Spawning of adults and rearing of juveniles only occurs upstream of the study area in the upper reaches of the Sacramento River watershed. Presence in the study area can only be inferred during the upstream migration of adults and the downstream migration of juveniles. The study area is not located within designated critical habitat for Chinook salmon ESU.</td>
<td>May affect, is likely to adversely affect the Sacramento River winter-run Chinook salmon ESU and its habitat. Will have no effect on designated critical habitat for this ESU.</td>
</tr>
<tr>
<td>Sacramento River winter-run</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Common Name (Scientific Name)</td>
<td>Federal Status</td>
<td>State Status</td>
<td>Habitat Requirements</td>
<td>Habitat Present/Absent</td>
<td>Potential to Occur within the Project study area</td>
<td>Effect Finding for Federally Listed Species</td>
</tr>
<tr>
<td>------------------------------</td>
<td>---------------</td>
<td>-------------</td>
<td>----------------------</td>
<td>------------------------</td>
<td>-----------------------------------------------</td>
<td>------------------------------------------</td>
</tr>
</tbody>
</table>
| North American green sturgeon (*Acipenser medirostris*)
Southern Distinct Population Segment (DPS) | FT, CH | None | Spawn in deep pools or "holes" in large turbulent freshwater river mainstems. Eggs likely are broadcast over large cobble substrates, but range from clean sand to bedrock substrates as well. Adults live in oceanic waters, bays, and estuaries when not spawning. | Present | Moderate. Post-spawning adults are known to remain in the Sacramento River through the fall, and juvenile/subadult green sturgeon remain in the Delta region for 2 to 3 years before entering the estuary or ocean. Post-spawning adults and rearing juveniles/subadults may be present in the study area due to its proximity to the Sacramento River. | May affect, is likely to adversely affect, the Southern DPS of green sturgeon. Will not adversely modify or destroy designated critical habitat. |
| longfin smelt (*Spinitrichus thaleichthys*) | C | SSC | Euryhaline, nektonic, and anadromous. Found in open waters of estuaries, mostly in middle or bottom of water column. Prefer salinities of 15 to 30 parts per thousand (ppt) but can be found in completely freshwater to almost pure seawater. | Absent | Very Low. Estuarine habitat is not present within the study area. Nearest CNDDB documented occurrence is 3.7 miles. | May affect, is likely to adversely affect. |
| delta smelt (*Hypomesus transpacificus*) | FT, CH | None | Sacramento-San Joaquin River Delta. Seasonally in Suisun Bay, Carquinez Strait, and San Pablo Bay. Seldom found at salinities greater than 10 ppt. Most often at salinities less than 2 ppt. | Present | High. Species known to seasonally occur in the vicinity of Miner Slough between December and July. Critical habitat includes Miner Slough within study area. | May affect, is likely to adversely affect. Will not adversely modify or destroy designated critical habitat. |
### Table D-2  Special-status Animal Species with a Potential to Occur within the Miner Slough Bridge Project study area

<table>
<thead>
<tr>
<th>Common Name (Scientific Name)</th>
<th>Federal Status</th>
<th>State Status</th>
<th>Habitat Requirements</th>
<th>Potential to Occur within the Project study area</th>
<th>Effect Finding for Federally Listed Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>steelhead - Central California coast DPS (Oncorhynchus mykiss)</td>
<td>FT; CH</td>
<td>None</td>
<td>Occurs from Russian River south to Soquel Creek near Santa Cruz and to, but not including, the Pajaro River near Watsonville, California. Also occurs in San Francisco Bay and San Pablo Bay.</td>
<td>Present</td>
<td>Moderate. Spawning of adults and rearing of juveniles only occurs upstream of the study area in the Sacramento River watershed and in the San Joaquin River watershed. Presence in the study area can only be inferred during the upstream migration of adults and the downstream migration of juveniles. Designated critical habitat within the study area in Miner Slough.</td>
</tr>
</tbody>
</table>

**Invertebrates**

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Federal Status</th>
<th>State Status</th>
<th>Habitat Requirements</th>
<th>Potential to Occur within the Project study area</th>
<th>Effect Finding for Federally Listed Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>valley elderberry longhorn beetle (Desmocerus Californicus dimorphus)</td>
<td>FE</td>
<td>None</td>
<td>Restricted to the Central Valley of California, in association with blue elderberry (Sambucus mexicana) with stems that are 1-inch-diameter or greater at ground level.</td>
<td>Present</td>
<td>Low. Elderberry shrubs found within the study area; however, no sign of VELB was observed. The closest VELB record noted in the CNDB is approximately 13 miles away from the project along the Cosumnes River in Sacramento County.</td>
</tr>
</tbody>
</table>
### Table D-2  Special-status Animal Species with a Potential to Occur within the Miner Slough Bridge Project study area

<table>
<thead>
<tr>
<th>Common Name (Scientific Name)</th>
<th>Federal Status</th>
<th>State Status</th>
<th>Habitat Requirements</th>
<th>Potential to Occur within the Project study area</th>
<th>Effect Finding for Federally Listed Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>giant garter snake (Thamnophis gigas)</td>
<td>FT</td>
<td>ST</td>
<td>Permanent or seasonal water, mud bottoms, and vegetated dirt banks. Sufficient water to supply cover and food such as small fish and amphibians. Emergent, herbaceous wetland vegetation, accompanied by vegetated banks to provide basking and foraging habitat and escape cover; high ground or upland habitat above the annual high-water mark to provide cover and refuge from flood.</td>
<td>Present</td>
<td>Moderate. Marginally suitable habitat is present within the study area. Although no CNDDDB occurrence records are located within 5 miles of the study area, the project is within the historic and currently recognized range of the species.</td>
</tr>
</tbody>
</table>

Notes:

*USFWS designations are as follows:
C = Candidate species
CH = Critical Habitat (area essential to the conservation of a species)
FE = Endangered (any species in danger of extinction throughout all or a significant portion of its range)
FT = Threatened (any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range)

*CDFW designations are as follows:
FP = Fully Protected species
SE = Endangered (any species at risk of becoming extinct in all or a significant portion of its range)
SSC = Species of Special Concern
ST = Threatened (any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range)

Except for the species with effects determination made in Table D-2, all other species included in the list below and in Appendix E, the proposed project will have no effect on: California clapper rail, California least tern, Northern spotted owl, Western snowy plover, Yellow-billed cuckoo, California freshwater shrimp, Conservancy fairy shrimp, Vernal pool fairy shrimp, Vernal pool tadpole shrimp, Tidewater goby, Antioch Dunes evening-primrose, Colusa grass, Contra Costa goldfields, Contra Costa wallflower, Keck’s checker-mallow, San Joaquin orcutt grass, Santa Cruz tarplant, Sebastopol meadowfoam, Showy Indian clover, Soft bird’s-beak, Solano grass, Sonoma sunshine, Suisun thistle, Tiburon paintbrush, Callippe silverspot butterfly, Delta green ground beetle, Lange’s metalmark butterfly, Myrtle’s silverspot butterfly, San Bruno elfin butterfly, Salt marsh harvest mouse, San Joaquin kit fox, Alameda whipsnake, Coho salmon – central California coast, Central Valley steelhead.
Appendix E  CNDDB, USFWS, and NMFS
Species Lists
June 22, 2017

In Reply Refer To:
Consultation Code: 08FBDT00-2017-SLI-0215
Event Code: 08FBDT00-2017-E-00413
Project Name: bridge on Route 84

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having
similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2) (c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:


Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 et seq.), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at:
http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm;
http://www.towerkill.com; and

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

San Francisco Bay-Delta Fish And Wildlife
650 Capitol Mall
Suite 8-300
Sacramento, CA 95814
(916) 930-5603
Project Summary

Consultation Code: 08FBDT00-2017-SLI-0215
Event Code: 08FBDT00-2017-E-00413
Project Name: bridge on Route 84
Project Type: TRANSPORTATION
Project Description: Bridge replacement
Project Location:
Approximate location of the project can be viewed in Google Maps:
https://www.google.com/maps/place/38.29243755002139N121.63096595135849W

Counties: Solano, CA

Endangered Species Act Species

There is a total of 9 threatened, endangered, or candidate species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area. Please contact the designated FWS office if you have questions.
Reptiles

NAME
Giant Garter Snake (Thamnophis gigas)
No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/4482

STATUS
Threatened

Amphibians

NAME
California Red-legged Frog (Rana draytonii)
There is a final critical habitat designated for this species. Your location is outside the designated critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/2891

STATUS
Threatened

California Tiger Salamander (Ambystoma californiense)
Population: U.S.A. (Central CA DPS)
There is a final critical habitat designated for this species. Your location is outside the designated critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/2076

STATUS
Threatened

Fishes

NAME
Delta Smelt (Hypomesus transpacificus)
There is a final critical habitat designated for this species. Your location overlaps the designated critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/321

STATUS
Threatened

Insects

NAME
Delta Green Ground Beetle (Elaphrus viridis)
There is a final critical habitat designated for this species. Your location is outside the designated critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/2319

STATUS
Threatened

Valley Elderberry Longhorn Beetle (Desmocerus californicus dimorphus)
There is a final critical habitat designated for this species. Your location is outside the designated critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/7850

STATUS
Threatened
Crustaceans

NAME

Conservancy Fairy Shrimp (*Branchinecta conservatio*)
There is a final critical habitat designated for this species. Your location is outside the designated critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/8246

Vernal Pool Fairy Shrimp (*Branchinecta lynchii*)
There is a final critical habitat designated for this species. Your location is outside the designated critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/498

Vernal Pool Tadpole Shrimp (*Lepidurus packardi*)
There is a final critical habitat designated for this species. Your location is outside the designated critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/2246

Critical habitats
There is 1 critical habitat wholly or partially within your project area.

NAME

Delta Smelt (*Hypomesus transpacificus*)

STATUS

Endangered

Threatened

Endangered

Final designated
ESM Anadromous Fish

SONCC Coho ESU (T) -
CCC Coho ESU (E) -
CC Chinook Salmon ESU (T) -
CVSR Chinook Salmon ESU (T) -
SRWR Chinook Salmon ESU (E) -
NC Steelhead DPS (T) -
CCC Steelhead DPS (T) -
SCCC Steelhead DPS (T) -
SC Steelhead DPS (E) -
CCV Steelhead DPS (T) -
Eulachon (T) -
sDPS Green Sturgeon (T) -

ESM Anadromous Fish Critical Habitat

SONCC Coho Critical Habitat -
CCC Coho Critical Habitat -
CC Chinook Salmon Critical Habitat -
CVSR Chinook Salmon Critical Habitat -
SRWR Chinook Salmon Critical Habitat -
NC Steelhead Critical Habitat -
CCC Steelhead Critical Habitat -
SCCC Steelhead Critical Habitat -
SC Steelhead Critical Habitat -
CCV Steelhead Critical Habitat -
Eulachon Critical Habitat -
sDPS Green Sturgeon Critical Habitat -

ESM Marine Invertebrates

Range Black Abalone (E) -
Range White Abalone (E) -

**ESA Marine Invertebrates Critical Habitat**

Black Abalone Critical Habitat -

**ESA Sea Turtles**

East Pacific Green Sea Turtle (T) -
Olive Ridley Sea Turtle (T/E) -
Leatherback Sea Turtle (E) -
North Pacific Loggerhead Sea Turtle (E) -

**ESA Whales**

Blue Whale (E) -
Fin Whale (E) -
Humpback Whale (E) -
Southern Resident Killer Whale (E) -
North Pacific Right Whale (E) -
Sei Whale (E) -
Sperm Whale (E) -

**ESA Pinnipeds**

Guadalupe Fur Seal (T) -
Steller Sea Lion Critical Habitat -

**Essential Fish Habitat**

Coho EFH -
Chinook Salmon EFH -
Groundfish EFH -
Coastal Pelagics EFH -
Highly Migratory Species EFH -

**MMPA Species (See list at left)**

**ESA and MMPA Cetaceans/Pinnipeds**
See list at left and consult the NMFS Long Beach office 562-980-4000
Robert Blizard  
Acting Branch Chief, North Counties  
Office of Biological Sciences and Permits  
111 Grand Ave. Oakland  
Ca.94623  
Cell 510 715-8585  
Desk 510 286-6238

From: NMFSWCRCA Specieslist - NOAA Service Account  
[mailto:nmfswcrca.specieslist+canned.response@noaa.gov]  
Sent: Friday, June 30, 2017 11:09 AM  
To: Blizard, Robert@DOT <robert.blizard@dot.ca.gov>  
Subject: Re: Caltrans District 04 Miner Slough Bridge WCR-2016-4900

Thank you for using NMFS’ California species list, providing information for ESA, MSA, and MMPA resources under the jurisdiction of NMFS. Messages sent to this email address are not responded to directly. For questions, please contact Darren Howe by phone at 707-575-3152 or by email at darren.howe@noaa.gov.
Appendix F  List of Technical Studies

- Hydraulic Report (Caltrans; September 2014, revised September 2015)
- 4(f) Analysis (Caltrans; March 2015)
- Air Quality Assessment (Caltrans; March 2015)
- Energy Analysis (Caltrans; March 2015)
- Geotechnical Report (Caltrans; March 2015)
- Location Hydraulic Study (Caltrans; March 2015, revised September 2015)
- Scenic Resource Evaluation and Visual Impact Assessment (Caltrans; March 2015)
- Water Quality Study (Caltrans; March 2015, revised September 2015)
- Cultural Findings Memo (Caltrans; April 2015; Addendum August 2015)
- Traffic Report (Caltrans; April 2015, revised September 2015)
- Natural Environment Study (CH2M HILL; April 2015, Final September 2015)
- Analysis of Potential Underwater Construction Noise (Illingworth & Rodkin; April 2015)
- Sea Level Rise Impact Assessment (CH2M HILL; August 2015)
- Summary Floodplain Encroachment Report (Caltrans; September 2015)
- Biological Resources Assessment, Focused Avian and Bats Survey for Caltrans Miner Slough Bridge Project (CH2M HILL; February 2016)
- Economic Impact Study for Caltrans Miner Slough Bridge Project (CH2M HILL; March 2016)
# Appendix E

## List of Technical Studies

<table>
<thead>
<tr>
<th>Study Title</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Site Selection</td>
<td>Initial site selection for the project.</td>
</tr>
<tr>
<td>HOLI Project</td>
<td>Review and selection of HOLI (High Occupancy Lane Infrastructure) project.</td>
</tr>
<tr>
<td>MND/Environmental Assessment</td>
<td>Assessment of the project's impact on the environment and MND (Management of Non-Development).</td>
</tr>
<tr>
<td>Final Site Selection</td>
<td>Final site selection for the project.</td>
</tr>
<tr>
<td>HOLI Project Implementation</td>
<td>Implementation of the HOLI project.</td>
</tr>
<tr>
<td>MND/Environmental Assessment Update</td>
<td>Update on the project's impact on the environment and MND.</td>
</tr>
<tr>
<td>Final Site Selection Update</td>
<td>Update on the final site selection.</td>
</tr>
<tr>
<td>HOLI Project Evaluation</td>
<td>Evaluation of the HOLI project's impact.</td>
</tr>
</tbody>
</table>

*0G660 State Route 84 Miner Slough Bridge Project*  
*Initial Study with MND/Environmental Assessment*
Appendix G  Layout Plans
SUMMARY OF THIS SHEET:
1) Required Acquisition from APN 0042-200-200
   76558 SQFT = 1.758 AC
2) Required Acquisition from APN 0042-200-140
   148598 SQFT = 3.411 AC
3) Required Acquisition from APN 0042-220-020
   38060 SQFT = 0.874 AC
4) TCE for Staging 69321 Sqft
   = 1.591 AC

APN 0042-200-200
Islands Inc.

Additional R/W Required
- 76558 SQFT = 1.758 AC

SUMMARY OF THIS SHEET:
1) Required Acquisition from APN 0042-200-200
   76558 SQFT = 1.758 AC
2) Required Acquisition from APN 0042-200-140
   148598 SQFT = 3.411 AC
3) Required Acquisition from APN 0042-220-020
   38060 SQFT = 0.874 AC
4) TCE for Staging 69321 Sqft
   = 1.591 AC

APN 0042-200-140
Gasto Co.
6/13/97
199700036.340

APN 0042-220-020

Additional R/W Required
- 148598 SQFT = 3.411 AC

MINER SLOUGH BRIDGE REPLACEMENT ALTERNATIVE
RIGHT OF WAY REQUIREMENT
EA00660
Appendix H State Historic Preservation Officer Concurrence Letter
April 14, 2015

Elizabeth McKee
Chief, Office of Cultural Resource Studies
Caltrans District 4
PO Box 23660
Oakland, CA 94623-0660

Re: Determinations of Eligibility for the Proposed Miner Slough Bridge Replacement Along State Route 84, Solano County, CA

Dear Ms. McKee:

Thank you for consulting with me about the subject undertaking in accordance with the January 1, 2014 First Amended Programmatic Agreement Among the Federal Highway Administration, the Advisory Council on Historic Preservation, the California State Historic Preservation Officer, and the California Department of Transportation Regarding Compliance with Section 106 of the National Historic Preservation Act, as it Pertains to the Administration of the Federal-Aid Highway Program in California (PA).

In your letter of February 19, 2015, Caltrans determined that the following properties are not eligible for the National Register of Historic Places:

- 5143-5151 Ryer Road, Walnut Grove, CA
- 4868 California 84, Walnut Grove, CA
- Bridge 23 0035, State Route 84, postmile 12.1/12.2

Based on my review of the submitted documentation I concur.

Thank you for considering historic properties during project planning. If you have any questions, please contact Natalie Lindquist of my staff at (916) 445-7014 or email at natalie.lindquist@parks.ca.gov.

Sincerely,

[Signature]

Carol Roland-Nawi, Ph.D.
State Historic Preservation Officer
Appendix I Notice of Availability
Notice of Completion & Environmental Document Transmittal

Project Title: Miner Slough Bridge Project
Lead Agency: The Department of Transportation
Mailing Address: 111 Grand Avenue, Oakland, CA 94612
City: Oakland
Zip: 94612
County: Alameda

Project Location: County: Solano
City/Nearest Community: Rio Vista
Cross Streets: Highway 84
Longitude/Latitude (degrees, minutes and seconds): 38° 17' 30.2" N / 121° 37' 51.2" W
Total Acres:
Assessor's Parcel No.:
Section:
Twp.:
Range:
Base:
Within 2 Miles:
Waterways: Miner Slough

Document Type:
CEQA: ☐ NOP
☐ Draft EIR
☐ Supplement/Subsequent EIR
☐ Mit Neg Dec
☐ NEPA: ☐ NOI
☐ Other:
☐ Joint Document
☐ Final Document
☐ Other:

Local Action Type:
☐ General Plan Update
☐ General Plan Amendment
☐ General Plan Element
☐ Community Plan
☐ Specific Plan
☐ Planned Unit Development
☐ Site Plan
☐ Rezone:
☐ Prezone
☐ Use Permit
☐ Land Division (Subdivision, etc.)
☐ Other:

Development Type:
☐ Residential: Units Acres
☐ Office: Sq. ft. Acres Employees
☐ Commercial-Sq. ft. Acres Employees
☐ Industrial: Sq. ft. Acres Employees
☐ Educational:
☐ Recreational:
☐ Water Facilities: Type MGD
☐ Transportation: Type Bridge
☐ Mining: Mineral
☐ Power: Type MW
☐ Waste Treatment: Type MGD
☐ Hazardous Waste: Type
☐ Other:

Project Issues Discussed in Document:
☒ Aesthetic/Visual
☒ Agricultural Land
☒ Air Quality
☒ Archeological/Historical
☒ Biological Resources
☒ Coastal Zone
☒ Drainage/Absorption
☒ Economic/Jobs
☒ Fiscal
☒ Flood Plain/Flooding
☒ Forest Land/Fire Hazard
☒ Geology/Seismic
☒ Minerals
☒ Noise
☒ Population/Housing Balance
☒ Public Services/Facilities
☒ Recreation/Parks
☒ Schools/Universities
☒ Septic Systems
☒ Sewer Capacity
☒ Soil Erosion/Compaction/Grading
☒ Solid Waste
☒ Toxic/Hazardous
☒ Traffic/Circulation
☒ Vegetation
☒ Water Quality
☒ Water Supply/Groundwater
☒ Wetland/Riparian
☒ Growth Inducement
☒ Land Use
☒ Cumulative Effects
☒ Other:

Present Land Use/Zoning/General Plan Designation:

Project Description: (please use a separate page if necessary)
The California Department of Transportation (Caltrans) proposes to rehabilitate or replace the existing bridge on State Route (SR) 84 over Miner Slough (the Miner Slough Bridge Project [project]). The project proposes two alternatives for the bridge based on a current planning study. The first alternative, Alternative 1 (bridge replacement), is to build a new swing-span bridge approximately 100 feet (ft) west of the existing alignment. The second alternative, Alternative 2 (bridge rehabilitation), is to rehabilitate the existing bridge.
## Reviewing Agencies Checklist

Lead Agencies may recommend State Clearinghouse distribution by marking agencies below with and "X". If you have already sent your document to the agency please denote that with an "S".

- [ ] Air Resources Board
- [x] Boating & Waterways, Department of
- [ ] California Emergency Management Agency
- [ ] California Highway Patrol
- [ ] Caltrans District #
- [ ] Caltrans Division of Aeronautics
- [ ] Caltrans Planning
- [x] Central Valley Flood Protection Board
- [x] Coachella Valley Mins. Conservancy
- [ ] Coastal Commission
- [ ] Colorado River Board
- [x] Conservation, Department of
- [ ] Corrections, Department of
- [x] Delta Protection Commission
- [ ] Education, Department of
- [ ] Energy Commission
- [x] Fish & Game Region #3
- [ ] Forestry and Agriculture, Department of
- [ ] General Services, Department of
- [ ] Health Services, Department of
- [ ] Housing & Community Development
- [x] Native American Heritage Commission
- [ ] Office of Historic Preservation
- [x] Office of Public School Construction
- [x] Parks & Recreation, Department of
- [ ] Pesticide Regulation, Department of
- [ ] Public Utilities Commission
- [x] Regional WQCB #5
- [ ] Resources Agency
- [ ] Resources Recycling and Recovery, Department of
- [ ] S.F. Bay Conservation & Development Comm.
- [ ] San Gabriel & Lower L.A. Rivers & Mins, Conservancy
- [ ] San Joaquin River Conservancy
- [ ] Santa Monica Mins. Conservancy
- [ ] State Lands Commission
- [x] SWRCB: Clean Water Grants
- [x] SWRCB: Water Quality
- [ ] SWRCB: Water Rights
- [ ] Tahoe Regional Planning Agency
- [ ] Toxic Substances Control, Department of
- [x] Water Resources, Department of
- [x] Other: Department of Fish and Wildlife, region 3
- [ ] Other:

---

### Local Public Review Period (to be filled in by lead agency)

Starting Date: November 5, 2015

Ending Date: December 4, 2015

---

### Lead Agency (Complete if applicable):

Consulting Firm: 
Address: 
City/State/Zip: 
Contact: 
Phone: 

Applicant: 
Address: 
City/State/Zip: 
Phone: 

Signature of Lead Agency Representative:  
Date: 12/5/15


Revised 2010
Appendix J Biological Opinion from the U.S Fish and Wildlife Service
Appendix 1 Biological Opinion from the U.S. Fish and Wildlife Service
Ms. JoAnn Cullom
California Department of Transportation
Environmental Division, MS-8E
111 Grand Avenue
Oakland, California 94612

Subject: Formal Consultation on the State Route 84 Miner Slough Bridge Replacement Project, Solano County, California (Caltrans EA 04-0G660)

Dear Ms. Cullom:

This Biological Opinion (BO) is in response to the California Department of Transportation’s (Caltrans) May 25, 2016, correspondence with the U.S. Fish and Wildlife Service (Service) on the proposed State Route (SR) 84 Miner Slough Bridge Replacement Project in Solano County, California. The project addresses a deficient bridge that does not meet current design and safety standards. At issue are the proposed project’s effects on the federally threatened delta smelt (Hypomesus transpacificus) and its critical habitat, the federally threatened valley elderberry longhorn beetle (Desmocerus californicus dimorphus), and the federally threatened giant garter snake (Thamnophis gigas). This response is provided under the authority of the Endangered Species Act of 1973, as amended (16 U.S.C. § 1531 et seq.)(Act), and in accordance with the implementing regulations pertaining to interagency cooperation (50 CFR 402).

Caltrans determined that the proposed project may affect but is not likely to adversely affect the valley elderberry longhorn beetle because the associated elderberry host plants will not be removed and measures will be taken to sufficiently avoid or minimize damage to the plants. These measures are included in the Conservation Measures of this BO. Based on the supporting documentation and correspondence, and evaluation of project effects, the Service concurs with the determination that the project as described is not likely to adversely affect the valley elderberry longhorn beetle as the effects will be discountable. The remainder of this BO covers the effects of the proposed project on the delta smelt, its critical habitat, and the giant garter snake. Critical habitat has not been designated for the giant garter snake.

Fixing America’s Surface Transportation Act (FAST Act) was signed into law on December 4, 2015. Providing funding from 2016 to 2020, the FAST Act includes provisions to promote streamlined and accelerated project delivery. Caltrans is approved to participate in the FAST Act project delivery program through the National Environmental Policy Act (NEPA) Assignment Memorandum of Understanding (MOU). The MOU allows Caltrans to assume the Federal
Highway Administration’s (FHWA) responsibilities under NEPA as well as FHWA’s consultation and coordination responsibilities under Federal environmental laws for most highway projects in California. Caltrans is exercising this authority as the Federal nexus for section 7 consultation on this project.

This BO is based on: (1) Caltrans January 2016 Biological Assessment (BA); (2) multiple site visits; (3) a May 25, 2016 correspondence received from Caltrans; (4) various correspondence received by the Service throughout the consultation history; (5) coordination between the Service’s Sacramento and Bay Delta Fish and Wildlife Offices; and (6) other baseline information available to the Service regarding the species and project location.

Consultation History

June 5, 2013
The Service received Caltrans' request for technical assistance along with a preliminary project description via an electronic mail (e-mail) message.

January 24, 2014
The Service visited the proposed project site with representatives of Caltrans and National Marine Fisheries Service (NMFS) to gather project information and provide technical assistance.

January 29, 2014
The Service received Caltrans' notes regarding the January 24, 2014, field visit via an e-mail message.

February 3, 2014
The Service sent Caltrans technical assistance regarding the giant garter snake via an e-mail message.

April 3, 2014
The Service sent Caltrans technical assistance regarding valley elderberry longhorn beetle surveys.

November 13, 2015
The Service visited the proposed project site with representatives of Caltrans, NMFS, and California Department of Fish and Wildlife (CDFW) to provide technical assistance.

January 14, 2016
The Service received Caltrans' January 8, 2016 request for formal consultation for the delta smelt and its critical habitat, along with a January 2016 BA.

February 9, 2016
The Service sent Caltrans an e-mail message regarding our initial review of the January 8, 2016, request for consultation. The Service recommended that Caltrans pursue formal consultation on the delta smelt and giant garter snake as well as informal consultation for the valley elderberry longhorn beetle as recommended in previous technical assistance.

February 16, 2016
The Service sent Caltrans an e-mail message regarding our review of the January 2016 BA. The message was sent as an equivalent of a 30-day letter.

April 7, 2016
The Service visited the proposed project site with representatives of Caltrans to provide technical assistance following transfer of the project to
another Caltrans biologist.

May 11-24, 2016  The Service and Caltrans had correspondence regarding the effects of the proposed project on the valley elderberry longhorn beetle. Caltrans was able to confirm with their design team that the nearby elderberry shrubs would not have to be removed and standard valley elderberry longhorn beetle measures would be implemented as part of the conservation measures.

May 25, 2016  The Service received additional information from Caltrans in response to our February 16, 2016 e-mail message. The message included a revised request to seek formal consultation for the giant garter snake and informal consultation for the valley elderberry longhorn beetle.

June 16, 2016  The Service received additional project information regarding Caltrans’ proposed project description via an e-mail message.

August 25, 2016  The Service requested additional information from Caltrans regarding fender installation including methodology and resulting hydroacoustic effects.

October 28, 2016  The Service received Caltrans’ revised hydroacoustics analysis.

November 22, 2016  The Service received Caltrans’ November 18, 2016 letter detailing their fixed span bridge option.

December 13, 2016  The Service received additional information from Caltrans regarding a fixed span option for the central bridge pier.

**BIOLOGICAL OPINION**

**Description of the Action**

The following project description for the activities associated with the replacement of the SR 84 Miner Slough Bridge and associated restoration activities is adapted from Caltrans’ January 2016 BA and additional subsequent information provided by Caltrans.

The proposed project is located between post miles 12.0 and 12.4, approximately 12 miles north of Rio Vista. The existing bridge crosses over Miner Slough, connecting Ryer Island to the mainland. The existing 367-foot long swing bridge structure rotates on a central pier-supported pivot to allow passage of sufficiently sized boats. The existing structure is subject to removal due to deteriorating timber planks and broken timber stringers.

The primary project elements will be completed in the following order:

1. Geotechnical investigation

2. Site preparation including the establishment of equipment and construction site best management practices (BMPs), temporary access roads, and staging areas.
3. Temporary trestle construction.


5. Demolition of the existing bridge.


7. Completing revegetation, restoration, and compensation.

The above activities are further described as follows.

**Geotechnical Exploration**

Prior to the new bridge construction, Caltrans will need to conduct geotechnical borings to collect subsurface information relative to the proposed foundations for the abutments and piers. Caltrans will conduct borings at four locations to correspond with the proposed locations for these structures. The bores will be from 100 to 150 feet deep. Two of the borings will take place in the upland area on the opposing levees, using a truck-mounted drill rig. The other two bore locations will be within the slough and will be accessed by barge.

Boreholes will be approximately 3.8 inches in diameter and the drilling fluid will be a mixture of water, bentonite clay, and a liquid polymer. The drilling fluid will be circulated through a closed system using a drill rod and a mud tank. After the soil samples are taken, the boreholes are flushed of drilling-related materials and backfilled with a cement grout.

For the in-water borings, the barge will be assembled and launched at an existing dock and launch ramp located approximately 1 mile downstream. A drill rig will be mounted on the barge along with a crane. The barge will be transported and maneuvered within Miner Slough by a 17-foot long Boston Whaler boat. A Zodiac raft will be used to taxi personnel and equipment between the barge and the shore. The barge will likely be anchored to the piers of the existing bridge for stabilization along with anchors dropped from each of the barge’s four corners. First a 5-inch diameter steel casing will be driven into the floor of the slough. The drill rod and associated drilling fluid will be contained within the casing. Water used in the drilling will be drafted from Miner Slough. After the material has been excavated, the drill hole will be backfilled with cement grout and all the drilling-related material will be cleared before the casing is removed.

Geotechnical investigations are expected to take approximately twelve days to complete, with each bore taking approximately three working days to complete. The in-water drilling will be continuous until completed.

**Staging and Access**

Caltrans will establish a 0.68-acre staging area on the north side of Miner Slough, in the area between the existing SR 84 approach to the levee and the proposed realigned approach. A residential property southeast of the existing bridge will also be used for storage. This location has been used in the past to stage material for emergency repairs and is accessed down a 1,200 foot-long dirt road. Use of this second area will require grading of the 18 to 20-foot wide dirt road to a width of 24 feet. The widened road will be topped with a 6-inch layer of crushed rock.
Access for bridge demolition and construction will be gained with the construction of two temporary trestles. Both trestles will be perpendicular to and sandwiched between the old and new bridges. They will be situated approximately 18 feet below the elevation of the existing bridge. The northern trestle will be approximately 204 feet long and the southern trestle approximately 86 feet long. Both trestles will be from 35 to 40 feet wide and with timber decking, steel stringers, steel bents, and safety railing. The bents will be located approximately 25 to 40 feet apart, set on piles that will be driven into the bottom of the slough. Approximately 125 piles will be driven into the slough bottom with an impact or vibratory hammer. A vibratory hammer will be the preferred method. An impact hammer will only be used if necessary for the conditions.

Construction of the new bridge and demolition of the existing bridge will occur during two consecutive summer construction seasons. The trestle will be used for both tasks and will remain in place between construction seasons. After use, the trestles will be removed by crews working from a barge.

The approximately 85-foot open water gap between the two trestles will allow continued boat passage through the project area during construction. Access will be needed along the levee bank below to construct and later remove the trestles.

In-water access will also be gained by barge. Caltrans will use a barge for both construction of the new bridge and demolition of the old bridge. The barge will be assembled and maneuvered as described for the geotechnical exploration.

*Site Preparation*

Site preparation will include installation of project boundary identification fencing and vegetation removal (clearing and grubbing).

*Road Realignment*

From the north side of Miner Slough, SR 84 quickly ascends from the low-lying agricultural fields to the top of the levee where it meets Holland Road, the north levee road. From there SR 84 travels approximately 170 feet along Holland Road to the existing bridge. On the south side of Miner Slough, SR 84 travels west along the top of the levee.

The SR 84 approach alignment will change to correspond with the location of the new bridge. The northern approach to the levee will be realigned for an approximately 900-foot length, shifting this segment of the road to the west for a more direct approach to the bridge. Approximately 45 trees larger than 6-inch diameter will be removed to make way for the new alignment. The last 250 feet of the realignment will climb a fill-supported ramp up to the levee and bridge elevation. The fill prism will vary from 16 to 84 feet wide, becoming wider as it meets the levee. Cross drainage will be provided by up 24-inch culverts at the base of the road. The pavement along with the former alignment will be removed and the area will be subsequently graded and vegetated once the road is no longer needed for staging and access. Holland Road will be paved for approximately 200 feet on either side of the northern bridge entry.

*Bridge Construction*

Similar to the existing bridge, the new structure will be supported by three piers, one central pivot pier located in-water, flanked by a static pier on both sides on the upland levee. The central pier, Pier 3, will pivot to swing the central portion of the bridge deck to a perpendicular position
to allow boat traffic through. Caltrans has an alternative plan to replace the swing Pier 3 with a fixed pier. Either design will have the same project footprint. The outlying piers, Pier 4 to the north and Pier 2 to the south, will support the approaches and will act in conjunction with the central pier to support the full deck when subject to vehicle traffic.

