# Environmental Assessment

# Eastside Bypass Conveyance Project


U.S. Department of the Interior
Bureau of Reclamation

January 2016
SJRRP-EA-15-3

*This Page Intentionally Left Blank*

# List of Acronyms and Abbreviations

| | |
|---|---|
| CAAQS | California Ambient Air Quality Standards |
| CalEEMod | California Emissions Estimator Model |
| CCID | Central California Irrigation District |
| CDFW | California Department of Fish and Wildlife |
| CEQ | Council on Environmental Quality |
| CEQA | California Environmental Quality Act |
| cfs | cubic feet per second |
| CNDDB | California Natural Diversity Database |
| CWD | Cawelo Water District |
| DDT | dichlorodiphenyltrichloroethane |
| DWR | Department of Water Resources |
| EFH | Essential Fish Habitat |
| ESB | Eastside Bypass |
| ESA | Endangered Species Act |
| FCWD | Firebaugh Canal Water District |
| FMP | Fishery Management Plan |
| FWCA | Fish and Wildlife Coordination Act |
| GHG | Greenhouse Gas |
| ITA | Indian Trust Assets |
| LSJLD | Lower San Joaquin Levee District |
| MNWR | Merced National Wildlife Refuge |
| NAAQS | National Ambient Air Quality Standards |
| National Register | National Register of Historic Properties |
| NHPA | National Historic Preservation Act |
| NMFS | National Marine Fisheries Service |
| $NO_2$ | Nitrogen Dioxide |
| $NO_x$ | Nitrogen Oxide |
| NRDC | National Resources Defense Council |
| $O_3$ | Ozone |
| OHWM | Ordinary High Water Mark |
| PEIS/R | Programatic Environmental Impact Statement/ Report |
| $PM_{10}$ | Inhalable Particulate Matter between 2.5 and 10 Microns in Di |
| $PM_{2.5}$ | Particulate Matter Less than 2.5 Microns in Diameter |
| Project | Eastside Bypass Conveyance Project |
| Reclamation | U.S. Bureau of Reclamation |
| ROD | Record of Decision |
| ROG | Reactive Organic Gases |
| Service | U.S. Fish and Wildlife Service |
| Settlement | Stipulation of Settlement in NRDC, et.al., vs. Kirk Rodgers, et.al. |
| SJKF | San Joaquin kit fox |

| | |
|---|---|
| SJR | San Joaqin River |
| SJRRP | San Joaqin River Restoration Program |
| SJVAB | San Joaquin Valley Air Basin |
| SJVAPCD | San Joaquin Valley Air Pollution Control District |
| $SO_2$ | Sulfur Dioxide |
| TMDL | Total Maximum Daily Load |
| VOC | Volatile Organic Compounds |

# Table of Contents

# 1. Introduction

This Environmental Assessment (EA) has been prepared by the Bureau of Reclamation (Reclamation) in accordance with the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) regulations (40 CFR

1500-1508), and DOI Regulations (43 CFR Part 46). This EA examines the potential direct, indirect, and cumulative impacts to the affected environment associated with implementing the Eastside Bypass Conveyance Project (Project). The Project is located in Merced County, approximately 19 miles southwest of the city of Merced, California, in the vicinity of El Nido Road and the southern extent of the Merced National Wildlife Refuge (MNWR) (Figures 1 and 2).

Reclamation proposes to excavate accumulated sand in the low-flow channel of the Mariposa Slough/Eastside Bypass (ESB), remove inoperable concrete culverts currently impeding flows at the low-flow El Nido Road crossing, and remove the low-flow crossing to improve hydraulic conditions at this location. Figure 3 shows current estimates of channel elevations.

## 1.1 San Joaquin River Restoration Program

Friant Dam on the San Joaquin River (SJR) was completed in 1942 by the Bureau of Reclamation. In 1945 the Madera Canal was completed and in 1951 the Friant-Kern Canal was completed. With these canals, Reclamation has diverted water supplies to over 1 million acres of farmland, supporting a $4.5 billion economy in the San Joaquin Valley. Operation of the dam ceased flow in some portions of the river for several months of the year and substantially altered the natural flow regime (Reclamation, 2011). In 1988 a coalition of environmental groups, led by the Natural Resources Defense Council (NRDC), filed a lawsuit known as *NRDC*, et al., *v. Kirk Rodgers*, et al. (*NRDC v. Rodgers 2006*), challenging the renewal of long-term water service contracts between the United States and Central Valley Project Friant Division contractors. In 2006, the Court approved the Settlement Agreement and the terms of authorization and implementation were signed into law in 2009 with the San Joaquin River Restoration Settlement Act (Public Law 111-11). The Settlement Agreement establishes two primary goals:

- Restoration Goal – To restore and maintain fish populations in "good condition" in the main stem SJR below Friant Dam to the confluence of the Merced River, including naturally reproducing and self-sustaining populations of salmon and other fish.

- Water Management Goal – To reduce or avoid adverse water supply impacts on all of the Friant Division long-term contractors that may result from the Interim and Restoration flows provided for in the Settlement.

The Settlement Agreement calls for increased releases from Friant Dam to the confluence of the Merced River (termed Interim and Restoration Flows), a combination of channel and water control structure modifications along the SJR below Friant Dam, and the reintroduction of Chinook salmon(*Oncorhynchus tshawytscha*). Restoration Flows are specific volumes of water to be released from Friant Dam during different water year types, according to Exhibit B of the

Settlement Agreement; Interim Flows are experimental flows that began in 2009 and continued until 2014 when Restoration Flows were initiated with the purpose of collecting relevant data concerning flows, temperatures, fish needs, seepage losses, recirculation, recapture, and reuse. These Interim and Restoration Flows are protected for in-stream and fish and wildlife uses under the California Water Code.

Under current conditions, Restoration Flows through Reach 4A of the SJR and the ESB raise the shallow groundwater table in the adjacent agricultural fields. Reclamation currently limits the release from Friant Dam and Mendota Dam to non-damaging flow rates below Sack Dam, which may be increased from 150 cubic feet per second (cfs) to 300 cfs in February 2016. The Restoration Administrator, consistent with requests by the Technical Advisory Committee, recommends maximizing the amount of flow conveyed into downstream reaches to take advantage of data collection opportunities. However, Reclamation cannot implement recommendations that exceed non-damaging flow rates.

The San Joaquin River Restoration Program's (SJRRP) Programmatic Environmental Impact Statement/Report (PEIS/R) and Record of Decision were completed in 2012 (Reclamation 2012a and 2012b), which analyzed and disclosed the impacts of releasing Restoration Flows as well as a series of construction and management actions to achieve the Restoration and Water Management goals. The proposed work at El Nido Road is a component of the series of actions analyzed in the PEIS/R along Reach 4A of the SJR and the ESB, which seek to improve hydraulic conditions for the passage of fish and Restoration Flows. Technical Report No. SRH-2011-20, *Reach 4A Conveyance in the Vicinity of Sand Slough*, and Technical Report No. SRH-2013-02, *Low Flow Conveyance in the Vicinity of El Nido Road* (Appendix D), were prepared by the Denver Technical Service Center of Reclamation in 2011 and 2013, respectively. These reports cover conveyance issues in the vicinity of the Sand Slough control structure and the ESB control structure as well as analyze the effect of excavating sand upstream and downstream of El Nido Road in order to reduce low-flow water surface elevations upstream of the road. The Project is one of a suite of actions described in the technical reports to improve fish passage. Several other fish passage improvement projects that were included in the technical reports are now being developed by the California Department of Water Resources (DWR) and will likely be implemented in the next two years. Due to the nature of fish passage, each barrier requires fish to expend valuable resources during migration that could otherwise be used to migrate to the ocean as juvenile fish or to successfully spawn as adult fish. Addressing each partial barrier improves the chances for fish to migrate and reproduce successfully. As previously mentioned, the PEIS/R analyzed and disclosed, at a programmatic level, the potential effects of implementing the SJRRP.

Hydraulic modeling of the ESB shows that there is a substantial flow impediment at the El Nido Road crossing. Sand has accumulated in the low-flow channel and the road culverts have silted in completely. The Project has been designed to reduce the water surface elevation through the ESB between El Nido Road and the MNWR weir at flows greater than 150 cfs. El Nido Road is located 5.5 miles upstream of the MNWR weir, which is 3.3 miles upstream of the ESB control structure.

**FIGURE 1. PROJECT LOCATION MAP**

# Figure 2 Action Area Map

El Nido Road

El Nido Road

Eastside Bypass

Flow

**Legend**

- Access Road
- Staging Area
- Low-Flow Crossing & Culvert Removal
- Excavation
- Action Area (200-ft buffer from activities)
- Merced NWR

0 0.0375 0.075 0.15 Miles

1 inch = 295 feet

N W E S

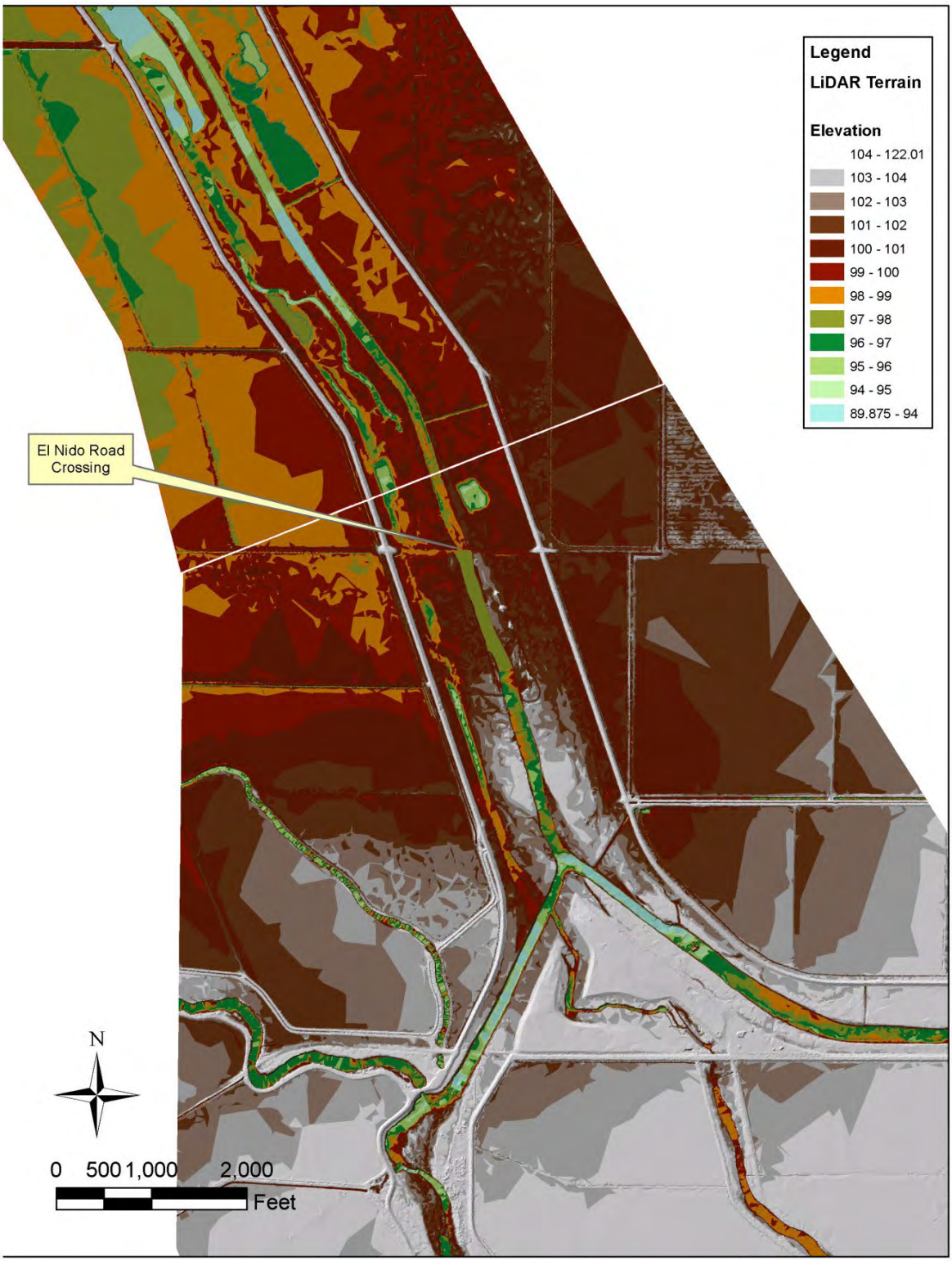
**Action Area Map**

Source: Esri, DigitalGlobe, GeoEye, i-cubed,

Date Created: January 25, 2016

Prepared By: Alex Aviles, Bureau of Reclamation

**FIGURE 3. ESTIMATED CURRENT CHANNEL ELEVATIONS**



## 1.2 Need for the Proposal

Reclamation needs to alleviate the flow impediment currently caused by the clogged culverts beneath the El Nido Road low-flow crossing and sand deposition in the ESB channel in order to release Restoration Flows in accordance with the Settlement Agreement and Settlement Act. The purpose of the proposed action is to facilitate passage of Restoration Flows through the Project area of the ESB channel, in accordance with the Settlement Agreement and Public Law 111-11.

# 2. Proposed Action and Alternatives

## 2.1 No Action Alternative

Under the No Action Alternative, Reclamation would not excavate the accumulated sand or remove the inoperable culverts. Flow conveyance impediments that have been identified would remain in place, possibly interfering with implementation of Restoration Flows as implementation of the SJRRP progresses.

## 2.2 Alternatives Considered but not Carried Forward

### 2.2.1 160-Foot Wide Bridge Alternative

The 160-Foot Wide Bridge Alternative assumes that a bridge with a 160 ft opening would be constructed over the existing low flow channel. The piers would be placed 20 feet on either side of the center and the deck elevation would be at approximately 102 feet above sea level. Restoration Flows are intended to be as high as 4,500 cfs; however, the bridge for this alternative would overtop at flows greater than 2,200 cfs and at high flows result in significant abutment scour. El Nido Road has been closed to road traffic in a separate agreement with the local landowner; therefore, access across the low-flow crossing will no longer be permitted.

### 2.2.2 60-Foot Wide Bridge Alternative

The 60-Foot Wide Bridge Alternative assumes that a bridge with a 60 ft total opening would be constructed over the existing low-flow channel with the deck placed at approximately 100 feet above sea level. The bridge would not be able to allow passage of full Restoration Flows at 4,500 cfs, and would overtop at 1,500 cfs and at high flows, resulting in significant abutment scour. El Nido Road has been closed to road traffic in a separate agreement with the local landowner; therefore, access across the low-flow crossing will no longer be permitted.

### 2.2.3 Two 15-Foot Wide Culverts Alternative

The Two 15-Foot Wide Culverts Alternative assumes that two concrete box culverts that are 15 feet wide by 4 feet high with an invert opening elevation of 95 feet on the upstream side and 94.5 feet on the downstream side would be constructed at the El Nido Crossing. The culverts would become pressurized at a flow of approximately 475 cfs and the road overtopped by about 0.5 foot at a flow of 700 cfs. The upstream and downstream faces of the crossing would need protection with rock to prevent erosion and to protect from approximately 10 feet of abutment scour when it becomes overtopped. El Nido Road has been closed to road traffic in a separate

agreement with the local landowner; therefore, access across the low-flow crossing will no longer be permitted.