A temporary 44 x 44-foot cofferdam will be constructed to dewater the area needed to install the base of the central in-water pier (Pier 3). The walls of the cofferdam will consist of individual 2-foot wide interlocking sheet pile panels. The panels will be vertically placed through the water column and then driven 30 feet into the streambed with vibratory hammers. The sheet pile will extend 5 feet above the water surface. After the walls of the cofferdam are in place, the interior will be dewatered with a hose and pump system. Once dewatered, the area within the dam will be excavated to approximately 2 feet below the footing elevation. Impact hammers, drills, and pile drivers will be used to install the subsurface footings and supports for the pier.

Opposing fenders will be placed in the slough, perpendicular to the new bridge to direct watercraft through the 85-foot navigable opening between the Pier 3 and Pier 2, as well as protect the piers from impact. The fenders will be 195 feet long; and extend 10 feet past the bridge deck and curve for 20 feet on both sides of the bridge. The fenders will be supported by steel pipe piles driven into the channel from the temporary trestle and/or barge. Support piles will be 2 feet in diameter and spaced 5 to 8 feet apart. The pipes will be filled with concrete and either timbers or plastic whalers will be used to form the interconnecting fender walls, supported by the pipes. A pile cap 3 feet wide and 195 feet long will cover the piles and complete the fender system. A cofferdam system may be required to install the fender system and will be determined based on results of geotechnical investigations. If needed, the cofferdam would be installed and operated similar to what was described in the previous paragraph.

The subsurface footing and support for Piers 2 and 4 will be installed with similar techniques though without the use of cofferdams.

Abutments will be constructed at both ends of the bridge where it meets the opposing levees. Construction of the bridge abutments will include excavation of a portion of the levee below and the installation of a series of vertically drilled piles. Concrete caps and slabs are installed on top of the piles to support the deck above.

Once the supports are in place, the bridge structure will be installed, much of which will be prefabricated and lifted into place with a crane mounted on the trestles or levee.

Operator Control House
A 25 x 25-foot operator control house will be constructed on top of the levee, adjacent to the north entrance of the new bridge. An associated 20 x 30-foot parking lot will be constructed across the road, opposite the control house. Because they will be located on the levee, the house and parking lot will be supported by piles driven vertically into the levee.

The generator used to operate the bridge will be contained within the control house and an armored underwater electrical cable will be laid on the bed of the slough to connect the control house with the central Pier 3.

Bridge Demolition
Demolition of the existing bridge will be accomplished by cutting the structure into pieces that will be lifted out and away with cranes to haul trucks and the barge. The structure will be
dismantled by hand and the use of a hoe ram and crane. Larger elements will be lifted away while small pieces may be caught on a working platform below and removed by a loader. The swing spans may need temporary supports to provide stability during demolition. The in water and upland piles will be cut to 3 feet below surface, and then covered with appropriate material. The dolphins used to protect the pivot pier, will also be removed to 3 feet below the mud surface.

Vegetation Removal and Restoration
Vegetation within areas that will be replaced by hardscape and other permanent features will be permanently removed. Vegetation will be cleared only where necessary and will be cut above soil level in the surrounding area needed for temporary workspace. The intent is to promote the plants’ ability to reproduce vegetatively or resprout following construction. All clearing and trimming of woody vegetation will be done by hand in areas needed for work space that will later be restored. Large equipment will be used as needed to clear woody vegetation from areas that will be replaced by hardscape, such as the new road alignment. Cleared vegetation will be removed from the project footprint to prevent attracting animals to the project site. The contractor will be responsible for obtaining all permits, licenses, and environmental clearances for properly disposing of such materials. Temporarily disturbed areas with vegetative ground cover will be reseeded with native grasses and shrubs to stabilize the soil and prevent erosion. Where disturbance includes the removal of woody shrubs, native species will be replanted based on local species composition.

Habitat Compensation
Caltrans will compensate at 3:1 for the net increase in the shading of delta smelt shallow water habitat (SWH). The proposed project will result in a net increase of 0.08 acre of shaded SWH, so Caltrans will purchase 0.24 acre of delta smelt mitigation credits.

To enhance riparian habitat for the valley elderberry longhorn beetle, Caltrans will include elderberry and other locally native riparian shrub and tree species in their restoration plan.

There are no established conservation banks for the giant garter snake that include the action area within their approved service area. Caltrans will restore temporary work areas and the existing bridge foundations with riparian vegetation and appropriate cover substrate for the listed snake. Caltrans will continue to work with the Service and CDFW to identify on and offsite opportunities to offset adverse effects to the giant garter snake by conserving habitat or otherwise enabling recovery actions within the Delta Region. If a Service and CDFW-approved option is not identified by the time of the initial ground breaking, Caltrans will provide a funding assurance letter to demonstrate that they have allocated sufficient funds for an eventual compensation option.

Conservation Measures
Caltrans proposes to reduce adverse effects to the delta smelt, valley elderberry longhorn beetle, and giant garter snake and their habitats by implementing the following measures. The requirements needed to implement these measures will be communicated to the contractor using special provisions included in the bid solicitation package.

1. The names and qualifications of the proposed Biological Monitor(s) will be submitted to Service for approval at least 30 calendar days prior to start of construction.
2. Prior to working on the site, the approved Biological Monitor(s) will submit a letter or e-mail message to the Service verifying that they possess a copy of the BO and understand the Terms and Conditions.

3. The Biological Monitor(s) will keep a copy of the BO in their possession when onsite.

4. The Service-approved Biological Monitor will inspect the project site daily during active construction for compliance with the conservation measures and Terms and Conditions of this BO.

5. The Biological Monitor(s) will have the authority to stop work that may result in the unauthorized take of the delta smelt, valley elderberry longhorn beetle, and giant garter snake through communication with the Resident Engineer. If the Biological Monitor(s) exercises this authority, the Service will be notified by telephone and e-mail within one (1) working day.

6. At least 30 calendar days prior to groundbreaking, the Resident Engineer’s name and telephone number will be provided to the Service. The Resident Engineer will send a letter to the Service verifying that they possess a copy of the BO and understand its Terms and Conditions.

7. The Resident Engineer will maintain a copy of the BO onsite whenever construction is taking place.

8. Construction personnel will attend a mandatory environmental education program delivered by the Service-approved Biological Monitor(s) prior to any work, vegetation clearing, or construction activities. The program will focus on the conservation measures that are relevant to an employee’s personal responsibilities and will include an explanation as to how to best avoid take of delta smelt, valley elderberry longhorn beetle, and giant garter snake. At a minimum, the training will include a description of the delta smelt, valley elderberry longhorn beetle, and giant garter snake and how they may be encountered within the action area; their status and protection; and the relevant Conservation Measures and Terms and Conditions of the BO. A fact sheet conveying this information will be prepared and distributed to all construction and project personnel. Distributed materials will include cards with distinctive photographs of the delta smelt, valley elderberry longhorn beetle, and giant garter snake, compliance reminders, and relevant contact information. As needed, training will be conducted in Spanish for Spanish-language speakers. Documentation of the training, including sign-in sheets, will be kept on file and made available to the Service on request. An outline of the program will be submitted to the Service at least twenty (20) working days prior to the first training session.

9. The number of access routes, number and size of staging areas, and the total area of the proposed construction footprint will be limited to that which was described in the January 2016 BA. Routes and boundaries will be clearly demarcated. Movement of heavy equipment to and from the project site will be restricted to established roadways to minimize habitat disturbance. Project-related vehicles will observe a 20-mile-per-hour speed limit within construction areas, except on county roads and state and Federal highways. This is particularly important during periods when the snake may be sunning
or moving on roadways. All heavy equipment, vehicles, and supplies will be stored in the designated staging area at the end of each work period.

10. Stockpiling of construction materials, portable equipment, vehicles, and supplies will be restricted to the designated construction staging areas identified in the January 2016 BA.

11. Caltrans will delineate all environmentally sensitive areas on the final construction plans. Caltrans will install high-visibility fencing along the boundaries of the project footprint within the riparian zone (i.e., on the levees) of Miner Slough. Fencing will also be installed along the perimeter of the new alignment north of the new bridge and near other environmentally sensitive locations, such as bird nest sites. The features used to identify work boundaries will be removed at the end of construction within the given area, or in the bird nest example, when the nest is no longer active.

12. Along the north levee, adjacent to the identified elderberry shrubs, signs will be attached every 50 feet along the high-visibility fencing with the following information: "This area is habitat of the valley elderberry longhorn beetle, a threatened species, and must not be disturbed. This species is protected by the Endangered Species Act of 1973, as amended. Violators are subject to prosecution, fines, and imprisonment." The signs will be clearly readable from a distance of 20 feet, and will be maintained for the duration of construction.

13. Fencing will be installed as a first order of work. The Service-approved Biological Monitor will be onsite to direct the installation of this fencing. Fencing will then be installed on an as-needed basis such as when bird nests are established.

14. All construction activity in giant garter snake aquatic and upland habitat within 200 feet of aquatic habitat will be conducted between May 1 and October 1 to coincide with the snake’s typical active period.

15. All in-water work (including geotechnical investigation, trestle construction and removal, pile driving, fender installation, and removals) will be conducted between August 1 and November 30 only.

16. To the extent practicable, nighttime construction will be minimized. In-water work will be conducted during daylight hours only to provide fish in the action area with an extended quiet period during nighttime hours for feeding and unobstructed passage.

17. Pre-construction surveys will be conducted by a Service-approved Biological Monitor(s) for the giant garter snake no more than thirty (30) calendar days prior to ground disturbance within 200 feet of aquatic habitat (including grubbing or vegetation removal. The Biological Monitor will investigate suitable aestivation burrows and other potential refugia for the giant garter snake. Following inspection, all burrows and other refugia that are expected to be disturbed or destroyed as a result of construction activities will be excavated by hand and then carefully collapsed or removed by or under the supervision of the Service-approved Biological Monitor. Exclusion fencing will be installed as stated above around the perimeter following the excavation and collapse of burrows and other refugia.
18. The Service-approved Biological Monitor(s) will perform a giant garter snake clearance survey immediately prior to initial vegetation removal and ground disturbing activities with special attention given to sensitive locations, such as work areas on the levees. Safety permitting, the Biological Monitor will investigate areas of disturbed soil for signs of the giant garter snake within 30 minutes following initial disturbance of that given area.

19. If a giant garter snake is encountered during construction, the Service-approved Biological Monitor will have the authority, through communication with the Resident Engineer, to stop construction activities within 50 feet until appropriate corrective measures have been completed, or until the Service-approved Biological Monitor has determined the snake is out of harm’s way. The priority will be to allow snakes to move away from the area on their own volition.

20. At most, 24 hours prior to the commencement of construction activities in any given area, the location plus a 50 foot buffer will be surveyed for the giant garter snake by a Service-approved biologist. The project area will be re-inspected by the Service-approved biologist whenever a lapse in construction activity of two weeks or greater has occurred.

21. To avoid entrapment of the giant garter snake, thereby preventing injury or mortality resulting from falling into trenches, all excavated areas more than 1 foot deep will be provided with one or more escape ramps constructed of earthen fill or wooden planks at the end of each workday. If escape ramps cannot be provided, then holes or trenches will be covered with plywood or other hard material.

22. Materials and equipment left onsite overnight will be inspected by the Service-approved Biological Monitor(s) prior to the beginning of each day’s activities.

23. Pre-construction nesting surveys will be performed along with nest monitoring and establishment of resource agency recommended buffers by a qualified biologist during the typical bird nesting season (February 1 through August 31).

24. During dewatering of the cofferdam for Pier 3, fish rescue and relocation will be conducted by a Service-approved Fish Monitor(s). The Service-approved Fish Monitor(s) will remain onsite during the entire dewatering process. Fish relocation will be accomplished by seining, dipnetting, and/or electrofishing. The Service-approved biologist will minimize handling of fish species, and all captured fish will be held in a container with a lid that contains cool, shaded water, adequately aerated water until relocated outside of the cofferdam.

25. Aquatic habitat that will be filled or surrounded by coffer dams will be dewatered 15 days prior to the initiation of activities within the coffer dam. If complete dewatering is not possible, potential giant garter snake prey (such as fish and tadpoles) will be removed so that snakes and other wildlife are not attracted to the enclosed area.

26. The contractor will vibrate all piles to the maximum depth possible before using an impact hammer.
27. During impact driving, the contractor will limit the number of strikes per day to the minimum necessary to complete the work, and will limit the total number of hammer strikes to 2,000 strikes per day (i.e., 1,000 hammer strikes per pile, per day).

28. The smallest pile driver and minimum force necessary will be used to complete the work.

29. During impact driving, Caltrans will require the contractor to use a bubble ring or other device to minimize the extent to which the interim peak and cumulative sound exposure level (SEL) thresholds are exceeded.

30. Caltrans and/or its construction contractor will develop and implement a hydroacoustic monitoring plan. The monitoring plan will be submitted to the Service for approval at least 60 days before the start of project activities. The plan will include the following requirements:

   a. Caltrans and/or its construction contractor will monitor underwater noise levels during all impact pile driving activities on land and in water to ensure that peak and cumulative SELs do not exceed 183 decibels (dB).

   b. The monitoring plan will describe the methods and equipment that will be used to document the extent of underwater sounds produced by pile driving, including the number, location, distances, and depths of the hydrophones and associated monitoring equipment.

   c. The monitoring plan will include a reporting schedule that includes provisions of weekly summaries of the hydroacoustic monitoring results to the resource agencies and more comprehensive reports on a monthly basis during the pile driving season.

   d. The reports will include the number of piles installed per day, the number of strikes per pile, the interval between strikes, the peak sound pressure level and SEL per strike, and accumulated SEL per day at each monitoring station.

   e. Caltrans or its contractors will ensure that a Service-approved fish biologist is on site during impact pile driving to document any occurrences of stressed, injured, or dead fish.

31. Caltrans will require the contractor to monitor turbidity levels in Miner Slough during in-water construction activities. Turbidity will be measured using standard techniques upstream and downstream of the construction area to determine whether changes in ambient turbidity levels exceed 20 percent, the threshold derived from the Sacramento and San Joaquin Rivers Basins Plan (Central Valley Regional Water Quality Control Board 2011). If it is determined that turbidity levels exceed the 20 percent threshold, then Caltrans and/or its contractors will adjust work to ensure that turbidity levels do not exceed the 20 percent threshold.

32. Plastic monofilament netting will not be used on the job site. Tightly woven fiber netting or similar material will be used for erosion control and other purposes to minimize the likelihood of giant garter snake becoming trapped or entangled.
33. All food-related trash items, such as wrappers, cans, bottles, and food scraps, will be disposed of in closed containers and removed from the entire project site at the end of each workday.

34. Fill, gravel, construction debris, and other imported construction-related material will be removed when construction is complete. Areas of the footprint, not occupied by hardscape will be graded as needed, relative to the surrounding topography and will be vegetated with appropriate native plants. The success of the restoration will be monitored for at least one year and the restoration plan will be submitted to the Service for approval at least 30 days prior to initial groundbreaking. Monitoring reports documenting the restoration efforts will be submitted to Service, both upon the completion of the restoration implementation and 1 year after the restoration implementation. Monitoring reports will include photo documentation, identification of when restoration was completed, what materials were used, specified plantings, and justifications of any substitutions to the Service-recommended guidelines.

35. Following construction, damage done to areas within 100 feet of the elderberry plants will be restored with adequate erosion control and re-vegetated with appropriate native plants.

36. No insecticides, herbicides, fertilizers, or other chemicals that might harm the beetle or its host plant will be used within 100 feet of any elderberry plant.

37. The Caltrans Construction Support/Compliance Monitor(s) will inspect the project site within one (1) week prior to a forecasted rain event to ensure that adequate storm-water BMPs are properly installed. The Service-approved Biological Monitor(s) will also inspect the site during and/or within two (2) calendar days following the onset of a rain event to ensure that restarting activities would not result in harm to the delta smelt, valley elderberry longhorn beetle, and giant garter snake, and their habitats.

38. No firearms will be allowed on the project site except for those carried by authorized security personnel or local, state, or Federal law enforcement officials.

39. No pets will be allowed on the project site.

40. Waste management measures will be implemented to avoid fuel spills and properly dispose of excess concrete, soil, or other materials.

41. All grindings and asphaltic concrete waste will be stored within previously disturbed areas absent of habitat and at a minimum of 150 feet from any culvert or drainage feature.

42. Caltrans standard BMPs will be implemented to control erosion and sedimentation during construction and post-construction. These are required by Caltrans' statewide National Pollutant Discharge Elimination System permit, which also includes measures for stormwater management.

43. A spill plan will be in place and implemented for the geotechnical boring operation. The drilling will follow Caltrans Drilling Services Best Management Practices for Geotechnical Investigations.
44. A Storm Water Pollution Prevention Plan (SWPPP), and erosion control BMPs will be developed and implemented to minimize wind and water related erosion. They will also be in compliance with the requirements of the Regional Water Quality Control Board and standards outlined in Caltrans’ BMP Guidance Handbook.

At a minimum, protective measures will include:

a. Disallowing any discharging of pollutants from vehicle and equipment cleaning into any storm drains or watercourses.

b. Keeping vehicle and equipment fueling and maintenance operations at least 50 feet away from watercourses, except at established commercial gas stations or established vehicle maintenance facilities.

c. Collecting and disposing of concrete wastes in washouts and water from curing operations. Neither will be allowed into watercourses.

d. Maintaining spill containment kits onsite at all times during construction operations and/or staging or fueling of equipment.

e. Using water trucks and dust palliatives to control dust in excavation and fill areas, covering temporary access road entrances and exits with rock (rocking), and covering of temporary stockpiles when weather conditions require.

f. Protecting graded areas from erosion using a combination of silt fences, fiber rolls along toes of slopes or along edges of designated staging areas, and erosion control netting (such as jute or coir) as appropriate on sloped areas.

g. Establishing permanent erosion control measures such as bio-filtration strips and swales to receive storm water discharges from the highway, or other impervious surfaces will be incorporated to the maximum extent practicable.

45. Materials containing possible contaminants, such as fuels, lubricants, oils, or solvents, will be stored offsite or in sealable containers at designated locations per applicable permits and Caltrans requirements.

46. Noxious weeds will be controlled in accordance with Caltrans’ Highway Design Manual Topic 110.5 “Control of Noxious Weeds—Exotic and Invasive Species,” Executive Order 13112 (Invasive Species), and by methods approved by Caltrans’ landscape architect or vegetation control specialist.

47. Temporarily affected areas where vegetation is to be removed, will be re-vegetated (e.g., hydro-seeding and installation of woody plants) with locally appropriate native plant species. Narrow leaved milkweed (Asclepias fascicularis) and/or showy milkweed (A. speciosa) will be added to the seed mix to enhance habitat for the monarch butterfly. Caltrans will submit a restoration plan to the Service for approval prior to initial ground breaking.
**Action Area**

An action area is defined in 50 CFR § 402.02, as “all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action.” For the purposes of the effects assessment, the action area for the entire project encompasses the approximately 9.2-acre construction footprint that will be directly affected primarily by ground and in-water disturbance; a 300-foot upland buffer in which valley elderberry longhorn beetle could be affected by dust or other discharge and giant garter snakes could be affected by noise, light, and increased activity; and approximately 2,192 feet upstream and 1,290 feet downstream of the project footprint to encompass potential hydroacoustic and material discharge effects to the delta smelt. The hydroacoustic effects reference are a result of studies described by Caltrans in the January 2016 BA.

**Analytical Framework for the Jeopardy Determination**

Section 7(a)(2) of the Endangered Species Act requires that Federal agencies ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of listed species. “Jeopardize the continued existence of” means 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).

The jeopardy analysis in this biological opinion considers the effects of the proposed Federal action, and any cumulative effects, on the rangewide survival and recovery of the listed species. It relies on four components: (1) the *Status of the Species*, which describes the rangewide condition of the species, the factors responsible for that condition, and its survival and recovery needs; (2) the *Environmental Baseline*, which analyzes the condition of the species in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the species; (3) the *Effects of the Action*, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the species; and (4) the *Cumulative Effects*, which evaluates the effects of future, non-Federal activities in the action area on the species.

**Analytical Framework for the Adverse Modification Determination**

Section 7(a)(2) of the Act requires that Federal agencies insure that any action they authorize, fund, or carry out is not likely to destroy or to adversely modify designated critical habitat. A final rule revising the regulatory definition of “destruction or adverse modification” (DAM) was published on February 11, 2016 (81 FR 7214). The final rule became effective on March 14, 2016. The revised definition states:

“Destruction or adverse modification means a direct or indirect alteration that appreciably diminishes the value of critical habitat for the conservation of a listed species. Such alterations may include, but are not limited to, those that alter the physical or biological features essential to the conservation of a species or that preclude or significantly delay development of such features.”

The DAM analysis in this biological opinion relies on four components: (1) the *Status of Critical Habitat*, which describes the range-wide condition of the critical habitat in terms of the key components (i.e., essential habitat features, primary constituent elements, or physical and
biological features) that provide for the conservation of the listed species, the factors responsible for that condition, and the intended value of the critical habitat overall for the conservation/recovery of the listed species; (2) the \textit{Environmental Baseline}, which analyzes the condition of the critical habitat in the action area, the factors responsible for that condition, and the value of the critical habitat in the action area for the conservation/recovery of the listed species; (3) the \textit{Effects of the Action}, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated and interdependent activities on the key components of critical habitat that provide for the conservation of the listed species, and how those impacts are likely to influence the conservation value of the affected critical habitat; and (4) \textit{Cumulative Effects}, which evaluate the effects of future non-Federal activities that are reasonably certain to occur in the action area on the key components of critical habitat that provide for the conservation of the listed species and how those impacts are likely to influence the conservation value of the affected critical habitat.

For purposes of making the DAM determination, the Service evaluates if the effects of the proposed Federal action, taken together with cumulative effects, are likely to impair or preclude the capacity of critical habitat in the action area to serve its intended conservation function to an extent that appreciably diminishes the rangewide value of critical habitat for the conservation of the listed species. The key to making that finding is understanding the value (i.e., the role) of the critical habitat in the action area for the conservation/recovery of the listed species based on the \textit{Environmental Baseline} analysis.

\textbf{Status of the Species}

\textit{Delta Smelt}

\textbf{Legal Status}

The Service proposed to list the delta smelt as threatened with proposed critical habitat on October 3, 1991 (Service 1991). The Service listed the delta smelt as threatened on March 5, 1993 (Service 1993), and designated critical habitat for the species on December 19, 1994 (Service 1994). The delta smelt was one of eight fish species addressed in the \textit{Recovery Plan for the Sacramento–San Joaquin Delta Native Fishes} (Service 1996), which is currently under revision. A 5-year status review of the delta smelt was completed on March 31, 2004 (Service 2004). The 2004 review concluded that delta smelt remained a threatened species. A subsequent 5-year status review recommended uplisting delta smelt from threatened to endangered (Service 2010a). A 12-month finding on a petition to reclassify the delta smelt as an endangered species was completed on April 7, 2010 (Service 2010b). After reviewing all available scientific and commercial information, the Service determined that re-classifying the delta smelt from a threatened to an endangered species was warranted but precluded by other higher priority listing actions (Service 2010c). The Service annually reviews the status and uplisting recommendation for delta smelt during its Candidate Notice of Review (CNOR) process. Each year, the CNOR has recommended the uplisting from threatened to endangered. Electronic copies of these documents are available at http://ecos.fws.gov/docs/five_year_review/doc3570.pdf and http://www.gpo.gov/fdsys/pkg/FR-2013-11-22/pdf/2013-27391.pdf (Service 2010a; Service 2010b).
Description and Life Cycle

The delta smelt is a small fish of the family Osmeridae. It is endemic to the San Francisco Bay-Delta where it primarily occupies open-water habitats in Suisun Bay and marsh and the Sacramento-San Joaquin Delta. The delta smelt is primarily an annual species, meaning that it completes its life cycle in one year which typically occurs from April to the following April, within a 1-2 month buffer. In captivity delta smelt can survive to spawn at two years of age (Lindberg et al. 2013), but this appears to be rare in the wild (Bennett 2005). Very few individuals reach lengths over 3.5 inches (90 millimeters [mm]).

Population Numbers

Currently, the spawning stock of delta smelt appears to be at its second lowest abundance on record, the lowest having been recorded during WY 2016 (Table 1). The 2016 Fall Mid water Trawl (FMWT) Index was 8, the second lowest value on record. The California Department of Fish and Wildlife’s (CDFW) Spring Kodiak Trawl (SKT) monitors the adult spawning stock of delta smelt and serves as an indication for the relative number and distribution of spawners in the system. The Service has calculated an absolute abundance estimate\(^1\) for adult spawners in water year 2017 using January and February SKT data. This absolute abundance estimate is also the second lowest on record (Table 1). The population size of adult delta smelt January-February (2017) was estimated to be between 22,000 and 92,000 fish with a point estimate of 47,786. The January-February (2016) point estimates were the lowest values since 2002 and suggested delta smelt experienced increased mortality during extreme drought conditions occurring during 2013-2015. While 2017 estimates likely represent an increase in recruitment and survival from the prior year, the continued low parental stock of delta smelt relative to historical numbers suggest the population will continue to be vulnerable to stochastic events and operational changes that may occur in response until successive years of increased population growth result in a substantial increase of abundance.

<table>
<thead>
<tr>
<th>Water Year</th>
<th>FMWT Index (unitless)</th>
<th>SKT Index (unitless)</th>
<th>Jan-Feb SKT abundance estimate (thousands of fish)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>603</td>
<td>80.6</td>
<td>739.8</td>
</tr>
<tr>
<td>2003</td>
<td>139</td>
<td>97.3</td>
<td>634</td>
</tr>
<tr>
<td>2004</td>
<td>210</td>
<td>51.2</td>
<td>654.5</td>
</tr>
<tr>
<td>2005</td>
<td>74</td>
<td>18.2</td>
<td>477.8</td>
</tr>
<tr>
<td>2006</td>
<td>41</td>
<td>32.5</td>
<td>186.8</td>
</tr>
<tr>
<td>2007</td>
<td>26</td>
<td>24.1</td>
<td>292</td>
</tr>
<tr>
<td>2008</td>
<td>28</td>
<td>44.6</td>
<td>325.3</td>
</tr>
<tr>
<td>2009</td>
<td>23</td>
<td></td>
<td>365.9</td>
</tr>
</tbody>
</table>

\(^1\) The Service completed a new adult delta smelt abundance estimation procedure based on CDFW’s SKT data for January and February (see Table 1). This procedure has recently been updated from that used in 2016. While these estimates likely represent a minimum population size due to the method reliance on survey data, this is our current best estimate of population size.
In addition to the abundance estimates, the CDFW conducts four fish surveys from which it develops indices of delta smelt’s relative abundance (Figures 3-1 and 3-2). Each survey has variable and unquantified capture efficiency, and in each, the frequency of zero catches of delta smelt is very high, largely due to the species’ rarity (e.g., Latour 2015; Polansky et al. in review). The [summer] Towner Survey (TNS) is the longest running indicator of delta smelt relative abundance; it has been conducted since 1959. Although this survey was designed to index the relative abundance of metamorphosing juvenile striped bass (Morone saxatilis) (Turner and Chadwick 1972), delta smelt have been collected incidentally; most of the delta smelt captured are age-0 and about 20-40 mm in length (Miller 2000). The Fall Midwater Trawl Survey (FMWT) is the second longest running indicator of delta smelt relative abundance; it has been conducted since 1967. This survey was also designed to index the relative abundance of age-0 striped bass (Stevens 1977), but as with the TNS, delta smelt are collected incidentally (Stevens and Miller 1983). Most of the delta smelt captured by the FMWT are age-0 “subadults” and are about 50-70 mm in length (Sweetnam 1999). The 20-mm Survey is the third longest running indicator of delta smelt relative abundance; it has been conducted since 1995. This survey was designed to monitor the distribution of late larval or metamorphosing juvenile delta smelt to assess their distribution and risk of entrainment into the large water export diversions of the Central Valley Project (CVP) and State Water Project (SWP) (Dege and Brown 2004). As its name suggests, most of the delta smelt collected by the 20-mm Survey are about 10-30 mm in length, with a peak catch of fish just under 20 mm (Kimmerer 2008). The newest indicator of delta smelt relative abundance is the Spring Kodiak Trawl Survey (SKT), which has been conducted since 2002. This survey was designed to monitor the distribution of pre-spawn and spawning adult delta smelt to assess their distribution and risk of entrainment. Most of the delta smelt captured in the SKT are 60-80 mm in length (Bennett 2005).

The TNS and FMWT abundance indices for delta smelt have documented the species’ long-term decline, while the newer 20-mm and SKT abundance indices have generally confirmed the recent portions of the trends implied by the older surveys (Figures 3 and 4). During the period of record, juvenile delta smelt relative abundance has declined from peak levels observed during the latter 1970s (Figure 3), while subadult relative abundance was at its highest in 1970 and again in 1980 (Figure 3). Juvenile and subadult abundance indices both declined rapidly during the early 1980s, increased somewhat during the 1990s, and then collapsed in the early 2000s. Since 2005, the TNS and the FMWT have produced indices that reflect less year to year variation than their 20-mm and SKT analogs, but overall, the trends in both sets of indices are similar. During the past decade, each index has frequently reached new record low levels. The TNS index was 0.0 in 2015 and 2016, and the 2015 FMWT index and subsequent 2016 SKT index were record lows (about one half of one percent of the relative abundance recorded in 1970-1971).

The abundance of adult delta smelt may have exceeded twenty million in 1980-1981 (Rose et al. 2013b). This may sound like a large number — and it is compared to the contemporary estimates
listed in Table 1. However, decades of monitoring by CDFW has shown that the delta smelt has usually not been very abundant when compared to other pelagic (meaning offshore-oriented or open-water) fishes (Figure 4). In the TNS, delta smelt catches have usually been lower than age-0 striped bass, and in recent years, also lower than gobies and threadfin shad. In the FMWT, delta smelt catches have been persistently lower than at least five other species. Research and monitoring in shallower habitats like Suisun Marsh (Moyle 1986; Matern et al. 2002), Delta

Figure 3-1. Time series of the California Department of Fish and Wildlife's Summer Townet Survey (black line; primary y-axis) and 20-mm Survey (gray line; secondary y-axis) abundance indices for delta smelt.
Figure 3-2. Time series of the California Department of Fish and Wildlife’s Fall Midwater Trawl (black line; primary y-axis) and Spring Kodiak Trawl (gray line; secondary y-axis) abundance indices for delta smelt.

beaches (Nobriga et al. 2005), and small tidal marshes in the upper estuary (Gewant and Bollens 2012) have reported even lower relative abundances of delta smelt. In each of the studies cited, the catches of delta smelt represented less than one percent of the total fish catch and there were usually more than a dozen more abundant fish species.

Figure 4. Fractional compositions of the eight most frequently collected fish species in the California Department of Fish and Wildlife’s Summer Tow-net Survey (1959-2015), and the seven most frequently collected fish species in the Fall Midwater Trawl (1967-2015).
The long-term rarity of the delta smelt has had a consequence for understanding the reasons for their population decline, which generates uncertainty about how resource managers should intervene. Some pelagic fishes have shown long-term relationships between Delta inflow, Delta outflow, or X2 and their abundance or survival (Stevens and Miller 1983; Jassby et al. 1995; Kimmerer 2002a; Kimmerer et al. 2009). There does seem to be some difference in the likelihood of whether the delta smelt population will increase or decrease in abundance from one year to the next based on hydrology (Figure 5), but there has never been any predictable relationship linking freshwater flow conditions to the relative abundance of delta smelt (Stevens and Miller 1983; Jassby et al. 1995; Kimmerer 2002a; Kimmerer et al. 2009). Recently, several teams of researchers have built several varieties of conceptual (IEP 2015) and mathematical (Thomson et al. 2010; Maunder and Deriso 2011; Miller et al. 2012; Rose et al. 2013a) life cycle models for the delta smelt that attempt to describe the reasons the population has declined. Some of these models have been able to recreate the trend observed in abundance indices very well (Figure 6), but they have all done so using different approaches and different variables to do so. Collectively, these modeling efforts have been helpful in that they generally support water temperature and changes in the estuary’s food web as ‘universally supported’ factors affecting delta smelt. However, they have also come to very different conclusions about the conservation value of more readily manageable factors like water project operations.

Figure 5. Frequencies of delta smelt population increases or decreases (red colored portions of each bar occurring below zero) based on the California Department of Fish and Wildlife’s Fall Midwater Trawl Survey, 1967-2015. A population increase reflects an increase in relative abundance over the prior year’s index and a population decrease reflects a decrease in relative abundance compared to the prior year’s index. The Service performed bootstrap resampling on
each year’s catch per tow to generate a mean catch per tow with 95 percent confidence intervals. This resulted in four possible outcomes: (1) a statistically significant increase in relative abundance from one year to the next in which the confidence intervals of the two years did not overlap (“Up”; solid blue bar segments), (2) a statistically non-significant increase in relative abundance from one year to the next in which the confidence intervals of the two years overlapped (“Maybe Up”; lighter blue bar segments), (3) a statistically significant decrease in relative abundance from one year to the next in which the confidence intervals of the two years did not overlap (“Down”; solid red bar segments), or (4) a statistically non-significant decrease in relative abundance from one year to the next in which the confidence intervals of the two years overlapped (“Maybe Down”; lighter red bar segments). The counts in each of the four categories were combined by Sacramento Valley Water Year Types except that below-normal years were not plotted. The frequencies of population decline were converted into a negative number so that population increases would count up from the zero line on the y-axis and population decreases would count down from the zero line.

Thomson et al. (2010)

Maunder and Deriso (2011)

Miller et al. (2012)

Rose et al. (2013a)

Figure 6. Examples of recent published model fits to time series of delta smelt relative abundance data. The source of each is referenced above or alongside each time series. In each plot, observed catches are depicted as black dots and model predictions of the data as gray or black lines. Model predictions from Rose et al. (2013a) are a black line with open symbols. In Maunder and Deriso (2011), the three panels represent the 20-mm Survey, Summer Tow-net Survey, and Fall Midwater Trawl (FMWT) Survey from top to bottom, respectively. The other three studies are fit to estimates of adult delta smelt relative abundance (FMWT catch in Thomson et al. 2010 and the FMWT index in Miller et al. 2012) or absolute abundance (Rose et al. 2013a). See each study for further details on Methods, Results, and the authors’ interpretations of their Results.
Habitat and Distribution

Because the delta smelt only lives in one part of one comprehensively monitored estuary, its general distribution is well understood (Moyle et al. 1992; Bennett 2005; Hobbs et al. 2006; 2007; Feyrer et al. 2007; Nobriga et al. 2008; Kimmerer et al. 2009; Merz et al. 2011; Murphy and Hamilton 2013; Sommer and Mejia 2013). There are both location-based (e.g., Sacramento River around Decker Island) and conditions-based (low-salinity zone) habitats that delta smelt permanently occupy. There are habitats that delta smelt occupy seasonally (e.g., for spawning), and there are habitats that delta smelt occupy transiently, which we define here as occasional seasonal use. These include distribution extremes from which delta smelt are not collected every year or even in most years.

Most delta smelt complete their entire life cycle within or immediately upstream of the estuary's low-salinity zone. The low-salinity zone is frequently defined as waters with a salinity range of about 0.5 to 6 parts per thousand (ppt) (Kimmerer 2004). The 0.5 to 6 ppt and similar salinity ranges reported by different authors were chosen based on analyses of historical peaks in phytoplankton and zooplankton abundance, but recent physiological and molecular biological research has indicated that the salinities that typify the low-salinity zone are also optimal for delta smelt (Komoroske et al. 2016). The low-salinity zone is a dynamic habitat with size and location that respond rapidly to changes in tidal and river flows. The U.S. Environmental Protection Agency (EPA) recently finished a comprehensive set of maps that show how the low-salinity zone changes in size and shape when freshwater flows change the location of X2 (EPA 2012). This document can be found at: http://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/docs/cmnt081712/karen_schwinn.pdf.

The low-salinity zone expands and moves downstream when river flows into the estuary are high, placing low-salinity water over a larger and more diverse set of nominal habitat types than occurs under low flow conditions. During periods of low outflow, the low-salinity zone contracts and moves upstream. Due to its historical importance as a fish nursery habitat, there is a long research history into the physics and biology of the San Francisco Estuary’s low-salinity zone (Kimmerer 2004).

The ecological function of the low-salinity zone also varies depending mainly on freshwater flow (Jassby et al. 1995; Kimmerer 2002b; Kimmerer 2004). Low outflow can decrease the capacity of the low-salinity zone and adjacent habitats to support the production of delta smelt by reducing habitat diversity and concentrating the fish with their predators and competitors (Service 1993; 1994). During the past four decades, the low-salinity zone ecosystem has undergone substantial changes in turbidity (Schoellhamer 2011) and food web function (Winder and Jassby 2011) that cannot be undone by increasing Delta outflow. These habitat changes, which extend into parts of the Delta where water is fresher than 0.5 ppt, have also decreased the ability of the low-salinity zone and adjacent habitats to support the production of delta smelt (Thomson et al. 2010; Rose et al. 2013b; IEP 2015).

Delta smelt have been observed as far west as San Francisco Bay, as far north as Knight’s Landing on the Sacramento River, as far east as Woodbridge on the Mokelumne River and Stockton on the Calaveras River, and as far south as Mossdale on the San Joaquin River (Figure 7). This distribution represents a range of salinity from essentially zero ppt up to about 20 ppt, which represents a salinity range well beyond definitions of the low-salinity zone or mixing zone near a salinity of 2 ppt emphasized in the critical habitat rule (Service 1994). It is also well beyond the geographic extent of the critical habitat rule (described below). However, most delta
smelt that have been collected in the extensively surveyed San Francisco Estuary have been collected from locations within the bounds defined in the critical habitat rule. In addition, all habitats known to be occupied year-round by delta smelt occur within the bounds defined in the critical habitat rule.

Figure 7. Delta smelt range map. Waterways colored in purple depict the delta smelt distribution described by Merz et al. (2011). The Service has used newer information to expand the transient range of delta smelt further up the Napa and Sacramento rivers than indicated by Merz et al. (2011). The red polygon depicts the designated critical habitat for the delta smelt.
Delta smelt permanently occupy the Cache Slough ‘complex’ including Liberty Island and the adjacent reach of the Sacramento Deepwater Shipping Channel (Sommer and Mejia 2013), Cache Slough to its confluence with the Sacramento River and the Sacramento River from that confluence downstream to Chipps Island, Honker Bay, and the eastern part of Montezuma Slough (Figure 8). The reasons delta smelt are believed to permanently occupy this part of the estuary are the presence of fresh- to low-salinity water year around that is comparatively turbid and of a tolerable water temperature year around. These appropriate water quality conditions overlap an underwater landscape featuring variation in depth, tidal current velocities, edge habitats, and food production (Sweetnam 1999; Nobriga et al. 2008; Feyrer et al. 2011; Murphy and Hamilton 2013; Hammock et al. 2015; Bever et al. 2016). Field observations are increasingly being supported by laboratory research that explains how delta smelt respond physiologically to variation in salinity, turbidity, water temperature, and other aspects of their habitat that can vary with changes in climate, freshwater flow and estuarine bathymetry (Hasenbein et al. 2014, 2016; Komoroske et al. 2014, 2016).

**Figure 8.** Maps of multi-year average distributions of delta smelt collected in four monitoring programs. The sampling regions covered by each survey are outlined. The areas with dark shading surround sampling stations in which 90 percent of the delta smelt collections occurred, the areas with light shading surround sampling stations in which the next 9 percent of delta smelt collections occurred. Source: Murphy and Hamilton (2013).

Each year, the distribution of delta smelt seasonally expands when adults disperse in response to winter flow increases that also coincide with seasonal increases in turbidity and decreases in water temperature (Figure 8). The annual range expansion of adult delta smelt extends up the
Sacramento River to about Garcia Bend in the Pocket neighborhood of Sacramento, up the San Joaquin River from Antioch to areas near Stockton, up the lower Mokelumne River system, and west throughout Suisun Bay and marsh. Some delta smelt seasonally and transiently occupy Old and Middle rivers in the south Delta each year, but face a high risk of entrainment when they do (Grimaldo et al. 2009).

The distribution of delta smelt occasionally expands beyond this area (Figure 7). For instance, during high outflow winters, adult delta smelt also disperse west into San Pablo Bay and up into the Napa River (Hobbs et al. 2007). Similarly, delta smelt have occasionally been reported from the Sacramento River north of Garcia Bend up to Knights Landing (e.g., Merz et al. 2011; Vincik and Julienne 2012).

The expanded adult distribution initially affects the distribution of the next generation because delta smelt eggs are adhesive and not believed to be highly mobile once they are spawned. The distribution of larvae reflects a combination of where spawning occurred and freshwater flow conditions when the eggs hatched. Variation in Delta outflow affects the spatial distribution of the delta smelt population for most of its life. The ecological condition of the estuary’s low-salinity zone has historically been indexed using a statistic called X2, a local name for the geographic location of 2 ppt salinity near the bottom of the water column (Jassby et al. 1995). During spring, larval delta smelt have centers of distribution in freshwater, typically 20-40 km upstream of X2 (Dege and Brown 2004). By July, as water temperatures in the Delta reach annual peaks, post-larval and juvenile delta smelt have centers of distribution very close to X2 (Dege and Brown 2004), but the fish are broadly distributed around that peak (Sweetnam 1999; Nobriga et al. 2008). During the fall, subadult delta smelt still have a center of distribution near X2 (Sommer et al. 2011), and remain broadly distributed around that peak (Feyrer et al. 2007; 2011). During the winter, maturing adult delta smelt disperse in connection with winter storms following the spread of turbid fresh water (Grimaldo et al. 2009; Sommer et al. 2011; Murphy and Hamilton 2013). After an initial dispersal, recent analyses suggest the delta smelt population’s distribution no longer responds strongly to variation in Delta outflow (Polansky et al. in review), though some individuals continue to move around in response to flow changes associated with storms (Leo Polansky, unpublished analysis of Early Warning Survey data set).

Food

At all life stages, numerous small crustaceans, especially a group called calanoid copepods, make up most of the delta smelt diet (Nobriga 2002; Slater and Baxter 2014). Small crustaceans are ubiquitously distributed throughout the estuary, but which prey species are present at particular times and locations has changed dramatically over time (Winder and Jassby 2011; Kratina et al. 2014). This has likely affected delta smelt feeding success, particularly during Central California’s warm summers.

Reproductive Strategy

The reproductive behavior of delta smelt is only known from captive specimens spawned in artificial environments and most of the information has never been published. Spawning likely occurs mainly at night with several males attending a female that broadcasts her eggs onto bottom substrate (Bennett 2005). Although preferred spawning substrate is unknown, spawning habits of delta smelt’s closest relative, the Surf smelt (Hypomesus pretiosus), as well as unpublished experimental trials, suggest that sand may be the preferred substrate (Bennett 2005; Sommer and Mejia 2013). Hatching success peaks at temperatures of 15-16°C (59-61°F) and
decreases at cooler and warmer temperatures. Hatching success nears zero percent as water temperatures exceed 20°C (68°F) (Bennett 2005). Water temperatures suitable for spawning occur most frequently during the months of March-May, but ripe female delta smelt have been observed as early as January and larvae have been collected as late as July. Delta smelt spawn in the estuary and have one spawning season for each generation, which makes the timing and duration of the spawning season important every year. As stated above, delta smelt are believed to spawn on sandy substrates in fresh and possibly low-salinity water (Bennett 2005). Therefore, freshwater flow affects how much of the estuary is available for delta smelt to spawn (Hobbs et al. 2007).

Delta smelt can start spawning when water temperatures reach about 10°C (50°F) and can continue until temperatures reach about 20°C (Bennett 2005). The ideal spawning condition occurs when water temperatures remain cool throughout the spring (e.g., March-May). Few delta smelt ≤55 mm in length are sexually mature and 50% of delta smelt reach sexual maturity at 60 to 65 mm in length (Rose et al. 2013b). Thus, if water temperatures raise much above 10°C in the winter, the “spawning season” can start before most individuals are mature enough to actually spawn. If temperatures continue to warm rapidly toward 20°C in early spring, that can end the spawning season with only a small fraction of ‘adult’ fish having had an opportunity to spawn. Delta smelt were initially believed to spawn only once before dying (Moyle et al. 1992). It has since been confirmed that like many other ecologically similar forage fishes (Winemiller and Rose 1992) individual delta smelt can spawn more than once if water temperatures remain suitable for a long enough time, and if the adults find enough food to support the production of another batch of eggs (Lindberg et al. 2013; Kurobe et al. 2016). As a result, the longer water temperatures remain cool, the more fish have time to mature and the more times individual fish can spawn.

Although adult delta smelt can spawn more than once, mortality is high during the spawning season and most adults die by May (Polansky et al. in review). The egg stage averages about 10 days before the embryos hatch into larvae. The larval stage averages about 30 days. Metamorphosing “post-larvae” appear in monitoring surveys from April into July of most years. By July, most delta smelt have reached the juvenile life stage. Delta smelt collected during the fall are called “subadults”, a stage which lasts until the following winter when fish disperse toward spawning habitats. This winter dispersal usually precedes sexual maturity (Sommer et al. 2011).

Recovery and Management

Following Moyle et al. (1992), the Service (1993) indicated that SWP and CVP exports were the primary factors contributing to the decline of delta smelt due to entrainment of larvae and juveniles and the effects of low flow on the location and function of the estuary mixing zone (now called the low-salinity zone). In addition, prolonged drought during 1987-1992, in-Delta water diversions, reduction in food supplies by nonindigenous aquatic species -specifically overbite clam and nonnative copepods, and toxicity due to agricultural and industrial chemicals were also factors considered to be threatening the delta smelt. In the Formal Endangered Species Act Consultation on the Proposed Coordinated Long-Term Operations of the State Water Project and Central Valley Project (2008 Service BiOp), the Service’s Reasonable and Prudent Alternative required protection of all life stages from entrainment and augmentation of Delta outflow during the fall of Wet or Above-Normal years as classified by the State of California (Service 2008). The expansion of entrainment protection for delta smelt in the 2008 Service BiOp was in response to large increases in juvenile and adult salvage in the early 2000s
The fall X2 requirement was in response to increased fall exports that had resulted in greatly reduced variability in Delta outflow during the fall months (Feyrer et al. 2011).

The Service’s (2010c) recommendation to uplist delta smelt from threatened to endangered included reservoir operations and water diversions upstream of the estuary as mechanisms interacting with exports to restrict the low-salinity zone and concentrate delta smelt with competing fish species. In addition, Brazilian waterweed (Egeria densa) and increasing water transparency were considered new detrimental habitat changes. Predation was considered a low-level threat linked to increasing waterweed abundance and increasing water transparency. Additional threats considered potentially significant by the Service in 2010 were entrainment into power plant diversions, contaminants, and reproductive problems that can stem from small population sizes. Conservation recommendations included: establish Delta outflows proportionate to unimpaired flows to set outflow targets as fractions of runoff in the Central Valley watersheds; minimize reverse flows in Old and Middle rivers; and, establish a genetic management plan with the goals of minimizing the loss of genetic diversity and limiting risk of extinction caused by unpredictable catastrophic events. The Service (2012b) recently added climate change to the list of threats to the delta smelt.

Continued protection of the delta smelt from excessive entrainment, improving the estuary’s flow regime, suppression of nonnative species, increasing zooplankton abundance, and improving water quality are among the actions needed to recover the delta smelt.

**Climate Change**

Climate projections for the San Francisco Bay-Delta and its watershed indicate that temperature and precipitation changes will diminish snowpack in the Sierra-Nevada, changing the availability of natural water supplies (Knowles and Cayan 2002; Dettinger 2005). Warming may result in more precipitation falling as rain which will mean less water stored in spring snowpacks. This would increase the frequency of rain-on-snow events and increase winter runoff with an associated decrease in runoff for the remainder of the year (Hayhoe et al. 2004). Overall, these and other storm track changes may lead to increased frequency of flood and drought cycles during the 21st century (Dettinger et al. 2015). Thus far, the 21st century has been substantially drier than the 20th century (Figure 9).
Sea level rise is also anticipated as a consequence of a warming global climate and if it is not mitigated, sea level rise will likely influence saltwater intrusion into the Bay-Delta. Salinity within the northern San Francisco Bay is projected to rise by 4.5 ppt by the end of the century (Cloern et al. 2011). Elevated salinity could push X2 farther up the estuary if outflows were not increased to compensate. Fall X2 mean values are projected to increase by about 7 km to the area near the City of Antioch approximately 90 km from the Golden Gate Bridge by 2100 (Brown et al. 2013). This projected change in the location of X2 in the fall is expected to decrease suitable physical habitat if current levees and channel structures are maintained.

Central California’s warm summers are already a source of energetic stress for delta smelt and warm springs already severely compress the duration of their spawning season (Rose et al. 2013a, b). Central California’s climate is anticipated to get warmer (Detttinger 2005). We expect warmer estuary temperatures to present a significant conservation challenge for delta smelt. Mean annual water temperatures within the Delta are expected to increase steadily during the second half of this century (Cloern et al. 2011). Warmer water temperatures could further reduce delta smelt spawning opportunities, decrease juvenile growth during the warmest months, and increase mortality via several food web pathways including: increased vulnerability to predators, increased vulnerability to toxins, and decreased capacity for delta smelt to successfully compete in an estuary that is energetically more optimal for warm water-tolerant fishes.

Recent research into the ecological effects of warming water temperatures suggests that delta smelt, depending on location, may be forced to spawn an average of ten to twenty-five days earlier in the season (Brown et al. 2013). The number of high mortality days (cumulative number of days of daily average water temperature >25 °C (77°F)) is expected to increase (Brown et al.
2013). The number of physiologically stressful days (cumulative number of days of daily average water temperature >20 °C (68°F)) is expected to be stable or decrease partly because many stressful days will become high mortality days. Thus, current modeling indicates that delta smelt will likely face a shorter maturation window and reduced habitat availability due to increased water temperatures. A shorter maturation window will likely have effects on reproduction (Brown et al. 2013). Growth rates have been shown to slow as water temperatures increase above 20 °C (68°F), requiring delta smelt to consume more food to reach growth rates that are normal at lower water temperatures (Rose et al. 2013a). Delta smelt are smaller, on average, than in the past (Sweetnam 1999; Bennett 2005) and expected temperature increases due to climate change will likely slow growth rates further.

In summary, the delta smelt is currently at the southern limit of the inland distribution of the family Osmeridae along the Pacific coast of North America. Thus, increased temperatures associated with climate change may present a significant conservation challenge if they result in a Bay-Delta that is outside of the delta smelt’s competitive limits. For the time being however, water temperatures are cool enough in the delta smelt’s range for the species to complete its life cycle.

Summary of the Status of Delta Smelt

The relative abundance of delta smelt has reached very low numbers (Table 1) for a small forage fish in an ecosystem the size of the San Francisco Estuary. The recent record-low relative abundance reflects decades of habitat change, marginalization by non-native species that prey on and out-compete delta smelt, and remarkably dry hydrology occurring over recent years. The anticipated effects of climate change on the San Francisco Estuary and watershed such as warmer water temperatures, greater salinity intrusion, and the potential for frequent extreme drought, which has been experienced for the 21st century thus far (Figure 9) indicate challenges to delta smelt survival will increase. However, a rebound in relative abundance during the very wet and cool conditions during 2011 and again in 2017, indicate that delta smelt has retained some population resilience in years of increased spring outflows from the Delta (IEP 2015).

Designated Critical Habitat for Delta Smelt

Legal Status

The Service designated critical habitat for the delta smelt on December 19, 1994 (Service 1994). The geographic area encompassed by the designation includes all water and all submerged lands below ordinary high water and the entire water column bounded by and contained in Suisun Bay (including the contiguous Grizzly and Honker Bays); the length of Goodyear, Suisun, Cutoff, First Mallard (Spring Branch), and Montezuma sloughs; and the existing contiguous waters contained within the legal Delta (as defined in section 12220 of the California Water Code) (Service 1994).

Conservation Role of Delta Smelt Critical Habitat

The Service’s primary objective in designating critical habitat was to identify the key components of delta smelt habitat that support successful completion of the life cycle, including spawning, larval and juvenile transport, rearing, and adult migration back to spawning sites. Delta smelt are endemic to the Bay-Delta and the vast majority only live one year. Thus, regardless of annual hydrology, the Bay-Delta estuary must provide suitable habitat all year,
every year. The primary constituent elements essential to the conservation of the delta smelt are physical habitat, water, river flow, and salinity concentrations required to maintain delta smelt habitat for spawning, larval and juvenile transport, rearing, and adult migration (Service 1994). The Service recommended in its designation of critical habitat for the delta smelt that salinity in Suisun Bay should vary according to water year type. For the months of February through June, this element was codified by the State Water Resources Control Board’s “X2 standard” described in D-1641 and the Board’s current Water Quality Control Plan.

Description of the Primary Constituent Elements

The original descriptions of the primary constituent elements are compared and contrasted with current scientific understanding in Table 2.

Primary Constituent Element 1: “Physical habitat” is defined as the structural components of habitat (Service 1994). The ancestral Delta was a large tidal marsh-floodplain habitat totaling approximately 300,000 acres. During the late 1800’s and early 1900’s, most of the wetlands were diked and reclaimed for agriculture or other human use. The physical habitat modifications of the Delta and Suisun Bay were mostly due to land reclamation and urbanization. Water conveyance projects and river channelization have had some influence on the regional physical habitat by armoring levees with riprap, building conveyance channels like the Delta Cross Channel, storage reservoirs like Clifton Court Forebay, and by building and operating temporary barriers in the south Delta and permanent gates and water distribution systems in Suisun Marsh.

During the 1930’s to 1960’s, the shipping channels were dredged deeper (~12 meters [m]) to accommodate shipping traffic from the Pacific Ocean and San Francisco Bay to ports in Sacramento and Stockton. These changes left Suisun Bay and the Sacramento-San Joaquin River confluence region as the largest and most depth-varying places in the typical range of the low-salinity zone. This region remained a highly productive nursery for many decades (Stevens and Miller 1983; Moyle et al. 1992; Jassby et al. 1995). However, the deeper landscape created to support shipping and flood control requires more freshwater outflow to maintain the low-salinity zone in the large Suisun Bay/river confluence region than was once required. The shipping itself has historically provided a source of non-native organisms, that along with depleted flows and deep channelization, have contributed to the changing ecology of the upper estuary (Winder and Jassby 2011; Kratina et al. 2014).

Table 2. Comparison of delta smelt primary constituent elements of critical habitat between the 1994 publication of the rule and the present.

<table>
<thead>
<tr>
<th>Primary Constituent Element</th>
<th>1994 critical habitat rule</th>
<th>2016 state of scientific understanding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spawning Habitat</td>
<td>Shallow fresh or slightly brackish edgewaters</td>
<td>No change</td>
</tr>
<tr>
<td>Backwater sloughs</td>
<td>Possible, never confirmed. Most likely spawning sites have sandy substrates and need not occur in sloughs. Backwater sloughs in particular tend to have silty substrates that would suffocate eggs.</td>
<td></td>
</tr>
<tr>
<td>Larval and juvenile transport</td>
<td>No change</td>
<td></td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-----------</td>
<td></td>
</tr>
<tr>
<td><strong>Low concentrations of pollutants</strong></td>
<td><strong>No change</strong></td>
<td></td>
</tr>
<tr>
<td>Submerged tree roots, branches, emergent vegetation (tules)</td>
<td>Not likely. Unpublished observations of spawning by captive delta smelt suggest spawning on substrates oriented horizontally and a preference for gravel or sand that is more consistent with observations of other osmerid fishes.</td>
<td></td>
</tr>
<tr>
<td>Key spawning locations: Sacramento River &quot;in the Delta&quot;, Barker Slough, Lindsey Slough, Cache Slough, Prospect Slough, Georgiana Slough, Beaver Slough, Hog Slough, Sycamore Slough, Suisun Marsh</td>
<td>All of the locations listed in 1994 may be suitable for spawning, but based on better monitoring from the Spring Kodiak Trawl Survey, most adult fish have since been observed to aggregate around Grizzly Island, Sherman Island, and in the Cache Slough complex including the subsequently flooded Liberty Island.</td>
<td></td>
</tr>
<tr>
<td>Adults could spawn from December-July.</td>
<td>Adults are virtually never fully ripe and ready to spawn before February and most spawning is completed by May (warm years) or June (cool years).</td>
<td></td>
</tr>
<tr>
<td>Larvae require adequate river flows to transport them from spawning habitats in backwater sloughs to rearing habitats in the open waters of the low-salinity zone</td>
<td>Not likely. Most delta smelt that survive to the juvenile life stage do eventually inhabit water that is in the 0.5 to 6 ppt range, due to either or both of downstream movement or decreasing outflow. However, delta smelt larvae can feed in the same habitats they were hatched in and juvenile fish can rear in water less than 0.5 ppt salinity.</td>
<td></td>
</tr>
<tr>
<td>Larvae require adequate flow to prevent entainment</td>
<td>No change</td>
<td></td>
</tr>
<tr>
<td>Larval and juvenile transport needs to be protected from physical disturbances like sand and gravel mining, diking, dredging, rip-rapping</td>
<td>No change, but seems likely to have more impact on spawning habitat than larval transport</td>
<td></td>
</tr>
<tr>
<td>2 ppt isohaline (X2) must be west of the Sacramento-San Joaquin River confluence to support sufficient larval and juvenile transport</td>
<td>Generally is during February-June due to State Water Resources Control Board X2 standard; however, the standard does have a drought off-ramp</td>
<td></td>
</tr>
<tr>
<td>Maturation must not be impaired by pollutant concentrations</td>
<td>No change</td>
<td></td>
</tr>
<tr>
<td>Rearing habitat</td>
<td>Additional flows might be required in the July-August period to protect delta smelt that were present in the south and central Delta from being entrained in export pumps.</td>
<td></td>
</tr>
<tr>
<td>----------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td></td>
<td>July-August outflow augmentations may be helpful, but not to mitigate entrainment. Habitat changes in the central and south Delta have rendered it seasonally unsuitable to delta smelt during the summer; entrainment is seldom observed past June and the 2008 Service BiOp RPA has a 25 degree Celsius off-ramp that usually triggers in June.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 ppt isohaline (X2) should remain between Carquinez Strait in the west, Three-Mile Slough on the Sacramento River and Big Break on the San Joaquin River in the east. This was determined to be a historical range for 2 ppt salinity (including its tidal time scale excursion into the Delta).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Generally is during February-June due to State Water Resources Control Board X2 standard; however the standard does have a drought off-ramp. Most juvenile delta smelt still rear in this area but it is now recognized that a few remain in the Cache Slough complex as well.</td>
<td></td>
</tr>
<tr>
<td>Adult migration</td>
<td>Adults require unrestricted access to spawning habitat from December-July.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Adults disperse faster than was recognized in 1994; most of it is finished by the time Spring Kodiak Trawls start in January, though local movements and possibly rapid longer distance dispersal occurs throughout the spawning season, which as mentioned above is usually February-June or a subset of those months.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Unrestricted access results from adequate flow, suitable water quality, and protection from physical disturbance.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No change</td>
<td></td>
</tr>
</tbody>
</table>

Although the delta smelt is a generally pelagic or open-water fish, depth variation of open-water habitats is an important habitat attribute (Moyle et al. 1992; Hobbs et al. 2006). In the wild, delta smelt are most frequently collected in water that is somewhat shallow (4-15 feet deep) where turbidity is often elevated and tidal currents exist, but are not excessive (Moyle et al. 1992; Bever et al. 2016). In Suisun Bay, the deep shipping channels are poor quality habitat because tidal velocity is very high (Bever et al. 2016), but in the north Delta where tidal velocity is slower, the Sacramento Deepwater Shipping Channel is used to a greater extent, particularly for spawning and by larval fish (CDFW unpublished data). Adult delta smelt also use edge habitats as tidal current refuges and corridors to spawning habitats (Bennett and Burau 2015).

Primary Constituent Element 2: “Water” is defined as water of suitable quality to support various delta smelt life stages that allow for survival and reproduction (Service 1994). Certain conditions of temperature, turbidity, and food availability characterize suitable pelagic habitat for delta smelt and are discussed in detail below. Contaminant exposure can degrade this primary constituent element even when the basic habitat components of water quality are otherwise suitable (Hammock et al. 2015).
Turbidity: Delta smelt require turbidity. Even in captivity, clear water is a source of physiological stress (Lindberg et al. 2013; Hasenbein et al. 2016). The small plankton that delta smelt larvae eat are nearly invisible in clear water. The sediment (or algal) particles that make turbid water turbid, provide a dark background that helps delta smelt larvae see their translucent prey (Baskerville-Bridges et al. 2004). Older delta smelt are less reliant on turbidity to see their prey, but older fish still feed more effectively in water of moderate turbidity (Hasenbein et al. 2013; 2016) and probably need turbid water to help disguise themselves from predators (Ferrari et al. 2014). The turbidity of the Delta and Suisun Bay has been declining for a long time due to dams and rip-rapped levees, both of which cut off sources of sediment from rivers flowing into the estuary (Arthur et al. 1996; Wright and Schoellhamer 2004), and due to the spread of Brazilian waterweed (Hestir et al. 2015) which filters the water, increasing clarity. Water exports from the South Delta may also have contributed to the trend toward clearer water by removing resuspended sediment in the exported water (Arthur et al. 1996). The primary turbid areas that remain in the upper estuary are the semi-shallow embayments in northern Suisun Bay (Bever et al. 2016) and the lower Yolo Bypass region that includes Liberty Island and the upper reach of the Sacramento Deepwater Shipping Channel (Morgan-King and Schoellhamer 2013). Both tidal and river flows, as well as wind speed, affect turbidity in these locations. Many of the estuary’s deeper channels tend to have somewhat lower turbidity because water velocity and wind cannot resuspend sediment that sinks into deep water (Ruhl and Schoellhamer 2004).

Water temperature: Water temperature is the primary driver of the timing and duration of the delta smelt spawning season (Bennett 2005). Water temperature also affects delta smelt’s growth rate which in turn can affect their readiness to spawn (Rose et al. 2013a). Water temperature is not strongly affected by variation in Delta outflow; the primary driver of water temperature variation in the delta smelt critical habitat is air temperature (Wagner et al. 2011). Very high flows can transiently cool the upper estuary (e.g., flows in the upper 10th percentile, Kimmerer 2004), but the system rapidly re-equilibrates once air temperatures begin to warm.

Older laboratory based research suggested an upper water temperature limit for delta smelt of about 25°C, or 77°F (Swanson et al. 2000). Newer laboratory research suggests delta smelt temperature tolerance decreases as the fish age, but is a little higher than previously reported, up to 28°C or 82°F in the juvenile life stage (Komoroske et al. 2014). It should be kept in mind that these are upper acute water temperature limits meaning temperatures in this range will kill, on the average, one of every two fish.

In the laboratory and the wild, delta smelt appear to have a physiological optimum temperature near 20°C or 68°F (Nobriga et al. 2008; Rose et al. 2013a; Jeffries et al. 2016); most of the upper estuary exceeds this water temperature from June through September (Wagner et al. 2011). Thus, many parts of the estuary are energetically costly and stress delta smelt. Generally speaking, spring and summer water temperatures are cooler to the west and warmer to the east due to the differences in overlying air temperatures between the Bay Area and the warmer Central Valley (Kimmerer 2004). In addition, there is a strong water temperature gradient across the Delta with cooler water in the north and warmer water in the south. The higher flows from the Sacramento River probably explain this north-south gradient. Note that water temperatures in the north Delta near Liberty Island and the lower Yolo Bypass are also typically warmer than they are along the Sacramento River (Sommer et al. 2001; Nobriga et al. 2005).

Food: Food and water temperature are strongly interacting components of delta smelt health and habitat because the warmer the water, the more food delta smelt require (Rose et al. 2013a). If the water gets too warm, then no amount of food is sufficient. The more food delta smelt eat (or must try to eat) the more they will be exposed to predators and contaminants. Water exports can
limit the flux of phytoplankton production from the Delta into Suisun Bay (Jassby and Cloern 2000), but the effect of water exports on phytoplankton production appears to be lower than grazing by clams (Jassby et al. 2002) and ammonium inhibition of phytoplankton growth from Sacramento’s urban wastewater inputs (Dugdale et al. 2012).

Historically, prey production occurred when the low-salinity zone was positioned over the shoals of Suisun Bay during late spring through the summer, but this function has been depleted due to grazing by overbite clams (Kimmerer and Thompson 2014), high ammonium concentrations in critical habitat (Dugdale et al. 2012, 2016), and water diversions (Jassby and Cloern 2000). Recent research suggests delta smelt occupying Suisun Bay may experience poor nutritional health (Hammock et al. 2015). Delta smelt occupying the Cache Slough region in the north Delta are in better nutritional health, but have shown evidence of relatively high contaminant impacts. The southern Delta is among the more productive areas remaining in the upper estuary (Nobriga et al. 2005), but delta smelt cannot remain in this habitat during the warmer months of the year (Nobriga et al. 2008) and may face a high risk of entrainment when they occupy it during cooler months (Kimmerer 2008; Grimaldo et al. 2009). Extensive blooms of the toxin-producing cyanobacteria Microcystis in the central and southern Delta became abundant around 1999 and depending on flow, and temperature, blooms can extend westward into the low-salinity zone where rearing delta smelt (Brooks et al. 2011). However, in general delta smelt that occupy Suisun Marsh fare better both in terms of nutrition and in experiencing lower level of contaminant impact (Hammock et al. 2015).

*Primary Constituent Element 3*: “River flow” was originally defined as transport flow to facilitate spawning migrations and transport offspring to low-salinity zone rearing habitats (Service 1994). River flow includes both “inflow to” and “outflow from” the Delta, both of which influence the movement of migrating adult, larval, and juvenile delta smelt. Inflows, outflows, and Old and Middle River flows influence the vulnerability of delta smelt larvae, juveniles, and adults to entrainment at the Banks and Jones facilities (Grimaldo et al. 2009).

The spawning microhabitats of delta smelt are not really known, but whatever they are, it is likely there are more suitable spawning habitats when Delta outflow is high during spawning than when it is low because more of the estuary is covered in fresh- and low-salinity water when outflow is high (Jassby et al. 1995). Most spawning occurs between February and May. Delta outflow during February through May is mainly driven by the climatic effect on the amount and form of precipitation in the watershed, the storage and diversion of water upstream of the Delta, and CVP and SWP water operations in the Delta (Jassby et al. 1995; Kimmerer 2002b). Thus far, the 21st century has tended to be pretty dry (Figure 9) and that could have resulted in some chronic reduction in spawning habitat availability or suitability.

*Primary Constituent Element 4*: “Salinity” helps define nursery habitat (Service 1994). Older laboratory research suggested that delta smelt have an upper acute salinity tolerance of about 20 ppt (Swanson et al. 2000) which is about 60% of seawater’s salt concentration of 32-33 ppt. Newer laboratory-based research suggests that some individuals can acclimate to seawater, but that comes at a high energetic cost that is lethal to about one in four individuals (Komoroske et al. 2014, 2016). In the wild, delta smelt are nearly always collected at very low salinities which recent laboratory research has confirmed is nearer to the physiological optimum (Komoroske et al. 2016). Few individuals are collected at salinities higher than 6 ppt (about 20% of seawater salt concentration) and very few are collected at salinities higher than 10 ppt (about 30% of seawater salt concentration) (Bennett 2005). This well documented association with fresh to low salinity water is a reason for the scientific emphasis on X2 as a delta smelt habitat indicator (Dege and Brown 2004; Feyrer et al. 2011). Recent research combining long-term monitoring
data with three-dimensional hydrodynamic modeling shows that the spatial overlap of several of the key habitat attributes described above increases as Delta outflow increases (Bever et al. 2016). This means that higher outflow, which lowers the salinity of Suisun Bay and marsh, increases the suitability of habitat in the estuary by increasing the overlap of some, but not necessarily all, needed elements. Lower outflows provide less overlap and in fewer places.

### Summary of Status of Delta Smelt Designated Critical Habitat

The Service’s primary objective in designating critical habitat was to identify the key components of delta smelt habitat that support successful completion of the life cycle, including spawning, larval and juvenile transport, rearing, and adult migration back to spawning sites. Since the implementation of the Reasonable and Prudent Alternative in the Service’s 2008 BiOp, there has been much lower likelihood of water operations that are highly detrimental to the spawning migration of adult delta smelt, the spawners themselves, or larval transport. Further, recent research suggests that the movement of adult delta smelt to nominal spawning locations is quite similar among years (Polansky et al. in review).