Additional flow information for these alternatives can be found in Technical Report No. SRH-2011-20, *Reach 4A Conveyance in the Vicinity of Sand Slough* (Appendix D). Current subsidence rates in this region may be as high as 0.5 ft per year and the life span of a bridge may be severely limited because the water surfaces may rise and sedimentation rates may increase. The rejected bridge and culvert alternatives could result in erosion of the levees near the structure abutments.

## 2.3 Proposed Action

The proposed action involves the excavation of a compound channel in the ESB from El Nido Road to approximately 2,500 feet downstream into the MNWR. The compound channel would consist of an inner low-flow channel with a 135-foot wide base and 3:1 bank slope. The amount of material to be excavated from the compound channel would be approximately 34,000 cubic yardswhich would be hauled off-site to a facility where it is anticipated that the material would be processed for commercial or industrial purposes, such as cement production.

The approximate length of El Nido Road between the two levees is 1,600 feet, and 135 feet across the low-flow channel. The existing non-functioning culverts at the El Nido Road crossing would be removed and disposed of off-site at a permitted facility. The culverts would not be replaced and El Nido Road would be removed and graded as part of the low-flow channel. Approximately 10 acres of surface area would be excavated. The approximate area of channel excavation and culvert removal is shown in Figure 2.

Sand excavation from the low-flow channel would begin first in the sequence of Project activities and continue for several weeks, with ongoing haul and disposal of excavated material to an offsite facility. During the last week of sand excavation, the demolition and removal of the nonfunctioning culverts would occur.

Earthmoving would be accomplished with typical construction equipment such as bulldozers, excavators, skid steer loaders, graders, and aggregate transport/dump trucks. A truck mounted crane or backhoe would be used to assist in the removal of the clogged culverts. Reclamation proposes to start the proposed action on July 1, 2016. Work is anticipated to last up to 6 weeks.

Depending on the water year type and frequency and magnitude of high flow events, it is anticipated that sediment would need to be removed from the channel annually to maintain the channel's hydraulic capacity. Annual maintenance excavations in years following the initial excavation would be within the footprint and amount described for the initial excavation and is estimated to take between 1 and 6 weeks to complete, depending on the amount of accumulated sediment. Annual maintenance excavation activities would be completed in summer months and will be coordinated with the recommendations of the Restoration Administrator.

**2.3.1 Environmental Commitments and Best Management Practices** The following environmental commitments and best management practices will be implemented to avoid and minimize any potential impacts to the human environment:

a) The limits of project disturbance in the field will be identified with stakes or other markers, which will be removed once work is finished.

b) Staging will occur outside of waters of the U.S., east of the bypass, in an area of the farm equipment stockyard used for the adjacent agricultural operation.

c) All work will occur in the summer months of July and August when the ESB is dry and chance for storm events is low. Prior to construction activities for the initial excavation activities and potential maintenance activities, Reclamation will coordinate with the Implementing Agencies on the specific actions planned to dewater the action area, if necessary, and develop a plan for potential fish rescue activities, as appropriate.

d) In order to keep the Project area dry prior to and during the Project, the MNWR will temporarily shut off the inlet valve near the east levee that provides water to the refuge.

e) If a high water table is reached during excavation, water will be pumped and discharged onto the dry ground surface outside of the inner low-flow channel, away from the levees and nearby drainage in accordance with applicable Clean Water Act Section 401 and 402 permits. Pumped and discharged water will dissipate by infiltration. No surface runoff will be allowed.

f) Active construction sites will be watered 2-3 times per day, sufficient to keep soil moist enough so that fugitive dust emissions will be minimized.

g) A Spill Prevention, Control and Countermeasure Plan will be required where release of oil and oil products have the potential to enter into the channel in quantities that may be harmful. Spill prevention kits will be in close proximity to the Project site at all times and workers will be trained in their use.

h) The contractor will be required to keep their equipment in good working condition in order to prevent leaks and spills of petroleum products or other fluids into waters of the U.S.

i) The contractor or Reclamation will prepare and implement a Storm Water Pollution Prevention Plan that includes details on the installation and monitoring of erosion control devices.

j) Tracked out material on the paved portion of El Nido Road near the Project site will be swept up once a day to minimize fugitive dust emissions, trackout, and sediment in storm water runoff.

k) Workers will tightly secure covering or maintain at least 2 feet of freeboard on trucks hauling excavated or fill material.

l) Excavating activities will be suspended if wind speeds exceed 25 mph.

m) Vehicles will observe a speed limit of 15 mph on access roads within the Project

area.

n) All equipment will be washed prior to arriving at the Project site to remove soil and seeds to prevent spread of noxious weed seeds.

o) Within 10 days before the start of work on the Project (including future maintenance excavations), a qualified biologist will survey accessible areas within the immediate Project footprint, for nesting migratory birds, particularly ground-nesting birds. If an active nest is found, the District will coordinate with a qualified biologist, the U.S. Fish and Wildlife Service (Service) or California Department of Fish and Wildlife(CDFW) to identify a suitable construction-free buffer around the nest. The buffer(s) will be identified on the ground with flagging, fencing or by other easily visible means, and will be maintained and monitored by a qualified biologist until it has been determined that the young have fledged or that the nest is no longer active. If active nests are observed and the recommended nest avoidance buffer is not feasible, a qualified biologist may propose a non-disturbance buffer based on, but not limited to, species-specific information, site lines from the nest to the work-site, and observations of the nesting bird's reaction to Project activities. If the biologist determines that a smaller avoidance buffer is warranted, the biologist will provide Reclamation with a written explanation as to why. Based on the submitted explanation, Reclamation will determine whether to allow the smaller buffer.

p) Per the Service's 2011 *Standardized Recommendations for Protection of the Endangered San Joaquin Kit Fox Prior to or During Ground Disturbance* and 1999 *Survey Protocol* (Service, 2011; Service, 1999), a Service-approved biologist will conduct pre-construction protocol level surveys for San Joaquin kit fox (SJKF; *Vulpes macrotis mutica*), signs or presence and dens in the Project footprint and within a 200-foot area outside of the Project footprint. The survey will be conducted no less than 14 days and no more than 30 days prior to the initiation of any ground-disturbing activities associated with the Project. If SJKF, SJKF signs, or active SJKF dens are found during the survey, Project work will not begin until the Service has been contacted and appropriate consultation has been completed.

q) All Project-related vehicle traffic will be restricted to established roads and designated Project areas.

r) Work on the Project will not occur at night when SJKF are most active (*i.e.* start no less than 30 minutes after sunrise and stop work no less than 30 minutes prior to sunset).

s) All food-related trash items such as wrappers, cans, bottles, and food scraps will be disposed of in securely closed containers and removed at least once every day from the entire Project site.

t) To prevent inadvertent entrapment of SJKF or other animals during the excavation phases of the Project, all excavated, steep-walled holes or trenches more than 2-feet deep will be covered at the close of each working day by plywood or similar

materials. If the trenches cannot be closed, one or more escape ramps (with slopes greater than or equal to 1:1) constructed of earthen-fill or wooden planks will be installed. Before such holes or trenches are filled, they will be thoroughly inspected for trapped animals. If at any time a trapped or injured SJKF is discovered, work on the Project will stop immediately and the Service will be consulted.

u) All construction pipes, culverts, or similar structures with a diameter of 4- inches or greater that are stored at a construction site for one or more overnight periods shall be thoroughly inspected for SJKF and other animals before the pipe is subsequently buried, capped, or otherwise used or moved in any way. In the unlikely event a SJKF is discovered in a structure, work on the Project will stop immediately, and that structure will not be moved until the Service has been consulted.

v) An employee education program will be conducted. The program will consist of a brief presentation by a Service-approved biologist. The program will include a description of the SJKF and its habitat needs; a report of SJKF occurrence in the Project area; an explanation of the status of the species and its protection under the Endangered Species Act (ESA); and a list of measures being taken to avoid impacts to the species during construction. A fact sheet conveying this information will be prepared for distribution to construction personnel.

w) No firearms will be allowed on the Project site.

x) No pets will be allowed on the Project site.

y) Use of rodenticides in the Project area will not be allowed.

z) Upon completion of the Project, all areas subject to temporary ground disturbances, including staging areas and temporary roads, will be re-contoured if necessary, and if appropriate revegetated with native seed to promote restoration of the area to pre-project conditions,.

aa) Sightings of SJKF will be reported to the California Natural Diversity Database (CNDDB).

bb) If annual maintenance excavations must continue beyond 5 years after initial work (original excavation and culvert removal) on the Project has been completed, potential effects to federally protected species will be reevaluated.

cc) Additional avoidance and minimization measures required by all applicable permits will be implemented.

# 3. Affected Environment and Environmental Consequences

## 3.1 Resources Not Analyzed in Detail

Impacts to the following resources were considered and found to be minor or absent. Brief explanations for their elimination from further consideration are provided below:

- Indian Sacred Sites: The proposed action does not have the potential to affect or prohibit access to and ceremonial use of Indian sacred sites.
- Indian Trust Assets (ITA): The proposed action does not have the potential to affect ITA (Appendix A).
- Environmental Justice: No significant changes in agricultural communities or practices would result from the proposed action. The proposed action is not likely to have effects to any individuals or populations within the action area. Accordingly, the proposed action would not have disproportionately negative impacts on low-income or minority populations within the Project area.

## 3.2 No Action Alternative

The No Action Alternative would consist of Reclamation not excavating the accumulated sand or removing the inoperable culverts. Flow conveyance impediments that have been identified would remain in place, interfering with implementation of Restoration Flows released by the SJRRP as the program progresses.

## 3.3 Proposed Action

### 3.3.1 Transportation

El Nido Road is a private dirt road, used primarily for agriculture activities and is owned by Tri-Iest Dairy. The road was only used by Tri-Iest Dairy and the Lone

Tree Mutual Company to cross the ESB as they both have facilities or lands on both sides. El Nido Road has been closed to road traffic in a separate agreement with the local landowner. Reclamation obtained a flowage easement with Tri-Iest Dairy granting the permanent inundation of El Nido Road where it crosses the ESB. Although it may take longer, the local landowners are able to use other private roads to continue daily operations.

### 3.3.2 Water Resources

*Hydrology*

The San Joaquin Valley has a semi-arid climate, receiving an average of 5 to 16 inches of rainfall annually. Surface water flows through the valley originate mainly from the western Sierra Nevada where much of the precipitation occurs as snow. The SJR begins in the Sierra Nevada

in eastern Madera County. The river flows into the valley and takes a northerly path towards the Sacramento-San Joaquin Delta. On its way to the delta, the SJR collects flows from several tributary rivers and creeks (USGS 2001).

2014 was a Critical-Low water year, and 2015 is currently categorized as a Critical-Low water year type as well; therefore, there currently is not enough water behind Friant Dam to support SJRRP flow releases. If 2016 were to be a Critical-High, Normal or High water year, SJRRP flows could be released, under current conditions with downstream seepage constraints due in part to sand deposit and flow impediment in the ESB. SJRRP flows would be picked up at Mendota Pool, until capacity is available, which is anticipated to be achieved for up to 300 cfs by 2016. The picked up supply from Mendota Pool can be used by the SJR Exchange contractors and Reclamation would release less water from the San Luis Reservoir through the Delta-Mendota Canal (see Figure 4a). The water that remains in the San Luis Reservoir would then become recaptured Restoration Flows and become part of the SJRRP's Recapture and Recirculation Program. The main objective of the Recapture and Recirculation Program is to offset adverse water supply impacts to the Friant Division long-term contractors as specified in the Water Management Goal of the Settlement Agreement.

The channel capacity in the ESB increases from south to north up to 18,500 cfs at the confluence of Bear Creek. Within the ESB, there is a linear low-flow channel in the center of the two levees. A second meandering low-flow channel runs along the west levee. The meandering low-flow channel appears to be the historic Mariposa Slough channel since it resembles the meander pattern of the slough mapped on historic quad maps. Flow within the ESB is controlled by the ESB control structure, and is generally received from the Chowchilla Bypass. High flows were measured in March 2011 with a peak of 11,598 cfs on March 31, 2011, as measured at the ESB near El Nido Road flow gauge 1.5 miles downstream from El Nido Road.

The ESB can be dry many months of the year, especially during extended periods of drought. During the winter, the downstream end of the ESB located in the MNWR will hold water for months at a time, providing waterfowl habitat.

The proposed action would improve hydraulic conditions in the ESB channel by reducing water surface elevations as much as a foot. Once the Project is complete, Reclamation would be able to convey additional flows through the ESB. Once Restoration flows are released from Friant Dam, these flows would follow a path through Reaches 1, 2, 3, and 4A of the SJR, then into the ESB over the Sand Slough control structure, and all the way downstream until the ESB meets Reach 5 of the SJR (see Figure 4b). These flows will then continue down the SJR. This is the route that Restoration Flows will take until the route downstream of Sand Slough is decided upon, which could either be for Restoration Flows to continue into the lower ESB or go into the Mariposa Bypass, to Reach 4B2, and then to Reach 5 of the SJR.

The proposed action would allow additional Restoration Flows through the ESB by decreasing the water surface elevation at Sand Slough and thereby improving conveyance. Depending on the existing channel capacity, Restoration Flows could flow beyond Mendota Pool and would no longer be terminated at Mendota Pool. SJR Exchange contractors would return to their traditional practice of obtaining their Central Valley Project water from the San Luis Reservoir.

Higher flows carry greater sediment loads and depending on the water year, may require maintenance excavation of the low-flow channel every year for up to 5 years to maintain the hydraulic improvements of this Project. The SJRRP plans to carry out the maintenance dredging as necessary. Future excavations would also occur when the channel is dry[2], between May and September, and would take 1 to six weeks, depending on the amount of sediment that has accumulated in the channel.