The delta smelt’s critical habitat is currently doing a poor job of serving its intended conservation role and function because there are very few locations that consistently provide all the needed habitat attributes for larval and juvenile rearing at the same times and in the same places (Table 3; IEP 2015). It is the larval and juvenile rearing Primary Constituent Element that remains most impacted by ecological changes in the estuary since the delta smelt’s listing under the Act. As described above, those changes have stemmed from chronic low outflow, species invasions and associated changes in how the upper estuary food web functions, declining prey availability, high water temperatures, declining water turbidity, summertime blooms of *Microcystis aeruginosa*, proliferation of submerged aquatic plants, and localized contaminant accumulation by delta smelt.

### Table 3. Summary of habitat attribute conditions for delta smelt in six regions of the estuary that are permanently or seasonally occupied in most years.

<table>
<thead>
<tr>
<th>Area</th>
<th>Landscape</th>
</tr>
</thead>
<tbody>
<tr>
<td>Montezuma Slough</td>
<td>Appropriate except in shipping channel</td>
</tr>
<tr>
<td>Suisun Bay</td>
<td>Appropriate, but declining</td>
</tr>
<tr>
<td>West Delta</td>
<td>Limited area 4 to 15 feet deep</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Turbidity</th>
<th>Salinity</th>
<th>Temperature</th>
<th>Food</th>
</tr>
</thead>
<tbody>
<tr>
<td>Montezuma Slough</td>
<td>Appropriate</td>
<td>Appropriate when outflow is sufficient</td>
<td>Usually appropriate</td>
<td>Appropriate</td>
</tr>
<tr>
<td>Suisun Bay</td>
<td>Appropriate, but declining</td>
<td>Appropriate when outflow is sufficient</td>
<td>Usually appropriate</td>
<td>Depleted</td>
</tr>
<tr>
<td>West Delta</td>
<td>Limited area 4 to 15 feet deep</td>
<td>marginal, declining</td>
<td>Can be too high during summer</td>
<td>Depleted</td>
</tr>
</tbody>
</table>
Giant Garter Snake
Please refer to the December 2015 Revised Draft Recovery Plan for the Giant garter snake (Service 2015) (available at https://www.fws.gov/sacramento/outreach/2015/12-22/docs/GGRevisedDraftRecoveryPlan2015.pdf) and the June 2012 5-Year Review (Service 2012) (available at http://ecos.fws.gov/docs/five_year_review/doc4009.pdf); for the latest published status of the species. The referenced documents do not include the threat, recovery, survey data, and other relevant updates for the species since their issuance. Since that time, actions have been implemented that have resulted in additional adverse effects to the species. In association with those actions, conservation measures have been implemented for the purpose of minimizing those adverse effects and in some cases, restoring or enhancing giant garter snake habitat. Environmental factors such as the recent cycle of below average annual rainfall may have influenced the distribution and quality of suitable habitat throughout its range. B0s have been issued during this period.

Environmental Baseline

Delta Smelt
The action area is located within the range of the delta smelt. A map depicting the species’ range is included in the Service’s online profile for the species at http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=E070.

The project occurs within Miner Slough which is within the north Delta region of the species’ recognized distribution near the Cache Slough complex. The delta smelt can be found in the north Delta year round but is typically more abundant as they move into upper reaches of the system in the winter and spawn in this fresh water environment in the spring (IEP 2015). During the summer, the majority of the fish are expected to migrate downstream, out of the Miner Slough area, towards the low salinity zone but some rear in the Cache Slough complex. The habitat conditions within the Delta are variable by season and year, influencing delta smelt abundance and presence in the system.
The project occurs within the range of delta smelt and delta smelt are found year around within the project area in one part of their life stage or another. Currently, the delta smelt is experiencing the lowest abundance on record. The 2016 FMWT index of delta smelt abundance was 8. Following record low abundance indices from survey data in 2015, delta smelt survey results in water year 2016 continued to decline and exhibit record low abundance. The 2016 SKT index was 1.8, a decrease from the 2015 SKT index (13.8, a record low at the time) and is the lowest SKT index on record. The SKT monitors the adult spawning stock of delta smelt and is currently in progress for 2017. The Service is currently in the process of piloting the Enhanced Delta Smelt Monitoring Program to estimate abundance of delta smelt.

**Delta Smelt Critical Habitat**

Critical habitat includes all submerged land below ordinary high water and the entire water column bounded by and contained in Suisun Bay (including the continuous Grizzly and Honker Bays); the length of Goodyear, Suisun, Cutoff, First Mallard (Spring Branch), and Montezuma Sloughs; and the existing contiguous waters contained in the Delta (59 FR 65256). Miner Slough, where the project is located, is within delta smelt designated critical habitat. Miner Slough is located between the Sacramento River Deep Water Ship Channel and the mainstem of the Sacramento River and has connectivity with both channels. Primary constituent elements that are found within the project’s action area consist of physical habitat, water, river flow, and salinity concentrations required to maintain delta smelt habitat for spawning, larval and juvenile transport, rearing, and adult migration (59 FR 65279).

**Giant Garter Snake**

The action area is within what the December 2015 Revised Draft Recovery Plan identifies as the snake’s Delta Basin population and recovery unit (Service 2015). The action area is further defined as being within the Stone Lakes Management Unit of the Delta Basin Recovery Unit.

The action area is characterized by an engineered channel confined by opposing levees. Although it does not represent the classic habitat characteristics and values attributed to the species or the more favorable managed habitats, such as flooded rice fields, the action area does include (1) perennial slow moving water with a mud substrate; (2) a narrow zone of emergent and bankside vegetation, as well as large woody debris for cover and thermoregulation; (3) open bank, provided by breaks in the riparian cover; (4) small amphibian and fish prey; (5) suitable basking sites adjacent to escape cover; (6) infrequent flooding; (7) available upland shelter sites, such as riprap, soil cracks, mammal burrows, and accumulated woody debris; and (8) lack of routine vegetation management in upland habitat.

Miner Slough is part of the water delivery system to surrounding agricultural fields. It therefore has connectivity with many side channels/canals similar to where giant garter snakes are most frequently observed. Giant garter snakes have been documented to move up to 5 miles over a few days in response to dewatering of habitat (Wylie et al. 1997) and to use up to more than 8 miles of linear aquatic habitat over the course of a few months, and to have a home range as large as 14.5 miles (Wylie and Martin 2004). Therefore, there is a potential to encounter dispersing giant garter snakes throughout Miner Slough. Miner Slough does have large predatory fish that could prey on the snake and compete with it for amphibian and small fish prey. Snakes would be more at risk of predation in the action area when navigating deep water. They are less likely to be preyed upon when occupying the shallow bank side aquatic habitat and irrigation canals.
Little is known of the snake’s distribution in the Delta Region. The region has not been subject to comprehensive surveys and much of the potential habitat is located on private property. Recent observations have greatly increased our knowledge of the potential distribution. As reported in Caltrans’ BA, there are six giant garter snake occurrence reported in the California Natural Diversity Database (CNDDB) (CDFW 2016a and b, occurrences 82, 242, 79, 132, 133, and 250). The closest record (occurrence 82) is approximately 5.4 miles from the project footprint. Two of the records were observed in agricultural canals (occurrences 82 and 79) and one was seen in a slough (occurrence 242).

As reported in the BA, Caltrans had Whitney Brennan, a biologist experienced with conducting giant garter snake radio telemetry tracking, assess the action area in 2014. Brennan concluded that the habitat within the action area was marginal but all the habitat characters needed to support the snake’s life history were present. According to Brennan, the habitat within the action area is similar to other confirmed occupied habitat and therefore the snake’s occupation of the area could not be discounted.

Because of the biology and ecology of the snake, the presence of suitable habitat within the action area, and observations of the species in similar situations, the Service has determined that the snake is reasonably certain to occur within the action area and likely uses the action area for foraging and dispersal.

**Effects of the Action**

Caltrans proposes to minimize construction related effects by implementing the *Conservation Measures* included in the project description section of this BO. Effective implementation of *Conservation Measures* will likely minimize effects to the delta smelt and giant garter snake during construction but incidental take is still likely to occur. Therefore, the proposed project has the potential to result in a variety of adverse effects to both species.

The direct effects of the proposed project are those effects occurring within the action area during construction of the proposed project. Direct effects may be temporary (lasting less than 1 year) or permanent (lasting more than 1 year). Indirect effects are the effects of the proposed project generally occurring later in time after construction has been completed (e.g., degradation of habitat due to the spread of invasive plant species; barriers to dispersal due to the installation of retaining walls). An interrelated activity is an activity that is part of the larger actions and depends on the larger action for its justification. An interdependent activity is an activity that has no independent utility apart from the proposed action.

**Delta Smelt**

The proposed project has the potential to result in loss of habitat, increased localized turbidity, the production of damaging sound pressure waves (hydroacoustics), and compromised water quality. By implementing the proposed in-water work windows prescribed in the conservation measures, egg, larva and early juvenile life stages of delta smelt will be avoided, therefore not further addressed.

**Habitat Loss**

The proposed project will result in a net increase of 0.08 acre of shaded SWH. Caltrans will compensate at 3:1 for the net increase in the shading of delta smelt shallow water habitat (SWH) by purchasing 0.24 acre of delta smelt credits at a Service-approved conservation bank.
Turbidity
Both options for the geotechnical investigation (i.e., traditional boring and wire core), steel pile driving and removal of the existing timber piles along with the corresponding barge operations are expected to generate small sediment plumes which will increase turbidity in the action area. Exposure to excessive suspended sediment concentrations could lead to physiological stresses such as clogged gills, eroded gill and epithelial tissues, impaired foraging activity and feeding success, and altered movement and migration patterns of juvenile and adult fish (Clarke and Wilber 2000; Newcombe and Jensen 1996; Newcombe and MacDonald 1991). Exposure of fish to elevated suspended sediment concentrations could result in behavioral avoidance and exclusion from otherwise suitable habitat, disrupt movement and migration patterns, reduce feeding rates and growth, result in sublethal and lethal physiological stress, habitat degradation, or delayed hatching; and, under severe circumstances, could result in mortality (Newcombe and Jensen 1996; Clarke and Wilber 2000). The response of fish to suspended sediments varies among species and life stages as a function of suspended particle size, particle shape, water velocities, suspended sediment concentrations, water temperature, depressed dissolved oxygen concentrations, contaminants, and exposure duration (O’Connor 1991; Sherk 1971; Newcombe and Jensen 1996). Short-duration exposure to elevated suspended sediment concentrations could result in sublethal effects; however, potential exposure and dosage of suspended sediment concentrations drops exponentially from the source of the plume.

While adult delta smelt already live in an environment with high background levels of turbidity and increased turbidity generally correlates with higher abundance of delta smelt (Feyrer et al. 2007; Nobriga et al. 2008), it is possible that excessive sedimentation may exceed turbidity levels ideal for delta smelt. If adult delta smelt were present within the plume, the behavioral avoidance response of this life stage is expected to substantially reduce or eliminate the risk of lethal or sublethal exposure the farther they are from the plume source.

However, turbidity during the pile driving will be minimized by being in compliance with State Water Quality Control Board (SWQCB) permit thresholds for water quality parameters throughout the entire project, any additional sources of turbidity will be minimized.

Hydroacoustics
Adult and older juvenile delta smelt distributed in Miner Slough may be adversely affected during construction actions. Fish may be stressed, exhibit alarm behaviors and/or increased swim speeds, compromising their physiological processes if they attempt to evade in-water construction equipment within the action area. In such situations, fish cannot optimally feed or shelter and may be susceptible to predation and/or reduced fitness.

Adult delta smelt are least likely to be in the action area during the in-water work window from August 1 and November 30. However, older juveniles rearing in and near Cache Slough complex are likely to be adversely affected by pile-related construction activities. Some delta smelt will avoid the action area once barges and construction equipment are present in the channel. Swimming away from the action area reduces direct fish mortality; however, fish fitness may be compromised if delta smelt that were previously occupying or migrating to this location are restricted from feeding or sheltering.

Adult delta smelt may be subjected to harassment and trauma from the generation of noise and underwater sound pressure levels (SPLs) due to installation of new piles and their associated equipment. Barotraumas are pathologies in fish linked to the exposure to drastic changes in pressure which include hemorrhage and rupture of internal organs either immediately or a few
days after exposure. Fish with swim bladders are susceptible to tissue damage from impulsive sounds. When pressure waves strike a gas-filled swim bladder, vibration occurs with expansion and contraction of the organ. If the amplitude of the vibration is high, the swim bladder can press against and strain adjacent organs. This compression can cause obvious injury in the form of ruptured capillaries, internal bleeding and destruction of highly vascular organs (Gaspin 1975; Hastings and Popper 2005).

Elevated noise levels can cause sublethal injuries affecting survival and fitness. Similarly, if injury does not occur, noise may modify fish behavior that may make them more susceptible to predation. Fish suffering damage to hearing organs may suffer equilibrium problems, and may have a reduced ability to detect predators and prey. Other types of sub-lethal injuries can place the fish at increased risk of predation and disease. Adverse effects on survival and fitness can occur even in the absence of overt injury. Exposure to elevated noise levels can cause a temporary shift in hearing sensitivity (referred to as a temporary threshold shift or TTS), decreasing sensory capability for periods lasting from hours to days (Turnpenny et al. 1994; Hastings et al. 1996).

The Fisheries Hydroacoustic Working Group, an interagency working group that includes the Service, has established interim criteria for evaluating underwater noise impacts from pile driving on fish. These criteria are defined in the document entitled “Agreement in Principal for Interim Criteria for Injury to Fish from Pile Driving Activities” dated June 12, 2008 (Fisheries Hydroacoustic Working Group 2008). This agreement identifies a peak sound pressure level of 206 dB and an accumulated (ASEL) of 187 dB as thresholds for injury to fish ≥ to 2 grams. For fish less than 2 grams, the accumulated SEL threshold is reduced to 183 dB. Although there has been no formal agreement on a “behavioral” threshold, NMFS uses 150 dB-RMS as the threshold for adverse behavioral effects. Pile driving with a vibratory hammer minimizes the amount of noise and turbidity generated by the activity and reduces traumas to fish. Compared to the standard impact driving method, vibratory driving reduces the distance that noise exceeds NMFS thresholds by almost 1,000 feet from the area of impact, substantially reducing or avoiding the potential to cause take of the listed species.

NMFS recommends using an underwater attenuation rate of 4.5 dB per doubling of distance (NMFS 2009a). Noise reduction measures will include: (1) vibrating all piles to the maximum depth possible before using an impact hammer; (2) limiting the number of strikes per day to the minimum necessary to complete the work, with no more than 2,000 strikes per day; (3) using the smallest pile driver and minimum force necessary to complete the work; and (4) using a bubble ring or other attenuation method.

The proposed project will produce underwater noise through pile driving activities associated with the geotechnical investigations; installation of the temporary trestles; installation of the new bridge piers, associated coffer dams, and fenders; installation of abutments; and the removal of timbers associated with the existing bridge. Some of these activities will produce sound pressure waves that exceed the 206, 187, 183, and 150 dB thresholds. The diameters of the piles will vary between 24 to 72 inches, and will be driven to a depth of 30 to 100 feet.

Caltrans calculated the distances up and downstream that waves, at or above the stated effects thresholds, would travel from the source. The calculations included values with and without attenuation methods, such as a bubble curtain. The assessment included both in-water and upland pile driving, producing a range of hydroacoustic waves, all of which have the potential to adversely affect the delta smelt through either harm or harassment within a given distance.
Caltrans intends to incorporate attenuation methods for in-water work. Such methods cannot be used to minimize the hydroacoustic waves created by pile driving in the nearby uplands (as is the case for Pier 4 and Abutment 5).

This effects analysis will focus on the maximum forecasted effects. Hydroacoustic effects will be greatest upstream of the bridge as a result of the pile-driving activities associated with Pier 2. The threshold distances are summarized in Table 1. These values are based on the use of attenuation.

<table>
<thead>
<tr>
<th>Structure</th>
<th>Distance to 150 dB RMS criteria (feet)</th>
<th>Distance to 183 dB cumulative SEL criteria (feet)</th>
<th>Distance to 187 dB cumulative SEL criteria (feet)</th>
<th>Distance to 206 dB peak criteria (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pier 2</td>
<td>2,193</td>
<td>2,192</td>
<td>1,290</td>
<td>&lt;33</td>
</tr>
</tbody>
</table>

Hydroacoustic effects will be greatest downstream of the bridge as a result of the pile-driving activities associated with Pier 4. The threshold distances are summarized in Table 2. Pier 4 is located in the uplands and therefore attenuation will not be employed.

<table>
<thead>
<tr>
<th>Structure</th>
<th>Distance to 150 dB RMS criteria (feet)</th>
<th>Distance to 183 dB cumulative SEL criteria (feet)</th>
<th>Distance to 187 dB cumulative SEL criteria (feet)</th>
<th>Distance to 206 dB peak criteria (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pier 4</td>
<td>1,968</td>
<td>1,290</td>
<td>750</td>
<td>&lt;33</td>
</tr>
</tbody>
</table>

Therefore, pile driving is expected to reach threshold levels for behavior effects up to 2,193 feet upstream and 1,969 feet downstream of the new bridge. The threshold distances for sub-lethal injury effects for fish less than 2 grams will extend 2,192 feet upstream and 1,290 feet downstream. The threshold distances for sub-lethal injury effects for fish less than 2 grams will extend 2,192 feet upstream and 1,290 feet downstream. The threshold distances for sub-lethal injury effects for fish equal to or greater than 2 grams will extend 1,290 feet upstream and 750 feet downstream. Lethal sound waves are likely to be limited to within less than 33 feet up or downstream of the new bridge.

If a vibratory hammer cannot be used, Caltrans proposes to use a bubble ring around the piles to minimize driving noise and the extent of sound pressure waves from the point of origin. Further, Caltrans will conduct real-time, hydroacoustic monitoring to ensure underwater pile-related construction noise does not exceed hydroacoustic thresholds that are detrimental to delta smelt, as described in the proposed Conservation Measures.

Caltrans has proposed additional conservation measures which will reduce adverse pile construction effects to delta smelt including limiting in-water work to occur between August 1 and November 30 when adult delta smelt are least likely to be in the action area and to avoid incidental take of delta smelt eggs and larva in the action area, and reducing hydroacoustic effects by limiting impact strikes per day.

Water Quality
The project activities have the potential to impair water quality should hazardous chemicals (e.g. drilling fluids or core materials) or other contaminants enter the water column. The operation of
construction barges, heavy equipment, cranes, vibratory and/or impact hammer rigs, and other construction equipment in or near the stream can result in accidental spills and leakage of fuel, lubricants, hydraulic fluids, and coolants.

Impaired water quality has the potential to affect delta smelt by causing physiological stress, interfering with fish passage, and injury or direct mortality. This will be minimized by the borings being backfilled and/or plugged with bentonite chips to prevent leakage into the water column. This will prevent the loss of drilling fluids or core materials into the streambed of the Sacramento River. BMPs will be deployed around and beneath all drilling equipment for both over water and upland borings and an emergency response plan will be implemented.

Caltrans has proposed to use bentonite as a lubricant for pile placement. This creates the potential for an accidental release of bentonite into the water. Bentonite is potentially lethal to fish. Sigler et al. (1984) reported that fish show reduced growth rates or increased emigration rates when exposed to 125 to 175 mg/l bentonite. In addition to toxic chemicals associated with construction equipment, stream water that comes into contact with wet cement can adversely affect water quality by raising the pH of water, which may result in injury or death to listed fish species. The proposed conservation measures will be implemented and should reduce the potential for any spill.

The removal of the existing creosote-treated timber piles by cutting or breaking has the potential to release creosote into the aquatic environment. Creosote is a distillate of coal tar and is a variable mixture of 200-250 compounds consisting of simple polycyclic aromatic hydrocarbons (PAHs), multi-aromatic fused rings, cyclic nitrogen-containing hetero-nuclear compounds, and phenolic substances. PAHs are the dominant class of compounds found in creosote and comprise approximately 85% of creosote's mass. Sixteen of the top seventeen PAHs found most commonly in creosote are on the Environmental Protection Agency's List of Priority Pollutants, pursuant to the Clean Water Act. PAHs are released from wood treated with creosote and are known to cause cancer, reproductive anomalies, and immune dysfunction; to impair growth and development; and to cause other impairments in fish exposed to sufficiently high concentrations over periods of time. Impacts to phytoplankton and zooplankton communities have also been reported in the literature.

The removal of the existing timber piles by cutting or breaking off at or near the mud-line has the potential for an acute release of creosote into the aquatic environment. If treated wood sawdust or shavings (generated during construction) are allowed to enter soil or water below a treated structure, they make a disproportionately large contribution to environmental contamination. Impacts from the leaching of construction debris immersed in water are vastly greater than from solid wood. Construction debris may release 30 to 100 times more preservative than typical submerged pieces, due to the increased surface area available for leaching.

In both possible construction scenarios the collection of construction debris will be stressed. Storing treated wood out of contact with standing water and wet soil, as well as protecting the wood from precipitation significantly reduces the likelihood of chemical leaching during construction. The replacement of the treated timber piles with steel piles will result in an overall reduction in the amount of PAHs currently being released by leaching into this segment of the Sacramento River.

The main exposure scenario of concern for PAHs, including those leached from creosote treated wood, occurs as they accumulate in sediments and are assimilated into the food web. The
concentration of creosote derived PAHs required to cause acute mortality to adult fish is generally high enough that the level rarely occurs and the behavioral avoidance response of the adult life stage is expected to substantially reduce or eliminate the risk of lethal or sub-lethal exposure the farther they are from the increased levels of PAHs. If delta smelt are directly in the vicinity of the increase in PAHs, they may be injured or killed. Removal of the timber piles will benefit habitat for delta smelt, as removing these piles will reduce the amount of creosote potentially leaching into the slough and the downstream San Francisco Bay-Delta waters.

The proposed 16-inch or 20-inch steel pipe piles are hollow and the inside spaces (annuli) of the pipe piles may be dewatered subsequent to pile driving activities and may either be left hollow or the annuli may be filled with re-bar and concrete. To prevent discharge of turbid water to the Sacramento River as a result of de-watering the hollow piles, water removed from the steel pipe piles will be filtered and/or treated in a manner to ensure that discharges conform to the water quality requirements of the waste discharge permit or water quality certification issued by the SWQCB prior to discharging water to the slough.

Potential water quality effects that would expose delta smelt to hazardous contaminants will be minimized and avoided by implementation of the conservation measures including the BMPs and a spill prevention plan. Also, removing piles by cutting or encasing existing piles minimizes the disturbance of sediments and helps prevent the spread of localized contamination compared to vibratory removal. The project will also be in compliance with SWQCB permit thresholds for water quality parameters.

*Delta Smelt Critical Habitat*

Miner Slough is within the designated critical habitat for the delta smelt and contain in some part all of the PCEs. The project will include introduction of a permanent structure into as well as removal of existing structures from the aquatic environment that constitutes the delta smelt’s designated critical habitat. The Service has reviewed the proposed project and its effects to the delta smelt’s designated critical habitat. In designating critical habitat for the delta smelt, the Service identified the following PCEs essential to the conservation of the species:

- PCE 1 is physical habitat for spawning. The proposed project through placement of the piles will disturb or remove available spawning habitat substrates within the project area.
- PCE 2 is suitable water quality for all life stages. It is anticipated there will be a temporary reduction in the quality of available water within the project area from the proposed actions.
- PCE 3 is river flow. The proposed project is not expected to diminish river flow.
- PCE 4 is salinity for rearing. The proposed project is not expected to have any effect on salinity.

Caltrans has proposed to purchase delta smelt conservation bank credits to minimize the effects of construction and to compensate for the loss of PCE 1 and 2 of the delta smelt’s critical habitat.

*Giant Garter Snake*

The proposed project will include activities in giant garter snake upland habitat along the levee banks as well as in aquatic habitat in the relatively shallow water zone adjacent to the bank. According to the BA, the new bridge and control house structures will result in the permanent loss of 0.1 acre of upland levee habitat for the snake between the levee roads and the water’s edge. Workspace needed within the upland levee habitat for the temporary trestles, control
house, and bridge construction will occupy 0.14 acre which will be subject to post-construction restoration. Given our definitions, the effects to this 0.14 acre area would be permanent since restoration to baseline will not begin until more than one year following the initial disturbance.

Activities in and adjacent to these areas have the potential to result in adverse effects to giant garter snakes. Activities in upland habitat will include vegetation clearing for access, workspace, placement of new structures, and demolition. Access as well as placement and removal of structures within the slough are also likely to have adverse effects on the listed snake.

The ground disturbing activities along the bank will include the removal of vegetation and other features that the snake would use for cover and basking. Ground work may also result in the loss of important underground refugia that the snake depends on for long-term winter and year-round retreat. The noise and vibration associated with the vegetation removal, geotechnical exploration, bridge construction, and demolition will be disruptive and may result in giant garter snakes avoiding the action area, therefore modifying their behavior and creating a barrier to resource areas. Noise and vibration may also result in snakes taking cover in the project footprint rather than fleeing potential harm. This will make them more difficult to find, avoid, and rescue from harm’s way. This disturbance may also interfere with normal behaviors such as feeding, sheltering, movement between refugia and foraging grounds, and other essential behaviors. This can result in avoidance of areas that have suitable habitat but intolerable levels of disturbance.

Caltrans proposes to conduct all construction between May 1 and October 1. This is the active period for the giant garter snake therefore allowing snakes the potential to vacate the area at their own volition. However, there is no guarantee that the snake will flee the area of potential harm. Snakes may also retreat to nearby shelter locations within the project footprint, making them more difficult to find and avoid. Underground retreat is difficult to identify and problematic to investigate and clear. There is a high probability that snakes occupying underground refugia within areas subject to ground disturbance will be crushed or entombed. Snakes that do flee the work area may face an increased risk of predation as they move into deep water or open and unfamiliar upland areas with inadequate cover and less optimal resources. The habitat degradation and removal and associated disturbance may also reduce the snake’s prey availability.

Pre-construction surveys by a Service-approved biologist will assist in dispersing and clearing giant garter snakes from the work areas prior to the introduction of a potential construction-related threat. Biological clearance of work areas prior to the start of each day’s work and during construction will increase the chances of identifying snakes in the work area that would be susceptible to injury. Biological clearance of work areas is limited by the experience of the biologist, the complexity and abundance of potential cover sites, the inconspicuous nature of the species, and the challenges of completing a thorough clearance given the construction schedule.

Preconstruction surveys and dispersal or active relocation of individual snakes may avoid injury or mortality; however, capturing and handling snakes may result in stress and/or inadvertent injury during handling, containment, and transport. Caltrans proposes to minimize these effects by using Service-approved Biological Monitors, limiting the duration of handling, and relocating snakes to suitable nearby habitat within the Miner Slough corridor in accordance with Service guidance.

Despite being “cleared” prior to construction, giant garter snakes can continue to move into the work site undetected. The project is situated within a corridor in which snakes would routinely
move through as well as back and forth from the adjacent upland. Snakes may be actively moving around, through, or within the work area when work is taking place. This places greater emphasis on thorough biological clearance of work areas and under staged equipment and materials prior to the start of each day's activities.

Giant garter snakes and their prey could also be affected by contamination due to chemical or sediment discharge. Exposure pathways could include inhalation, dermal contact, direct ingestion, or secondary ingestion of contaminated soil, plants or prey species. Exposure to contaminants could cause short- or long-term morbidity, possibly resulting in reduced productivity or mortality. However, Caltrans proposes to reduce these risks by implementing BMPs and the SWPPP that consist of refueling, oiling, or cleaning of vehicles and equipment a minimum of 50 feet from riparian and aquatic areas; installing coir rolls, straw wattles and/or silt fencing to capture sediment and prevent runoff or other harmful chemicals from entering the aquatic habitat; and locating staging, storage and parking areas away from aquatic habitat.

Caltrans' commitment to use erosion control devices other than mono-filament should be effective in avoiding the associated risk of entrapment that can result in death by predation, starvation, or desiccation (Stuart et al. 2001).

Although giant garter snakes may occasionally cross the levee roads and SR 84 for overland dispersal to other aquatic habitat, the completed project is unlikely to increase the local risk of giant garter snake mortality from vehicle collision. The bridge replacement will not result in significant increased pavement surface, vehicle speed, or use.

Educating project personnel will encourage compliance with the conservation measures and increase the possibility that giant garter snakes in the work area will be identified and addressed appropriately for avoidance. Worker education is limited by the effectiveness of the presentation and the willingness of the construction personnel to participate in compliance.

Effective restoration of the areas needed for access and work space is expected to reestablish baseline aquatic, riparian, and upland habitat values for the giant garter snake within 5 years of project completion.

**Cumulative Effects**

Cumulative effects include the effects of future State, Tribal, local or private actions that are reasonably certain to occur in the action area considered in this BO. Future Federal actions that are unrelated to the SR 84 Miner Slough Bridge Replacement Project are not considered in this section because they require separate consultation pursuant to section 7 of the Act. The Service is not aware of specific projects that might affect listed species or its critical habitat in the action area that are currently under review by State, county, or local authorities.

**Conclusion**

*Delta smelt*

After reviewing the proposed project description with the proposed conservation measures, the status of the species, the environmental baseline and the determination of effects, it is the Service's biological opinion that the SR 84 Miner Slough Bridge Replacement Project, as proposed, is not likely to jeopardize the continued existence of the delta smelt. This is based on: (1) the *Conservation Measures* and construction BMPs proposed by Caltrans to help minimize
adverse project effects to delta smelt and its critical habitat; (2) implementation of a noise monitoring plan to prevent hydroacoustic noise level exceedances from pile driving actions that would harm fish that are \( \leq 2 \) grams, such as delta smelt; (3) the implementation of water quality and turbidity monitoring by Caltrans’ contractor(s); (4) compliance with Regional Water Quality Control Board permit thresholds for water quality parameters that minimize adverse effects to delta smelt, its prey and critical habitat; and (5) Caltrans’ adherence to the August 1 and November 30 work-window for in-water activities that help minimize adverse effects to delta smelt by avoiding the spawning period for delta smelt and significantly reducing the likelihood of incidentally taking delta smelt eggs or larva.

**Delta Smelt Critical Habitat**

After reviewing the proposed project description with the proposed conservation measures, the status of the species’ critical habitat, the environmental baseline and the determination of effects, it is the Service’s biological opinion that the SR 84 Miner Slough Bridge Replacement Project, as proposed, is not likely to destroy or adversely modify the delta smelt’s critical habitat. This is based on: (1) the relatively small area of habitat of PCE 1 that would be lost to the installation of the piles; (2) the effects to PCE 2 are temporary in nature and are expected to return to baseline conditions upon completion of the project; and (3) Caltrans’ proposal to compensate for the loss of habitat through the purchase of delta smelt conservation banking credits.

**Giant Garter Snake**

After reviewing the current status of the giant garter snake, the environmental baseline for the action area, and the effects of the proposed action, and the cumulative effects on the species, it is the Service’s biological opinion that the SR 84 Miner Slough Bridge Replacement Project, as described herein, is not likely to jeopardize the continued existence of the giant garter snake. We base this conclusion on the following: (1) successful implementation of the described Conservation Measures is likely to reduce the potential for proposed construction activities to result in the disruption of normal giant garter snake behavior or risk of injury; and (2); the completed project is not expected to result in a significant alteration of the baseline habitat following successful restoration of temporary work areas.

**INCIDENTAL TAKE STATEMENT**

Section 9(a)(1) of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened fish and wildlife species without special exemption. Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harass is defined by the Service as an intentional or negligent act or omission which creates the likelihood of injury to a listed animal by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. Harm is defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of any agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with this Incidental Take Statement.

The measures described below are non-discretionary, and must be implemented by Caltrans so that they become binding conditions of any grant or permit issued to Caltrans as appropriate, in order for the exemption in section 7(o)(2) to apply. Caltrans has a continuing duty to regulate the
activity covered by this Incidental Take Statement. If Caltrans (1) fails to assume and implement
the Terms and Conditions or (2) fails to adhere to the Terms and Conditions of the Incidental
Take Statement through enforceable terms that are added to the permit or grant document, the
protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental
take, Caltrans must report the progress of the action and its impact on the species to the Service
as specified in the Incidental Take Statement [50 CFR §402.14(i)(3)].

Amount or Extent of Take

The Service anticipates that incidental take of the delta smelt will be difficult to detect or
quantify because they have a small body size; injured or dead fish are likely to be quickly carried
by the current outside of the Biological Monitor’s view; and Miner Slough is relatively turbid
offering low visibility in the water column. Losses of this species may also be difficult to
quantify due to a lack of baseline survey data and seasonal/annual fluctuations in their numbers
due to environmental or human-caused disturbances. Implementation of Caltrans’ proposed
conservation measures, including an in-water work window, hydroacoustic attenuation methods,
and water quality BMPs are expected to avoid take due to harm, injury, and mortality within the
described action area within Miner Slough, encompassing approximately 2,193 feet upstream
and 1,968 feet downstream of the project footprint. Avoidance of lethal take is especially critical
for this species based on current population estimates. The Service is authorizing take incidental
to the proposed action as the harassment of all delta smelt within the action area.

The Service anticipates that incidental take of the giant garter snake will be difficult to detect or
quantify because giant garter snakes are cryptically colored, elusive, and most likely to be
subject to harm, injury or mortality when underground. Snakes may avoid detection by retreating
to burrows, soil crevices, vegetation, and other cover. Individual snakes are difficult to detect
unless they are observed, undisturbed, at a distance. Most close-range observations represent
chance encounters that are difficult to predict. Losses of this species may also be difficult to
quantify due to a lack of baseline survey data and seasonal/annual fluctuations in their numbers
due to environmental or human-caused disturbances. There is a risk of harm, harassment, injury
and mortality as a result of the proposed construction activities, disturbance of upland and
aquatic habitat, and capture and relocation efforts; therefore, the Service is authorizing take
 incidental to the proposed action as: (1) the harassment and capture of all giant garter snakes
within the action area; and (2) the injury or mortality of no more than one giant garter snake.

Upon implementation of the following Reasonable and Prudent Measures, the incidental take of
the delta smelt and giant garter snake within the action area in proportion to the amount and type
of take outlined above will become exempt from the prohibitions described under section 9 of
the Act. No other forms of take are exempted under this opinion.

Effect of the Take

The Service has determined that this level of anticipated take for the delta smelt and giant garter
snake is not likely to jeopardize the continued existence of the species.

Reasonable and Prudent Measure

The Service has determined that the following reasonable and prudent measure is necessary and
appropriate to minimize the effect of the action on the delta smelt and giant garter snake.
Caltrans will be responsible for the implementation and compliance with this measure:
1. Minimize the adverse effects to the delta smelt and giant garter snake and their habitat in the action area by implementing their proposed project, including the conservation measures as described, with the following terms and conditions.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, Caltrans must comply with the following terms and conditions, which implement the reasonable and prudent measure described above. These terms and conditions are nondiscretionary.

1. The following Terms and Conditions implement Reasonable and Prudent Measure one (1):

   a. Caltrans shall include language in their contracts that expressly requires contractors and subcontractors to work within the boundaries of the project footprint identified in this BO, including staging and access.

   b. If requested, before, during, or upon completion of groundbreaking and construction activities, Caltrans shall allow access by Service personnel into the project footprint to inspect the project and its activities.

Reporting Requirements

In order to monitor whether the amount or extent of incidental take anticipated from implementation of the project is approached or exceeded, Caltrans shall adhere to the following reporting requirements. Should this anticipated amount or extent of incidental take be exceeded, Caltrans must reinitiate formal consultation as per 50 CFR 402.16.

1. Notification of living, injured, or dead listed species will be made to the Assistant Field Supervisor of the Endangered Species Division at the San Francisco-Bay Delta Fish and Wildlife Office. When an injured or dead individual of the listed species is found, Caltrans shall follow the steps outlined in the following Disposition of Individuals Taken section.

2. Sightings of any listed or sensitive animal species should be reported to the Service and CNDDDB (https://www.wildlife.ca.gov/Data/CNDDDB/Submitting-Data).

3. Construction compliance reports will be addressed to the Assistant Field Supervisor of the Endangered Species Division at the San Francisco-Bay Delta Fish and Wildlife Office.

4. Caltrans shall submit post-construction compliance reports prepared by the Service-approved biologist to the Service within 60 calendar days following completion of each construction season or within 60 calendar days of any break in construction activity lasting more than 60 calendar days. This report shall detail (1) dates that relevant project activities occurred; (2) pertinent information concerning the success of the project in implementing avoidance and minimization measures; (3) an explanation of failure to meet such measures, if any; (4) known project effects on the delta smelt, valley elderberry longhorn beetle, and giant garter snake; (5) occurrences of incidental take of any listed species; (6) documentation of employee environmental education; and (7) other pertinent information.
Disposition of Individuals Taken
Injured listed species must be cared for by a licensed veterinarian or other qualified person(s), such as the Service-approved biologist. Dead individuals must be sealed in a resealable plastic bag containing a paper with the date and time when the animal was found, the location where it was found, and the name of the person who found it, and the bag containing the specimen frozen in a freezer located in a secure site, until instructions are received from the Service regarding the disposition of the dead specimen. The Service contact person is the Assistant Field Supervisor of the Endangered Species Division at the San Francisco-Bay Delta Fish and Wildlife Office.

CONSERVATION RECOMMENDATIONS
Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The Service recommends the following actions:

1. Caltrans should assist the Service in implementing recovery actions identified in the Revised Draft Recovery Plan for the Giant Garter Snake (Service 2015).

2. Caltrans should consider participating in the planning for a regional habitat conservation plan for the delta smelt, giant garter snake, other listed species, and sensitive species.

3. Caltrans should consider establishing functioning preservation and creation conservation banking systems to further the conservation of the delta smelt and giant garter snake. Such banking systems also could be utilized for other required mitigation (i.e., seasonal wetlands, riparian habitats, etc.) where appropriate. Particular emphasis should be on the preservation of habitat along roadways in association with wildlife crossings.

4. The Service appreciates Caltrans’ proposals to use native plants as part of their restoration plans and right of way seed mix. The Service encourages Caltrans to incorporate native milkweed species into their restoration seed mixes because establishment of these monarch adult and larval food plants would be an appropriate response to President Obama’s June 20, 2014 Executive Memorandum (https://www.whitehouse.gov/the-press-office/2014/06/20/presidential-memorandum-creating-federal-strategy-promote-health-honey-b) that encourages the Department of Transportation to increase pollinator habitat within road right-of-ways, as well as the Service’s goals for monarch butterfly recovery. The Service encourages Caltrans to implement a roadside management program that is compatible with the monarch’s life cycle. Compatible maintenance would exclude the use of herbicides/pesticides as well as limiting mowing to one swath closest to the shoulder, outside the butterfly’s peak activity and milkweed blooming period.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.
REINITIATION-CLOSING STATEMENT

This concludes formal consultation on the SR 84 Miner Slough Bridge Replacement Project. As provided in 50 CFR § 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) the amount or extent of incidental take 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 BO, including work outside of the described project footprint, including vehicle parking, staging, lay down areas, and access roads; (3) the agency action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in this BO, including use of rodenticides or herbicides, relocation of utilities, and use of vehicle parking, staging, lay down areas, and access roads; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any additional take will not be exempt from the prohibitions of section 9 of the Act, pending reinitiation.

Please address any questions or concerns regarding this response to John Cleckler, Endangered Species Biologist, at john_cleckler@fws.gov at the Sacramento Fish and Wildlife Office or Kim Squires, Section 7 Division Chief, at Kim_Squires@fws.gov. Please refer to Service file number 08ESMF00-2016-F-0842-1 in any future correspondence regarding this project.

Sincerely,

[Signature]
Kaylee Allen
Field Supervisor

cc:
Craig Weightman, California Department of Fish and Wildlife, Napa, California
Gregory Pera and Robert Blizard, Caltrans District 4, Oakland, California
Literature Cited


(CDFW) 2016b. BIOSIS. Giant garter snake occurrences 82, 242, 79, 132, 133, and 250. Natural Heritage Division, Sacramento, California.


Dettinger, M., B. Udall and A. Georgakakos. 2015. Western water and climate change. Ecological Applications 25(8): 2069-2093. doi: http://dx.doi.org/10.1890/15-0938.1


Feyrer, F. M.L. Nobriga and T.R. Sommer. 2007. Multidecadal trends for three declining fish species: habitat patterns and mechanisms in the San Francisco Estuary, California, USA.
Ms. JoAnn Cullom

Canadian Journal of Fisheries and Aquatic Science 64(4):723-734. doi: http://dx.doi.org/10.1139/f07-048


Polansky et al. Using spatiotemporal models to discern the role of scale in the environmental effects on the distribution and abundance of an endangered fish. In review.


Sommer, T., F.H. Mejia, M.L. Nobriga, F. Feyrer and L. Grimaldo. 2011. The spawning migration of delta smelt in the upper San Francisco Estuary. San Francisco Estuary and Watershed Science 9(2) [online serial]. https://escholarship.org/uc/item/86m0g5sz


(Service) U.S. Fish and Wildlife Service. 1994. Endangered and threatened wildlife and plants; final rule critical habitat determination for the delta smelt. Federal Register 59: 65256-


Appendix K Biological Opinion from the National Marine Fisheries Service
Mr. Christopher States  
Branch Chief  
Office of Biological Sciences and Permits,  
    District 4, Caltrans  
P.O. Box 23660  
Oakland, California  94623-5903  

Dear Mr. States:  

This document transmits the National Marine Fisheries Service's (NMFS) biological opinion (BO) (Enclosure 1) based on our review of the California Department of Transportation's (Caltrans) proposed Miner Slough Bridge Replacement Project (project) located on Highway 84 in eastern Solano County, California, and its effects on the federally listed endangered Sacramento River winter-run Chinook salmon (Oncorhynchus tshawytscha) evolutionary significant unit (ESU), threatened Central Valley (CV) spring-run Chinook salmon ESU (O. tshawytscha), threatened California Central Valley (CCV) steelhead distinct population segment (DPS) (O. mykiss), threatened North American green sturgeon southern DPS (Acipenser medirostris) and their respective designated critical habitats in accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 et seq.). Your request for initiation of formal section 7 consultation on this Project was received on January 15, 2016. On May 26, 2016, formal consultation was initiated by NMFS' California Central Valley Office.  

This BO is based on the biological assessment provided on January 15, 2016. Based on the best available scientific and commercial information, the BO concludes that the project is not likely to jeopardize the continued existence of the federally listed endangered Sacramento River winter-run Chinook salmon (O. tshawytscha) ESU, threatened CV spring-run Chinook salmon ESU, (O. tshawytscha), threatened CCV steelhead DPS (O. mykiss), or threatened Southern DPS of North American green sturgeon (A. medirostris), and is not likely to destroy or adversely modify their designated critical habitats. NMFS has also included an incidental take statement with reasonable and prudent measures and non-discretionary terms and conditions that are necessary and appropriate to avoid, minimize, or monitor incidental take of listed species associated with the project.  

This letter also transmits NMFS’s essential fish habitat (EFH) conservation recommendations for Pacific salmon as required by the Magnuson-Stevens Fishery Conservation and Management Act.
(MSA) as amended (16 U.S.C. 1801 et seq.). The document concludes that the project will adversely affect the EFH of Pacific salmon in the action area and adopts the ESA reasonable and prudent measures and associated terms and conditions from the BO as the EFH conservation recommendations.

Caltrans has a statutory requirement under section 305(b)(4)(B) of the MSA to submit a detailed written response to NMFS within 30 days of receipt of these conservation recommendations, and 10 days in advance of any action, that includes a description of measures for avoiding, minimizing, or mitigating the impact of the project on EFH (50 CFR 600.920(j)). If unable to complete a final response within 30 days, Caltrans should provide an interim written response within 30 days before submitting its final response. In the case of a response that is inconsistent with our recommendations, Caltrans must explain its reasons for not following the recommendations, including the scientific justification for any disagreements with NMFS over the anticipated effects of the proposed action and the measures needed to avoid, minimize, or mitigate such effects.

Please direct questions regarding this letter to LTJG Sean Luis in NMFS’ West Coast Region, California Central Valley Office, at (916) 930-3724 or via email at Sean.M.Luis@noaa.gov.

Sincerely,

[Signature]
William W. Stelle, Jr.
Regional Administrator

Enclosure

cc: California Central Valley Office Division- File Copy
151422-WCR2016-SA00244
Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion, Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation and Fish and Wildlife Coordination Act Recommendations

Miner Slough Bridge Replacement Project

National Marine Fisheries Service Consultation Number: 2016-4900

Action Agency: California Department of Transportation (Caltrans)

Affected Species and NMFS’ Determinations:

<table>
<thead>
<tr>
<th>ESA-Listed Species</th>
<th>Status</th>
<th>Is Action Likely to Adversely Affect Species?</th>
<th>Is Action Likely to Affect Critical Habitat?</th>
<th>Is Action Likely To Jeopardize the Species?</th>
<th>Is Action Likely To Destroy or Adversely Modify Critical Habitat?</th>
</tr>
</thead>
<tbody>
<tr>
<td>California Central Valley steelhead (<em>Oncorhynchus mykiss</em>)</td>
<td>Threatened</td>
<td>Likely</td>
<td>No*</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>California Central Valley spring-run Chinook salmon (<em>O. tshawytscha</em>)</td>
<td>Threatened</td>
<td>Not Likely*</td>
<td>No*</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Sacramento River winter-run Chinook salmon (<em>O. tshawytscha</em>)</td>
<td>Endangered</td>
<td>Not Likely*</td>
<td>No*</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Southern Distinct Population Segment of North American green sturgeon (<em>Acipenser medirostris</em>)</td>
<td>Threatened</td>
<td>Likely</td>
<td>No*</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

*Please refer to section 2.4 for the analysis of species or critical habitat that are not likely to be adversely affected.

<table>
<thead>
<tr>
<th>Fishery Management Plan That Describes EFH in the Project Area</th>
<th>Does Action Have an Adverse Effect on EFH?</th>
<th>Are EFH Conservation Recommendations Provided?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pacific Coast Salmon</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

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

Issued By: [Signature]
William W. Stelle, Jr.
Regional Administrator

Date: JUN 2 0 2016
List of Acronyms and Abbreviations
ac - acre
ACID – Anderson-Cottonwood Irrigation Dam
BA – Biological Assessment
BMPs – Best Management Practices
BO – Biological Opinion
C – Celsius
Caltrans – California Department of Transportation
CCV – California Central Valley
CDFW – California Department of Fish and Wildlife
CFR – Code of Federal Regulations
cfs – cubic feet per second
CISS – Cast-In-Steel-Shell
CVP – Central Valley Project
CV – Central Valley
dB – decibels
DJFMP - Delta Juvenile Fish Monitoring Program
DO – Dissolved Oxygen
DPS – Distinct Population Segment
DQA – Data Quality Act
EFH – Essential Fish Habitat
EPA – Environmental Protection Agency
ESA – Endangered Species Act
ESU – Evolutionarily Significant Unit
F – Fahrenheit
FHWG – Fisheries Hydroacoustic Working Group
FMP – Fisheries Management Plan
FR – Federal Register
g – grams
ft – feet
FWCA – Fish and Wildlife Coordination Act
GCID – Glen-Colusa Irrigation District
HAPC – Habitat Area of Particular Concern
hr - hour
ITS – Incidental Take Statement
kg - kilogram
LWM – Large Woody Material
m – meters
mg O₂/l – milligrams of oxygen per liter
MHWM – Mean High Water Mark
MSA – Magnusson-Stevens Act
NMFS – National Marine Fisheries Service
OHWL – Ordinary High Water Line
PAH – Polycyclic Aromatic Hydrocarbon
PBF – Physical and Biological Feature
PAH – Polycyclic Aromatic Hydrocarbons
PCB - Polychlorinated Biphenyls
PM – Post Mile
ppt – parts per thousand
PVA – Population Viability Analysis
RBDD – Red Bluff Diversion Dam
RC – Reinforced Concrete
Reclamation – U.S. Bureau of Reclamation
RM – River Mile
RMS – Root Mean Squared
RWQCB – Regional Water Quality Control Board
sDPS – Southern Distinct Population Segment
SEL – Sound Exposure Level
SR – State Route
SWE – Snow Water Equivalent
SWP – State Water Project
SWPPP – Storm Water Pollution Prevention Plan
SWRCB – State Water Resources Control Board
TCP – Temperature Compliance Point
USFWS – U.S. Fish and Wildlife Service
USGS – U.S. Geological Survey
VSP – Viable Salmonid Parameters
WRO – Water Rights Order
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

The National Marine Fisheries Service (NMFS) prepared the biological opinion (BO) and incidental take statement portions of this document in accordance with section 7(b) of the Endangered Species Act (ESA) of 1973 (16 USC 1531 et seq.), and implementing regulations at 50 CFR 402.

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.

Because the Proposed Action would modify a stream or other body of water, NMFS also provides recommendations and comments for the purpose of conserving fish and wildlife resources, and enabling the Federal agency to give equal consideration with other project purposes, as required under the Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.).

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 (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554). The document will be available through NMFS’ Public Consultation Tracking System https://pcts.nmfs.noaa.gov/pcts-web/homepage.pcts. A complete record of this consultation is on file at the NMFS California Central Valley Office.

1.2 Consultation History

- On January 15, 2016, the NMFS West Coast Region – California Central Valley Office received a consultation initiation request and Biological Assessment (BA) for the Miner Slough Bridge Replacement Project. Listed species and critical habitats in the Action Area include California Central Valley steelhead and their critical habitat; California Central Valley spring-run Chinook salmon and their critical habitat; Sacramento River winter-run Chinook salmon and their critical habitat; and Southern Distinct Population Segment (sDPS) green sturgeon and their critical habitat.
- On May 9, 2016, NMFS requested additional information from Caltrans regarding avoidance and minimization measures to be implemented with the project.
- On May 26, 2016, NMFS received additional information on avoidance and minimization measures to be implemented with the project.
- On May 26, 2016, NMFS initiated formal ESA Section 7 consultation.
- On May 31, 2016, NMFS received information regarding geotechnical drilling associated with the project.
1.3 Proposed Action

“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).

Project Description

Caltrans is proposing to replace the existing Miner Slough Bridge. The new bridge would be constructed on a new alignment with improvements such as lanes and shoulders of standard width, standard vertical clearance, and flares at each end to provide extra width for truck-turning movements. A new swing bridge is proposed to be constructed approximately 100 feet (ft) west of the existing alignment. The new bridge will have standard features with a 12-ft lane and an 8-ft shoulder in each direction. The project proposes to maintain the existing vertical clearance over the slough. The project would also require construction of temporary trestles to be used during construction. There will be a control-house structure on the levee, to house operating equipment and parking for maintenance personnel. Route 84 will also be realigned for a length of about 900 ft north of Holland Road.

Existing Bridge

The existing bridge was built in 1933, and is 18 ft wide and accommodates one lane of traffic in either direction. It is a swing bridge with nonstandard features and very low annual average daily traffic (336 vehicles in 2011). The existing bridge is 367 ft long and is composed of three sections with timber plank decks and a 2-inch-thick asphalt concrete wearing surface. The 191-ft center steel truss swing span is on a reinforced concrete (RC) cylindrical swing pier, with RC rest piers. The two approach spans are made of timber stringers on timber cap-and-pile bents with abutments of RC on timber piles.

Staging Areas and Access Roads

Staging will occur in the area between the existing alignment and the new alignment to the north of the bridge (Figure 1). This 0.68-acre (ac) area will be cleared by the construction contractor for staging and preparation of the new SR 84 alignment. The existing house property southeast of the existing bridge will be utilized for storing materials and equipment for the new bridge. This area is currently used for staging of material for emergency repairs. Traffic coordination and limited closures of the existing bridge for construction of trestles, as well as conforming of the approach spans of new bridge to highway lanes, may be necessary. The existing bridge will continue to be used for traffic during construction.

A section of SR 84 immediately north of the bridge will be permanently realigned for a stretch of approximately 900 ft, where it will conform to the existing highway. This realignment will have standard 12-ft lanes with 8-ft paved shoulders. An approximately 250-ft-long section of the existing SR 84 will be widened to conform to the realigned section of SR 84. After the newly realigned section of SR 84 is open to the public, the pavement of the old section will be scarified, removed, and revegetated (See Figure 1). Holland Road will be paved for approximately 200 ft on either side of the new bridge, at which point it will conform to the existing county road. The
new toe line for fill on this stretch will be 12 ft out from the edge of existing pavement on the south side (slough side) of Ryer Road, and will vary from 16 ft to 84 ft from the edge of existing pavement on the north side of Holland Road (see Figure 1). The realignment of SR 84 and paving of Holland Road will permanently impact approximately 0.71 ac.

The unpaved access road extending from the old Highway (84) to the staging area is currently 18 to 20 ft wide. This access road needs to be widened to 24 ft over a distance of approximately 1,200 ft in order to accommodate large construction equipment and trucks. Widening of this access road will require minor grading of the approximately 0.22 ac area to be widened, and placing 6-in of crushed rocks over the adjacent ground.

Temporary Trestle Bridge Construction and Removal

There will be two trestles on each end of bridge. The one on the south end will be approximately 86 ft long and the other on the north end will be about 204 ft long. This will leave an opening of about 85 ft for traffic navigation between the two trestles. Each trestle will be a width of 35 ft to 40 ft with a superstructure of timber decking, steel stringers, and prefabricated steel bents; and safety railing. The bents will be spaced approximately 25 ft to 40 ft apart and supported on piles varying from 15 inches to 36 inches in diameter. The piles may be driven by an impact hammer or through use of a vibratory hammer and will be spaced 5 ft to 10 ft apart. The number of piles is estimated to be approximately 125. Each pile will be approximately 50 ft to 75 ft long. The elevation of the trestle will be below the soffit of the new bridge at about 18 ft. Once the old trestle is taken away by crane, the piles will be removed by vibratory method or cut 3 ft below the mudline. Trestles alone, or in combination with reclaimed lumber from demolition of the old bridge, can be placed on a barge to be used for construction of the new bridge. Barges may be used to facilitate construction of the new bridge and demolition of the old bridge.

New Piers with Foundations

The Project includes construction of three steel-reinforced cast concrete piers to support the bridge—one central pivot pier (Pier 3) and two independent piers (Pier 2 and Pier 4)—which support both the approach spans and swing span when it is not in operation. Each pier will be supported through cap-on, cast-in-steel-shell (CISS) piles. The cap will be constructed of steel-reinforced cast concrete over a group of CISS piles as shown in Table 1.

Table 1. Pier Construction Parameters.

<table>
<thead>
<tr>
<th>Description</th>
<th>Pier 3</th>
<th>Piers 2 and 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of piles</td>
<td>25</td>
<td>4</td>
</tr>
<tr>
<td>Depth of piles</td>
<td>50-ft</td>
<td>50-ft</td>
</tr>
<tr>
<td>Diameter of pile</td>
<td>2-ft</td>
<td>6-ft</td>
</tr>
<tr>
<td>Diameter of pier</td>
<td>18-ft</td>
<td>6-ft</td>
</tr>
<tr>
<td>Diameter of caps</td>
<td>32-ft</td>
<td>8-ft</td>
</tr>
<tr>
<td>Height of caps</td>
<td>8-ft</td>
<td>5-ft</td>
</tr>
<tr>
<td>Height of pier</td>
<td>18-ft</td>
<td>18-ft</td>
</tr>
<tr>
<td>Elevation of top of pier</td>
<td>24-ft</td>
<td>24-ft</td>
</tr>
</tbody>
</table>
For Pier 3, a 44-ft by 44-ft cofferdam will be constructed to facilitate the pile driving and construction of the caps and pier. The cofferdam will be constructed by driving 2-ft sheet pile sections 30 ft deep into the streambed using vibratory hammers. The piles will be tall enough so that the tops reach 5 ft above the surface of the water and placed adjacent to each other. The area within the cofferdam is then dewatered and excavated to 2 ft below the footing elevation. A 2-ft-deep seal course of poured concrete is placed at the base of the cofferdam to prevent water leakage. The CISS piles will be driven using impact-hammer, with pile drivers situated on the temporary trestle bridge. The material inside each pile is bored out using drills situated on the temporary trestle bridge, leaving a plug of native material at the bottom. Rebar is placed in the shell and the shell is filled with concrete, using pumps from the temporary bridge. Forms and rebar will be placed over the pile ends and then filled with concrete to form the cap, and the same process is used to form the pier.

For Pier 2 and Pier 4, CISS piles will be driven without cofferdams into the streambed using impact hammers situated on the temporary trestle, and the pile shells will be drilled out, leaving a plug of native material at the bottom. Only piers 2 and 3 will be located within the active channel. Rebar is placed into the shells, which are then filled with concrete. Forms are built around the top of the shells to construct concrete caps approximately 9 ft wide by 26 ft long by 5 ft high, on which the bridge and abutment sections will rest after construction. Fenders with a 3-ft-wide cap on 2-ft-diameter piles spaced 5 ft to 8 ft apart will be placed adjacent to Pier 2 and Pier 3 only. The fenders extend 10 ft past the edge of deck on the east and west sides, and then curve for another 20 ft.

Operator Control House

An operator control house will be constructed approximately 50 ft north of the abutment on the levee, down slope facing the slough. This will provide the control house operator a better view of the bridge opening from the bend in the slough on the north side than one would have from the south side. The control house structure will consist of a 25-ft-wide by 25-ft-long concrete structure with a metal roof and windows, with its operating floor approximately 25 ft above the levee road. It will be supported by 20 CISS piles placed 2 ft in diameter around the perimeter of the control house. A 20-ft by 30-ft parking area will be provided across from the control house on the north side of Holland Road for maintenance. Construction of the structure will consist of steel pipe piles driven into the levee with an impact hammer. The interior of the piles will be cleaned out, a rebar cage will be placed inside the pile, and then the cage filled with concrete. The control house will be built with forms filled with RC. A 5-ft-wide stairway leading to the control house will also be constructed. A roadside pullout built on a RC viaduct will be constructed on a 24-inch RC slab sitting on top of 2-ft-diameter steel pipe piles. The piles will be approximately 30 ft long. Three bents will be installed 20 ft on center, using 10 CISS piles driven as described above, with a 2-ft-diameter footprint. A dowel attachment to the slab, which is poured in place with forms and rebar, will be constructed. A parking slab, with a construction footprint of 25 ft by 30 ft, will be constructed to adjoin the roadway. The parking slab will be on a 3-ft-deep cap, which will be supported on 2- ft-diameter piles that are 30 ft deep.

The operator control house is stationary on the north end of the bridge and contains the switch gear with the generator to be attached to the outside of the control house. The main drive motor
is below the deck at Pier 3 on a platform near the drive gear machinery. A separate motor and hydraulic pump is used to operate the end jack mechanisms via hydraulic pipes and hoses extending to both ends of the bridge.

**Abutment Foundations**

On the levees, at the ends of each approach span at elevation 26.4 ft on the north and 27 ft on the south above the high-water elevation (16.84 ft), a row of 28 2-ft-diameter piles with a 65.5-ft-long by 8-ft-wide concrete cap will be constructed. The seat abutments are approximately 14 ft high by 63.5 ft in length. The area will be excavated to a depth of 5 ft for a length of 60 ft to construct a trench 5 ft wide. Approximately 70-ft-long CISS piles will be driven into the trench, drilled out, and filled with rebar and concrete. The 65.5-ft-long by 8-ft-wide by 5-ft-deep cap will be constructed over the tops of the piles to support the approach span with a 4-ft to 5-ft abutment stem, either precast abutment slab or cast in place.

**Bridge Structure**

A swing span, steel girder bridge will make up the superstructure of the proposed new bridge. Continuous steel 1-girder beams longitudinally connected by cross-frames and diaphragm will provide support from the superstructure down to the piers. The dimensions of the bridge superstructure will consist of two 110-ft spans supported by a central pivot pier. The depth of the superstructure will be 7 ft deep at center, and 4 ft at the end.

The bridge will be constructed from a prefabricated girder that will be dropped into place using a crane mounted on the temporary trestle or from the edge of the levee. Larger sections will be assembled in the staging area, while smaller sections will be assembled offsite and brought in by truck. A concrete deck will be poured on top of the girders.

**Approach Structure**

Precast, prestressed concrete 1-girders spaced evenly will be mounted on top of the all piers to form the lower part of the superstructure. Between the precast 1-girders, forms will be placed to lay out the deck reinforcement as well as curbs, and then the forms filled with concrete.

From Abutment 1 to Pier 2, the section flares from approximately 86 ft to 44 ft wide, with a length of 61 ft. From Pier 4 to Abutment 5, the section flares from approximately 89 ft to 44 ft wide, with a length of 61 ft. This part of the superstructure is 4 ft deep and the deck is approximately 9 inches deep.

On the south end of the bridge, the approach slab conforms to the edge of the existing highway. On the north end of the bridge, the approach slab is higher by 3 ft at the edge of Holland Road.

**Pavement Section**

The bridge deck will have standard RC for the swing span and approach spans. Standards for placing asphalt concrete pavement sections to the bridge deck will be followed and include
excavating 12 inches of soil, adding a gravel sub-base, compacting, and then placing the asphalt concrete.

A section of State Route (SR) 84 immediately north of the bridge will be permanently realigned for a stretch of approximately 900 ft, where it will conform to the existing highway. This realignment will have a standard 12-ft lane with 8-ft paved shoulder in each direction. The realigned section of SR 84 will be on fill, ranging in depth from 0.25 ft to 15.5 ft, and its footprint from toe-of-fill to toe-of-fill will range between 80 ft to 160 ft. Before placement of the fill, the Project area will undergo vegetation clearing and grubbing, scraping and excavating up to 1 ft below ground surface, compacting the soil, and adding gravel base. An approximately 250-ft-long section of the existing SR 84 will be widened to conform to the realigned section of SR 84. To achieve this, there will be an approximately 2-ft to 3-ft excavation within the existing roadway and fill area. After the newly realigned section of SR 84 is open to the public, the old paved section will be scarified, removed, and revegetated.

Holland Road will be paved for approximately 200 ft on either side of the new bridge, at which point it will conform to the existing Holland Road. The new toe line for fill on this stretch of the road will be 12 ft out from the edge of the existing pavement on the south side (slough side) of Ryer Road, and will vary from 16 ft to 84 ft from the edge of the existing pavement on the north side of the road.

**Electrical**

An armored underwater electrical cable will be laid on the bed of the slough to connect the control house with the central span. A generator will be used to run the bridge and control gates. The generator will fit into the control house. No outside lighting or utilities are anticipated.

**Drainage**

Scuppers will be used for the concrete barriers on either side of bridge shoulders. Scuppers are drainage ports along the edges of the bridge that will aid in removing storm water from the bridge deck. The bridge will have a 2% grade with an apex at the middle designed to direct the flow of storm water towards the ends of the bridge. The majority of storm water will likely flow into Miner Slough. On the new stretch of SR 84 on the north side of new bridge, cross culverts of up to 48 inches will be installed to maintain proper drainage.

**Demolition of the Existing Bridge**

The trestle and cofferdam, described above, will be used in the existing bridge demolition. The barrier rail and post will most likely be removed by hand. The swing spans may need temporary supports to provide stability during the demolition of the truss. The removal of the beams would require a crane. Once the truss is removed, the deck asphalt concrete and concrete will be chipped with a hoe ram. The chipped pieces will be caught on a working platform and removed with a loader. Steel beams, cross beams, and stringers will be removed by a crane. The pivot pier will be have steel plates that will be removed by a crane. The approach spans’ superstructure will be removed in a similar way. The RC bents will be chipped down to 3 ft
below the timber. The wooden bents will have the RC caps removed and the wood piles removed to at least 3 ft below the channel bed. Disturbed soil will be restored to levee requirements. The pivot pier will be chipped down with a hoe ram. Chunks of RC will be loaded out of the cofferdam area. The pivot pier will be chipped down 3 ft below the mud-sounding elevation. The removed soil will need to be replaced by hand. The dolphins will need to be removed 3 ft below the mud soundings. Trestles will be removed from a barge located in Miner Slough. No utility relocation is anticipated.

Borrow and Disposal

The Project will not require onsite borrow or disposal of excavated material. Gravel and rock will be imported for road widening. These materials will be removed on completion of the Project, and removal and disposal of this material will be implemented through contractors and subcontractors and comply with Caltrans standard Best Management Practices (BMPs) and the Storm Water Pollution Prevention Plan (SWPPP). BMPs and SWPPP measures are a standard part of the plans and specifications for the Project and are covered by the Regional Water Quality Control Board (RWQCB) 401 Water Quality Certification.

Geotechnical Exploration

Prior to project implementation, geotechnical boring will be conducted in the action area. Four bore holes are planned with two occurring in-water and two occurring in the adjacent levees outside of the channel. The in-water test bores will be conducted using rotary wash self-casing drilling system. Geotechnical work will be conducted between August 1st and November 30th and will require approximately 12 working days to complete.

Project Schedule

The construction is scheduled to begin January 2018 and last up to 1 year. Construction would be restricted to daytime hours. In-water work will be restricted to the proposed August 1 to November 30 work window.

1.4 Avoidance and Minimization Measures

Construction Planning

Caltrans will install environmentally sensitive area fencing around the project limits along the banks of Miner Slough to protect riparian vegetation and elderberry shrubs adjacent to the project site. This will prevent the encroachment of construction personnel into sensitive areas not needed for construction of the project. All construction personnel will attend an environmental education program delivered by a Services-approved biologist prior to working on the project site. The program will include an explanation of how to best avoid the incidental take of listed species. The field meeting will include topics on species identification, life history, descriptions, and habitat requirements during various life stages. Emphasis will be placed on the importance of the habitat and life stage requirements within the context of project maps showing areas where avoidance and minimization measures are to be implemented. The program will
include an explanation of applicable federal and state laws protecting endangered species as well as the importance of compliance with Caltrans and various resource agency conditions.

Sedimentation and Turbidity

Caltrans will construct one or more Baker tanks or other settling tanks onsite. Alternative methods may include pumping the water over the levee and allowing the water to filter through riparian vegetation before it re-enters the slough system. If the settling tank method is used, all water removed from the area inside the coffer dam during construction and installation will be pumped into a settling tank until all sediments settle out of the water. This water will then be discharged downstream of the project area. Caltrans will also construct the coffer dam during low tide as much as possible to reduce the likelihood of a sediment plume washing away downstream. Sediment curtains may also be used outside the coffer dam as it is being installed. These measures will be included in the project's standard special provisions. Caltrans will also implement several erosion control measures to minimize sediment incursion into the active channel. Such measures will include the use of erosion control blankets, fiber rolls, and silt fences where applicable. All disturbed areas will be hydroseeded or revegetated post-construction. Caltrans will hydroseed all disturbed areas between construction seasons.

Pollution and Hazardous Materials

A SWPPP will be required as part of this project. The SWPPP will include dedicated fueling and refueling practices. Dedicated fueling areas will be protected from storm water run-on and will be located at least 50 feet from downslope drainage facilities and water courses. Fueling will be performed on level-grade areas only. On-site fueling will only be used when and where it is impractical to send vehicles and equipment off-site for fueling. When fueling must occur on-site, the contractor will designate an area to be used subject to the approval of the Resident Engineer representing Caltrans. Drip pans or absorbent pads will be used during on-site vehicle and equipment fueling. Equipment staging areas will be sited at least 150 ft away from the active channel. A spill response plan is currently in place for geotechnical operations.

Effects to Riparian Vegetation

Approximately 0.061 ac of forested riparian habitat will be permanently lost and 0.186 ac will be temporarily lost as a result of this project. Riparian habitat loss will result from the bridge span itself and construction of the bridge abutments and temporary trestles. Some riparian habitat loss will be offset through removal of the old bridge and restoration of those areas post-demolition. Caltrans will work with NMFS and the other resource agencies to identify a species palette that will be used to restore all disturbed areas on site. Native grasses, shrubs, and trees will be included in onsite restoration efforts. Caltrans will also re-contour all areas graded for construction of the trestles; Caltrans will restore the site to pre-project conditions to the extent possible. All vegetation restoration efforts and plans for recontouring the levee will be developed through coordination with the resource agencies and the U.S. Army Corps of Engineers and the Reclamation Districts 501 and 999 who own and operate the levee.
Offsite restoration to offset the permanent loss of riparian habitat will also be required (see Section 2.8.4).