**FIGURE 4A. CURRENT FLOW PATH OF SJRRP FLOWS**

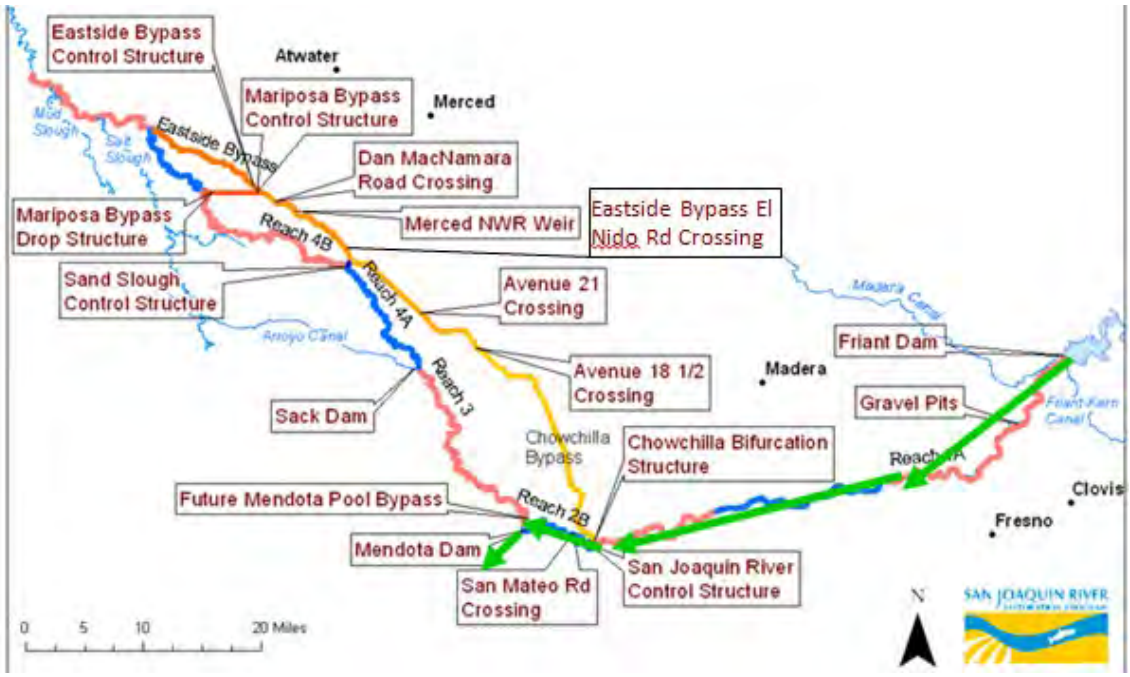
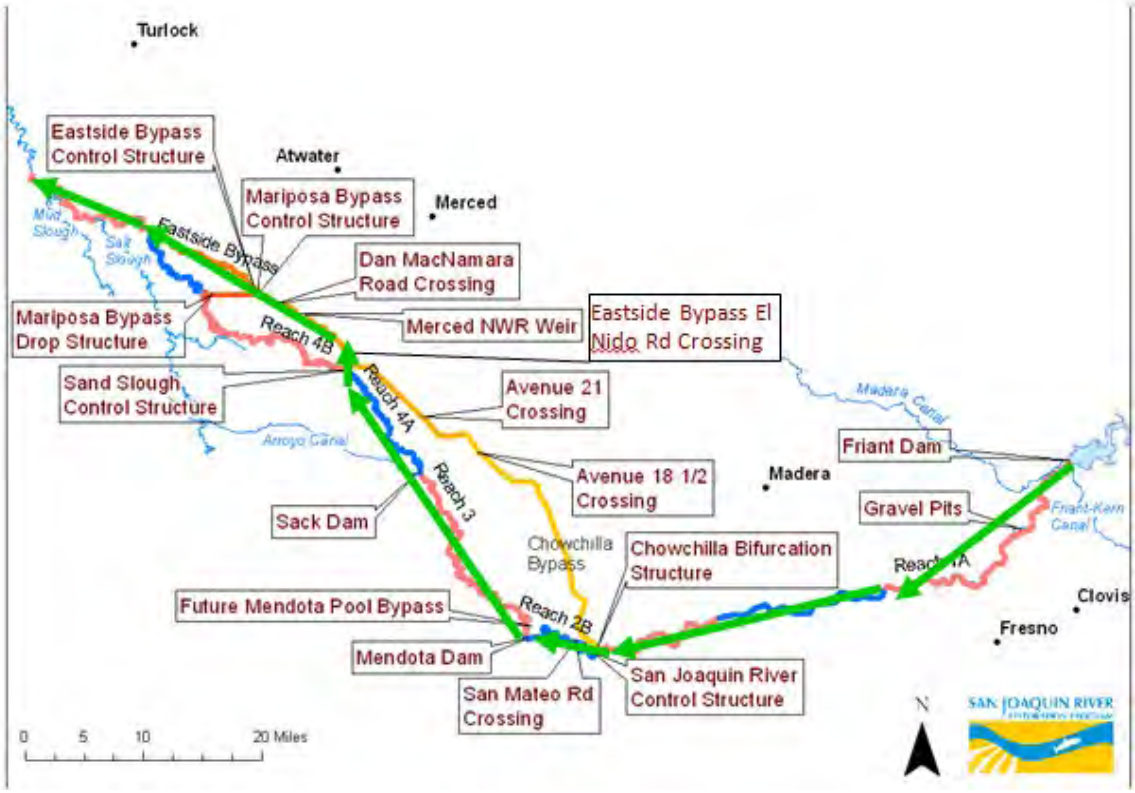


**FIGURE 4B. FUTURE FLOW PATH OF SJRRP FLOWS OVER THE NEXT FIVE YEARS[3]**




[3] This flow path may change once the SJR Reach 4B routing decision is made, which is expected in 2020.

*Water Quality*

Water quality in various segments of the SJR watershed below Friant Dam is degraded because of low-flow and discharges from agricultural areas and waste water treatment plants. Section 303(d) of the Clean Water Act requires the identification of water bodies that do not or are not expected to meet water quality standards. An impaired water body is prioritized on the 303(d) List and a Total Maximum Daily Load (TMDL) established for each pollutant exceeding standards within that water body. Several waters of the U.S. within the watershed of the ESB are considered impaired. TMDL and Basin Plan (Water Quality Control Plan for the California Regional Water Quality Control Board, Central Valley Region, Sacramento and San Joaquin River Basins) amendments are currently in place for diazinon and chloropyrifos runoff into the SJR. TMDLs and Basin Plan amendments are currently being developed for selenium, salt and boron, pesticides, and unknown toxicity (State Water Resources Control Board 2010).

The ESB has not been evaluated to determine whether it is an impaired waterbody by the Central Valley Regional Water Quality Control Board. However, just downstream of the ESB, Deep Slough has been listed as impaired based on pH readings above 8.5 (State Water Resources Control Board 2010). Basin Plan objectives state that pH level should not be lower than 6.5 or

higher than 8.5. Upstream tributaries to the ESB are also considered impaired and are on the 303(d) list, such as Ash Slough and the SJR (Mendota Pool to Bear Creek). Ash Slough feeds into the ESB from the Chowchilla River, and downstream of the Chowchilla Bifurcation Structure. SJR water is diverted into the ESB by the Sand Slough control structure upstream of El Nido Road. Ash Slough is impaired based on high levels of chlorpyrifos and a TMDL is expected to be developed by 2021 (State Water Resources Control Board 2010). The SJR from Mendota Pool to Bear Creek is considered impaired based on high levels of boron, chlorpyrifos, DDT ( dichlorodiphenyltrichloroethane), diazinon, Group A pesticides, and unknown toxicity (State Water Resources Control Board 2010). The TMDL for DDT was developed in 2011.

The proposed action would not involve the use or discharge of diazinon, chlorpyrifos, selenium, boron, salt, DDT, or Group A Pesticides. Therefore, the proposed a ction would not contribute to the exceedance of an established or proposed TMDL in nearby impaired waterways.

The Project would result in the disturbance of more than an acre of land, triggering the need for the Project to comply with Section 402 of the Clean Water Act and obtain a National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities, Order No. 200-0009-DWQ, NPDES No. CAS000002 (Construction General Permit). In order to obtain coverage under the Construction General Permit, Reclamation will electronically file permit registration documents, including a Notice of Intent and Storm Water Pollution Prevention Plan with the State Water Resources Control Board.

Water quality concerns may arise with equipment working in the ESB channel. Concerns include potential erosion and equipment leaks, resulting in the release of petroleum products, lubricants, or other hazardous materials into the river channel. In order to avoid and minimize potential impacts to water quality in the ESB and SJR, water quality protection measures listed in Section 2.3.1 and required by permits for sections 401, 402, and 404 of the Clean Water Act will be implemented.

### 3.3.3 Flood Protection

The levees bordering the ESB are locally maintained and operated by the Lower San Joaquin Levee District and the Central Valley Flood Protection Board. The levees rise above the landscape, approximately 15 feet in height. The terrain leading up to the levees along the ESB is flat. However, with the current condition of poor hydraulic flow through the ESB at El Nido Road, Restoration Flow rates above 50 cfs cause seepage issues and the shallow groundwater table in adjacent lands to rise, damaging agricultural fields. However, with the implementation of several projects to address seepage in the restoration area, the channel capacity will likely increase to 300 cfs by the summer of 2016.

Restoration flows could also potentially degrade the integrity of the levees and flood management zone. However extensive work has been completed by the California DWRto establish the true capacity of the levees in the ESB to convey water. The most current geotechnical information indicates that for Restoration Flows to meet U.S. Army Corps of Engineers criteria for levee stability, the Middle ESB would need a capacity of 580 cfs (Department of Water Resources 2015).

The proposed action would restore the low-flow channel to a design with lower bed elevations, and remove flow impediments such as failed culverts below the low-flow crossing, and the low-flow crossing itself. The increased capacity of the low-flow channel and improved flows reduces the chance of raising the water table and causing potential damages to levees.

### 3.3.4 Land Use and Agriculture

The landscape near the project area has been dramatically altered by human activities over the past century. Most of the area is in agricultural production with permanent crops. Conversion from ranch lands to permanent crops has occurred on adjacent properties within the last two decades. The 1918, 1946, and 1962 Sandy Mush historic quad maps illustrate the progressing development of the area, from a landscape with many seasonal swales and drainages feeding into Mariposa Slough to leveled ranch lands and fields.

There also is substantial acreage along the Sandy Mush Road corridor under conservation easements held by the Service for wildlife values, as well as the MNWR.

Mendota Dam distributes water into the SJR as irrigation supply for downstream diversions at Sack Dam, and as SJRRP Restoration Flows, which will pass Sack Dam and enter the ESB, upon completion of pending seepage management actions, as previously mentioned. However, the Interim Flows from Sack Dam through Reach 4A of the SJR and into the ESB raised the shallow groundwater table in the adjacent agricultural fields, causing damage to fields and crops. Seepage of Restoration Flow water into fields can limit the amount and type of crops that can be farmed due to the high water table causing damage to farm fields. Due to the effects of potential seepage on adjacent farm land, Reclamation has limited releases below Sack Dam to flow rates of 150 cfs or lower, which have the potential to be increased up to 300 cfs in February 2016.

The proposed action would remove inoperable culverts and accumulated sand to lower the low-flow channel bed profile in order to improve hydraulic conditions through the ESB, in the vicinity of El Nido Road crossing. With a lower water surface elevation and improved hydraulics through this portion of the ESB, the SJRRP would be able to maximize the amount of Restoration Flow conveyance into downstream reaches while minimizing the potential for seepage impacts.

### 3.3.5 Air Quality

Section 176(c) of the Clean Air Act (42 U.S.C. 7506(c)) requires that any entity of the federal government that engages in, supports, or in any way provides financial support for, licenses or permits, or approves any activity to demonstrate that the action conforms to the applicable State Implementation Plan required under Section 110(a) of the Clean Air Act (42 U.S.C. 7401(a)) before the action is otherwise approved. In this context, conformity means that such federal actions must be consistent with a State Implementation Plan's purpose of eliminating or reducing the severity and number of violations of the National Ambient Air Quality Standards (NAAQS) for criteria air pollutants and achieving expeditious attainment of those standards. Each federal agency must determine that any action that is proposed by the agency and that is subject to the regulations implementing the conformity requirements will, in fact, conform to the applicable State Implementation Plan before the action is taken.

The proposed action lies within the San Joaquin Valley Air Basin (SJVAB), the second largest air basin in the State. Air basins share a common "air shed", the boundaries of which are defined by surrounding topography and meteorology.

Although mixing between adjacent air basins inevitably occurs, air quality conditions are relatively uniform within a given air basin. The SJVAB experiences episodes of poor atmospheric mixing caused by inversion layers formed when temperature increases with elevation above ground, or when a mass of warm, dry air settles over a mass of cooler air near the ground.

The SJVAB lies within the management area of the San Joaquin Valley Air Pollution Control District (SJVAPCD) responsible for developing a local plan with control measures to meet or maintain the NAAQS/California Ambient Air Quality Standards (CAAQS). Despite years of improvements, the SJVAB does not meet all state and federal health-based air quality standards. NAAQS and CAAQS have been established for the following criteria pollutants, below which the air is considered healthy to breathe: carbon monoxide (CO), ozone, ($O_3$), sulfur dioxide ($SO_2$), nitrogen dioxide ($NO_2$), inhalable particulate matter between 2.5 and 10 microns in diameter ($PM_{10}$), particulate matter less than 2.5 microns in diameter ($PM_{2.5}$), and lead. The CAAQS also set standards for sulfates, hydrogen sulfide and visibility.

The SJVAB has reached NAAQS and CAAQS attainment status for all criteria pollutants except for $O_3$, $PM_{10}$ (CAAQS only), and $PM_{2.5}$. As a result, the emissions of most concern are $O_3$ (which includes precursors such as volatile organic compounds [VOC] and nitrogen oxides [$NO_x$], $PM_{10}$ and $PM_{2.5}$. Table 1 below shows the attainment status and *de minimis* threshold for general conformity for the criteria pollutants of most concern. The *de minimis* threshold is the minimum threshold for which a conformity determination must be performed, for various criteria pollutants in areas of nonattainment. All federal actions that are taken in designated nonattainment or maintenance areas are subject to the General Conformity Regulations except for those that are covered by the transportation conformity rule, associated with emissions below *de minimis* levels, and are either exempt or presumed to conform.

Table 1. SJVAB Attainment Status and *De Minimis* Thresholds for Federal Conformity Determinations

| **Pollutant** | | |
|---|---|---|
| VOC | Nonattainment-Extreme | 10[b] |
| $NO_X$ | Nonattainment-Extreme | 10[b] |
| $PM_{10}$ | Nonattainment-(CAAQS) | 15[c] |
| $PM_{2.5}$ | Nonattainment | 100[b] |

[a] Source: http://www.arb.ca.gov/desig/adm/adm.htm
[b] 40 CFR 93.153
[c] SJVAPCD Threshold: http://www.valleyair.org/transportation/ceqaanalysislevels.htm

Construction emissions would vary from day to day and by activity, depending on the timing and intensity of construction, and wind speed and direction. Generally, air quality impacts from the proposed action would be localized in nature and decrease with distance. Ground disturbing activities would result in the temporary emissions of fugitive dust and vehicle combustion pollutants during earthwork activities, hauling materials off-site, and construction equipment and

haul truck engine emissions.

Calculated emissions from the proposed action were estimated using the California Emissions Estimator Model (CalEEMod),version 2013.2.2, which incorporates emission factors for reactive organic gases (ROG), $NO_x$, CO, $SO_2$, and both fugitive and exhaust $PM_{10}$, and $PM_{2.5}$. Total estimated Project emissions with mitigation measures are presented in Table 2 below.

The proposed action would comply with the SJVAPCD's Regulation VIII (SJVAPCD 2012) control measures for construction emissions of $PM_{10}$. One of these control measures includes the use of water with all "land clearing, grubbing, scraping, excavation, land leveling, grading, cut and fill, and demolition activities" for fugitive dust suppression. The estimated emissions with mitigation were based on implementing Best Management Practices listed in Section 2.3.1.

Table 2. Estimated Mitigated Project Emissions[a]

[a] Source: CalEEMOD version 2013.2.2

| Pollutant | Construction (tons/year) |
|---|---|
| ROG/VOC | 0.0699 |
| $NO_x$ | 0.5539 |
| $PM_{10}$ | 0.0716 |
| $PM_{2.5}$ | 0.0374 |
| Carbon dioxide equivalents | 45.265 (metric tons/year) |

As shown in Table 2, the proposed action has been estimated to emit less than the *de minimus* thresholds for NOx, ROG/VOC as O3 precursors, PM2.5, and PM10; therefore, a Federal General Conformity Analysis Report is not required. Even if dust suppression measures were not implemented, the estimated emissions for PM2.5 (0.0400 tons/year) and PM10 (0.0964 tons/year) would still be well below the respective thresholds.

### 3.3.6 Biological Resources

The action area is the footprint of the sand excavation, culvert removal, low-flow crossing removal, material stockpiling, equipment staging and a 200-ft buffer around those activities in which noise and dust could occur. The present land use within the action area consists of a bypass, agricultural fields and orchards, farm roads and shoulders, and irrigation ditches. Immediately south of the El Nido low-flow crossing, the private landowner has maintained the ESB and excavated accumulated sediments. North of El Nido Road in the ESB, the land is owned and managed by the Service as a part of the MNWR and has not been excavated of accumulated sediment for approximately 30 years. Flows in the ESB channel are controlled and can vary, and during the winter the ESB will hold water for months at a time, providing waterfowl habitat.

Reclamation biologists requested an official species list of listed species that may occur within the Sandy Mush and Santa Rita Bridge 7½ minute U.S. Geological Survey quadrangles, which overlap the action area, from the Service on January 28, 2015 via the Sacramento field office's

website, http://www.fws.gov/sacramento/es/spp_list.htm. The species list was checked for updates for the action area on September 14, 2015 via the Service's new website, http://ecos.fws.gov/ipac/ (Consultation code 08ESMF00-2015-SLI- 1239), and there were no updates. Service species lists were also checked for updates before each survey in 2013 and 2014, and there were no changes. The CDFW's CNDDB was also queried for records of federally-protected species within 10 miles of the action area (CNDDB, 2015). Additionally, Reclamation biologists surveyed the action area on January 10, 2013 and January 6, 2014 for listed species and habitat that may occur in the action area. The information collected above was combined with information within scientific literature and Reclamation's files to determine what listed species may occur within dispersal distance of the action area. Table 3 includes a list of species considered, a brief description of each species' habitat and status, a determination of effects, and a summary of the rationale supporting the determination. The action area is within dispersal distance of SJKF, but does not contain habitat or is outside of dispersal distance of the remaining terrestrial species in Table 3.

The SJRRP began reintroducing spring-run Chinook salmon *(Oncorhynchus tshawytscha*) in the SJR in 2014. While the proposed ction would occur when it is dry, Central Valley Steelhead (*Oncorhynchus mykiss)* and spring-run Chinook salmon, as well as other fish and salmonids, could potentially occur in the action area when Restoration Flows are providing for river connectivity.

Table 3: Federally-Listed Species Identified as Potentially Occurring within 10 Miles of the Action Area

| Scientific Name | Common Name | Federal Status | Effects | Potential habitat utilized by species in Action Area |
|---|---|---|---|---|
| **INVERTEBRATES** | | | | |
| *Branchinecta conservation* | Conservancy fairy shrimp | E, X | NE | **Absent.** Suitable vernal pool habitat is not present within the Action Area. There is no designated Critical Habitat for this species within the Action Area. |
| *Branchinecta longiantenna* | Longhorn fairy shrimp | E | NE | **Absent.** Suitable vernal pool habitat is not present within the Action Area. |
| *Branchinecta lynchi* | Vernal pool fairy shrimp | T, X | NE | **Absent**. Suitable vernal pool habitat is not present within the Action Area. There is no designated Critical Habitat for this species within the Action Area. |
| *Desmocerus californicus dimorphus* | Valley elderberry longhorn beetle | T | NE | **Absent.** The valley elderberry longhorn beetle does not occur within the Action Area because their host plant, the elderberry bush, is not present (Reclamation, 2015). |
| *Lepidurus packardi* | Vernal pool tadpole shrimp | E, X | NE | **Absent.** Suitable vernal pool habitat is not present within the Action Area. There is no designated Critical Habitat for this species within the Action Area. |
| | | | | |
| *Hypomesus transpacificus* | Delta smelt | T | NE | **Absent**. This species is not present within the ESB (Service, 2010a). Work on the proposed action, including future maintenance, would occur when the ESB channel is dry. |
| *Oncorhynchus mykiss* | Central Valley steelhead | T, NMFS | NE | **Low Potential to Occur.** This species is not currently present within the ESB (NMFS, 2011), but there is a low potential for the species to occur. Work on the proposed action, including future maintenance, would occur when the ESB channel is dry. |

| Scientific Name | Common Name | Federal Status | Effects | Potential habitat utilized by species in Action Area |
|---|---|---|---|---|
| *Oncorhynchus tshawytscha* | Spring-run Chinook salmon | EXP, NMFS | NE | **Low Potential to Occur.** This species is not currently present within the ESB (NMFS, 2011), but could be starting in 2016. Work on the proposed action, including future maintenance, would occur when the ESB channel is dry. |
| **AMPHIBIANS** | | | | |
| *Ambystoma californiense* | California tiger salamander, central population | T | NE | **Absent.** Suitable breeding habitat for this species is not present within the Action Area or within dispersal distance (1.3 miles) of the Action Area. The Action Area does not provide suitable upland habitat as the ESB floods periodically and has very few small mammal burrows. |
| *Rana draytonii* | California red-legged frog | T | NE | **Absent.** The California red-legged frog was extirpated from the floor of the Central Valley over 50 years ago, and does not occur within the Action Area (Service, 2002). |
| **MAMMALS** | | | | |
| *Dipodomys nitratoides exilis* | Fresno kangaroo rat | E | NE | **Absent.** There is no suitable habitat in the Action Area, and the proposed action is outside of the current range of this species (Service, 2010b). |
| *Vulpes macrotis mutica* | San Joaquin kit fox | E | NLAA | **Potential Movement Corridor.** There are records of SJKF observations occurring within 5 miles of the Action Area; the most recent observation occurred in 2000 (CNDDB, 2015). Although no kit fox tracks, scat, or suitable burrows were found within the Action Area during 2013 and 2014 biological surveys, there is still some potential for SJKF to move through the Action Area. |
| **REPTILES** | | | | |
| *Gambelia sila* | Blunt-nosed leopard lizard | E | NE | **Absent**. This species is not expected to occur within the Action Area because this species does not occupy areas that flood and the ESB is subjected to seasonal flooding. No individuals or burrows were observed during the 2013 and 2014 surveys. |
| *Thamnophis gigas* | Giant garter snake | T | NE | **Absent**. The ESB has a hydro-period that is incompatible with the habitat requirements of the giant garter snake, which requires water in the summer and upland refugia in the winter (Service, 2012b). The proposed action would occur during the summer, when giant garter snakes occupy aquatic habitats and when the ESB channel is dry; therefore, the proposed action would have *No Effect* on giant garter snakes. |
| **PLANTS** | | | | |
| *Chamaesyce hooveri s* | Hoover's spurge | X | NE | **Absent**. There is no designated Critical Habitat for this species within the Action Area. Suitable vernal pool habitat for this species is not present within the Action Area, and this species has not been observed in or near the Action Area (CNDDB, 2015; Service, 2009). |
| *Neostapfia colusana* | Colusa grass | T, X | NE | **Absent.** Suitable vernal pool habitat for this species is not present within the Action Area, and this species has not been observed in or near the Action Area (CNDDB, 2015; Service, 2008).<br><br>There is no designated Critical Habitat for this species |

| Scientific Name | Common Name | Federal Status | Effects | Potential habitat utilized by species in Action Area |
|---|---|---|---|---|
| | | | | within the Action Area. |
| **BIRDS** | | | | |
| *Agelaius tricolor* | Tri-colored blackbird | MBTA | NT | **Potential Nesting or Foraging Habitat.** There are CNDDB records of this species within the MNWR wetlands, 3 miles to the north of the Action Area (CNDDB, 2015). Tri-colored blackbirds may nest or forage in the Action Area. |
| *Buteo swainsoni* | Swainson's hawk | MBTA | NT | **Potential Foraging Habitat.** There are CNDDB records of Swainson's hawks nesting within five miles of the v (CNDDB, 2015). Although there are no suitable nesting trees in or immediately adjacent to the Action Area, there is still a potential for this species to forage within the Action Area. |
| *Buteo jamaicensis* | Red-tailed hawk | MBTA | NT | **Potential Foraging Habitat.** During the 2013 and 2014 surveys, multiple red-tailed hawks were seen flying or perching near the Action Area. Although there are no suitable nesting trees in or immediately adjacent to the Action Area, there is still a potential for this species to forage within the Action Area. |
| *Athene cunicularia* | Burrowing owl | MBTA | NT | **Potential Foraging Habitat.** There is one CNDDB record of burrowing owls nesting five miles from the Action Area (CNDDB, 2015). Although no burrowing owls, suitable mammal burrows, or sign of burrowing owls was found during 2013 and 2014 surveys of the Action Area, there is still a potential for this species to forage within the Action Area. |

Key:
(MBTA) Migratory Bird Treaty Act – It is unlawful "by any means or manner to pursue, hunt, take, capture or kill" any migratory bird, except as permitted by regulations issued by the Service.
(E) Endangered– Listed in the Federal Register as being in danger of extinction
(T) Threatened – Listed as likely to become endangered within the foreseeable future
(X) Critical Habitat – Critical Habitat has been designated for this species.
(NE) No Effect – Proposed Action will have no effect on the species
(NLAA) Not Likely to Adversely Affect – Proposed Action may affect the species, but is not likely to adversely affect.
(NT) No Take of migratory birds would occur from the proposed action.
(EXP) Federal Non-Essential Experimental Population

#### *3.3.6.1* San Joaquin Kit Fox

SJKF are an arid, land-adapted species and typically occur in desert-like habitats in North America. Such areas have been characterized by sparse or absent shrub cover, sparse ground cover, and short vegetative structure. The subspecies historically ranged in alkali scrub/shrub and arid grasslands throughout the level terrain of the San Joaquin Valley floor from southern Kern County north to Tracy in San Joaquin County, and up into more gradual slopes of the surrounding foothills and adjoining valleys of the interior coast range. Within this range, the SJKF has been associated with areas having open, level, sandy ground that is relatively stone-free to depths of about 3 – 4.5 feet. The SJKF utilizes subsurface dens, which may extend to six

feet or more below ground surface, for shelter and for reproduction. SJKF subspecies are absent or scarce in areas where soils are shallow due to high water tables, impenetrable hardpans, or proximity to parent material, such as bedrock. SJKF also do not den in saturated soils or in areas subjected to periodic flooding. Reproductive success appears to be correlated with prey abundance.

There are four CNDDB records of individual SJKF within a 10-mile radius of the action area, with the most recent observation recorded in 2000 (CNDDB, 2015). SJKF populations in central Merced County have declined substantially in recent years and are now believed to be extirpated from most parts of the county (Service, 2010c). However, it is unknown when the last focused survey efforts were conducted in the vicinity of the Project. With the exception of the staging area in the farm equipment stockyard a mile down El Nido Road, the action area is located within an 80-acre portion of the ESB channel and the Lonetree Unit of the MNWR. This portion of the ESB is subject to seasonal flooding, and SJKF do not typically den in areas that are subjected to flooding (Service, 2010c). During surveys of the action area, conducted by Reclamation biologists in January 2013 and 2014, no burrows of suitable size for SJKF (4-8 inches in diameter) were found. The action area does not provide high quality denning habitat as the ESB is subject to periodic flooding. In addition, no SJKF tracks or scat were observed within the action area (Reclamation, 2015).

The action area is surrounded by farmlands, which are unsuitable for long-term occupation by SJKF. Irrigation and frequent ground disturbance are common on agricultural lands and can destroy dens and reduce prey abundance (Warrick *et. al*, 2007). Rodenticide use is also a common practice on many farmlands, and can further reduce prey availability. Furthermore, farmlands are used more frequently by red foxes and dogs, which are also known to compete with and kill SJKF (Service, 2010c). Several coyote tracks and scats were found during the 2013 and 2014 surveys of the action area (Reclamation, 2015). SJKF and coyotes compete with each other for prey resources and territory, and this competition is often a significant source of kit fox mortality (Service, 2010c). The effects of competition with coyotes can be exaggerated in drought years, when prey resources are scarce, and in disturbed habitats like those surrounding the action area (Cypher and Spencer, 1998; Nelson *et. al*, 2007).

Construction vehicles and activities involved with the proposed action have the potential to affect SJKF, since the species could use the action area as denning habitat or as a movement corridor. The action area is located primarily in the ESB channel within the Lonetree Unit of the MNWR, and is surrounded by cultivated farmlands. Although this is an area that is seasonally wet and subject to inundation, which normally creates unsuitable conditions for denning habitat, there are records from 1999 of potential SJKF dens on the water side of the ESB levees, approximately one mile downstream.

The surrounding cultivated farmlands typically establish poor habitat for SJKF prey base due to pesticide and rodenticide use, but there is one record from 2000 of an individual in an alfalfa field half a mile north of the action area. Despite the lack of high quality denning and foraging habitat, records in this area indicate that SJKF may use the action area as denning habitat or a movement corridor. However, the Project will be implemented from July through August, which is outside the SJKF natal season. Best Management Practices and avoidance and minimization measures to help reduce the potential Project effects on SJKF, as described in

Section 2.3.1, will be implemented to avoid and minimize potential impacts to SJKF that may use the action area as a movement corridor.

Considering that the action area does not contain high quality denning habitat due to seasonal flooding, it has marginal to poor suitability as foraging habitat. Project activities will occur during the daytime when SJKF are not active, and avoidance and minimization measures will be implemented; the proposed action would have discountable effects on SJKF. Reclamation has completed informal consultation with the Service in accordance with Section 7(a)(2) of the ESA on the Project's potential effects on SJKF.

While Central Valley Steelhead and spring-run Chinook salmon, as well as other fish and other salmonids, could potentially occur in the action area when Restoration Flows are providing for river connectivity, it is currently unknown if that will occur in 2016, depending on hydrology. Activities under the proposed action, including potential maintenance actions, would occur when the action area is dry, and will be coordinated, with the input of the SJRRP Restoration Administrator, to occur when the potential for impacts to special status salmonids are avoided and minimized to the extent feasible. Prior to construction activities for the initial excavation activities and potential maintenance activities, Reclamation will coordinate with the Implementing Agencies on the specific actions planned to dewater the action area and develop a plan for potential fish rescue activities, as appropriate. This and other Best Management Practices and avoidance and minimization measures, as described in Section 2.3.1, will be implemented to avoid and minimize potential impacts on special status salmonids. Reclamation has completed informal consultation with the National Marine Fisheries Service (NMFS) in accordance with Section 7(a)(2) of the ESA on the Project's potential effects, including initial excavation activities and potential maintenance activities on spring-run Chinook salmon and Central Valley steelhead. If annual maintenance excavations must continue beyond 5 years after initial work (original excavation and culvert removal) on the Project has been completed, potential effects to federally protected species will be reevaluated.

#### *3.3.6.2* Migratory Birds

Several different species of migratory birds are known to occur in and near the action area. The action area is located within the Lonetree Unit of the MNWR, which contains seasonal wetlands that provide important wintering habitat for migratory waterfowl, water birds, and shorebirds. Hunting of geese, ducks, coots, and moorhens is permitted in the Lonetree Unit (Service, 2012a; Service, 2014). A majority of migratory birds that use the MNWR are present in the winter, and are largely absent from the area when the wetlands dry in the summer. The Cinnamon Slough wetlands are the only wetlands in the MNWR that contain water into the summer months, and which may provide breeding and nesting habitat for the small number of ducks that remain at the refuge through the summer. These wetlands are located over 2 miles from the action area; therefore, the proposed action would have no effect on nesting or breeding waterfowl.

Work on the proposed action would occur during the raptor nesting season (which is from February 1 through August 31), in the summer when the ESB channel is dry (Service and Edison Electric Institute, 2005). The action area consists primarily of sandy areas dominated by cocklebur and other weedy annuals, and does not contain any large trees that would be suitable for tree- nesting birds such as Swainson's hawk or Red-tailed hawk. Ground-nesting bird

species, like killdeer, may be present in the action area during construction; therefore, a survey for nesting birds will be conducted prior to the start of work on the proposed action (Section 2.3.1).