_Hydroacoustic Impacts_

Pile driving activities will be restricted to August 1 to November 30. The contractor will be required to use attenuation devices around piles that will be driven in the water. Attenuation devices could take the form of bubble rings or of completely dewatering the cofferdam at Pier 3.
Figure 1. Miner Slough Bridge Replacement Project
Interrelated or Interdependent Actions

"Interrelated actions" are those that are part of a larger action and depend on the larger action for their justification. "Interdependent actions" are those that have no independent utility apart from the action under consideration (50 CFR 402.02). There are no interdependent or interrelated activities associated with the proposed action.

1.5 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).

Miner Slough Bridge is located at position 38.291847, -121.630818 in the Northern region of the Sacramento/San Joaquin River Delta, connecting Ryer Island with the mainland. The project is located approximately 13 miles north of Rio Vista in Solano County, California. The bridge is located at post mile (PM) 12.1/12.2 on SR 84. The bridge traverses the active flow channel of Miner Slough and connects Ryer Island in the Sacramento-San Joaquin River Delta (Delta) to the mainland. Most of the project area is located adjacent to the active channel of Miner Slough, a tributary of the Sacramento River. The project is located within the Liberty Island U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle. Miner Slough flows south into the Sacramento River and Suisun Bay, which flows into the San Francisco Bay. Miner Slough is a navigable waterway that ebbs and flows with the tide, with a depth of about 6 ft to the mean high water mark (MHWM). The action area encompasses 10.3 ac of Miner Slough (approximately 1050 ft upstream and 1025 ft downstream of the existing bridge), as well as 0.7.576 ac of riparian area, emergent seasonal wetland area, and shrub scrub wetland area. The action area includes areas adjacent to the project that may be adversely affected by (but not limited to) the following: noise generated by pile driving; sedimentation and increased turbidity; and construction-related effects.

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, Federal agencies must ensure that their 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 provides an opinion stating how the agency’s actions would affect listed species and their critical habitat. If incidental take is expected, section 7(b)(4) requires NMFS to provide an incidental take statement (ITS) that specifies the impact of any incidental taking and includes non-discretionary reasonable and prudent measures and terms and conditions to minimize such impacts.

The proposed action is not likely to adversely affect CV spring-run Chinook or their critical habitat, Sacramento River winter-run or CCV steelhead critical habitat. The analysis is found in the "Not Likely to Adversely Affect" Determinations section (2.11).
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 “to jeopardize the continued existence of a listed species,” which is “to engage in an action that 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.

The adverse modification analysis considers the impacts of the Federal action on the conservation value of designated critical habitat. This biological opinion does not rely on the regulatory definition of “destruction or adverse modification” of critical habitat at 50 CFR 402.02. Instead, we have relied upon the statutory provisions of the ESA to complete the following analysis with respect to critical habitat.¹

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

- Identify the rangewide status of the species and critical habitat likely to be adversely affected by the proposed action.
- Describe the environmental baseline in the action area.
- Analyze the effects of the proposed action on both species and their habitat using best available information and an “exposure-response-risk” approach.
- Describe any cumulative effects in the action area.
- Integrate and synthesize the above factors to assess the risk that the proposed action poses to species and critical habitat.
- Reach jeopardy and adverse modification conclusions using best available information.
- If necessary, define a reasonable and prudent alternative to the proposed action.

2.2 Rangewide Status of the Species and Critical Habitat

This BO 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’ current “reproduction, numbers, or distribution” as described in 50 CFR 402.02. The BO 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 current function of the essential physical and biological features (PBFs) that help to form that conservation value. One factor affecting the rangewide status of Sacramento

¹ Memorandum from William T. Hogarth to Regional Administrators, Office of Protected Resources, NMFS (Application of the “Destruction or Adverse Modification” Standard Under Section 7(a)(2) of the Endangered Species Act) (November 7, 2005).
River winter-run Chinook salmon, CV spring-run Chinook salmon, CCV steelhead, and the sDPS green sturgeon, and aquatic habitat at large is climate change.

The designations of critical habitat for CV spring-run Chinook salmon, CCV steelhead, and the sDPS of green sturgeon use the term primary constituent elements or essential features. The new critical habitat regulations (81 FR 7414) replace these terms 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 primary constituent elements, physical or biological features, 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.

In 2016, NMFS completed a status review of 28 species of Pacific salmon, steelhead and eulachon, including CV spring-run Chinook salmon, and CCV steelhead, and concluded that the species’ status should remain as previously listed (102 FR 33468; May 26, 2016). The 2016 status reviews for CV spring-run and CCV steelhead found that, although the listings should remain unchanged, the status of these populations have suffered in 2014 and 2016 from the unprecedented California drought. An updated status review for sDPS green sturgeon was issued recently (July 2015, NMFS 2015), concluding that the status of sDPS green sturgeon should remain as threatened.

The descriptions of the status of species and conditions of the designated critical habitats in this BO are a synopsis of the detailed information available on NMFS’ West Coast Regional website. The following federally listed species evolutionarily significant units (ESUs) or distinct population segments (DPSs) and designated critical habitat occur in the action area and may be affected by the proposed action.

Sacramento River winter-run Chinook salmon ESU (*Oncorhynchus tshawytscha*)
Listed as endangered (70 FR 37160, June 28, 2005)

Sacramento River winter-run Chinook salmon designated critical habitat
(58 FR 33212, June 16, 1993)


CV spring-run Chinook salmon ESU (*O. tshawytscha*)
Listed as threatened (70 FR 37160, June 28, 2005)

CV spring-run Chinook salmon designated critical habitat
(70 FR 52488, September 2, 2005)


CCV steelhead DPS (*O. mykiss*)
Listed as threatened (71 FR 834, January 5, 2006)
CCV steelhead designated critical habitat
(70 FR 52488, September 2, 2005)


Southern DPS of North American green sturgeon (Acipenser medirostris)
Listed as threatened (71 FR 17757, April 7, 2006)

Southern DPS of North American green sturgeon designated critical habitat
(74 FR 52300, October 9, 2009)


2.2.1 Sacramento River Winter-run Chinook Salmon

Summary of Sacramento River Winter-run Chinook Salmon ESU Viability

There are several criteria (only one is required) that would qualify the winter-run ESU at moderate risk of extinction, and since there is still only one population that spawns downstream of Keswick Dam, that population would be at high risk of extinction in the long-term according the criteria in Lindley et al. (2007). Recent trends in those criteria are: (1) continued low abundance; (2) a negative growth rate over 6 years (2006-2012), which is two complete generations; (3) a significant rate of decline since 2006; and (4) increased risk of catastrophe from oil spills, wildfires, or extended drought (climate change). The most recent 5-year status review (NMFS 2011) on winter-run concluded that the ESU had increased to a high risk of extinction. In summary, the most recent biological information suggests that the extinction risk for the winter-run ESU has increased from moderate risk to high risk of extinction since 2005, and that several listing factors have contributed to the recent decline, including drought and poor ocean conditions (NMFS 2011).

Critical Habitat: Physical and Biological Features for Sacramento River Winter-run Chinook Salmon

NMFS designated critical habitat for winter-run Chinook salmon on June 16, 1993 (58 FR 33212). Critical habitat was delineated as the Sacramento River from Keswick Dam at river mile (RM) 302 to Chipps Island, RM 0, at the westward margin of the Sacramento-San Joaquin Delta, including Kimball Island, Winter Island, and Brown’s Island; all waters from Chipps Island westward to the Carquinez Bridge, including Honker Bay, Grizzly Bay, Suisun Bay, and the Carquinez Strait; all waters of San Pablo Bay westward of the Carquinez Bridge, and all waters of San Francisco Bay north of the San Francisco-Oakland Bay Bridge from San Pablo Bay to the Golden Gate Bridge. In the Sacramento River, critical habitat includes the river water, river bottom, and the adjacent riparian zone.
Critical habitat for winter-run is defined as specific areas (listed below) that contain the PBFs considered essential to the conservation of the species. This designation includes the river water, river bottom (including those areas and associated gravel used by winter-run as spawning substrate), and adjacent riparian zone used by fry and juveniles for rearing (June 16, 1993, 58 FR 33212). NMFS limits “adjacent riparian zones” to only those areas above a stream bank that provide cover and shade to the nearshore aquatic areas. Although the bypasses (e.g., Yolo, Sutter, and Colusa) are not currently designated critical habitat for winter-run, NMFS recognizes that they may be utilized when inundated with Sacramento River flood flows and are important rearing habitats for juvenile winter-run. Also, juvenile winter-run may use tributaries of the Sacramento River for non-natal rearing. Critical habitat also includes the estuarine water column and essential foraging habitat and food resources used by winter-run as part of their juvenile outmigration or adult spawning migration.

The following is the status of the PBFs that are considered to be essential for the conservation of winter-run (June 16, 1993, 58 FR 33212):

1. **Access from the Pacific Ocean to Appropriate Spawning Areas**

Adult migration corridors should provide satisfactory water quality, water quantity, water temperature, water velocity, cover, shelter and safe passage conditions in order for adults to reach spawning areas. Adult winter-run generally migrate to spawning areas during the winter and spring. At that time of year, the migration route is accessible to the appropriate spawning grounds on the upper 60 miles of the Sacramento River, however much of this migratory habitat is degraded and they must pass through a fish ladder at the Anderson-Cottonwood Irrigation Dam (ACID). In addition, the many flood bypasses are known to strand adults in agricultural drains due to inadequate screening (Vincik and Johnson 2013). Since the primary migration corridors are essential for connecting early rearing habitat with the ocean, even the degraded reaches are considered to have a high intrinsic conservation value to the species.

2. **The Availability of Clean Gravel for Spawning Substrate**

Suitable spawning habitat for winter-run exists in the upper 60 miles of the Sacramento River between Keswick Dam and Red Bluff Diversion Dam (RBDD). However, the majority of spawning habitat currently being used occurs in the first 10 miles downstream of Keswick Dam. The available spawning habitat is completely outside the historical range utilized by winter-run upstream of Keswick Dam. Because Shasta and Keswick dams block gravel recruitment, the U.S. Bureau of Reclamation (Reclamation) annually injects spawning gravel into various areas of the upper Sacramento River. With the supplemented gravel injections, the upper Sacramento River reach continues to support a small naturally-spawning winter-run Chinook salmon population. Even in degraded reaches, spawning habitat has a high conservation value as its function directly affects the spawning success and reproductive potential of listed salmonids.

An April 5, 1960, Memorandum of Agreement between Reclamation and the CDFW originally established flow objectives in the Sacramento River for the protection and preservation of fish and wildlife resources. In addition, Reclamation complies with the 1990 flow releases required in State Water Resource Control Board (SWRCB) Water Rights Order (WRO) 90-05 for the protection of Chinook salmon. This order includes a minimum flow release of 3,250 cubic feet per second (cfs) from Keswick Dam downstream to RBDD from September through February during all water year types, except critically dry.

4. Water Temperatures at 5.8–14.1°C (42.5–57.5°F) for Successful Spawning, Egg Incubation, and Fry Development

Summer flow releases from Shasta Reservoir for agriculture and other consumptive uses drive operations of Shasta and Keswick dam water releases during the period of winter-run migration, spawning, egg incubation, fry development, and emergence. This pattern, the opposite of the pre-dam hydrograph, benefits winter-run by providing cold water for miles downstream during the hottest part of the year. The extent to which winter-run habitat needs are met depends on Reclamation’s other operational commitments, including those to water contractors, Delta requirements pursuant to State Water Rights Decision 1641 (D-1641), and Shasta Reservoir end of September storage levels required in the NMFS 2009 BO (NMFS 2009) on the long-term operations of the CV Project and State Water Project (CVP/SWP). WRO 90-05 and 91-1 require Reclamation to operate Shasta, Keswick, and Spring Creek Powerhouse to meet a daily average water temperature of 13.3°C (56°F) at RBDD. They also provide the exception that the water temperature compliance point (TCP) may be modified when the objective cannot be met at RBDD. Based on these requirements, Reclamation models monthly forecasts and determines how far downstream 13.3°C (56°F) can be maintained throughout the winter-run spawning, egg incubation, and fry development stages.

In every year since WRO 90-05 and 91-1 were issued, operation plans have included modifying the TCP to make the best use of the cold water available based on water temperature modeling and current spawning distribution. Once a TCP has been identified and established in May, it generally does not change, and therefore, water temperatures are typically adequate through the summer for successful winter-run egg incubation and fry development for those redds constructed upstream of the TCP (except for in some critically dry and drought years). However, by continually moving the TCP upstream, the value of that habitat is degraded by reducing the spawning area in size and imprinting upon the next generation to return further upstream.

5. Habitat and Adequate Prey Free of Contaminants

Water quality conditions have improved since the 1980s due to stricter standards and Environmental Protection Agency (EPA) Superfund site cleanups (see Iron Mountain Mine remediation under Factors). No longer are there fish kills in the Sacramento River caused by the heavy metals (e.g., lead, zinc and copper) found in the Spring Creek runoff. However, legacy contaminants such as mercury (and methyl mercury), polychlorinated biphenyls (PCB), heavy
metals and persistent organochlorine pesticides continue to be found in watersheds throughout the CV. In 2010, the EPA, listed the Sacramento River as impaired under the Clean Water Act, section 303(d), due to high levels of pesticides, herbicides, and heavy metals (http://www.waterboards.ca.gov/water_issues/programs/tmdl/2010state_ir_reports/category5_report.shtml). Although most of these contaminants are at low concentrations in the food chain, they continue to work their way into the base of the food web, particularly when sediments are disturbed and previously entombed compounds are released into the water column.

Adequate prey for juvenile salmon to survive and grow consists of abundant aquatic and terrestrial invertebrates that make up the majority of their diet before entering the ocean. Exposure to these contaminated food sources such as invertebrates may create delayed sublethal effects that reduce fitness and survival (Laetz et al. 2009). Contaminants are typically associated with areas of urban development, agriculture, or other anthropogenic activities (e.g., mercury contamination as a result of gold mining or processing). Areas with low human impacts frequently have low contaminant burdens, and therefore lower levels of potentially harmful toxicants in the aquatic system. Freshwater rearing habitat has a high intrinsic conservation value even if the current conditions are significantly degraded from their natural state.

6. Riparian and Floodplain Habitat that Provides for Successful Juvenile Development and Survival

The channelized, leveed, and riprapped river reaches and sloughs that are common in the Sacramento River system typically have low habitat complexity, low abundance of food organisms, and offer little protection from predators. Juvenile life stages of salmonids are dependent on the natural functioning of this habitat for successful survival and recruitment. Ideal habitat contains natural cover, such as riparian canopy structure, submerged and overhanging large woody material (LWM), aquatic vegetation, large rocks and boulders, side channels, and undercut banks which augment juvenile and adult mobility, survival, and food supply. Riparian recruitment is prevented from becoming established due to the reversed hydrology (i.e., high summer time flows and low winter flows prevent tree seedlings from establishing). However, there are some complex, productive habitats within historical floodplains [e.g., Sacramento River reaches with setback levees (i.e., primarily located upstream of the City of Colusa)] and flood bypasses (i.e., fish in Yolo and Sutter bypasses experience rapid growth and higher survival due to abundant food resources) seasonally available that remain in the system. Nevertheless, the current condition of degraded riparian habitat along the mainstem Sacramento River restricts juvenile growth and survival (Michel 2010; Michel et al. 2012).

7. Access Downstream so that Juveniles can Migrate from the Spawning Grounds to San Francisco Bay and the Pacific Ocean

Freshwater emigration corridors should be free of migratory obstructions, with water quantity and quality conditions that enhance migratory movements. Migratory corridors are downstream of the Keswick Dam spawning areas and include the mainstem of the Sacramento River to the Delta, as well as non-natal rearing areas near the confluence of some tributary streams.
Migratory habitat condition is strongly affected by the presence of barriers, which can include dams (i.e., hydropower, flood control, and irrigation flashboard dams), unscreened or poorly screened diversions, degraded water quality, or behavioral impediments to migration. For successful survival and recruitment of salmonids, freshwater migration corridors must function sufficiently to provide adequate passage. Unscreened diversions that entrain juvenile salmonids are prevalent throughout the mainstem Sacramento River and in the Delta. Predators such as striped bass (*Morone saxatilis*) and Sacramento pikeminnow (*Ptychocheilus grandis*) tend to concentrate immediately downstream of diversions, resulting in increased mortality of juvenile Chinook salmon.

Water pumping at the CVP/SWP export facilities in the South Delta at times causes the flow in the river to move back upstream (reverse flow), further disrupting the emigration of juvenile winter-run by attracting and diverting them to the interior Delta, where they are exposed to increased rates of predation, other stressors in the Delta, and entrainment at pumping stations. NMFS’ BO on the long-term operations of the CVP/SWP (NMFS 2009) sets limits to the strength of reverse flows in the Old and Middle Rivers, thereby keeping salmon away from areas of highest mortality. Regardless of the condition, the remaining estuarine areas are of high conservation value because they provide factors which function as rearing habitat and as an area of transition to the ocean environment.

**2.2.2 Central Valley Spring-run Chinook salmon**

**Summary of CV Spring-run Chinook salmon DPS Viability**

Since the independent populations in Butte, Deer and Mill creeks are the best trend indicators for ESU viability, NMFS can evaluate risk of extinction based on Viable Salmonid Population (VSP) parameters in these watersheds. Lindley et al. (2007) indicated that the spring-run Chinook salmon populations in the Central Valley had a low risk of extinction in Butte and Deer creeks, according to their population viability analysis (PVA) model and other population viability criteria (i.e., population size, population decline, catastrophic events, and hatchery influence, which correlate with VSP parameters abundance, productivity, spatial structure, and diversity). The Mill Creek population of spring-run Chinook salmon was at moderate extinction risk according to the PVA model, but appeared to satisfy the other viability criteria for low-risk status. However, the CV spring-run Chinook salmon ESU failed to meet the “representation and redundancy rule” since there are only demonstrably viable populations in one diversity group (northern Sierra Nevada) out of the three diversity groups that historically contained them, or out of the four diversity groups as described in the NMFS Central Valley Salmon and Steelhead Recovery Plan. Over the long term, these three remaining populations are considered to be vulnerable to catastrophic events, such as volcanic eruptions from Mount Lassen or large forest fires due to the close proximity of their headwaters to each other. Drought is also considered to pose a significant threat to the viability of the spring-run Chinook salmon populations in these three watersheds due to their close proximity to each other. One large event could eliminate all three populations.

In the 2011 status review of the CV spring-run Chinook salmon ESU, the authors concluded that the ESU status had likely deteriorated on balance since the 2005 status review and the Lindley et al. (2007) assessment, with two of the three extant independent populations (Deer and Mill creeks)
of spring-run Chinook salmon slipping from low or moderate extinction risk to high extinction risk. Additionally, Butte Creek remained at low risk, although it was on the verge of moving towards high risk, due to the rate of population decline. In contrast, spring-run Chinook salmon in Battle and Clear creeks had increased in abundance since 1998, reaching levels of abundance that place these populations at moderate extinction risk. Both of these populations have likely increased at least in part due to extensive habitat restoration. The Southwest Fisheries Science Center concluded in their viability report (Williams et al. 2011) that the status of CV spring-run Chinook salmon ESU has probably deteriorated since the 2005 status review and that its extinction risk has increased. The degradation in status of the three formerly low- or moderate-risk independent populations is cause for concern.

In the 2016 status review, the authors found, with a few exceptions, CV spring-run Chinook salmon populations have increased through 2014 returns since the last status review (2010/2011), which has moved the Mill and Deer creek populations from the high extinction risk category, to moderate, and Butte Creek has remained in the low risk of extinction category. Additionally, the Battle Creek and Clear Creek populations have continued to show stable or increasing numbers the last five years, putting them at moderate risk of extinction based on abundance. Overall, the SWFSC concluded in their viability report that the status of CV spring-run Chinook salmon (through 2014) has probably improved since the 2010/2011 status review and that the ESU’s extinction risk may have decreased, however the ESU is still facing significant extinction risk, and that risk is likely to increase over at least the next few years as the full effects of the recent drought are realized (Williams et al. 2016).

The 2015 adult CV spring-run Chinook salmon returns were very low. Those that did return experienced high pre-spawn mortality. Juvenile survival during the 2012 to 2015 drought has likely been impacted, and will be fully realized over the next several years.

**Critical Habitat: Physical and Biological Features for CV Spring-Run Chinook Salmon**

Critical habitat was designated for CV spring-run Chinook salmon on September 2, 2005 (70 FR 52488). Critical habitat for CV spring-run Chinook salmon includes stream reaches of the Feather, Yuba and American rivers, Big Chico, Butte, Deer, Mill, Battle, Antelope, and Clear creeks, the Sacramento River, as well as portions of the northern Delta. Critical habitat includes the stream channels in the designated stream reaches and the lateral extent as defined by the ordinary high-water line (OHWL). In areas where the OHWL has not been defined, the lateral extent will be defined by the bankfull elevation (defined as the level at which water begins to leave the channel and move into the floodplain; it is reached at a discharge that generally has a recurrence interval of one to two years on the annual flood series) (Bain and Stevenson 1999; 70 FR 52488). Critical habitat for CV spring-run Chinook salmon is defined as specific areas that contain the PBFs essential to the conservation of the species. Following are the inland habitat types used as PBFs for CV spring-run Chinook salmon.

1. **Spawning Habitat**

Freshwater spawning sites are those with water quantity and quality conditions and substrate supporting spawning, incubation, and larval development. Most spawning habitat in the CV for
Chinook salmon is located in areas directly downstream of dams containing suitable environmental conditions for spawning and incubation. Spawning habitat for CV spring-run Chinook salmon occurs on the mainstem Sacramento River between RBDD and Keswick Dam and in tributaries such as Mill, Deer, and Butte creeks; as well as the Feather and Yuba rivers, Big Chico, Battle, Antelope, and Clear creeks. However, little spawning activity has been recorded in recent years on the Sacramento River mainstem for spring-run Chinook salmon. Even in degraded reaches, spawning habitat has a high conservation value as its function directly affects the spawning success and reproductive potential of listed salmonids.

2. Freshwater Rearing Habitat

Freshwater rearing sites are those 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 salmonid development; and natural cover such as shade, submerged and overhanging LWM, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks. Both spawning areas and migratory corridors comprise rearing habitat for juveniles, which feed and grow before and during their outmigration. Nonnatal, intermittent tributaries also may be used for juvenile rearing. Rearing habitat condition is strongly affected by habitat complexity, food supply, and the presence of predators of juvenile salmonids. Some complex, productive habitats with floodplains remain in the system (e.g., the lower Cosumnes River, Sacramento River reaches with setback levees [i.e., primarily located upstream of the City of Colusa]) and flood bypasses (i.e., Yolo and Sutter bypasses). However, the channelized, leveed, and riprapped river reaches and sloughs that are common in the Sacramento-San Joaquin system typically have low habitat complexity, low abundance of food organisms, and offer little protection from piscivorous fish and birds. Freshwater rearing habitat also has a high intrinsic conservation value even if the current conditions are significantly degraded from their natural state. Juvenile life stages of salmonids are dependent on the function of this habitat for successful survival and recruitment.

3. Freshwater Migration Corridors

Ideal freshwater migration corridors are free of migratory obstructions, with water quantity and quality conditions that enhance migratory movements. They contain natural cover such as riparian canopy structure, submerged and overhanging large woody objects, aquatic vegetation, large rocks and boulders, side channels, and undercut banks which augment juvenile and adult mobility, survival, and food supply. Migratory corridors are downstream of the spawning areas and include the lower mainstems of the Sacramento and San Joaquin rivers and the Delta. These corridors allow the upstream passage of adults and the downstream emigration of juveniles. Migratory habitat condition is strongly affected by the presence of barriers, which can include dams (i.e., hydropower, flood control, and irrigation flashboards dams), unscreened or poorly screened diversions, degraded water quality, or behavioral impediments to migration. For successful survival and recruitment of salmonids, freshwater migration corridors must function sufficiently to provide adequate passage. For adults, upstream passage through the Delta and much of the Sacramento River is not a problem, yet a number of challenges exist on many tributary streams. For juveniles, unscreened or inadequately screened water diversions throughout their migration corridors and a scarcity of complex in-river cover have degraded this
PBF. However, since the primary migration corridors are used by numerous populations and are essential for connecting early rearing habitat with the ocean, even the degraded reaches are considered to have a high intrinsic conservation value to the species.

4. Estuarine Areas

Estuarine areas free of migratory obstructions with water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between fresh and salt water are included as a PBF. Natural cover such as submerged and overhanging LWM, aquatic vegetation, and side channels are suitable for juvenile and adult foraging.

The remaining estuarine habitat for these species is severely degraded by altered hydrologic regimes, poor water quality, reductions in habitat complexity, and competition for food and space with exotic species. Regardless of the condition, the remaining estuarine areas are of high conservation value because they provide factors which function to provide predator avoidance, as rearing habitat and as an area of transition to the ocean environment.

2.2.3 California Central Valley steelhead

Summary of CCV Steelhead DPS Viability

All indications are that natural CCV steelhead have continued to decrease in abundance and in the proportion of naturally spawned fish to hatchery produced fish over the past 25 years (Good et al. 2005, NMFS 2011b); the long-term abundance trend remains negative. Hatchery production and returns are dominant over natural fish, and one of the four hatcheries is dominated by Eel/Mad River origin steelhead stock. Continued decline in the ratio between naturally produced juvenile steelhead to hatchery juvenile steelhead in fish monitoring efforts indicates that the wild population abundance is declining. Hatchery releases (100 percent adipose fin-clipped fish since 1998) have remained relatively constant over the past decade, yet the proportion of adipose fin-clipped hatchery smolts to unclipped naturally produced smolts captured in monitoring studies has steadily increased over the past several years.

Although there have been recent restoration efforts in the San Joaquin River tributaries, CCV steelhead populations in the San Joaquin Basin continue to show an overall very low abundance, and fluctuating return rates. Lindley et al. (2007) developed viability criteria for Central Valley salmonids. Using data through 2005, Lindley et al. (2007) found that data were insufficient to determine the status of any of the naturally-spawning populations of CCV steelhead, except for those spawning in rivers adjacent to hatcheries, which were likely to be at high risk of extinction due to extensive spawning of hatchery-origin fish in natural areas.

The widespread distribution of wild CCV steelhead in the Central Valley provides the spatial structure necessary for the DPS to survive and avoid localized catastrophes. However, most wild CCV steelhead populations are very small, are not monitored, and may lack the resiliency to persist for protracted periods if subjected to additional stressors, particularly widespread stressors such as climate change (NMFS 2011b). The genetic diversity of CCV steelhead has likely been impacted by low population sizes and high numbers of hatchery fish relative to wild fish. The life-history
diversity of the DPS is mostly unknown, as very few studies have been published on traits such as age structure, size at age, or growth rates in CCV steelhead.

The 2011 status review of the CCV steelhead DPS (NMFS 2011b) found that the status of the population appears to have worsened since the 2005 status review (Good et al. 2005), when it was considered to be in danger of extinction.

The 2016 status review concluded that overall, the status of CCV steelhead appears to have changed little since the 2011 status review when the Technical Recovery Team concluded that the DPS was in danger of extinction. Further, there is still a general lack of data on the status of wild populations. There are some encouraging signs, as several hatcheries in the Central Valley have experienced increased returns of steelhead over the last few years. There has also been a slight increase in the percentage of wild steelhead in salvage at the south Delta fish facilities, and the percentage of wild fish in those data remains much higher than at Chipps Island. The new video counts at Ward Dam show that Mill Creek likely supports one of the best wild steelhead populations in the Central Valley, though at much reduced levels from the 1950’s and 60’s. Restoration and dam removal efforts in Clear Creek continue to benefit CCV steelhead. However, the catch of unmarked (wild) steelhead at Chipps Island is still less than 5 percent of the total smolt catch, which indicates that natural production of steelhead throughout the Central Valley remains at very low levels. Despite the positive trend on Clear Creek and encouraging signs from Mill Creek, all other concerns raised in the previous status review remain.

**Critical Habitat: Physical and Biological Features for CCV Steelhead**

Critical habitat was designated for CCV steelhead on September 2, 2005 (70 FR 52488). Critical habitat for CCV steelhead includes stream reaches such as those of the Sacramento, Feather, and Yuba Rivers, and Deer, Mill, Battle, and Antelope creeks in the Sacramento River basin; the San Joaquin River, including its tributaries, and the waterways of the Delta. Critical habitat includes the stream channels in the designated stream reaches and the lateral extent as defined by the OHWL. In areas where the OHWL has not been defined, the lateral extent will be defined by the bankfull elevation (defined as the level at which water begins to leave the channel and move into the floodplain; it is reached at a discharge that generally has a recurrence interval of 1 to 2 years on the annual flood series) (Bain and Stevenson 1999; 70 FR 52488). Critical habitat for CCV steelhead is defined as specific areas that contain the PBFs and physical habitat elements essential to the conservation of the species. Following are the inland habitat types used as PBFs for CCV steelhead. PBFs for CCV steelhead include:

1. **Freshwater Spawning Habitat**

Freshwater spawning sites are those with water quantity and quality conditions and substrate supporting spawning, incubation, and larval development. Most of the available spawning habitat for steelhead in the CV is located in areas directly downstream of dams due to inaccessibility to historical spawning areas upstream and the fact that dams are typically built at high gradient locations. These reaches are often impacted by the upstream impoundments, particularly over the summer months, when high temperatures can have adverse effects upon salmonids spawning and rearing downstream of the dams. Even in degraded reaches, spawning
habitat has a high conservation value as its function directly affects the spawning success and reproductive potential of listed salmonids.

2. Freshwater Rearing Habitat

Freshwater rearing sites are those with water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and survival; water quality and forage supporting juvenile development; and natural cover such as shade, submerged and overhanging LWM, log jams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks. Both spawning areas and migratory corridors comprise rearing habitat for juveniles, which feed and grow before and during their outmigration. Non-natal, intermittent tributaries also may be used for juvenile rearing. Rearing habitat condition is strongly affected by habitat complexity, food supply, and the presence of predators of juvenile salmonids. Some complex, productive habitats with floodplains remain in the system (e.g., the lower Cosumnes River, Sacramento River reaches with setback levees [i.e., primarily located upstream of the City of Colusa]) and flood bypasses (i.e., Yolo and Sutter bypasses). However, the channelized, leveed, and riprapped river reaches and sloughs that are common in the Sacramento-San Joaquin system typically have low habitat complexity, low abundance of food organisms, and offer little protection from either fish or avian predators. Freshwater rearing habitat also has a high conservation value even if the current conditions are significantly degraded from their natural state. Juvenile life stages of salmonids are dependent on the function of this habitat for successful survival and recruitment.

3. Freshwater Migration Corridors

Ideal freshwater migration corridors are free of migratory obstructions, with water quantity and quality conditions that enhance migratory movements. They contain natural cover such as riparian canopy structure, submerged and overhanging large woody objects, aquatic vegetation, large rocks and boulders, side channels, and undercut banks which augment juvenile and adult mobility, survival, and food supply. Migratory corridors are downstream of the spawning areas and include the lower mainstems of the Sacramento and San Joaquin rivers and the Delta. These corridors allow the upstream and downstream passage of adults, and the emigration of smolts. Migratory habitat condition is strongly affected by the presence of barriers, which can include dams (i.e., hydropower, flood control, and irrigation flashboard dams), unscreened or poorly screened diversions, degraded water quality, or behavioral impediments to migration. For successful survival and recruitment of salmonids, freshwater migration corridors must function sufficiently to provide adequate passage. For this reason, freshwater migration corridors are considered to have a high conservation value even if the migration corridors are significantly degraded compared to their natural state.

4. Estuarine Areas

Estuarine areas free of migratory obstructions with water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between fresh and salt water are included as a PBF. Natural cover such as submerged and overhanging LWM, aquatic vegetation, and side channels, are suitable for juvenile and adult foraging. Estuarine areas are
considered to have a high conservation value as they provide factors which function to provide predator avoidance and as a transitional zone to the ocean environment.

2.2.4 Southern DPS of North American Green Sturgeon

Summary of sDPS Green Sturgeon Viability

The viability of sDPS green sturgeon is constrained by factors such as a small population size, lack of multiple populations, and concentration of spawning sites into just a few locations. The risk of extinction is believed to be moderate because, although threats due to habitat alteration are thought to be high and indirect evidence suggests a decline in abundance, there is much uncertainty regarding the scope of threats and the viability of population abundance indices (NMFS 2010). Viability is defined as an independent population having a negligible risk of extinction due to threats from demographic variation, local environmental variation, and genetic diversity changes over a 100-year timeframe (McElhany et al. 2000). The best available scientific information does not indicate that the extinction risk facing sDPS green sturgeon is negligible over a long term (~100 year) time horizon; therefore the sDPS is not believed to be viable. To support this statement, the PVA that was done for sDPS green sturgeon in relation to stranding events (Thomas et al. 2013) may provide some insight. While this PVA model made many assumptions that need to be verified as new information becomes available, it was alarming to note that over a 50-year time period the DPS declined under all scenarios where stranding events were recurrent over the lifespan of a green sturgeon.

Although the population structure of sDPS green sturgeon is still being refined, it is currently believed that only one population of sDPS green sturgeon exists. Lindley et al. (2007), in discussing winter-run Chinook salmon, states that an ESU represented by a single population at moderate risk of extinction is at high risk of extinction over the long run. This concern applies to any DPS or ESU represented by a single population, and if this were to be applied to sDPS green sturgeon directly, it could be said that sDPS green sturgeon face a high extinction risk. However, the position of NMFS, upon weighing all available information (and lack of information) has stated the extinction risk to be moderate (NMFS 2010).

There is a strong need for additional information about sDPS green sturgeon, especially with regards to a robust abundance estimate, a greater understanding of their biology, and further information about their habitat needs.

Southern DPS of North American Green Sturgeon Critical Habitat

Critical habitat was designated for the sDPS green sturgeon on October 9, 2009 (74 FR 52300). A full and exact description of all sDPS green sturgeon critical habitat, including excluded areas, can be found at 50 CFR 226.219. Critical habitat includes the stream channels and waterways in the Delta to the OHWL. Critical habitat also includes the main stem Sacramento River upstream from the I Street Bridge to Keswick Dam, the Feather River upstream to the fish barrier dam adjacent to the Feather River Fish Hatchery, and the Yuba River upstream to Daguerrue Dam. Coastal marine areas include waters out to a depth of 60 fathoms, from Monterey Bay in California, to the Strait of Juan de Fuca in Washington. Coastal estuaries designated as critical
habitat include San Francisco Bay, Suisun Bay, San Pablo Bay, and the lower Columbia River estuary. Certain coastal bays and estuaries in California (Humboldt Bay), Oregon (Coos Bay, Winchester Bay, Yaquina Bay, and Nehalem Bay), and Washington (Willapa Bay and Grays Harbor) are also included as critical habitat for sDPS green sturgeon.