There is one CNDDB record of burrowing owls nesting within five miles of the action area (CNDDB, 2015). The nesting season for burrowing owls is mid- March through September. Typical breeding habitat for burrowing owl is open grassland or prairie, with occasional open areas of airports, golf courses, and agricultural fields. The action area is surrounded by agricultural fields and the proposed action would occur during the burrowing owl nesting season; however, the ESB is subject to seasonal flooding and would not provide high quality nesting habitat. Burrowing owls forage in a variety of habitats, including cropland, pasture, prairie dog colonies, fallow fields, and sparsely vegetated areas (Butts and Lewis 1982, Thompson and Anderson, 1988; Desmond, 1991; Haug *et al.*, 1993; Wellicome, 1994). No burrowing owls, or burrowing owl burrows, were found during surveys of the action area conducted in the 2013 and 2014 surveys, but potentially suitable foraging habitat for this species is present within the action area. Burrowing owls may use the action area to forage for arthropods, small mammals, amphibians or reptiles during Project implementation.

However, with the lack of high quality nesting habitat, implementation of preconstruction surveys for active ground nests and foraging individuals, and implementation of the provided avoidance measures in Section 2.3.1, there would be no take of migratory birds.

#### *3.3.6.3* Wetlands

Reclamation conducted a field survey of the site on January 10, 2013. During the site visit, a delineation of the Ordinary High Water Mark (OHWM) was conducted in accordance with *A Field Guide to the Identification of the Ordinary High Water Mark in the Arid West Region of the Western United States: A Delineation Manual*. Wetland plant information was collected, but a wetland delineation was not performed since the wetland plant community documented onsite occurred below the OHWM of the ESB. Analysis from the wetland delineation is located in the *Waters of the U.S. Delineation for the Mariposa Slough/Eastside Bypass Low-Flow Conveyance Project at El Nido Road* report (Reclamation 2013).

A 90.85 acre study area boundary was surveyed along the haul route and within the ESB from El Nido Road to approximately 1,500 feet downstream, between the levees. 79.08 acres of the study area boundary is waters of the U.S., which contained 60.58 acres of wetland vegetation below the OHWM. Approximately 3 acres of the 60.58 acres (five-percent) of wetland vegetation would be impacted during sediment excavation. Although the roposed action would not change the extent of waters of the U.S., it may impact the aquatic system and ecosystem functions downstream in the MNWR. Potential impacts include reducing water filtration, sediment storage, flood retention, wildlife habitat, and endangered species habitat. However, the amount of wetland vegetation potentially impacted, and thus potential impacts to aquatic and ecosystem function downstream is negligible

Reclamation will obtain a Clean Water Act, Section 404 permit from the U.S. Army Corps of Engineers. The wetland vegetation that would be impacted is located within a floodway. It is unlikely that the U.S. Army Corps of Engineers will require mitigation measures for wetland

vegetation in a floodway and below the OHWM.

#### *3.3.6.4* Essential Fish Habitat

There are four Fishery Management Plans (FMPs) in the Pacific region under the Magnuson-Stevens Fishery Conservation and Management Act (Pacific Coast salmon, groundfish, coastal pelagic species, and highly migratory species), but only Pacific Coast salmon Essential Fish Habitat (EFH) occurs within the boundaries of the action area. EFH for Chinook salmon has been designated in the Sacramento River and SJR basins under the Pacific Coast salmon FMP and includes the action area. Central Valley spring-run and fall-run are the Chinook salmon stocks with potential to occur in the ESB. However, the action area and ESB are currently nearly completely separated from the lower SJR and the ocean fishery by a lack of connectivity and several fish barriers.

The Habitat Area of Particular Concern established under the Pacific Coast salmon FMP consists of complex channels and floodplain habitats; thermal refugia; spawning habitat; estuaries; and marine and estuarine submerged aquatic vegetation. Most of the ESB currently contains low quality habitat for salmonids primarily because the accumulated sediment and inoperable culverts at El Nido Road has created a fish barrier and caused flows to be limited to avoid flooding in surrounding lands. The ESB is also mostly dry during summer months, preventing the growth of submerged aquatic vegetation.

As previously mentioned, the proposed action is one of a suite of actions the SJRRP is considering to contribute to the achievement of the Restoration Goal; reintroduction of spring-run Chinook salmon began in 2014. The Project goals include restoring capacity to the low-flow channel within the ESB and facilitating implementation of the Restoration Goal of the SJRRP to allow fish passage for the benefit of juvenile and adult salmonids and other native fishes.

Overall, the Project will benefit EFH by improving habitat and connectivity. However, Project construction activities, including initial excavation activities and potential future maintenance activities, may adversely affect Pacific Coast salmon EFH. During construction the Project may cause a temporary introduction of pollutants into the ESB and indirectly into the SJR during flow passage. All of the potential adverse impacts would be temporary in nature and would result from construction, staging, and access during implementation of the Project. None of the Project effects to EFH are expected to negatively affect Chinook salmon populations. Implementation of measures listed in Section 2.3.1, regarding hazardous materials and pollutants would avoid and minimize potential impacts to EFH. In the long-term, the Project would benefit Chinook salmon populations. If annual maintenance excavations must continue beyond 5 years after initial work (original excavation and culvert removal) on the Project has been completed, potential effects to EFH will be reevaluated.

### 2.3.1 Cultural Resources

Cultural resources is a term used to describe both archaeological sites depicting evidence of past human use of the landscape through material culture and the built environment, which is represented in structures such as dams, roadways, and buildings. The term, ‘cultural resources’ may also apply to other types of resources that are not archaeological nor built environment in

nature; cultural resources could include, but are not limited to, traditional cultural properties, sites of religious or cultural significance, and sacred sites.

The National Historic Preservation Act (NHPA), Section 106 process is outlined in the federal regulations at 36 CFR Part 800. These regulations describe the process that Reclamation takes to identify cultural resources and the level of effect that the proposed undertaking will have on historic properties, which are cultural resources listed on or eligible for inclusion in the National Register of Historic Properties (National Register). In summary, Reclamation must first determine if the action is the type of action that has the potential to affect historic properties. If the action is the type of action to affect historic properties, Reclamation must identify the area of potential effects; determine if historic properties are present within that area of potential effects; determine the effect that the undertaking will have on historic properties; and consult with the State Historic Preservation Office to seek concurrence on Reclamation's findings. Although the Section 106 and NEPA process are independent statutes Reclamation uses the Section 106 process as its primary effort to identify impacts to cultural resources as they apply to NEPA.

The SJRRP contracted with Far Western Anthropological Research Group, Inc. in 2009 to prepare a context document that included a review of the known cultural resources and studies. This document, finalized in 2010 by Brian F. Byrd, Stephen Wee, and Julia Costello titled *Cultural Resources Sensitivity Study and Research Design for the San Joaquin River Restoration Program, Fresno, Madera, Merced, and Stanislaus Counties*, represents the most contemporary summary of work for the SJR from Friant Dam to the mouth of the Merced River. The final document can be viewed at Reclamation's Mid-Pacific Regional Office, the SJRRP office, or the Cultural Resources Information Centers in Bakersfield and Turlock. This document serves as the primary pre-historic and historic context for the SJRRP and is referenced here to after as Byrd *et al.* (2010). Readers are encouraged to review this document for a broader context of the cultural resources affected environment. As identified in Byrd *et al.* (2010) one previous cultural resources investigation of the Project area was completed in 1984 as documented in Werner (1984). The Werner (1984) investigation resulted in no cultural resources being recorded within the Project area. Werner noted that had any archaeological resources been present prior to the U.S. Army Corps of Engineers' construction of the ESB, they would have been destroyed as a result of the construction effort. Two archaeological sites were previously recorded in 1961 located approximately 1.5 miles northwest of the Project area currently within the ESB identified as CA-MER-010 and CA-MER-011. The sites were likely recorded as part of a salvage effort by the U.S. Army Corps of Engineers prior to the construction of the ESB. The low trinomial numbers indicates that these sites were among the earliest recorded in Merced County. Both sites are noted as being small village encampments and their proximity to each other seems to indicate a single contiguous site rather than two individual sites. Regardless, both sites were likely destroyed resulting from the construction of the ESB. Previous efforts to relocate the sites have been unproductive.

The landscape within the ESB and action area represents a heavily modified landscape resulting from the construction of the bypass. Additionally, modern sedimentation of the ESB has effectively covered any potential to identify surface manifestations of archaeological sites. Given this set of circumstances, there remains little to no potential for intact archaeological sites to be present within the Project area.

The proposed action would constitute an undertaking as outlined in Section 301(7) of the NHPA initiating Section 106 of the NHPA and its implementing regulations at 36 CFR §800. Because the area is highly disturbed and is unlikely to have a potential for intact archaeological resources, Reclamation concludes that the proposed action would result in a finding of no potential to affect historic properties pursuant to 36 CFR §800.3(a)(1) resulting in no effect to cultural resources. No additional cultural resources investigations, including archaeological or cultural monitoring, are recommended for this action. In the event cultural resources are inadvertently discovered during implementation of this action, the SJRRP and Reclamation will follow the Post Review Discovery section of the Section 106 regulations at 36 CFR §800.13.

### 2.3.2 Cumulative Impacts

According to the CEQ regulations for implementing the procedural provisions of NEPA, a cumulative impact is defined as *the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time* (40 CFR 1508.7). Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time.

*Air Quality*

The proposed action has the potential to impact air quality through emissions of the criteria pollutants of most concern from ground disturbance and construction equipment. As described earlier, the Project lies within the SJVAB, which currently does not meet all CAAQS and NAAQS. The proposed action must conform with the State Implementation Plan's purpose, part of which is to maintain emissions below the *de minimus* threshold for Federal general conformity of the four remaining criteria pollutants that the SJVAB is in nonattainment with (refer to Table 1). Since the SJVAB encompasses seven counties in addition to Merced County, emissions from projects occurring in those counties within the same general time period as the proposed action could lead to a cumulative impact. Additional projects proposed to be implemented simultaneously with the proposed action in the SJVAB that Reclamation is aware of include:

a) **Fresno County:**

- Firebaugh Canal Water District (FCWD) 2nd Lift Canal Modernization and Canal Lining Project Phase 4 – Washoe to Douglas Avenue Reclamation awarded FCWD with grant funding for a portion of the district's project to concrete-line 2.6 miles of the 2nd Lift Canal between Washoe Avenue and Douglas Avenue. The project also involves upgrading turnout structures, controls at Pump Station 109, and a meter structure at the 2nd Lift Canal discharge pipe with a long- crested weir. Construction started January 2015 and will continue until the end of February 2016. Remaining project activities will resume for one to two months between September 16, 2015 and February 2016. Emissions from this project were calculated with the CalEEMod version 2013.2.1 and are presented in Table 4 below.

b) **Stanislaus, Merced, and Fresno Counties**:

- Central California Irrigation District (CCID) East Ditch and Poso Canal Reservoirs Project Reclamation awarded CCID with grant funding for a portion of the district's project to construct diversion facilities and two separate regulating reservoirs complete with inlet and outlet pump stations with piped discharges and Supervisory Control and Data Acquisition system integrated controls. The East Ditch Reservoir would occupy no more than 37.5 acres. The Poso Canal Reservoir would occupy approximately 48 acres. Construction is expected to start as soon as permitted and most likely occur during the winter. Construction activities would take a total of 12 months over two years to complete. Emissions from this project were calculated with the CalEEMod version 2011.1.1 and are presented in Table 4 below.

c) **Kern County:**

- Cawelo Water District (CWD) Calloway Canal Lining Project Reclamation awarded CWD with grant funding for a portion of the district's project to concrete-line 3,523 feet of the Calloway Canal between the Cross Valley Canal Intertie and Coffee Road. The construction timeline would be dependent on hydrology, when the canal is dry and unused. 2015 is a dry year, so construction would occur any time after April. Emissions from this project were calculated with the 2012 URBEMIS version 9.2.4, and are presented in Table 4 below.

- CWD Calloway Canal Lining Project – Reach B Reclamation awarded CWD with grant funding for a portion of the district's project to concrete-line 4,124 feet of the Calloway Canal between the Cross Valley Canal Intertie and Coffee Road. The construction is proposed to take approximately four months between August 2015 and February 2016. Emissions from this project were calculated with the CalEEMod version 2013.2.1 and are presented in Table 4 below.

- CWD and North Kern Water Storage District Calloway Canal Lining Project – Reaches C1, C2, and D Reclamation proposes to award CWD with grant funding for a portion of the district's project to concrete-line a total of 5,290 feet of the Calloway Canal along reaches C1, C2, and D.

Proposed construction activities are expected to start on June 1, 2015 and be complete on December 1, 2015. Emissions from this project were calculated with the CalEEMod version 2013.2.2 and are presented in Table 4 below.

Table 4. Estimated Cumulative Mitigated Project Emissions

| | Pollutant (Metric Tons/Year) | | | | |
|---|---|---|---|---|---|
| **PROJECT** | **ROG/VOC** | **$NO_X$** | **$PM_{10}$** | **$PM_{2.5}$** | **$CO_2$** |
| **ESB** | 0.07 | 0.55 | 0.07 | 0.04 | 45.27 |
| **FCWD** | 0.14 | 1.35 | 0.41 | 0.13 | 106.40 |
| **CCID** | 0.80 | 9.40 | 4.80 | 1.20 | 887.90 |
| **CWD Calloway Canal Lining** | 0.12 | 0.89 | 0.52 | 0.14 | 0.46 |
| **CWD Calloway Reach B** | 0.71 | 0.61 | 0.37 | 0.08 | 49.31 |
| **CWD Reach C1/C2/D** | 0.13 | 1.35 | 0.98 | 0.20 | 101.09 |
| Total Metric Tons/Year | 1.97 | 14.15 | 7.15 | 1.79 | 1190.43 |

As shown in Table 4, the FCWD, CCID, and three CWD projects have been estimated to individually emit less than the *de minimus* thresholds for $NO_x$ and ROG/VOC as $O_3$ precursors, $PM_{2.5}$, and $PM_{10}$. In combination with the Project's emissions, the total for these criteria pollutants are still below the *de minimus* thresholds, with the exception of $NO_x$. Cumulatively, there would be an additional 14.15 tons/year of $NO_x$ emissions added to the SJVAB. The baseline emissions trend for $NO_x$ in the SJVAB is 144,832 tons/year (396.8 tons/day) (Ramalingam 2004: 3); therefore, the additional $NO_x$ emissions from the conservation projects are discountable. A Federal general conformity analysis report is not required.

Greenhouse gas (GHG) impacts are considered to be cumulative impacts since any increase in greenhouse gas emissions would add to the existing inventory of gases that could contribute to climate change. The estimated GHG emission due to temporary Project construction activities is 45.27 metric tons of carbon dioxide equivalents. There are no on-going operational emissions from the Project. One of the more commonly suggested mass emissions thresholds is 25,000 metric tons of carbon dioxide equivalents/year. This value has been selected because it is the threshold established for mandatory emissions reporting for most sources in

California under AB 32. Since the amount of GHGs emitted from the Proposed Project is well below 25,000 metric tons/year, no report is required to be submitted to the U.S. Environmental Protection Agency and California Air Resources Board.

*Water Resources*

The proposed action would improve the hydrology of Reach 4B and the ESB of the SJR, increasing flow rate and fish passage. The remaining series of actions along Reach 4B and the ESB of the SJR that also aim to improve hydraulic conditions such as potential remediation of levees and installation of fish passage, are not anticipated to be implemented until at least 2017 (SJRRP 2015). However, the remaining Reach 4B and ESB projects would also serve to improve hydraulic conditions; therefore, the proposed action would have cumulative beneficial impacts on hydrology through Reach 4B of the SJR and ESB.

*Water Quality*

The proposed action has the potential to indirectly impact water quality with equipment working in the ESB channel. Concerns include potential equipment leaks, resulting in the release of petroleum products, lubricants, or other hazardous materials into the river channel during implementation, then having these materials be transported to the SJR when there are flows through the ESB. As described earlier, this Project is a component of a series of actions along Reach 4B of the SJR and ESB. However, the remaining Reach 4B actions are not anticipated to be implemented until at least 2017; therefore, the potential minor water quality impacts would be spaced out by at least a year. Additionally, each of those projects, including this Project, will implement measures such as those listed in Section 2.3.1 to avoid and minimize potential spills of hazardous materials and other impacts to water quality in the SJR.

# 4. Consultation and Coordination

## 4.1 Agencies and Groups Consulted

Reclamation coordinated with the Service's Sacramento Fish and Wildlife Office, State of California Department of Water Resources, the National Marine Fisheries Service, the Settlement Parties, and Central Valley Flood Protection Board in preparation of this EA.

## 4.2 Endangered Species Act (16 USC § 1531 et seq.)

Section 7 of the ESA requires Federal agencies, in consultation with the Secretary of the Interior, to ensure that their actions do not jeopardize the continued existence of endangered or threatened species, or result in the destruction or adverse modification of the critical habitat of these species.

Reclamation has completed informal consultation with the Service on potential impacts to SJKF and informal consultation with NMFS on potential impacts to California Central Valley Steelhead and Central Valley Spring-run Chinook Salmon. Reclamation has determined, the proposed action is not likely to adversely affect SJKF, California Central Valley Steelhead and Central Valley Spring-run Chinook Salmon. The Service has concurred with the determination for SJKF, and NMFS has concurred with the determination for California Central Valley Steelhead and Central Valley Spring-run Chinook salmon.

## 4.3 Magnuson-Stevens Fishery Conservation and Management Act (16 USC § 1801 et seq.)

Section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act directs federal agencies to consult with NMFS on all actions or proposed actions that may adversely affect EFH. This act 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.

Reclamation included analysis of potential effects the proposed action may have on EFH in Section 3.3.6.4, and in the informal consultation with NMFS. In their January 12, 2016 concurrence letter, NMFS has stated that the proposed action includes adequate measures to avoid, minimize, or otherwise offset the adverse effects of the proposed action to EFH.

## 4.4 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. No FWCA comments or recommendations were received by the Service or NMFS.

## 4.5 National Historic Preservation Act (16 USC § 470 et seq.)

The National Historic Preservation Act of 1966, as amended (16 USC 470 et seq.) is the primary Federal legislation that outlines the Federal Government's responsibility to consider cultural resources. Section 106 of the NHPA requires the Federal Government to take into consideration the effects of an undertaking on cultural resources listed on or eligible for inclusion in the National Register, and to give the Advisory Council on Historic Preservation an opportunity to comment on the effects. Those resources that are on or eligible for inclusion in the National Register are referred to as historic properties.

Other applicable cultural resources laws and regulations that could apply include, but are not limited to, the Native American Graves Protection and Repatriation Act, and the Archaeological Resources Protection Act. In some cases, particularly on private lands or holdings, certain state laws may be applicable including but not limited to the California Environmental Quality Act (CEQA) and California Public Resources Code 5097.98 (applies to the disposition of human remains and funerary objects on private lands).

Reclamation determined that the proposed action is the type of activity that has no potential to cause effects on historic properties; therefore, the California State Historic Preservation Officer was not consulted (see Section 3.3.7 Cultural Resources above and Appendix B).

## 4.6 State Permits

SJRRP's PEIS/R and the execution of the associated Record of Decision (ROD) describes how the State Lead Agency would comply with State law so that the ROD includes parallel language to the CEQA documentation developed by California DWR, the CEQA lead agency. As Reclamation began implementing the SJRRP, state funding restrictions have resulted in projects that have no State Lead Agency or is in a State Lead Agency that only has a regulatory role and no funding or construction role. Reclamation is clarifying here that as the Sand Slough Low-Flow Conveyance Project at El Nido Road is a solely federal project, the SJRRP will only be pursuing permits required of a federal agency.

# 5. Public Comment Responses

Two comment letters were received during public review of the Draft EA (Appendix C). The following text provides responses to the comments received and notes any resulting revisions made to the EA.

Reclamation understands that private property owners have removed sand from their property in the ESB in the past, and understands that this sand removal project will not solve all ESB channel capacity concerns. It is not intended to. The SJRRP is not responsible for maintaining flood conveyance capacity in the ESB. The SJRRP is removing this sand in order to create a low-flow channel in the Eastside Bypass and to reduce backwater and potential seepage impacts to adjacent landowners during release of Restoration Flows. Long-term capacity concerns are not addressed by this project. The Reach 4B, ESB and Mariposa Bypass Project will determine the longer-term flow routing decision in this portion of the San Joaquin River. The San Joaquin River Restoration Program anticipates some ongoing funding related to operation and maintenance of the Reach 4B project, which may or may not include funds for sediment removal depending on the final design and implementation of the long-term project.

There is no expiration date on the San Joaquin River Restoration Act or Settlement and therefore the San Joaquin River Restoration Program will continue indefinitely into the future. As described in the Framework for Implementation, the initial construction of the major components of the Settlement will be completed by 2030. After that time, it is anticipated that staffing and funding for the SJRRP will be reduced with a change in SJRRP focus to operation and maintenance of SJRRP projects. Reclamation is working to obtain permits and environmental compliance for as long of a period as possible, recognizing the ongoing need for sediment removal. The term for one of these permits, the Clean Water Act Section 404 permit, will be issued for five years and for that reason the analysis for the EA and ESA consultation was aligned with that period.

Beyond the 5-year duration of this project, Reclamation cannot speculate if sand removal would continue in the ESB or who would be responsible for that sand removal. This EA analyzes and discloses Reclamation's proposed action and environmental commitments for this project. Requirements for the Lower San Joaquin Levee District (LSJLD) to perform operation and maintenance activities are beyond the scope of this analysis, and therefore the document is not intended to address ongoing operation and maintenance issues of the ESB, which are the responsibility of the LSJLD.

Preconstruction surveys for San Joaquin kit fox, along with all the other environmental commitments included in the proposed action are necessary to ensure that the proposed action's potential effects are analyzed and disclosed in accordance with the National Environmental Policy Act (NEPA) and that the proposed action will avoid and minimize, to the extent feasible, and to a level that is insignificant and discountable, adverse effects to San Joaquin kit fox in accordance with Section 7(a)(2) of the ESA.

Compared to the no action alternative, the proposed action would provide improved conditions for flood protection activities. As stated in Section 1.1. of the EA, the effects on the environment

(including flood management) of implementing the SJRRP as a program, including the release of Restoration Flows, as well as a series of construction actions to contribute to achieving the Restoration Goal, were addressed in the Programmatic Environmental Impact Statement / Report (PEIS/R), with a Record of Decision signed in September 2012. Beyond the comprehensive analysis of flood impacts in the PEIS/R and the comprehensive modeling efforts completed as part of the Channel Capacity Report, no credible significant adverse flood impact was identified by Reclamation. Neither time nor money limited the scope of our flood impact analysis.

Reclamation is not responsible for the El Nido Road gaging station. Reclamation has also found some significant discrepancies between the flow recorded at El Nido Road and the actual flow in the ESB – even that measured by the upstream (Washington Road) and downstream (ESB below Mariposa Bypass) gaging stations. Reclamation appreciates the comment bringing this station's inconsistencies to the attention of Reclamation and DWR.

The SJRRP analyzes and documents channel capacity on an annual basis through the Channel Capacity Report. The Channel Capacity Advisory Group, the oversight group for this effort, includes a member from the Lower San Joaquin Levee District. As part of that group, the LSJLD reviewed the modeling done as part of the draft Channel Capacity Report for the 2016 Restoration Year which was available as of September 2015 on the restoresjr.net website. The report has been incorporated into the EA by reference. The intent of the Channel Capacity Report is to model the allowable flow in the ESB while meeting US Army Corps of Engineers criteria for flood control levees. The Channel Capacity Report concludes that the Restoration Program can release 580 cfs into the Middle ESB assuming typical board operation at the MNWR weirs, based on one-dimensional hydraulic modeling of in-channel capacity and geotechnical investigations in the ESB levees.

All Restoration Flows are released in accordance with the Seepage Management Plan, Settlement, Legislation, Channel Capacity Report, PEIS/R, Water Rights Order, and Restoration Flow Guidelines. Several of these documents include protections for landowners related to groundwater seepage. The 300 cfs limitation cited in the EA is the estimated flow that would not cause groundwater seepage impacts when released into the ESB. This estimate is based on hydraulic modeling using the HEC-RAS software, using the same models discussed in Appendix D. This 300 cfs amount is an estimate and will be adjusted based on real-time groundwater monitoring and in accordance with the Seepage Management Plan. Weekly groundwater monitoring reports and hourly groundwater data are available at: http://www.restoresjr.net/monitoring-data/groundwater-monitoring/. These groundwater data will dictate when or if restoration flows can be increased incrementally up to this 300 cfs threshold. The process Reclamation has adopted to avoid material adverse seepage is described in detail in the Seepage Management Plan which is available at http://www.restoresjr.net/.

Reclamation constructed a cross section based hydraulic model in HEC-RAS 4.1 (US Army Corps of Engineers, 2010) between the ESB control structure on the ESB to Sack Dam on the SJR to evaluate options to reduce water surface elevation in the ESB. There are 4 basic pieces of information needed to construct such a model: river geometry, structure characteristics, hydraulic roughness, and boundary conditions. Hydraulic roughness values in the main channel were calibrated based upon water surface elevation data collected on April 10, 2010 and January 17-18, 2011 in Reach 4a and the ESB. This report evaluates the features that increase the water

surface elevation in the ESB, and finds that sediment deposition downstream of El Nido Road causes an increase in water surface elevation. The report also evaluates different El Nido Road options, including bridges and culverts. As discussed in the EA, the proposed action is sand removal and removing the existing culverts at El Nido Road. See Appendix D: Hydraulic Modeling , for additional details related to the hydraulic modeling done for this project.

As stated in Section 2.3.1 of the EA, the SJRRP flow schedule is determined annually, follows the Restoration Administrator's recommendation, and will likely call for no or very limited flows in the summer of the next five years. Construction timing will be carefully planned such that excavation occurs during the driest conditions in the ESB.

Section 2.3.1 of the EA includes avoidance and minimization measures for effects to salmonids, should they occur in the project area.

Note: The date referenced in one of the comments appears to have a typographical error and Reclamation has assumed that 'December 23, 2016' was intended to be 'November 23, 2015'.

**EA Revisions in Response to Comments**

The text on page 3 of the EA has been revised to clarify that the 2012 PEIS/R analyzed and disclosed the effects of implementing the SJRRP as a program.

A reference has been added to Page 3 and the hydraulic modeling is now included as Appendix D: Reclamation, 2015: Technical Report No. SRH-2015-18, Reach 4A Conveyance in the Vicinity of Sand Slough and Technical Report No. SRH-2015-19, Eastside Bypass Conveyance in the Vicinity of El Nido Road.

# References


Aviles, A. 2014. *Firebaugh Canal Water District 2nd Lift Canal Modernization and Lining Project Phase 4 – Washoe to Douglas Avenue*. U.S. Bureau of Reclamation. Available: http://www.usbr.gov/mp/nepa/nepa_projdetails.cfm?Project_ID=19661.

Accessed: February 11, 2015.

Butts, K. O., and J. C. Lewis. 1982. The importance of prairie dog towns to Burrowing Owls in Oklahoma. Proceedings of the Oklahoma Academy of Science 62:46-52.

Byrd, B.F., S. Wee, and J. Costello. 2010. *Cultural Resources Sensitivity Study and Research Design for the San Joaquin River Restoration Program, Fresno, Madera, Merced, and Stanislaus Counties, California.* Unpublished document prepared by Far Western Anthropological Research Group, Inc. Davis, CA for the Mid-Pacific Region of the Bureau of Reclamation. Document on File with the Bureau of Reclamation, Sacramento, CA, Project Number 07-SCAO-036 SJRRP.

California Emissions Estimator MODel (CalEEMOD). 2013. Windows Version

2013.2.2. January 28, 2015.

CNDDB (California Natural Diversity Database). 2015. Rarefind 4. California Natural Diversity Database. California Department of Fish and Wildlife, Biogeographic Data Branch, Sacramento, CA, March 2015.

Cypher, B.,& Spencer, K. 1998. Competitive interactions between coyotes and san joaquin kit foxes. *Journal of Mammalogy*, *79*(1), 204-214.

Department of Water Resources. 2015. Draft Levee Capacity Evaluation of Geotechnical Middle Eastside Bypass (Reach 4A, Sand Slough Connector Channel, Upper and Middle Eastside Bypass) Study Area. Fresno, CA.

Desmond, M. J. 1991. Ecological aspects of Burrowing Owl nesting strategies in the Nebraska panhandle. M.S. Thesis. University of Nebraska, Lincoln, Nebraska.

Hatleberg, S. 2014. *Central California Irrigation District East Ditch and Poso Canal Reservoirs Project*: U.S. Bureau of Reclamation. Available: http://www.usbr.gov/mp/nepa/nepa_projdetails.cfm?Project_ID=18861.

Accessed: October 16, 2014.

Haug, E. A., B. A. Millsap, and M. S. Martell. 1993. Burrowing Owl (Speotyto cunicularia). In A. Poole and F. Gill, editors. The birds of North America, No. 61.

The Academy of Natural Sciences, Philadelphia, Pennsylvania; The American Ornithologists' Union, Washington, DC.

Kleinsmith, D. 2014. *Cawelo Water District Calloway Canal Lining Project Reach B.* U.S. Bureau of Reclamation. Available at: http://www.usbr.gov/mp/nepa/nepa_projdetails.cfm?Project_ID=16081.

Accessed: February 12, 2015.

Kleinsmith. 2015. Bureau of Reclamation. Email communication with Alexandra Aviles, Bureau of Reclamation on February 9, 2015.

NMFS (National Marine Fisheries Service) 2011. 5-Year Review: Summary and Evaluation of Central Valley Steelhead DPS. Long Beach, California.

NatureServe. 2015. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://explorer.natureserve.org. (Accessed: April 23, 2015 ).

Nelson, J.,Cypher, B., Bjurlin,C.,& Creel, S. (2007). Effects of habitat on competition between kit foxes and coyotes. *Journal of Wildlife Management, 71*(5), 1467-1475.

Ramalingam, R. 2004. *ARB Staff Report on Proposed 2004 State Implementation Plan for Ozone in the San Joaquin Valley*: State of California Air Resources Board. Available: http://www.arb.ca.gov/planning/sip/sjv04/sjv_04_ozone_sip_staff_rpt.pdf.

Accessed: October 17, 2014.

Reclamation. 2012a. San Joaquin River Restoration Program Final Program Environmental Impact Statement/Environmental Impact Report.

Reclamation. 2012b. Record of Decision for San Joaquin River Restoration Program Final Program Environmental Impact Statement/Environmental Impact Report.

Reclamation. 2013. Waters of the U.S. Delineation for the

Mariposa Slough/Eastside Bypass Low-Flow Conveyance Project at El Nido Road. San Joaquin River Restoration Program. Sacramento, California.