Critical habitat for sDPS green sturgeon includes PBFs within the defined area that are essential to the conservation of the species. PBFs for sDPS green sturgeon have been designated for freshwater riverine systems, estuarine habitats, and nearshore coastal areas. In keeping with the focus on the California CV, we will limit our discussion to freshwater riverine systems and estuarine habitats.

Freshwater Riverine Systems

1. Food Resources

Abundant food items for larval, juvenile, subadult, and adult life stages for sDPS green sturgeon should be present in sufficient amounts to sustain growth, development, and support basic metabolism. Although specific information on food resources for green sturgeon within freshwater riverine systems is lacking, they are presumed to be generalists and opportunists that feed on similar prey as other sturgeons (Israel and Klimley 2008). Seasonally abundant drifting and benthic invertebrates have been shown to be the major food items of shovelnose and pallid sturgeon in the Missouri River (Wanner et al. 2007), lake sturgeon in the St. Lawrence River (Nilo et al. 2006), and white sturgeon in the lower Columbia River (Muir et al. 2000). As sturgeons grow, they begin to feed on oligochaetes, amphipods, smaller fish, and fish eggs as represented in the diets of lake sturgeon (Nilo et al. 2006), pallid sturgeon (Gerrity et al. 2006), and white sturgeon (Muir et al. 2000).

2. Substrate Type or Size

Critical habitat in the freshwater riverine system should include substrate suitable for egg deposition and development, larval development, subadults, and adult life stages. For example, spawning is believed to occur over substrates ranging from clean sand to bedrock, with preferences for cobbles (Emmett et al. 1991). Eggs are likely to adhere to substrates, or settle into crevices between substrates (Van Eenennaam et al. 2001; Deng et al. 2002). Larvae exhibited a preference for benthic structure during laboratory studies (Van Eenennaam et al. 2001; Deng et al. 2002; Kynard et al. 2005), and may seek refuge within crevices, but use flat-surfaced substrates for foraging (Nguyen and Crocker 2006).

3. Water Flow

An adequate flow regime is necessary for normal behavior, growth, and survival of all life stages in the upper Sacramento River. Such a flow regime should include stable and sufficient water flow rates in spawning and rearing reaches to maintain water temperatures within the optimal range for egg, larval, and juvenile survival and development (11°C - 19°C) (Mayfield and Cech 2004; Van Eenennaam et al. 2005; Allen et al. 2006). Sufficient flow is also needed to reduce the incidence of fungal infestations of the eggs, and to flush silt and debris from cobble, gravel,
and other substrate surfaces to prevent crevices from being filled in and to maintain surfaces for feeding. Successful migration of adult green sturgeon to and from spawning grounds is also dependent on sufficient water flow. Spawning in the Sacramento River is believed to be triggered by increases in water flow to about 14,000 cfs [average daily water flow during spawning months: 6,900 – 10,800 cfs; Brown (2007)]. In Oregon’s Rogue River, nDPS green sturgeon have been shown to emigrate to sea during the autumn and winter when water temperatures dropped below 10°C and flows increased (Erickson et al. 2002). On the Klamath River, the fall outmigration of nDPS green sturgeon has been shown to coincide with a significant increase in discharge resulting from the onset of the rainy season (Benson et al. 2006). On the Sacramento River, flow regimes are largely dependent on releases from Shasta Dam, thus the operation of this dam could have profound effects upon sDPS green sturgeon habitat.

4. Water Quality

Adequate water quality, including temperature, salinity, oxygen content, and other chemical characteristics are necessary for normal behavior, growth, and viability of all life stages. Suitable water temperatures would include: stable water temperatures within spawning reaches; temperatures within 11°C - 17°C (optimal range is 14°C - 16°C) in spawning reaches for egg incubation (March-August) (Van Eenennaam et al. 2005); temperatures below 20°C for larval development (Werner et al. 2007); and temperatures below 24°C for juveniles (Mayfield and Cech 2004; Allen et al. 2006). Suitable salinity levels range from fresh water (< 3 parts per thousand (ppt)) for larvae and early juveniles to brackish water (10 ppt) for juveniles prior to their transition to salt water. Prolonged exposure to higher salinities may result in decreased growth and activity levels and even mortality (Allen and Cech 2007). Adequate levels of dissolved oxygen (DO) are needed to support oxygen consumption by early life stages, ranging from 61.78 to 76.06 mg O₂ hr⁻¹ kg⁻¹ for juveniles (Allen and Cech 2007). Suitable water quality would also include water with acceptably low levels of contaminants (i.e., pesticides, organochlorines, selenium, elevated levels of heavy metals, etc.) that may disrupt normal development of embryonic, larval, and juvenile stages of green sturgeon. Poor water quality can have adverse effects on growth, reproductive development, and reproductive success. Studies on the effects of water contaminants upon green sturgeon are needed; studies performed upon white sturgeon have clearly demonstrated the negative impacts contaminants can have upon white sturgeon biology (Foster et al. 2001; 2001b; Feist et al. 2005; Fairey et al. 1997; Kruse and Scarnecchia 2002). Legacy contaminants such as mercury still persist in the watershed and pulses of pesticides have been identified in winter storm discharges throughout the Sacramento River basin, and the CV and Delta.

5. Migratory Corridor

Safe and unobstructed migratory pathways are necessary for adult green sturgeon to migrate to and from spawning habitats, and for larval and juvenile green sturgeon to migrate downstream from spawning and rearing habitats within freshwater rivers to rearing habitats within the estuaries. Unobstructed passage throughout the Sacramento River up to Keswick Dam (river mile (RM) 302) is important, because optimal spawning habitats for green sturgeon are believed to be located upstream of the RBDD (RM 242).
6. **Depth**

Deep pools of ≥ 5 m depth are critical for adult green sturgeon spawning and for summer holding within the Sacramento River. Summer aggregations of green sturgeon are observed in these pools in the upper Sacramento River upstream of Glenn-Colusa Irrigation District (GCID). The significance and purpose of these aggregations are unknown at the present time, but may be a behavioral characteristic of green sturgeon. Adult green sturgeon in the Klamath and Rogue rivers also occupy deep holding pools for extended periods of time, presumably for feeding, energy conservation, and/or refuge from high water temperatures (Erickson et al. 2002; Benson et al. 2006). As described above approximately 54 pools with adequate depth have been identified in the Sacramento River upstream of the GCID location.

7. **Sediment Quality**

Sediment should be of the appropriate quality and characteristics necessary for normal behavior, growth, and viability of all life stages. This includes sediments free of contaminants [e.g., elevated levels of heavy metals such as mercury, copper, zinc, cadmium, and chromium, polycyclic aromatic hydrocarbons (PAHs), and organochlorine pesticides] that can result in negative effects on any life stage of green sturgeon or their prey. Based on studies of white sturgeon, bioaccumulation of contaminants from feeding on benthic species may negatively affect the growth, reproductive development, and reproductive success of green sturgeon. The Sacramento River and its tributaries have a long history of contaminant exposure from abandoned mines, separation of gold ore from mine tailings using mercury, and agricultural practices with pesticides and fertilizers which result in deposition of these materials in the sediment horizons in the river channel. The San Joaquin River is a source for many of these same contaminants, although pollution and runoff from agriculture are the predominant driving force. Disturbance of these sediment horizons by natural or anthropogenic actions can liberate sequestered contaminants into the river. This is a continuing concern throughout the watershed.

**Estuarine Habitats**

1. **Food Resources**

Abundant food items within estuarine habitats and substrates for juvenile, subadult, and adult life stages are required for the proper functioning of this PBF for green sturgeon. Green sturgeon feed primarily on worms, mollusks, and crustaceans (Moyle 2002). Radtke (1966) studied the diet of juvenile sDPS green sturgeon and found their stomach contents to include a mysid shrimp, amphipods, and other unidentified shrimp. These prey species are critical for the rearing, foraging, growth, and development of juvenile, subadult, and adult green sturgeon within the bays and estuaries. Currently, the estuary provides these food resources, although annual fluctuations in the population levels of these food resources may diminish the contribution of one group to the diet of green sturgeon relative to another food source.

Invasive species are a concern because they may replace the natural food items consumed by green sturgeon. The Asian overbite clam (*Corbula amurensis*) is one example of a prolific
invasive clam species in the Delta. It has been observed to pass through white sturgeon undigested (Kogut 2008).

2. Water Flow

Within bays and estuaries adjacent to the Sacramento River (i.e., the Delta and the Suisun, San Pablo, and San Francisco bays), sufficient flow into the bay and estuary to allow adults to successfully orient to the incoming flow and migrate upstream to spawning grounds is required. Sufficient flows are needed to attract adult green sturgeon to the Sacramento River from the bay and to initiate the upstream spawning migration into the upper river. The specific quantity of flow required is a topic of ongoing research.

3. Water Quality

Adequate water quality, including temperature, salinity, oxygen content, and other chemical characteristics, is necessary for normal behavior, growth and viability of all life stages. Suitable water temperatures for juvenile green sturgeon should be below 24°C (75°F). At temperatures above 24°C, juvenile green sturgeon exhibit decreased swimming performance (Mayfield and Cech 2004) and increased cellular stress (Allen et al. 2006). Suitable salinities in the estuary range from brackish water (10 ppt) to salt water (33 ppt). Juveniles transitioning from brackish to salt water can tolerate prolonged exposure to salt water salinities, but may exhibit decreased growth and activity levels (Allen and Cech 2007), whereas subadults and adults tolerate a wide range of salinities (Kelly et al. 2007). Subadult and adult green sturgeon occupy a wide range of DO levels, but may need a minimum DO level of at least 6.54 mg O₂/l (Kelly et al. 2007; Moser and Lindley 2007).

Suitable water quality also includes water free of contaminants (e.g., pesticides, organochlorines, elevated levels of heavy metals) that may disrupt the normal development of juvenile life stages, or the growth, survival, or reproduction of subadult or adult stages. In general, water quality in the Delta and estuary meets these criteria, but local areas of the Delta and downstream bays have been identified as having deficiencies. Discharges of agricultural drain water have also been implicated in local elevations of pesticides and other related agricultural compounds within the Delta and the tributaries and sloughs feeding into the Delta. Discharges from petroleum refineries in Suisun and San Pablo bay have been identified as sources of selenium to the local aquatic ecosystem (Linville et al. 2002).

4. Migratory Corridor

Safe and unobstructed migratory pathways are necessary for timely passage of adult, sub-adult, and juvenile fish within the region’s different estuarine habitats and between the upstream riverine habitat and the marine habitats. Within the waterways comprising the Delta and bays downstream of the Sacramento River, safe and unobstructed passage is needed for juvenile green sturgeon during the rearing phase of their life cycle. Passage within the bays and the Delta is also critical for adults and subadults for feeding and summer holding, as well as to access the Sacramento River for their upstream spawning migrations and to make their outmigration back into the ocean. Within bays and estuaries outside of the Delta and the areas comprised by
Suisun, San Pablo, and San Francisco bays, safe and unobstructed passage is necessary for adult and subadult green sturgeon to access feeding areas, holding areas, and thermal refugia, and to ensure passage back out into the ocean. Currently, safe and unobstructed passage has been diminished by human actions in the Delta and bays. The CVP and SWP, responsible for large volumes of water diversions, alter flow patterns in the Delta due to export pumping and create entrainment issues in the Delta at the pumping and Fish Facilities. Power generation facilities in Suisun Bay create risks of entrainment and thermal barriers through their operations of cooling water diversions and discharges. Installation of seasonal barriers in the South Delta and operations of the radial gates in the Delta Cross Channel facilities alter migration corridors available to green sturgeon. Actions such as the hydraulic dredging of ship channels and operations of large ocean going vessels create additional sources of risk to green sturgeon within the estuary. Commercial shipping traffic can result in the loss of fish, particularly adult fish, through ship and propeller strikes.

5. Water Depth

A diversity of depths is necessary for shelter, foraging, and migration of juvenile, subadult, and adult life stages. Subadult and adult green sturgeon occupy deep (≥ 5 m) holding pools within bays, estuaries, and freshwater rivers. These deep holding pools may be important for feeding and energy conservation, or may serve as thermal refugia (Benson et al. 2006). Tagged adults and subadults within the San Francisco Bay estuary primarily occupied waters with depths of less than 10 m, either swimming near the surface or foraging along the bottom (Kelly et al. 2007). In a study of juvenile green sturgeon in the Delta, relatively large numbers of juveniles were captured primarily in shallow waters from 3 – 8 ft deep, indicating juveniles may require shallower depths for rearing and foraging (Radtke 1966).

Currently, there is a diversity of water depths found throughout the San Francisco Bay estuary and Delta waterways. Most of the deeper waters, however, are composed of artificially maintained shipping channels, which do not migrate or fluctuate in response to the hydrology in the estuary in a natural manner. Shallow waters occur throughout the Delta and San Francisco Bay. Extensive “flats” occur in the lower reaches of the Sacramento and San Joaquin river systems as they leave the Delta region and are even more extensive in Suisun and San Pablo bays. In most of the region, variations in water depth in these shallow water areas occur due to natural processes, with only localized navigation channels being dredged (e.g., the Napa River and Petaluma River channels in San Pablo Bay).

6. Sediment Quality

Sediment quality (i.e., chemical characteristics) is necessary for normal behavior, growth, and viability of all life stages. This includes sediments free of contaminants (e.g., elevated levels of selenium, PAHs, and organochlorine pesticides) that can cause negative effects on all life stages of green sturgeon (see description of sediment quality for riverine habitats above).
2.2.5 Climate Change

One major factor affecting the rangewide status of the threatened and endangered anadromous fish in the Central Valley and aquatic habitat at large is climate change.

Warmer temperatures associated with climate change reduce snowpack and alter the seasonality and volume of seasonal hydrograph patterns (Cohen et al. 2000). Central California has shown trends toward warmer winters since the 1940s (Dettinger and Cayan 1995). An altered seasonality results in runoff events occurring earlier in the year due to a shift in precipitation falling as rain rather than snow (Roos 1991; Dettinger et al. 2004). Specifically, the Sacramento River basin annual runoff amount for April-July has been decreasing since about 1950 (Roos 1987, 1991). Increased temperatures influence the timing and magnitude patterns of the hydrograph.

The magnitude of snowpack reductions is subject to annual variability in precipitation and air temperature. The large spring snow water equivalent (SWE) percentage changes, late in the snow season, are due to a variety of factors including reduction in winter precipitation and temperature increases that rapidly melt spring snowpack (VanRheenen et al. 2004). Factors modeled by VanRheenen et al. (2004) show that the melt season shifts to earlier in the year, leading to a large percent reduction of spring SWE (up to 100% in shallow snowpack areas). Additionally, an air temperature increase of 2.1°C (3.8°F) is expected to result in a loss of about half of the average April snowpack storage (VanRheenen et al. 2004). The decrease in spring SWE (as a percentage) would be greatest in the region of the Sacramento River watershed, at the north end of the Central Valley, where snowpack is shallower than in the San Joaquin River watersheds to the south.

Projected warming is expected to affect Central Valley Chinook salmon. Because the runs are restricted to low elevations as a result of impassable rim dams, if climate warms by 5°C (9°F), it is questionable whether any Central Valley Chinook salmon populations can persist (Williams 2006). Based on an analysis of an ensemble of climate models and emission scenarios and a reference temperature from 1951-1980, the most plausible projection for warming over Northern California is 2.5°C (4.5°F) by 2050 and 5°C by 2100, with a modest decrease in precipitation (Dettinger 2005). Chinook salmon in the Central Valley are at the southern limit of their range, and warming will shorten the period in which the low elevation habitats used by naturally-producing fall-run Chinook salmon are thermally acceptable. This would particularly affect fish that emigrate as fingerlings, mainly in May and June, and especially those in the San Joaquin River and its tributaries.

For winter-run Chinook salmon, the embryonic and larval life stages that are most vulnerable to warmer water temperatures occur during the summer, so this run is particularly at risk from climate warming. The only remaining population of winter-run Chinook salmon relies on the cold water pool in Shasta Reservoir, which buffers the effects of warm temperatures in most years. The exception occurs during drought years, which are predicted to occur more often with climate change (Yates et al. 2008). The long-term projection of operations of the CVP/SWP expects to include the effects of climate change in one of three possible forms: less total precipitation; a shift to more precipitation in the form of rain rather than snow; or, earlier spring
snow melt (Reclamation 2008). Additionally, air temperature appears to be increasing at a greater rate than what was previously analyzed (Lindley 2008; Beechie et al. 2012; Dimacali 2013). These factors will compromise the quantity and/or quality of winter-run Chinook salmon habitat available downstream of Keswick Dam. It is imperative for additional populations of winter-run Chinook salmon to be re-established into historical habitat in Battle Creek and above Shasta Dam for long-term viability of the ESU (NMFS 2014a).

Spring-run Chinook salmon adults are vulnerable to climate change because they over-summer in freshwater streams before spawning in autumn (Thompson et al. 2011). Spring-run Chinook salmon spawn primarily in the tributaries to the Sacramento River, and those tributaries without cold water refugia (usually input from springs) will be more susceptible to impacts of climate change. Even in tributaries with cool water springs, in years of extended drought and warming water temperatures, unsuitable conditions may occur. Additionally, juveniles often rear in the natal stream for one to two summers prior to emigrating, and would be susceptible to warming water temperatures. In Butte Creek, fish are limited to low elevation habitat that is currently thermally marginal, as demonstrated by high summer mortality of adults in 2002 and 2003, and will become intolerable within decades if the climate warms as expected. Ceasing water diversion for power production from the summer holding reach in Butte Creek resulted in cooler water temperatures, more adults surviving to spawn, and extended population survival time (Mosser et al. 2013).

Although steelhead will experience similar effects of climate change to Chinook salmon, as they are also blocked from the vast majority of their historic spawning and rearing habitat, the effects may be even greater in some cases, as juvenile steelhead need to rear in the stream for one to two summers prior to emigrating as smolts. In the Central Valley, summer and fall temperatures below the dams in many streams already exceed the recommended temperatures for optimal growth of juvenile steelhead, which range from 14°C to 19°C (57°F to 66°F). Several studies have found that steelhead require colder water temperatures for spawning and embryo incubation than salmon (McCullough et al. 2001). In fact, McCullough et al. (2001) recommended an optimal incubation temperature at or below 11°C to 13°C (52°F to 55°F). Successful smoltification in steelhead may be impaired by temperatures above 12°C (54°F), as reported in Richter and Kolmes (2005). As stream temperatures warm due to climate change, the growth rates of juvenile steelhead could increase in some systems that are currently relatively cold, but potentially at the expense of decreased survival due to higher metabolic demands and greater presence and activity of predators. Stream temperatures that are currently marginal for spawning and rearing may become too warm to support wild steelhead populations.

Southern DPS green sturgeon spawn primarily in the Sacramento River in the spring and summer. ACID is considered the upriver extent of green sturgeon passage in the Sacramento River. The upriver extent of green sturgeon spawning, however, is approximately 30 kilometers downriver of ACID where water temperature is higher than ACID during late spring and summer. Thus, if water temperatures increase with climate change, temperatures adjacent to ACID may remain within tolerable levels for the embryonic and larval life stages of green sturgeon, but temperatures at spawning locations lower in the river may be more affected. It is uncertain, however, if green sturgeon spawning habitat exists closer to ACID, which could allow spawning to shift upstream in response to climate change effects. Successful spawning of green
sturgeon in other accessible habitats in the Central Valley (i.e., the Feather River) is limited, in part, by late spring and summer water temperatures. Similar to salmonids in the Central Valley, green sturgeon spawning in the major lower river tributaries to the Sacramento River are likely to be further limited if water temperatures increase and suitable spawning habitat remains inaccessible.

In summary, observed and predicted climate change effects are generally detrimental to the species (McClure 2011; Wade et al. 2013), so unless offset by improvements in other factors, the status of the species and critical habitat is likely to decline over time. The climate change projections referenced above cover the time period between the present and approximately [2100]. While there is uncertainty associated with projections, which increases over time, the direction of change is relatively certain (McClure et al. 2013).

2.3 Environmental Baseline

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 consultation, and the impact of state or private actions which are contemporaneous with the consultation in process (50 CFR 402.02).

The action area encompasses 10.3 ac of Miner Slough (approximately 1050 ft upstream and 1025 ft downstream of the existing bridge), as well as 0.7576 ac of riparian area, emergent seasonal wetland area, and shrub scrub wetland area. The action area includes areas adjacent to the project that may be adversely effected by (but not limited to) the following: noise generated by pile driving; sedimentation and increased turbidity; and construction-related effects.

2.3.1 Status of Listed Species in the Action Area

The action area provides potential rearing and migration habitat for CCV steelhead, CV spring-run Chinook, Sacramento River winter-run Chinook, and sDPS green sturgeon. Due to observed life history patterns for these species, one or more of the following life stages of each species may be present in the action area year-round: spawning adult/migrating adult (steelhead and green sturgeon only), migrating or rearing subadult (green sturgeon only) or rearing and emigrating juveniles (green sturgeon only).

CCV steelhead

CCV steelhead are known to utilize the north Delta region primarily as a migration corridor for spawning adults migrating to spawning reaches upstream and for out-migrating juveniles, providing access to the ocean. Two ongoing monitoring studies that are typically used as indicators of presence and abundance of CCV steelhead in the Delta are the USFWS delta juvenile fish monitoring program (DJFMP), which includes a Kodiak trawl survey at Chipps Island; and the CDFW and Reclamation salvage monitoring efforts at the SWP/CVP export facilities. Juvenile steelhead sampled at Chipps Island show a difference in outmigration timing between natural and hatchery origin CCV steelhead (Nobriga and Cadrett 2001, USBR 2008). Hatchery origin fish were shown to outmigrate from the Sacramento River watershed to the
ocean between January and March. Natural origin fish displayed a more varied migration pattern with outmigration timing spread over a greater temporal scale, extending into spring and summer, suggesting that some juveniles may be present in the action area during the scheduled in-water work window. Adult escapement and spawning returns typically occur between August and November (Mc Ewan 2001) which also falls within the in-water work window.

Since the mid 1990’s salvage data has shown an overall decrease in the percent of natural origin vs. hatchery origin CCV steelhead recovered, as well as a decrease in relative abundance. These findings are indicative of a decrease in natural origin steelhead occupying the Delta.

CV spring-run Chinook

CV spring-run Chinook are thought to use the north Delta region as a migration corridor, however unlike steelhead, there is more evidence that they utilize this area for juvenile rearing as well. Allen and Hassler (1986) showed that in estuaries, as juvenile Chinook salmon increase in length, they tend to school in the surface waters of the main and secondary channels and sloughs, following the tides into shallow water habitats to feed. Within the Delta, juvenile Chinook salmon forage in shallow areas with protective cover, such as intertidal and subtidal mudflats, marshes, channels, and sloughs (McDonald 1960, Dunford 1975). A unique trait of CV spring-run Chinook life history relative to other Central Valley salmonids is the tendency for some juveniles to exhibit rearing in their natal stream for up to a year prior to outmigration. These “yearlings” may enter the Delta as early as November or December and continue outmigration through March. In addition to Delta rearing of fry and parr life stages, yearling individuals may utilize the north Delta for rearing as well. Peak outmigration of juvenile CV spring-run Chinook occurs in March and April and drops off in May. Adult escapement typically occurs from April through June and may extend into early summer.

Sacramento River winter-run Chinook

Similar to CCV steelhead, Sacramento River winter-run use the north Delta primarily as a migration corridor. Relative abundance is inferred through salvage monitoring data, CDFW rotary screw trap sampling, and U.S. Fish and Wildlife Service (USFWS) Delta Juvenile Fish Monitoring Program (DJFMP) data. Juveniles outmigrate from the mainstem Sacramento River in late fall/early winter and begin to enter the Delta in October. Juvenile outmigration timing is thought to be strongly correlated with winter rain events that result in higher flows in the Sacramento River. Juvenile outmigration may last until April. Adult escapement and spawning migration through the Delta is expected to begin in January and extend through the end of April.

sDPS North American green sturgeon

The north Delta functions as both rearing habitat and as a migration corridor for sDPS green sturgeon. Based on salvage monitoring data, sDPS green sturgeon may be present in the Delta year-round, with data suggesting that presence there peaks in July and August. Little is known about downstream migration timing of juveniles, however they are thought to rear in the Delta prior to entering the ocean, marking the transition from juvenile to subadult life stages. Ocean entry timing is also poorly understood. Nakamoto et al. (1995) found that on average, green
sturgeon on the Klamath River migrated to sea by age three and no later than age four. Laboratory experiments indicate that green sturgeon juveniles may occupy fresh to brackish water at any age, but they gain the physiological ability to transition to saltwater at approximately 1.5 years of age (Allen and Cech 2007). This information suggests that some juvenile and subadult green sturgeon will likely occupy the action area during the scheduled in-water work window. Based on data from acoustic tags (Heublein et al. 2009), adult sDPS green sturgeon leave the ocean and enter San Francisco Bay between January and early May. Migration through the bay/Delta takes about one week and progress upstream is fairly rapid to their spawning sites (Heublein et al. 2009).

2.3.2 Status of Critical Habitat in the Action Area

CCV steelhead and CV spring-run Chinook

The Action Area includes critical habitat that has been designated for CCV steelhead and CV spring-run Chinook. Critical habitat was designated under the same federal ruling for these two species as their habitat requirements are very similar. The PBFs for these species’ designated critical habitat that occur in the action area are: Migration Corridor and Estuarine Areas. Due to adjacent agricultural activity, levee construction and maintenance, shoreline armorning, removal of riparian and wetland vegetation, and removal of woody debris, these PBFs have been significantly degraded from their natural historical condition. Similar activities throughout the north Delta have resulted in degradation of these PBFs across the entire region. Conditions for juvenile rearing in these areas are poor and likely contribute to reduced growth and survival of these species.

Sacramento River winter-run Chinook

Critical habitat PBFs for Sacramento River winter-run Chinook that occur in the action area are: Access from the Pacific Ocean to appropriate spawning areas in the upper Sacramento River; Habitat and adequate prey free of contaminants; Riparian habitat that provides for successful juvenile development and survival; and access of juveniles downstream from the spawning grounds to San Francisco Bay and the Pacific Ocean. These PBFs have been significantly degraded from their historical condition and this degradation has contributed to the decline of this species. Access to historical spawning habitat upstream of Keswick and Shasta dams has been completely blocked. As in the case of CV spring-run Chinook and CCV steelhead, the quality and quantity of riparian habitat in the north Delta region has been degraded from its historical condition, reducing its overall functionality. Due to increasing urbanization, near-shore development, agriculture, and other human activities, the aquatic ecosystem in the Delta is exposed to a wide variety of contaminants. Multiple studies have documented high levels of contaminants in the Delta (Leatherbarrow et al. 2005, Brooks et al. 2012), suggesting that fish are exposed to them however, the inability to characterize concentrations and loading dynamics makes it difficult to quantify transport and total contaminant loading in the system (Johnson et al 2010). Highly managed hydrologic conditions in the Sacramento River likely impact outmigration patterns of juveniles, as outmigration timing has been correlated with high flow events
sDPS North American green sturgeon

The following PBFs for sDPS green sturgeon occur in the Action Area: Food Resources; Water Flow; Water Quality; Migratory Corridor; Water Depth; and Sediment Quality. Weston et al. (2004) found that measured levels of toxic substances throughout the Central Valley sourced from agricultural activity result in lethal effects to aquatic macroinvertebrates *Hyalella Azteca* (amphipod) and *Chironomus tentans* (midge). These findings suggest that the benthic food resources of sDPS green sturgeon may be impacted by agricultural activity in the north Delta.

Throughout the north Delta, water flow and quality has been degraded from historical conditions and is particularly poor during drought years. Low flow conditions increase water temperatures and can potentially create thermal barriers. Input of inorganic nutrients and contaminants from agricultural runoff has created poor water quality conditions in the north Delta and has had a negative impact on the aquatic ecosystem. Although levee construction and shoreline armoring has had less of an impact on juvenile rearing habitat of sDPS green sturgeon relative to listed salmonids, the change in habitat structure and substrate types has likely impacted food resources, piscivorous predator abundance and flow dynamics in the north Delta.

### 2.3.3 Factors Affecting Listed Species and Critical Habitat in the Action Area

Range-wide factors that affect listed fish species are described in section 2.2. This section will focus on factors that are specific to the Action Area.

The north Delta region has been degraded from its historic condition and many anthropomorphic and naturally occurring factors have led to the decline of anadromous fish in the system. Due to the construction of dams on the majority of major tributaries to the Sacramento River, flows and temperatures have been altered from their natural and historic regimes. Altered flow regimes can influence migratory cues, water quality (including contaminants, dissolved oxygen and nutrients for primary productivity) and temperature. Construction of the dams has also restricted access to historic spawning and rearing habitat, leading to the decline of anadromous fish abundance in the Sacramento River Basin. This is particularly true for Sacramento River winter-run Chinook salmon. Many of the PBFs described in section 2.3.2 have been impacted by altered and reduced flows in the north Delta. Drought conditions have played a significant role in the past 5 years as flows have decreased and summer temperatures have increased, leading to unfavorable environmental conditions in the Sacramento River watershed. This has resulted in direct and indirect impacts to listed fish as well as impacts to critical habitat. Increased temperatures also have the potential to disrupt aquatic macroinvertebrate production, leading to declines in food availability (Ward and Sanford 1982).

The north Delta has been heavily urbanized. This has likely increased the magnitude of contaminant loading in the aquatic ecosystem. Heavy metals, PAHs, petroleum products, plastics, fertilizer and many other contaminants can enter the river via urban runoff. Shore side development leads to decreased recruitment of LWM and results in a loss of habitat complexity which is a critical component of the freshwater rearing PBF.
2.3.4 Importance of the Action Area to the Survival and Recovery of Listed Species

The north Delta contains viable rearing and migratory habitat for listed anadromous fish species. In a fully-functional state, it promotes growth, survival and proliferation of the species. The specific frequency and magnitude of habitat utilization within Miner Slough by each species is not well understood and may vary among water year types. Presumably, it serves as a migration corridor for all listed species addressed in this BO, providing access to spawning grounds for returning adults as well as access to estuarine and ocean habitats for outmigrating juveniles. Miner Slough provides rearing habitat that is likely utilized by juvenile and subadult sDPS green sturgeon, although the spatial dynamics of rearing at those life stages is not well understood.

Miner Slough contains designated critical habitat for all listed species addressed in this BO and the action area contains PBFs related to rearing and migration (see section 2.3.2). These PBFs are of critical importance in the north Delta region as it serves as a spatial link between all habitats located within each species’ geographical range (spawning/freshwater and estuarine/ocean). The NMFS Recovery Plan for Central Valley Chinook Salmon and Steelhead (NMFS 2014a) identifies recovery actions in the Delta that are of vital importance to the eventual recovery of these listed species. The following recovery actions pertain to the proposed action and the habitat located within the action area:

- *Restore, improve, and maintain salmonid rearing and migratory habitats in the Delta and Yolo Bypass to improve juvenile salmonid survival and promote population diversity.*
- *Utilize biotechnical techniques that integrate riparian restoration for river bank stabilization instead of conventional rip rap.*
- *Increase monitoring and enforcement to stop illegal rip rap applications in the Delta.*
- *Curtail further development in active Delta floodplains through zoning restrictions, county master plans and other Federal, State, and county planning and regulatory processes, and land protection agreements.*
- *Implement management actions for addressing invasive aquatic species including those described in the California Aquatic Invasive Species Management Plan.*
- *Continue development of a long-term strategy for monitoring and regulating discharges from agricultural lands to protect waters within the Central Valley, including enforcing the regulations.*

An effort to finalize the NMFS recovery plan for sDPS green sturgeon is currently underway. A NMFS recovery outline was completed in 2010 and provides interim guidance on recovery actions (NMFS 2010). The following are recovery tasks that were identified in the outline and pertain to the proposed action and the habitat located within the action area:

- *Address the application of pesticides (Carbaryl and others) and herbicides applied to control burrowing shrimp and non-native plants in estuaries.*
- *Identify and prioritize potential contaminants of concern in the Central Valley.*
2.4 Effects of the Action

Under the ESA, “effects of the action” means the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action that will be added to the environmental baseline (50 CFR 402.02). Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur.

The proposed action includes activities that may directly or indirectly impact CCV steelhead and/or their critical habitat, CV spring-run Chinook salmon and/or their critical habitat, Sacramento River winter-run Chinook salmon and/or their critical habitat, and sDPS green sturgeon and/or their critical habitat. The following is an analysis of the potential direct and indirect effects to listed fish species and/or their critical habitat that may occur as a result of implementing the Miner Slough Bridge Replacement project.

2.4.1 Effects of the Proposed Action to Listed Fish Species

Based on best available life history information and monitoring data on the four species for which ESA designated critical habitat and geographical range occurs in the action area, species/life stages that are expected to be present during the proposed work window include the juvenile and adult life stages of CCV steelhead and the juvenile, subadult and adult life stages of sDPS green sturgeon. Other species/life stages are excluded from this analysis as potential effects to them are considered to be discountable based on their expected absence from the action area during the proposed work window (NMFS 2014a, USFWS 1976 – 2016 DJFMP Chipps Is. Trawl Data). The following analysis includes potential sources of take for the species resulting from the proposed action as well as the likelihood of those sources contributing to overall take associated with the proposed action.

Hydroacoustic Impacts

Construction of the new bridge will involve the installation of CISS piles within the channel and will require piles to be driven with an impact hammer. Each hammer strike on a given pile causes it to reverberate, generating a wave of sound that propagates through water. These high levels of sound have the potential to cause acute injury or death to fish present in Miner Slough and also have the potential to cause behavioral effects.