Reclamation. 2015. Biological Survey Report: San Joaquin River Restoration Program (SJRRP) El Nido Road Conveyance Project. Fresno, California.

SJRRP (San Joaquin River Restoration program). 2011. Programmatic Biological Assessment. Sacramento, California. November.

SJRRP. 2015. Revised Framework for Implementation. Sacramento, CA. Available: http://www.restoresjr.net/wp-content/uploads/Revised- Framework_Final_20150729.pdf. Accessed: August 19, 2015.

SJVAPCD. 2012. *Rules and Regulations. Regulation VII*: SJVAPCD. Available:

http://www.valleyair.org/aqinfo/attainment.htm. Accessed: July 24, 2013.

Service (U.S. Fish & Wildlife Service). 1999. San Joaquin Kit fox Survey Protocol For the Northern Range. Sacramento Fish and Wildlife Office. Website: https://www.fws.gov/sacramento/ES/Survey-Protocols-Guidelines/Documents/kitfox_no_protocol.pdf. Accessed on October 2, 2014.

Service. 2002. Recovery Plan for the California Red-legged Frog (*Rana aurora draytonii*). U.S. Fish and Wildlife Service, Portland, Oregon.

Service. 2009. Chamaesyce hooveri (Hoover's Spurge) 5-Year Review Summary and Evaluation. Sacramento, California.

Service. 2010a. Delta Smelt (Hypomesus transpacificus) 5-Year Review. Sacramento, California.

Service. 2010b. Fresno kangaroo rat (Dipodomys nitratoides exilis) 5-Year Review Summary and Evaluation. Sacramento, California.

Service. 2010c. San Joaquin Kit Fox (Vulpes macrotis mutica) 5 Year Review: Summary and Evaluation. Sacramento, California.

Service. 2011. *Standardized Recommendations for Protection of the San Joaquin Kit Fox Prior to or During Ground Disturbance*. Sacramento, CA.

Service. 2012a. "About the Merced National Wildlife Refuge." *Merced National Wildlife Refuge California*. Department of the Interior, 19 Dec. 2012. Web. 15 Apr. 2015. <http://www.fws.gov/Refuge/Merced/about.html>.

Service. 2012b. Giant Garter Snake (Thamnophis gigas) 5 Year Review: Summary and Evaluation. Sacramento, California.

Service. 2014. "Waterfowl Hunt Maps." *Merced National Wildlife Refuge California*. Department of the Interior, 17 Sept. 2014. Web. 15 Apr. 2015.

<http://www.fws.gov/refuge/merced/hunt_maps.html>.

Service and Edison Electric Institute. 2005. *Avian Protection Plan Guidelines*.

U.S. Fish and Wildlife Service and Edison Electric Institute's Avian Power Line Interaction Committee. April, 2015.

State Water Resources Control Board. 2010. 2010 Integrated Report (Clean Water Act Section 303(d) List / 305(b) Report) - Statewide. Available at: http://www.waterboards.ca.gov/water_issues/programs/tmdl/2010state_ir_reports/01266.shtml#7020. Accessed: February 2, 2015.

Thompson, C. D. and S. H. Anderson. 1988. Foraging behavior and food habits of Burrowing Owl in Wyoming. Prairie Naturalist 20:23-28.

U.S. Environmental Protection Agency. 2012. *Evaluating Pesticides for Carcinogenic Potential*.

Available: http://www.epa.gov/pesticides/health/cancerfs.htm. Accessed: February 2, 2015.

U.S. Geological Survey. 2013. *Land Subsidence along the Delta-Mendota Canal in the Northern Part of the San Joaquin Valley, California, 2003–10.* Available: http://pubs.usgs.gov/sir/2013/5142/pdf/sir2013-5142.pdf. Accessed: December 5, 2014.

U.S. Geological Survey. 2001. *San Joaquin Valley, California: Largest human alteration of the Earth's surface*. Menlo Park, California. Available: http://pubs.usgs.gov/circ/circ1182/pdf/06SanJoaquinValley.pdf. Accessed: January 27, 2015.

Vasquez, E. 2013. *Cawelo Water District Calloway Canal Lining Project.* U.S. Bureau of Reclamation. Available: http://www.usbr.gov/mp/nepa/nepa_projdetails.cfm?Project_ID=11770. Accessed February 11, 2015.

Warrick, Gregory D., Howard O. Clark, Jr., Patrick A. Kelly, Daniel F. Williams, and Brian L. Cypher. "Use of Agricultural Lands by San Joaquin Kit Foxes." *Western North American Naturalist* 67.2 (2007): 270-77.

Wellicome, T. I. 1994. Taverner award recipient's report: Is reproduction in Burrowing Owls limited by food supply? Picoides 7:9-10.

Werner, R. H. 1984. *Archaeological Record Search and Field Survey Lower San Joaquin River and Tributaries Channel Clearing Project.* Unpublished cultural resources investigation prepared by Archaeological Services, Clear Lake, CA for the U.S Army Corps of Engineers, Sacramento CA. On file with the California Historic Information System's Information Center in Turlock, CA

# Appendix A

# *Appendix A – ITA Determination*

**ITA Request: Mariposa Slough/Eastside Bypass Low Flow Conveyance Project at El Nido Road**

**RIVERA, PATRICIA** <privera@usbr.gov> Mon, May 5, 2014 at 4:02 PM
To: "Aviles, Alexandra" <aaviles@usbr.gov>

Alex,

I reviewed the proposed action described below and determined there are no potential impacts to Indian Trust Assets.

Project Description:
The San Joaquin River Restoration Program's (SJRRP) mission includes increasing water releases from Friant Dam in a program of Interim Flows to collect data on relevant physical and biological parameters. The interim flows through Reach 4A of the San Joaquin River and the Eastside Bypass (Bypass) raise the shallow groundwater table in the adjacent agricultural fields. Reclamation currently limits the release from Friant Dam and Mendota Dam to non-damaging flow rates. The Restoration Administrator, consistent with requests by the Technical Advisory Committee, recommends maximizing the amount of flow conveyed into downstream reaches to take advantage of data collection opportunities prior to the reintroduction of fish. However, Reclamation cannot implement recommendations that exceed non-damaging flow rates.

The proposed action is to modify the Bypass channel and El Nido Road crossing to allow passage of Interim Flows and fish. The proposed project includes the following key components:

1. Excavate low flow channel for Sand Slough water path.
2. Haul and dispose excess excavated material to offsite facility.
3. Remove and dispose of inoperable culverts at El Nido Road crossing.
4. Furnish, place, and compact El Nido Road embankment.
5. Place riprap on upstream and downstream facing of El Nido Road.

A compound channel would be excavated from El Nido Road to approximately 2,500 feet downstream. The compound channel would consist of an inner low flow channel with a 50 foot wide base. For 40 feet on either side of the inner flow channel, the existing channel would be excavated to 2 feet above the invert of the inner channel. The amount of material that would be excavated from the channel is estimated to be approximately 10,000 cubic yards.

The approximate length of El Nido Road between the two levees is 1,600 feet. Approximately 2,000 cubic yards of gravel would be placed and graded to approximately 1.5 feet over the roadway between the levees. The existing non-functioning culverts at the El Nido Road crossing would be removed. A new low flow crossing would be constructed with an approximate length of 160 feet. The approximate area of channel excavation and road fill.

Staging, if needed, would be located on a previously disturbed area approximately 1,000 feet east of the Bypass and adjacent to and south of El Nido Road. The proposed staging area is approximately 2,100 feet long and 180 feet wide. The proposed action does not have a potential to impact Indian Trust Assets. The nearest Indian Trust Asset is a Public Domain Allotment, approximately 46 miles Northwest of the project location.

Patricia Rivera
Native American Affairs Program Manager
US Bureau of Reclamation
Mid-Pacific Region
2800 Sacramento, California 95825
(916) 978-5194

# Appendix B

# *Appendix B – NHPA Section 106 Compliance*

**United States Department of the Interior**

BUREAU OF RECLAMATION
Mid-Pacific Regional Office
2800 Cottage Way
Sacramento, California 95825-1898

IN REPLY
REFER TO:
MP-153
ENV-3.00

VIA ELECTRONIC MAIL ONLY

August 12, 2013
MEMORANDUM

To: Tyler Nunes
San Joaquin River Restoration Program

From: Adam Nickels /S/
Archaeologist – Division of Environmental Affairs MP-153

Subject: 13-SCAO-249 SJRRP Sand Slough Interim Flow Conveyance Project

The proposed undertaking to fund the removal of accumulated sediments in the bypass channel, construct a low flow channel in the built-up sediment of the bypass channel, and replace an inoperable culvert currently impeding flows at El Nido Road has no potential to cause effects to historic properties pursuant to 36 CFR §800.3(a)(1).

The proposed action is confined to the East Side Bypass area near the Sand Slough Control Structure. The Bypass is a USACE constructed feature. The sediments within the bypass have built up over the years and need to be removed as well as an existing culvert that is adding to the problem of sedimentation. All work will occur within the existing disturbed contexts of the bypass channel and roadway. Staging for the project will be in adjacent areas that are leveled and have existing buildings and equipment on them.

After reviewing the project description for this action I am able to conclude the Section 106 process for this undertaking.

This memo is intended to convey the conclusion of the Section 106 process for this undertaking. Please retain with the administrative Record. Thank you for providing the opportunity to comment.

CC: Cultural Resources Branch (MP-153), Anastasia Leigh – Regional Environmental Officer (MP-150),

# Appendix C

# LINNEMAN LAW, LLP

1820 MARGUERITE STREET
P. O. BOX 156
DOS PALOS, CA 93620
(209) 392-2141
FAX (209) 392-3964

DIANE V. RATHMANN
ALFRED L. WHITEHURST
THOMAS J. KEENE

GABRIEL A. DELGADO

EUGENE J. VIERRA, RETIRED

L. M. LINNEMAN (1902-1983)
JOSEPH B. BURGESS (1902-1990)
JAY H. WARD (1942-1995)
C. E. VAN ATTA (1919-1997)
JESS P. TELLES, JR. (1920-2004)
JAMES E. LINNEMAN (1933-2015)

654 K STREET
P. O. BOX 1364
LOS BANOS, CA 93635
(209) 826-4911
FAX (209) 826-4766

312 WEST 19TH STREET
P. O. BOX 2263
MERCED, CA 95344
(209) 723-2137
FAX (209) 723-0899


November 23, 2015

Ms. Becky Vistorine
Bureau of Reclamation
San Joaquin River Restoration Program Office
2800 Cottage Way, MP-170
Sacramento, California 95825-1898

Re: Lower San Joaquin Levee District's comments on the Draft Environmental Assessment EASTSIDE BYPASS CONVEYANCE PROJECT, dated October 2015

Dear Ms. Victorine:

Enclosed please find the above referenced document.

Very truly yours,

Linneman Law, LLP,

Thomas J. Keene

Thomas J. Keene

cc: Reggie Hill, Secretary/Manager
Lower San Joaquin Levee District

Enclosure

# Lower San Joaquin Levee District's Comments on the Draft Environmental Assessment EASTSIDE BYPASS CONVEYANCE PROJECT, dated October 2015

## Section 2 Proposed Action and Preferred Alternatives

**Page 8, Section 2.3, first paragraph.** The section of the Eastside Bypass in which the Project is located is in an easement for the passage of flood flows rather than in that portion of the bypass system in which fee title is owned by the State of California. This means that the sand in this portion of the Eastside Bypass is owned by the adjacent property owner. As a consequence, the Levee District does not remove sand from this area. The landowners are the only ones who remove the sand deposits. Previous landowners contracted with local sand and gravel operations for the removal of the sand deposits. Since the USFWS has purchased all of the bypass north of El Nido Road, it has not removed any material.

Army Corps of Engineers' Design Memorandum No. 5, dated September 1984 provides that the flood channel should be excavated so the Eastside Bypass can pass flood flows within its design purpose. The Corps document reported that the amount of sediment to be removed at that time was approximately 650,000 cubic yards, for a length of over 12,000 feet. This was written in 1984, since we are now 30 years beyond 1984, the amount of sediment is presumably even greater.

The State Department of Water Resources, in evaluating Reach 4B1-Eastside Bypass flows, has calculated that sediment deposition in its current configuration will continue to reduce channel capacity in the "Middle" Eastside Bypass. DWR estimates that 120,000 cubic yards will be deposited in the reach annually, with an annual cost of removal estimated at $600,000 in order to maintain the channel's ability to convey flood flows. The Levee District cannot afford to remove sand at this pace has no obligation to remove sand from this area at all.

The Draft Environment Assessment indicates, as noted in the District's comments below, (see comment to Page 14, Section 3.3.2, "Water Resources", fourth paragraph) that the Program will continue to remove sand after the initial work, for a period of no more than five years. Clearly, if the work performed initially is to be preserved, dredging of the improvements constructed by the Eastside Bypass Conveyance Project will have to continue indefinitely in order to keep the benefits obtained to fish flows. There is no indication in the document as to who will perform this work or how its costs will be paid both the for the duration of the Program after the initial five years or for the future time when the Program no longer exists.

**Page 9, Section 2.3, second paragraph**. Annual maintenance of sediment removal should be consistent with the numbers mentioned in the above comment.

**Page 10, Section 2.3.1, paragraph "o)".** Indicates that all "future maintenance excavations"

will require, within ten days before starting work, for a biological survey. This will obviously add to the cost of maintenance. Nothing is said in the document as to who will bear that cost after the initial five years of this particular project or if it will apply to the Levee District's other operation and maintenance activities. Reclamation has consistently failed and refused to make any commitment as to who is going to provide on going maintenance to the system after the program itself has been completed. As the Levee District has pointed out consistently, this makes the consideration of flood impacts in these environmental documents generated at the project level inadequate and planning for flood protection activities almost impossible.

**Page 11, Section 2.3.1, paragraph "v)".** There is no doubt, given the River's history of moving sediment that annual maintenance excavations must continue for more than five years beyond the completion of the initial excavation. Therefore, the EA's failure to fully evaluate the impact on federally protected species, means that the EA has failed to examine identified negative impacts to the environment to determine whether they are significant.

## Section 3 Affected Environment and Environmental Consequences

**Page 13, Section 3.3.2, "Water Resources", third paragraph.** The channel measured flows should reflect the highest on record for the Eastside Bypass. The number stated in this paragraph of 11,598 cfs, on March 31, 2011, at the El Nido station is not the highest on record. The most accurate manner to compare measurements from different stations is through consistent field measurements as the channel bottom changes during flow events. This is not being done by CDEC in coordination with flow changes at the location and taking into account the constant movement of the sediment that is being deposited in the channel. The District has seen this inconsistency in its operation of the downstream control structures' gaging stations. At the control structures, the Levee District uses curve adjustments prepared by DWR to calculate flows at these locations. As a result, the District's readings have always shown greater flows than the El Nido station is sending to CDEC. The District has communicated this discrepancy to DWR. Attached is a photo of the flows at the Mariposa Control Structure in April 2006 that shows recorded flows at the structure at 20,388 cfs. This means the flow upstream of this location is greater than 20,000 cfs at the El Nido gaging station.

**Page 14, Section 3.3.2, "Water Resources", fourth paragraph.** This indicates that flows in wet years "may" require maintenance excavation every year "up to five years". The second sentence says that the River Restoration Program plans to carry on the dredging "as necessary". Presumably this means that the Program will dredge for no more than five years. As noted in prior comments, there is no doubt, given the history of moving sediment in this area, that annual maintenance excavations must continue for more than five years beyond the completion of the

initial excavation. There is no indication in this document as to who will be providing that maintenance or who will pay for it after the initial five years. Does the Bureau of Reclamation intend to continue channel maintenance beyond the end of the five year period? If not, why not? Even if it does continue beyond the initial five years, who will perform and who will pay for the dredging after the River Restoration Program is complete?