The fisheries hydroacoustic working group (FHWG 2008) has established threshold sound levels in which acute injury, cumulative injury (sound exposure level (SEL) for fish either ≥2g or <2g), or behavioral effects (root mean squared (RMS)) may occur. Those levels are 206-dB_{PEAK}, 187-dB_{SEL}, 183-dB_{SEL}, and 150-dB_{RMS} respectively. Acute injury may occur to any sized fish if they are within range of the source of sound to the extent that the sound exceeds a threshold of 206-dB_{PEAK} at any given time. Acute injury may also occur as a result of cumulative exposure to sound pressure if fish are exposed to levels exceeding 187-dB_{SEL} (for fish ≥2g) and 183-dB_{SEL} (for fish <2g) for more than one day or for a maximum of three piles driven in a day. Finally, changes in behavior may occur if sound levels exceed 150-dB_{RMS}. These behavioral changes may have deleterious effects to growth and survival of fish in the action area.
The most common form of acute injury to fish resulting from impact pile driving is barotrauma to the fish’s swim bladder. When sound propagates through the water, tissues of the swim bladder may become ruptured or torn as the sound wave passes through the fish and pressure levels rapidly rise and fall, causing the swim bladder to expand and contract. Internal organs adjacent to the swim bladder may be injured as well (Gaspin 1975). Both salmonids and sturgeon have physostomous swim bladders that may become injured in this way. Other injuries have been documented as well including structural damage to auditory organs (Enger 1981; Hastings et al. 1995, 1996) causing equilibrium problems (Hastings 1995). The fitness of salmonids and sturgeon may be reduced if they experience these injuries as their behaviors for swimming, predator avoidance, feeding and migrating may become temporarily or permanently impaired.

Behavioral effects may occur if sound levels exceed the established threshold of 150-dB\textsubscript{RMS}. Sound waves below 150-dB\textsubscript{RMS} are considered to be “effective quiet” and are not considered to be harmful to fish. Behavioral effects can include disruptions in feeding behavior, predatory avoidance behavior, and migratory behavior; impacting overall fitness of a species. “Agitation” is indicated by a change in swimming behavior, such as detected by Shin (1995) with salmonids, or “alarm” detected by McCauley et al. (2003). Additionally, Popper (1997) observed a “startle” response indicated by a quick burst in swimming following pile strikes.

Miner Slough serves as a migration corridor for both CCV steelhead and sDPS green sturgeon. Additionally, green sturgeon may also utilize this habitat for rearing. With respect to these species, it is expected that take will occur in the form of injury or death (acute injury) or harassment (behavioral effects).

**Dewatering and Fish Rescue Operations**

Following installation of the coffer dams around pier 3, dewatering will take place to make way for pile driving and pier installation. During the dewatering and fish rescue process, take will occur in the form of harassment as fish are handled and removed from the dewatered area. Sein nets, dip nets and/or electrofishing methods may be used to remove fish. Some incidental injury or mortality may occur during this process as fish experience abrasion from handling, exposure to air, and close proximity to one another as they are placed in the temporary holding tank. In addition, electrofishing techniques may result in some incidental injury or mortality. Throughout the duration of the project, based on best available information regarding relative abundance and migration timing, NMFS estimates that no more than 2 juvenile or subadult sDPS green sturgeon, 1 adult green sturgeon, 3 juvenile CCV steelhead, and/or 1 adult CCV steelhead may become entrained within the cofferdam or 72-inch piles (see Section 2.8.1).

**Increased Sedimentation and Turbidity**

Increased sedimentation and turbidity may occur as a result from the following construction activities within the channel: pile driving activities associated with the construction of the new bridge, temporary trestle, and operator control house; demolition of the existing bridge; geotechnical drilling; and dewatering activities. Sources of sedimentation and increased
turbidity outside of the channel include: realignment activities; excavation and installation of new bridge abutments; and post-project recontouring and regrading activities.

Juvenile and adult CCV steelhead are known to utilize the action area as a migration corridor during the proposed in-water work window and are therefore expected to be present during construction activities. Increased sedimentation and turbidity could potentially have direct and indirect adverse effects to adult CCV steelhead though gill fouling, reduced foraging ability and reduced predator avoidance (Kemp et al. 2011). Juvenile salmonids are not likely to avoid increased levels of turbidity below a level of 70 nephelometric turbidity units (NTU) (Bash et al. 2001). As a result, they may at greater risk to turbidity and sediment-related effects than adults. One effect of turbidity that has important implications for juvenile salmonids is that predator avoidance behavior has been shown to decrease at increased levels of turbidity (Gregory 1992). Growth and survival amidst increased sediment and turbidity levels has also been shown to decrease resulting from reduced prey detection and availability and physical injury due to increased activity, aggression and gill fouling (Suttle et al. 2004, Kemp et al 2011). Less information is available on the abundance and distribution at various life stages of sDPS green sturgeon. However, based on the best available information on their life history, individuals at the juvenile, sub-adult and adult life stages are expected to be present in the action area. Large increases in turbidity as well as sedimentation events have the potential to cause acute injury by gill fouling in sDPS green sturgeon. BMPs, minimization and avoidance measures will be implemented during construction to avoid or minimize increases in turbidity and sediment-related effects (see Section 1.4). Also, due to the relatively small spatial scale of the action area and proposed activities, increases in turbidity are expected to be transient in nature. Potential adverse effects to juvenile and adult CCV steelhead; and juvenile, sub-adult, and adult sDPS green sturgeon resulting from sedimentation and increases in turbidity will be insignificant as they will not occur at a scale in which take will occur.

Contaminants and Pollution-related Effects

The proposed action will involve heavy construction equipment and many potential sources of hazardous material contamination in the Action Area. Potential sources of pollutants include hazardous material spills, petroleum product leaks in construction equipment, introduction of metals from the operation of equipment and vehicles and the disturbance of sediments that may contain hazardous suspended particulates. BMPs, avoidance and minimization techniques will be implemented, minimizing the probability of pollutant incursion into Miner Slough. However, unlike sedimentation and turbidity-related effects, potential pollution-related effects have the potential to be highly persistent in the Action Area and may affect multiple species and life stages if they were to occur.

Incursion of contaminants into the action area has the potential to directly or indirectly effect species present at the time of construction or possibly afterwards. Construction equipment and heavy machinery will be present in the action area and metals may be deposited through their use and operation (Paul and Meyer 2001). These materials have been shown to alter juvenile salmonid behavior through disruptions to various physiological mechanisms including sensory disruption, endocrine disruption, neurological dysfunction and metabolic disruption (Scott and Sloman 2004). Oil-based products used in combustion engines are known to contain PAHs
which have been known to bio-accumulate in other fish taxa such as Pleuronectiformes and have carcinogenic, mutagenic and cytotoxic effects (Johnson et al. 2002). The exact toxicological effects of PAHs in salmonids and sturgeon is not well understood, although studies have shown that increased exposure of salmonids to PAHs reduced immunosuppression, increasing their susceptibility to pathogens (Arkoosh et al. 1998, Arkoosh and Collier 2002). Adult CCV steelhead and juvenile, sub-adult and adult sDPS green sturgeon are expected to be present in the action area during construction activities and would potentially be acutely injured by a pollution event. Other listed species and life stages are expected to be present in Miner Slough during winter and spring months and could be indirectly affected by a pollution event if contaminants were to settle within substrate in the active channel that may become disturbed at a later time.

BMPs, avoidance and minimization measures are described in Section 1.4 and will aid in minimizing potential direct or indirect adverse effects to listed fish species. Potential direct or indirect adverse effects resulting from the incursion of contaminants into Miner Slough are insignificant as they will not reach the scale where take occurs.

2.4.2 Effects of the Proposed Action to Critical Habitat PBFs

Critical habitat has been designated in the Action Area for CCV steelhead, CV spring-run Chinook, Sacramento River winter-run Chinook, and sDPS green sturgeon. The following analysis includes potential effects to critical habitat PBFs resulting from the proposed action.

Effects to critical habitat PBFs: Sedimentation

The action area contains rearing and migration habitat for all species addressed in this BO, with the potential for degradation of PBFs resulting from sedimentation associated with the proposed action. Kemp et al. (2011) describe a suite of physiochemical effects to lotic aquatic systems resulting from increased sedimentation and sediment-related events (Figure 2). Most notably, sedimentation events in a system that shares both lotic and estuarine characteristics have the potential to increase turbidity on a broad temporal scale and reduce oxygen supply. These impacts would degrade the PBFs of Migratory Corridor and Estuarine Areas for CCV steelhead and CV spring-run Chinook; and riparian habitat that provides for successful juvenile development and survival for Sacramento River winter-run Chinook salmon. Additionally, as is highlighted in Figure 2, sedimentation has the potential to reduce benthic invertebrate density and result in the loss of physical habitat. Therefore the following PBFs for sDPS green sturgeon could potentially be impacted by sedimentation: Food Resources; Water Quality; Migratory Corridor; Water Depth; and Sediment Quality.

BMPs, minimization and avoidance measures will be implemented during construction to avoid or minimize sediment-related effects (see Section 1.4). Potential adverse effects to critical habitat PBFs for the species addressed in this BO resulting from sedimentation will be insignificant as they will not occur at a scale in which habitat will be permanently impacted or reduce the conservation value of critical habitat.
Effects to critical habitat PBFs: Riparian Vegetation Removal

Removal of riparian vegetation will occur in the process of operating heavy construction machinery, equipment staging, and installation of the new infrastructure associated with the project. These activities have the potential to have direct or indirect adverse effects on critical habitat PBFs. Riparian vegetation plays a key role in the conservation value of rearing habitat for many salmonid and green sturgeon life stages. It provides shading to lower stream temperatures; increases the recruitment of LWM into the river, increasing habitat complexity; provides shelter from predators and; enhances the productivity of aquatic macro invertebrates (Pusey and Arthington 2003, Anderson and Sedell 1979). It has also been shown to directly influence channel morphology and may be directly correlated with improved water quality in aquatic systems (Dosskey et al. 2010, Schlosser and Karr 1981). It has been suggested by Dosskey et al. (2010) that presence and abundance of riparian vegetation can be directly correlated with water quality in riverine systems through biogeochemical cycling, soil and channel chemistry, water movement and erosion.

0.061 ac of forested riparian habitat will be permanently lost and 0.186 ac will be temporarily lost as a result of this project. This loss of riparian vegetation will result in the degradation of Migratory Corridors and Estuarine Area critical habitat PBFs for CCV steelhead and CV spring-run Chinook salmon; Riparian habitat that provides for successful juvenile development and
survival PBF for Sacramento River winter-run Chinook salmon; and Food Resources, Water Quality, and Migratory Corridor PBFs for sDPS green sturgeon. However, losses of riparian vegetation due to the implementation of the proposed action will be minimized and effects will be mitigated through the use of BMPs, minimization and avoidance measures, and on- and off-site mitigation activities described in Section 1.4. The loss of riparian vegetation will occur at a small, localized spatial scale and will not reduce the conservation value of critical habitat.

2.5 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). 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.

The north Delta region has experienced heavy agricultural activity and urbanization in the last century, leading to habitat loss, degradation of existing habitat and degradation of water quality. Grazing activities of livestock adjacent to water ways as well as the application of pesticides, herbicides and fertilizer result in an influx of harmful chemicals and inorganic nutrients that reduce the conservation value of existing fish habitat. In addition, agricultural and urban infrastructure have increased, altering the natural geomorphology of the north Delta and leading to increased inputs of contaminants (see Section 2.3.2). Urbanization increases the demand for additional infrastructure and access to natural resources such as potable water, natural gas, electricity, etc.

Recreational uses of the north Delta region have increased as well as local urban populations have grown in the area. Boat and other associated activities have led to increased shoreline development, leading to losses of riparian and wetland habitat. Boating activities may also directly impact riparian and wetland habitat as boats may operate in shallow, near shore areas. Contaminants that may have settled in sediments may be churned up by boat propellers and suspended in the water column. Additionally, recreational boats serve as primary vectors for the spread of invasive aquatic organisms including both invertebrates and plant species.

2.6 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 2.4) to the environmental baseline (Section 2.3) and the cumulative effects (Section 2.5), 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) reduce the value of designated or proposed critical habitat for the conservation of the species.

CCV steelhead, CV spring-run Chinook, Sacramento River winter-run Chinook, and sDPS green sturgeon have experienced significant declines in abundance and available habitat in the
California Central Valley and California Delta relative to historical conditions. The status of the species and critical habitat and environmental baseline sections (2.2 and 2.3) detail the current range-wide status of these species and also the current baseline conditions found in the north Delta region where the proposed action is to occur. Section 2.2.4 discusses the vulnerability of listed species and critical habitat to climate change projections in the California Central Valley and Delta. Climate effects in the Delta resulting from reduced summer flows and increased water temperatures throughout the Sacramento and San Joaquin watersheds will likely be exacerbated by increasing surface temperatures in the estuary. The north Delta is a highly manipulated system with flow and temperature regimes that differ drastically from their historical condition. Cumulative effects are likely to include continued loss of riparian and wetland habitat as well as degraded water quality resulting from agricultural activities and continued urban development.

**Effects of the Proposed Action to Listed Species**

The species/life stages that are expected to be present in the action area during the planned in-water work window of August 1 through November 30 are adult CCV steelhead; and juvenile, sub-adult, and adult sDPS green sturgeon. Hydroacoustic effects will result in take of these species as impact hammer pile driving techniques will be implemented and sound levels are projected to exceed the “effective quiet” threshold of 150 dB established by the FHWG. Acoustic impacts may result in acute injury and/or behavioral effects. Dewatering activities will cause take in the form of harassment as fish are handled and stored temporarily prior to their release back into Miner Slough. Sedimentation and increases in turbidity may occur as a result of pile driving activities associated with the construction of the new bridge, temporary trestle, and operator control house; demolition of the existing bridge; geotechnical drilling; and dewatering activities. Additionally, the potential exists for contaminant incursion into the channel, which could result in acute toxicity to listed fish species occupying the action area at the time of construction, or may result in contamination of sediment that could be re-suspended at a later time. Following the analysis of the BA and supporting materials, NMFS finds that the proposed minimization and avoidance measures will be sufficient to limit the effects of sedimentation, turbidity, and contaminants to insignificant levels.

**Effects of the Proposed Action to Critical Habitat**

Critical habitat has been designated in the action area for all four species addressed in this BO. The project will result in minor losses of benthic habitat due to the suspension of sediment associated with pile driving, installation of the coffer dam around pier 3 the removal of the existing bridge. Additionally, minor losses of riparian habitat will occur as a result of the added infrastructure associated with the project. PBFs pertaining to rearing and migration for all species will be impacted to a minor extent, however, there is ample analogous habitat upstream and downstream of the action area. It is NMFS’ determination that impacts will not result in channel-wide effects or reduce the conservation value of critical habitat and therefore will not impair the fitness, survival and recovery of these listed species.
Survival and Recovery

Miner Slough serves as a migratory corridor for all species addressed, providing access between estuarine/ocean habitat and freshwater rearing and spawning habitat. It also provides rearing habitat which is thought to be utilized by sDPS green sturgeon, although the spatial dynamics of their rearing behavior in the north Delta is not well understood. The habitat present in the action area falls under many of the PBF characterizations for each listed species. Although conservation value of the habitat present in the action area has been degraded from its historical condition, it remains functional to some degree and contributes to the carrying capacity of the north Delta region to support anadromous fish species.

Recovery actions identified in section 2.3.4 highlight the importance of the north Delta region to the survival and recovery of the species addressed in this document.

2.7 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, any effects of interrelated and interdependent activities, and cumulative effects, it is NMFS’ biological opinion that the proposed action is not likely to jeopardize the continued existence of CCV steelhead, CV spring-run Chinook salmon, Sacramento River winter-run Chinook salmon, or sDPS North American green sturgeon; or destroy or adversely modify their designated critical habitat (Table 2).

Table 2. Summary of ESA Section 7 Determinations.

<table>
<thead>
<tr>
<th>Species</th>
<th>Is the Proposed Action likely to result in adverse effects to the species?</th>
<th>Is the Proposed Action likely to result in Jeopardy for the species?</th>
<th>Is the Proposed Action likely to result in destruction or adverse modification of critical habitat?</th>
</tr>
</thead>
<tbody>
<tr>
<td>CCV steelhead (O. mykiss)</td>
<td>Likely</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>CV spring-run Chinook (O. tshawytscha)</td>
<td>Not Likely</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Sacramento River winter-run Chinook (O. tshawytscha)</td>
<td>Not Likely</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>sDPS North American green sturgeon (Acipenser mediorsis)</td>
<td>Likely</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>
2.8 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 incidental take statement.

2.8.1 Amount or Extent of Take

In the biological opinion, NMFS determined that incidental take would occur as follows:

NMFS anticipates incidental take of CCV steelhead and sDPS green sturgeon to occur in the course of the Miner Slough Bridge Replacement project. Specifically, NMFS anticipates that juvenile and/or adult CCV steelhead; and/or juvenile, subadult, and/or adult green sturgeon may be killed, wounded or harassed as a result of project implementation as they will likely be present in the Action Area during the scheduled in-water work window. Take is expected to occur in the form of injury, death and/or harassment resulting from pile driving and dewatering activities (see Section 2.4.1 Effects of the Proposed Action to Listed Fish Species).

Take Resulting from Hydroacoustic Impacts

The proposed pile driving activities associated with the project include pile driving using both vibratory and impact hammering methods. For the new bridge structure: a cofferdam will be installed around pier 3 using a vibratory hammer (approximately 88 sheet piles); small diameter piles will be driven in behind the dewatered cofferdam using a vibratory hammer and then driven to final tip elevation using an impact hammer (25 24-inch steel piles); and at pier 4, two 72-inch steel piles will be driven using an impact hammer. 1,620 hammer strikes per pile are expected for the 72-inch CISS piles and 1,800 are expected for the 24-inch piles. Number of piles per day will be limited to two 72-inch piles and 10 24-inch piles. Remaining piles associated with the project will be installed outside the active channel. Noise that may reverberate through the ground as a result of driving these piles is not expected to exceed the “effective quiet” threshold of 150dB.

Table 3 includes distance thresholds in which CCV steelhead or sDPS green sturgeon may be exposed to sound levels that may result in injury or death. The installation of piers 2 and 3 will involve in-water pile driving, resulting in excessive noise that is expected to cause take in the form of injury or death during the proposed in-water work window. The actual number of CCV steelhead and sDPS green sturgeon that may be incidentally taken during these activities is
expected to be small. NMFS will use the area of sound pressure waves projected to occur as a surrogate for the amount and extent of take resulting from exposure to high sound pressure levels (>206-dB_Peak, and >187-dB_SEL(fish ≥2g)). The species addressed in this BO are not expected to occur in the action area at a life stage in which they would be <2g in total mass. Table 3 indicates that peak sound levels will be below the 206 dB threshold, therefore take in the form of injury or death will not occur as a result of sound levels exceeding the peak limit. Cumulative SEL thresholds are exceeded, therefore take is expected to occur in the form of injury or death for fish migrating within 630 feet of the 72-inch CISS piles and within 354 feet of the 24-inch CISS piles. Beyond this distance, sound pressure levels are expected to exceed the 150-dBRMS threshold in which behavioral impacts may occur for 2,192 feet upstream and 630 feet downstream for 72-inch piles, and 971 feet upstream and 603 feet downstream for 24-inch piles (Table 3). Within these distances, take is expected to occur in the form of harassment as behavior may be disrupted.

If Caltrans monitoring finds that sound pressure levels greater than 206-dB_Peak, 187-dB_SEL, and 150-dBRMS extend beyond the calculated distances provided to NMFS, the amount of incidental take may be exceeded.

Take Resulting from Dewatering and Fish Rescue Operations

The proposed in-water work window coincides with adult CCV steelhead migration timing, indicating that adult steelhead may become entrained in the coffer dam that will be constructed around pier 3 or the 72-inch CISS piles that will be installed at pier 2. In addition, juvenile, subadult and adult sDPS green sturgeon may be migrating or rearing within the action area, creating the possibility that they may become entrained in these areas as well. NMFS estimates that no more than 2 juvenile or subadult sDPS green sturgeon, 1 adult green sturgeon, 3 juvenile CCV steelhead, and/or 1 adult CCV steelhead may become entrained within the cofferdam or 72-inch piles. Based on fish salvage analysis from a previous Caltrans project (NMFS 2014b), it is expected that no more than ten percent of fish captured and relocated during pier installation may be injured or killed.

Exceedance of Take

If these ecological surrogates are not met and maintained, the proposed project will be considered to have exceeded anticipated take levels, thus requiring Caltrans to coordinate with NMFS within 24 hours on ways to reduce the amount of take down to anticipated levels. Anticipated incidental take will be exceeded if the criteria described above are not met, the project is not implemented as described in the BA prepared for this project, all conservation measures are not implemented as described in the BA (including successful completion of monitoring and reporting criteria), or the project is not implemented in compliance with the terms and conditions of this incidental take statement. If take is exceeded formal consultation must be reinitiated (50 C.F.R. § 402.16(a)).
Table 3. Results from hydroacoustic impact calculations provided by Caltrans (attenuated piles) (Caltrans 2016)

<table>
<thead>
<tr>
<th>New Bridge Structure</th>
<th>Station</th>
<th>Pile Type</th>
<th>Pile Length</th>
<th>Number of Piles</th>
<th>Pile Location</th>
<th>Piles per Day</th>
<th>Estimated Blows per Pile (assumes piles driven to 90% of length)</th>
<th>Distance to Water (feet)</th>
<th>Peak</th>
<th>RMS</th>
<th>Single-strike SEL</th>
<th>Cumulative SEL at 10 meters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abutment 1</td>
<td>M1 26+19.93</td>
<td>24-inch</td>
<td>65</td>
<td>28</td>
<td>On Land</td>
<td>7</td>
<td>1,170</td>
<td>56</td>
<td></td>
<td></td>
<td></td>
<td>Piles on land and cannot be attenuated</td>
</tr>
<tr>
<td>Pier 2</td>
<td>M1 26+79.14</td>
<td>72-inch</td>
<td>100</td>
<td>2</td>
<td>In Water</td>
<td>2</td>
<td>1,620</td>
<td>0</td>
<td>204</td>
<td>189</td>
<td>179</td>
<td>214</td>
</tr>
<tr>
<td>Pier 3</td>
<td>M1 27+89.14</td>
<td>24-inch</td>
<td>100</td>
<td>25</td>
<td>In Coffer Dam</td>
<td>10</td>
<td>1,800</td>
<td>0</td>
<td>190</td>
<td>175</td>
<td>162</td>
<td>205</td>
</tr>
<tr>
<td>Pier 4</td>
<td>M1 28+99.14</td>
<td>72-inch</td>
<td>100</td>
<td>2</td>
<td>On Land</td>
<td>2</td>
<td>1,620</td>
<td>16</td>
<td></td>
<td></td>
<td></td>
<td>Piles on land and cannot be attenuated</td>
</tr>
<tr>
<td>Abutment 5</td>
<td>M1 29+61.90</td>
<td>24-inch</td>
<td>65</td>
<td>28</td>
<td>On Land</td>
<td>7</td>
<td>1,170</td>
<td>85</td>
<td></td>
<td></td>
<td></td>
<td>Piles on land and cannot be attenuated</td>
</tr>
</tbody>
</table>

1 Single-strike SELs below 150 dB do not accumulate to cause injury to fish.

<table>
<thead>
<tr>
<th>New Bridge Structure</th>
<th>East of the Bridge (Upstream)</th>
<th>West of the Bridge (Downstream)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Distance to 187-dB Cumulative SEL Criteria (feet)</td>
<td>Distance to 183-dB Cumulative SEL Criteria (feet)</td>
</tr>
<tr>
<td>Abutment 1</td>
<td>Piles on land and cannot be attenuated</td>
<td></td>
</tr>
<tr>
<td>Pier 2</td>
<td>1,290</td>
<td>2,192</td>
</tr>
<tr>
<td>Pier 3</td>
<td>354</td>
<td>607</td>
</tr>
<tr>
<td>Pier 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abutment 5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2 Constrained by the river channel.
2.8.2 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.

2.8.3 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).

1. Acoustic attenuation devices will be implemented to minimize noise generated by pile driving activities.

2. Fish rescue operations will be conducted according to the specifications provided to NMFS and the service-approved supervising biologist(s) will oversee all aspects of dewatering and fish handling operations.

3. Caltrans shall conduct onsite and offsite compensatory mitigation for temporary and permanent impacts to designated critical habitat.

4. Caltrans shall report any incidence of take to NMFS within 24 hours.

5. Caltrans shall provide a report of project activities to NMFS by December 31 of the construction year (2018 is currently the proposed calendar year).

2.8.4 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 reasonable and prudent measures (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 incidental take statement (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. In-water pile driving activities (installation of piers 2 and 3) will be restricted to August 1 to October 31. No in-water pile driving activity is to extend into the month of November as it may pose a significant disturbance to anadromous fish migration through the north Delta.

   b. Acoustic attenuation devices will be routinely inspected for proper installation, operation, and functionality.
c. Sound monitoring shall occur to ensure that sound pressure levels generated by pile driving activities are not exceeding those included in the incidental take statement above.

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

a. If they are to occur, all aspects of fish rescue operations shall be supervised by at least one service approved biologist who will be personally on site throughout each phase of the rescue operation.

b. A written plan for a fish rescue operation specific to this project shall be established prior to implementation of the project. The plan shall be thoroughly understood by all individuals that are to be involved and operations shall be conducted in strict accordance with the written plan.

3. The following terms and conditions implement reasonable and prudent measure 3:

a. Caltrans shall rehabilitate the construction zone through onsite planting of native riparian vegetation.

b. Caltrans shall purchase mitigation credits at a NMFS approved conservation bank at a 2:1 ratio for temporary losses and 3:1 ratio for impacts to critical habitat in the action area associated with this project.

c. Caltrans shall, to the maximum extent practicable and above the ordinary high water level, mix agricultural grade soil with RSP at a 70:30 ratio (rock:soil), cover the RSP with one foot of soil and plant native riparian shrubs and trees.

d. All onsite riparian vegetation shall be watered and maintained to ensure maximum survival for a three year period following construction.

4. The following terms and conditions implement reasonable and prudent measure 4:

a. Caltrans shall record the date, number, and specific location of all listed fish that are relocated for each construction-related activity in the project area in addition to any direct mortality observed during in-water work and relocation. If a listed species is observed injured or killed by project activities, Caltrans shall contact NMFS within 48 hours at 916-930-3600. Notification shall include species identification, the number of fish, and a description of the action that resulted in take. If possible, dead individuals shall be collected, placed in an airtight bag, and refrigerated with the aforementioned information until further direction is received from NMFS.

5. The following terms and conditions implement reasonable and prudent measure 5:
2.9 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. Caltrans should continue to work cooperatively with other State and Federal agencies, private landowners, governments, and local watershed groups to identify opportunities for cooperative analysis and funding to support salmonid and sturgeon habitat restoration projects within the Sacramento River Basin. Implementation of future restoration projects is consistent with agency requirements set forth in section 7(a)(1).

2. Caltrans should limit the amount of riprap used for bank and in-stream protection in the Central Valley to the minimum amount needed for erosion and scour protection and bench design. Engineering plans shall be provided to the contractors that clearly show the amount of riprap to be placed at the project site. Limitation of riprap in design considerations is consistent with agency requirements set forth in section 7(a)(1).

3. Caltrans should consider using alternative methods to traditional rock slope protection for bridge projects and incorporating geotextiles for bank erosion control and prevention. Bioengineered products are available on the market and can be used to protect areas against erosive forces along shorelines and is an alternative to using riprap. Implementation of riprap alternatives in design considerations is consistent with agency requirements set forth in section 7(a)(1).

2.10 Reinitiation of Consultation

This concludes formal consultation for The Miner Slough Bridge Replacement Project.

As 50 CFR 402.16 states, reinitiation of formal consultation is required 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 incidental take statement 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 agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion, or (4) a new species is listed or critical habitat designated that may be affected by the action.

2.11 “Not Likely to Adversely Affect” Determinations

NMFS does not anticipate the proposed action will take CV spring-run Chinook salmon or Sacramento River winter-run Chinook salmon (Table 2). Based on best available information, juvenile and adult life stages of each of these species are known occur in the action area and are not expected to be present in the action area during the proposed in-water work window. NMFS has also determined that the proposed action will NLAA critical habitat designated for CCV steelhead and CV spring-run Chinook salmon. Details regarding the potential for direct or indirect adverse effects to these species and/or their critical habitats are included in Section 2.4.

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

Section 305(b) of the Magnuson-Stevens Act (MSA) directs Federal agencies to consult with NMFS on all actions or proposed actions that may adversely affect EFH. The MSA (section 3) defines EFH as “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.” 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) also requires NMFS to recommend measures that can be taken by the action agency to conserve EFH.

This analysis is based, in part, on the EFH assessment provided by Caltrans and descriptions of EFH for Pacific coast salmon (PFMC 1999) contained in the fishery management plans developed by the Pacific Fishery Management Council and approved by the Secretary of Commerce.

3.1 Essential Fish Habitat Affected by the Project

EFH designated under the Pacific Coast Salmon Fisheries Management Plan (FMP) may be affected by the Proposed Action. Additional species that utilize EFH designated under this FMP within the Action Area include fall-run/late fall-run Chinook salmon. Habitat Areas of Particular Concern (HAPCs) that may be either directly or indirectly adversely affected include (1) complex channels and floodplain habitats, and (2) estuaries.
3.2 Adverse Effects on Essential Fish Habitat

Effects to the HAPCs listed in section 3.1 above are discussed in context of effects to critical habitat PBFs as designated under the ESA in section 2.4.2. Effects to ESA-listed critical habitat and EFH HAPCs are appreciably similar, therefore no additional discussion is included. A list of adverse effects to EFH HAPCs is included in this EFH consultation. Affected HAPCs are indicated by number corresponding to those identified as present in the action area in section 3.1:

Sedimentation and turbidity

- Reduced habitat complexity (1, 2)

Bridge Installation and Removal of Existing Bridge

- Degraded water quality (2)
- Permanent loss of wetland habitat (1)
- Reduction in aquatic macroinvertebrate production (1)

3.3 Essential Fish Habitat Conservation Recommendations

The following are EFH conservation recommendations for the proposed project:

(1) Caltrans should continue to work cooperatively with other State and Federal agencies, private landowners, governments, and local watershed groups to identify opportunities for cooperative analysis and funding to support salmonid and sturgeon habitat restoration projects within the Sacramento River Basin. HAPCs that would benefit from this include (1) complex channels and floodplain habitats, and (2) estuaries.

(2) Caltrans should limit the amount of riprap used for bank and in-stream protection in the Central Valley to the minimum amount needed for erosion and scour protection and bench design. Engineering plans shall be provided to the contractors that clearly show the amount of riprap to be placed at the project site. HAPC complex channels and floodplain habitats would benefit from this.

(3) Caltrans should consider using alternative methods to traditional rock slope protection for bridge projects and incorporating geotextiles for bank erosion control and prevention. Bioengineered products are available on the market and can be used to protect areas against erosive forces along shorelines and is an alternative to using riprap.

Fully implementing these EFH conservation recommendations would protect, by avoiding or minimizing the adverse effects described in section 3.2, above, approximately 10.3 ac of designated EFH for Pacific coast salmon.
3.4 Statutory Response Requirement

As required by section 305(b)(4)(B) of the MSA, Caltrans must provide a detailed response in writing to NMFS within 30 days after receiving an EFH Conservation Recommendation. Such a response must be provided at least 10 days prior to final approval of the action if the response is inconsistent with any of NMFS’ EFH Conservation Recommendations unless NMFS and the Federal agency have agreed to use alternative time frames for the Federal agency response. The response must include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with the Conservation Recommendations, the Federal agency must explain its reasons for not following the recommendations, including the scientific justification for any disagreements with NMFS over the anticipated effects of the action and the measures needed to avoid, minimize, mitigate, or offset such effects (50 CFR 600.920(k)(1)).

In response to increased oversight of overall EFH program effectiveness by the Office of Management and Budget, NMFS established a quarterly reporting requirement to determine how many conservation recommendations are provided as part of each EFH consultation and how many are adopted by the action agency. Therefore, we ask that in your statutory reply to the EFH portion of this consultation, you clearly identify the number of conservation recommendations accepted.

3.5 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 affects the basis for NMFS’ EFH Conservation Recommendations (50 CFR 600.920(l)).

4. FISH AND WILDLIFE COORDINATION ACT

The purpose of the Fish and Wildlife Coordination Act (FWCA) is to ensure that wildlife conservation receives equal consideration, and is coordinated with other aspects of water resources development (16 USC 661). The FWCA establishes a consultation requirement for Federal agencies that undertake any action to modify any stream or other body of water for any purpose, including navigation and drainage (16 USC 662(a)), regarding the impacts of their actions on fish and wildlife, and measures to mitigate those impacts. Consistent with this consultation requirement, NMFS provides recommendations and comments to Federal action agencies for the purpose of conserving fish and wildlife resources, and providing equal consideration for these resources. NMFS’ recommendations are provided to conserve wildlife resources by preventing loss of and damage to such resources. The FWCA allows the opportunity to provide recommendations for the conservation of all species and habitats within NMFS’ authority, not just those currently managed under the ESA and MSA.
The following recommendation applies to the proposed action:

(1) Caltrans should support and promote aquatic and riparian habitat restoration within California’s Central Valley, and implement practices that avoid or minimize negative impacts to salmon, steelhead, and sturgeon on all of their project sites within critical habitat.

The action agency must give these recommendations equal consideration with the other aspects of the proposed action so as to meet the purpose of the FWCA.

This concludes the FWCA portion of this consultation.

5. 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.

5.1 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 are the Caltrans, U.S. Department of Transpiration, and CH2M Hill Companies Ltd. Other interested users could include the USFWS; CDFW; FHWG; Delta Stewardship Council; and other federal, state, and local government entities or NGOs involved in Delta fish and wildlife conservation. Individual copies of this opinion were provided to Caltrans. This opinion will be posted on the Public Consultation Tracking System web site (https://pcts.nmfs.noaa.gov/pcts-web/homepage.pets ). The format and naming adheres to conventional standards for style.

5.2 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.

5.3 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 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 MSA implementation and reviewed in accordance with West Coast Region ESA quality control and assurance processes.

6. REFERENCES

A. Literature Cited


California Department of Transportation. 2016. Biological Assessment for the Miner Slough Bridge Replacement Project. 91pp.


61


B. Federal Register Notices Cited