**Page 17, Section 3.3.3, "Flood Protection", first two paragraphs.** The text indicates that, by the summer of 2016, the channel capacity "will likely" increase to 300 cfs. It then acknowledges that restoration flows have the potential to degrade the integrity of the "levee and flood management zone". It then acknowledges that "Restoration Flows to meet U. S. Army Corps of Engineers criteria for levee stability in the Middle Eastside Bypass would need a capacity of 580 cfs." It goes on in the third paragraph to say that the proposed project would increase the capacity in the low flow channel and so reduce the chance of raising the water table and causing potential damages to levees.

If the Program knows that the channel capacity will be no more than 300 cfs by the summer of 2016, and that restoration flows may degrade the levees and make flood management more difficult, and that the ACE says that 580 cfs is needed, why has there been no computer modeling done as a part of this Environmental Assessment to determine the extent to which this degradation is going to occur? The purpose of an Environmental Assessment is to determine the likelihood of a significant negative impact on the environment, yet this brief section on Flood Protections indicates that there may be a significant impact on the environment but the project proponents do not want to take the time or spend the money to assess the level of impact.

NEW YORK
LONDON
SINGAPORE
PHILADELPHIA
CHICAGO
WASHINGTON, DC
SAN FRANCISCO
SILICON VALLEY
SAN DIEGO
SHANGHAI
BOSTON
HOUSTON
LOS ANGELES
HANOI
HO CHI MINH CITY

DuaneMorris®

*FIRM and AFFILIATE OFFICES*

THOMAS M. BERLINER
DIRECT DIAL: +1 415 957 3333
PERSONAL FAX: +1 415 520 5835
*E-MAIL:* tmberliner@duanemorris.com

*www.duanemorris.com*

ATLANTA
BALTIMORE
WILMINGTON
MIAMI
BOCA RATON
PITTSBURGH
NEWARK
LAS VEGAS
CHERRY HILL
LAKE TAHOE
MYANMAR
OMAN
*A GCC REPRESENTATIVE OFFICE OF DUANE MORRIS*

MEXICO CITY
ALLIANCE WITH
MIRANDA & ESTAVILLO
SRI LANKA
ALLIANCE WITH
GOWERS INTERNATIONAL

November 23, 2015

Ms. Rebecca Victorine
Bureau of Reclamation
San Joaquin River
Restoration Program Office
2800 Cottage Way, MP – 170
Sacramento, CA 95825 – 1898
Via Email To: RVictorine@usbr.gov

**Re: Comments Of The San Joaquin River Exchange Contractors Water Authority And San Joaquin River Resource Management Coalition To The Draft Environmental Assessment, Eastside Bypass Conveyance Project, And Draft Finding Of No Significant Impact, October 2015**

Dear Ms. Victorine:

The following comments are submitted on behalf of the San Joaquin River Exchange Contractors Water Authority and San Joaquin River Resource Management Coalition (referred to hereafter for convenience as "Exchange Contractors") to the Draft Environmental Assessment, Eastside Bypass Conveyance Project, and Draft Finding Of No Significant Impact (FONSI), issued October 2015.

By these comments, the Exchange Contractors join in with the comments of the Lower San Joaquin Levee District (LSJLD) submitted on December 23, 2016, which comments are incorporated herein by reference.

In addition to the comments from the LSJLD, the Exchange Contractors offer the following comments to the Draft Environmental Assessment, Eastside Bypass Conveyance Project (DEA) and FONSI. Page references and/or section references are to the DEA. Comments to the DEA are incorporated as comments to the FONSI.

1. Pages 2-3. The DEA states: "Addressing each partial barrier improves the chances for fish to migrate and reproduce successfully and, therefore, the Project has

independent utility regardless of what other fish passage projects are implemented in the Eastside Bypass area."

Comment: This project does not have independent utility. It is not a project that could stand on its own and perform any beneficial actions. This project is one of a suite of actions that must be performed as part of the San Joaquin River Restoration Program (Program). If the only action taken were removal of sand and sediment plus other improvements to the Eastside Bypass area, neither spring run nor fall run salmon could migrate up and down the river area it as specified by the Program. Many improvements are necessary on the river. Each of them are part of a whole without which this Program cannot be successful.

2. Page 3. The DEA states: "Hydraulic modeling of the Eastside Bypass shows there is a substantial flow impediment at the El Nido Road crossing. Sand has accumulated in the low-flow channel and the road culverts have silted in completely. The project has been designed to reduce the water surface elevation through the Eastside Bypass between El Nido Road and the MNWR weir at flows greater than 150 CFS."

Comment: The hydraulic modeling should be discussed in the DEA. Conclusory statements do not help stakeholders understand what analysis has been done and what the possible impacts are. Further, a reference should be made to exactly which study is being cited to and those areas within the study that support the statement.

3. Page 9. The DEA states that "…it is anticipated that sediment would need to be removed from the channel annually to maintain the channels hydraulic capacity…. Annual maintenance excavation activities would be completed in summer months and will be coordinated with the recommendations of the Restoration Administrator."

Comment: According to the hydrographs, during non-critical drought years, year-round flows will occur in the San Joaquin River, including the Eastside Bypass. How will annual maintenance be performed in the event that flows are present in the Project area?

4. Page 11-12. The DEA states "If annual maintenance excavations must continue beyond five years after the initial work (original excavation and culvert removal) on [sic] the Project has been completed [sic], potential effects on federally protected species will be reevaluated."

Comment: Who will be performing maintenance after five years? On page 9 the DEA states that sediment would need to be removed from the channel on an annual basis. Hence, the phrase on page 11 "if annual maintenance excavations must continue beyond five years…" suggests that annual maintenance excavations may not be required after five years. This discrepancy should be clarified.

5. Page 14. The DEA states "higher flows carry greater sediment loads, and depending on the water year, they require maintenance excavation of the low-flow channel every year for up to five years to maintain the hydraulic improvements of this Project."

Comment: Is the Program anticipating that maintenance excavation of the low-flow channel will not be required beyond the five year period? There does not appear to be any assessment of impact after the first five years. This omission must be corrected. Further, the occurrence of annual restoration flows will continue to contribute to sediment loading. This impact must be mitigated by Reclamation pursuant to the terms of the San Joaquin River Restoration Settlement Act. There is no analysis of or commitment to excavation after five years. If sediment renewal is not continued after the first five years, it will continue to accumulate. This will result in clogging of the low-flow channel making it either inhospitable for fish or the source of seepage damage to adjacent properties. There is no analysis in the DEA.

6. Page 17-18, section 3.3.3, Flood Protection. The section notes that seepage damages are caused above 50 CFS. It also states that with implementation of several projects to address seepage in the restoration area, the channel capacity will likely increase to 300 CFS by the summer of 2016. The section goes on to state that by removing flow impediments the increased capacity of the low-flow channel and improved flows reduce the chances of raising the water table and causing damage to levees.

Comment: Have these conclusory statements been modeled? If so, references to the models should be included as well is a discussion of what the models disclosed.

7. Page 18. Section 3.3.4. Land Use and Agriculture. Similar to paragraph 6 above, this section identifies seepage impacts to adjacent lands and states that flows could be increased up to 300 CFS as of February 2016. It further states that with a lower water surface elevation and improved hydraulics through the Eastside Bypass more restoration flow will be conveyed through this reach of the river while minimizing the potential for seepage impacts.

Comment: What studies have been done to support these conclusions? Where are the studies?

8. Page 22. The DEA states: "The SJRRP began introducing spring-run Chinook salmon… in the SJR in 2014. While the proposed action would occur when it is dry, Central Valley steelhead… and spring run Chinook salmon, as well as other fish, including other salmonids, could potentially occur in the action area when restoration flows are providing for river connectivity."

Comment: If salmon are present in the action area, what mitigation measures will be taken to protect these fish, if any? Please note, this paragraph conflicts with Table 3, also on page 22, which states that salmon would not be present in the action area.

If you have any questions regarding these comments, please do not hesitate to contact the undersigned.

Sincerely yours,

Tom Berliner

Thomas M. Berliner

TMB:bah

cc: Reggie Hill, Secretary/Manager, LSJLD

# Appendix D

RECLAMATION

*Managing Water in the West*

**Technical Report No. SRH-2015-19**

# Low Flow Conveyance in the Vicinity of El Nido Road

**San Joaquin River Restoration Project**

U.S. Department of the Interior
Bureau of Reclamation
Technical Service Center
Denver, Colorado

March 2, 2015

This page left blank intentionally

# Mission Statements

The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to Indian Tribes and our commitments to island communities.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

**Technical Report No. SRH-2015-19**

# Low Flow Conveyance in the Vicinity of El Nido Road

## San Joaquin River Restoration Project

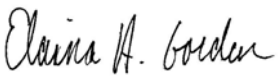

**Report Prepared by:**

**Blair P. Greimann, P.E., Ph.D., Hydraulic Engineer**
**Sedimentation and River Hydraulics Group, Technical Service Center**

**Signature:** 

**Peer Reviewed by:**

**Elaina Gordon, P.E., M.S., Hydraulic Engineer**
**Sedimentation and River Hydraulics Group, Technical Service Center**

**Signature:** 



U.S. Department of the Interior
Bureau of Reclamation
Technical Service Center
Denver, Colorado

March 2, 2015

# Table of Contents

# Index of Figures

Page

# Index of Tables

Page

# 1 Introduction

The Denver Technical Service Center (TSC) of Reclamation performed an analysis of the effect of excavating sand upstream and downstream of El Nido Road in order to lower low flow water surface elevations upstream of El Nido Road within the Eastside Bypass. This current study is an extension of the previous analysis (Reclamation, 2015) that examined the causes for increased low flow water surface elevations in the vicinity of the Sand Slough Control Structure and found that excavation of material upstream and downstream of El Nido would result in significantly lower flow water surface elevations within the Eastside Bypass upstream of El Nido Road to just upstream of the Sand Slough Control Structure.

The project reach is shown in Figure 1-1 within which the locations of several structures are noted. The Eastside Bypass Control Structure is located at the downstream end of the study reach near the Mariposa Bypass. The control structure has radial gates that control the flow rate to the lower Eastside Bypass Channel.

The Merced National Wildlife Refuge (MNWR) is located approximately 3.3 miles upstream of the Eastside Bypass Control Structure. A weir, located within the refuge, consists of stop logs that can create approximately 5 feet of backwater when in place to flood the refuge.

El Nido Road is located about 5.5 miles upstream of the MNWR. Currently, no culverts or openings allow low flow to pass underneath the road. The low flow channel just upstream of El Nido Road has been excavated several times within recent years and is an area of active deposition during high flows.

The Sand Slough Control Structure is located on the section of channel that connects the downstream end of Reach 4a of the San Joaquin River to the Eastside Bypass, known as the Sand Slough Connector. The structure is about 1.2 miles upstream of El Nido Road. Reach 4a of the San Joaquin River extends for approximately 14 miles upstream of the Sand Slough Control Structure. Highway 152 is located within Reach 4a, approximately 5.5 miles upstream of the Sand Slough Control Structure.

The measured bed profiles in 1998 and 2011 for the study reach are given in Figure 1-2. The overall bed profile has been relatively stable in the reach since 1998, but some local changes are notable. Some erosion appears to have occurred in the reach witin the first 2 miles downstream from Highway 152. Upstream of El Nido Rd, a significant drop in bed elevations is visible and is likely due to sand excavation in the vicinity.

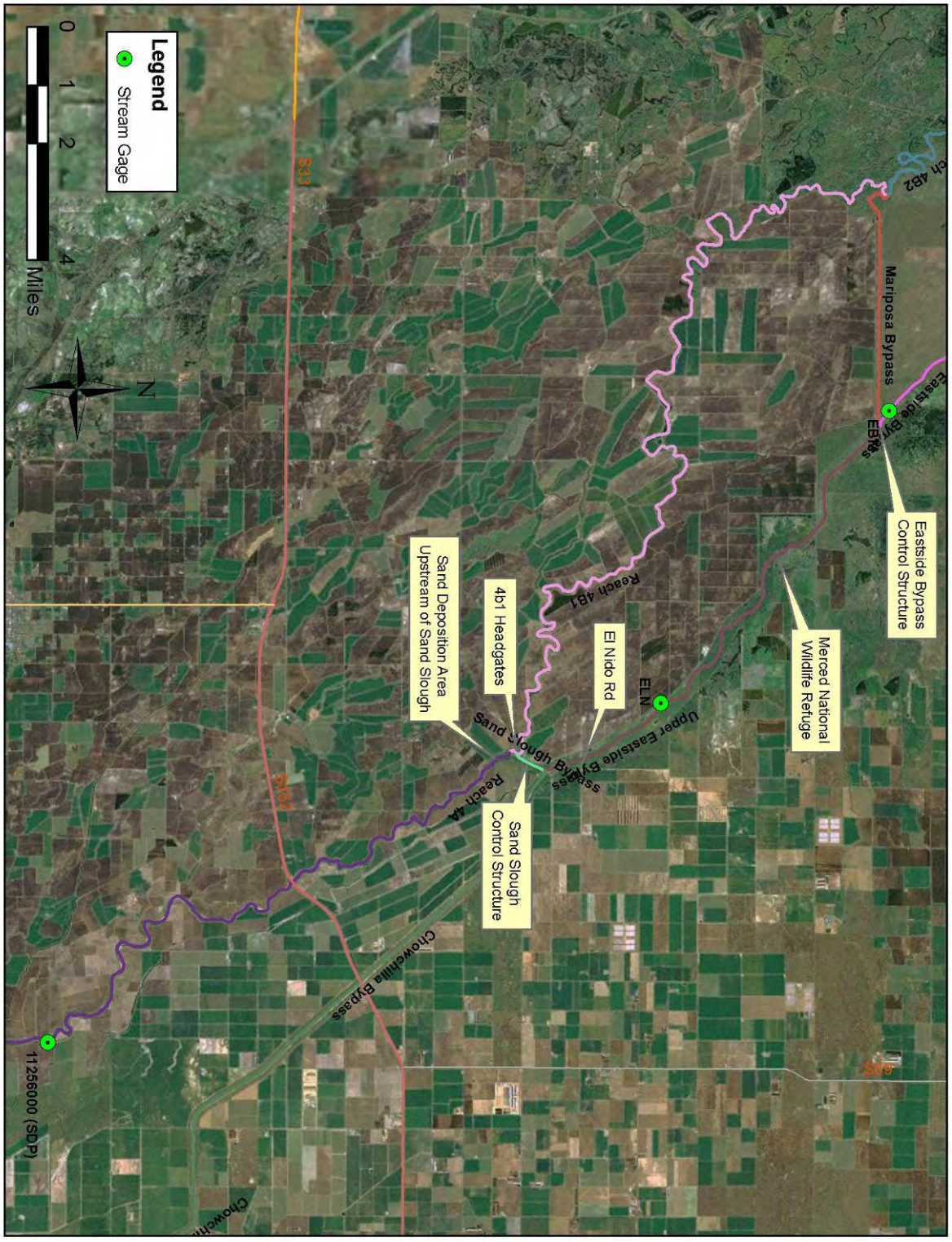



Figure 1-1. Overview of Project Reach of Reach 4a and the Eastside Bypass.

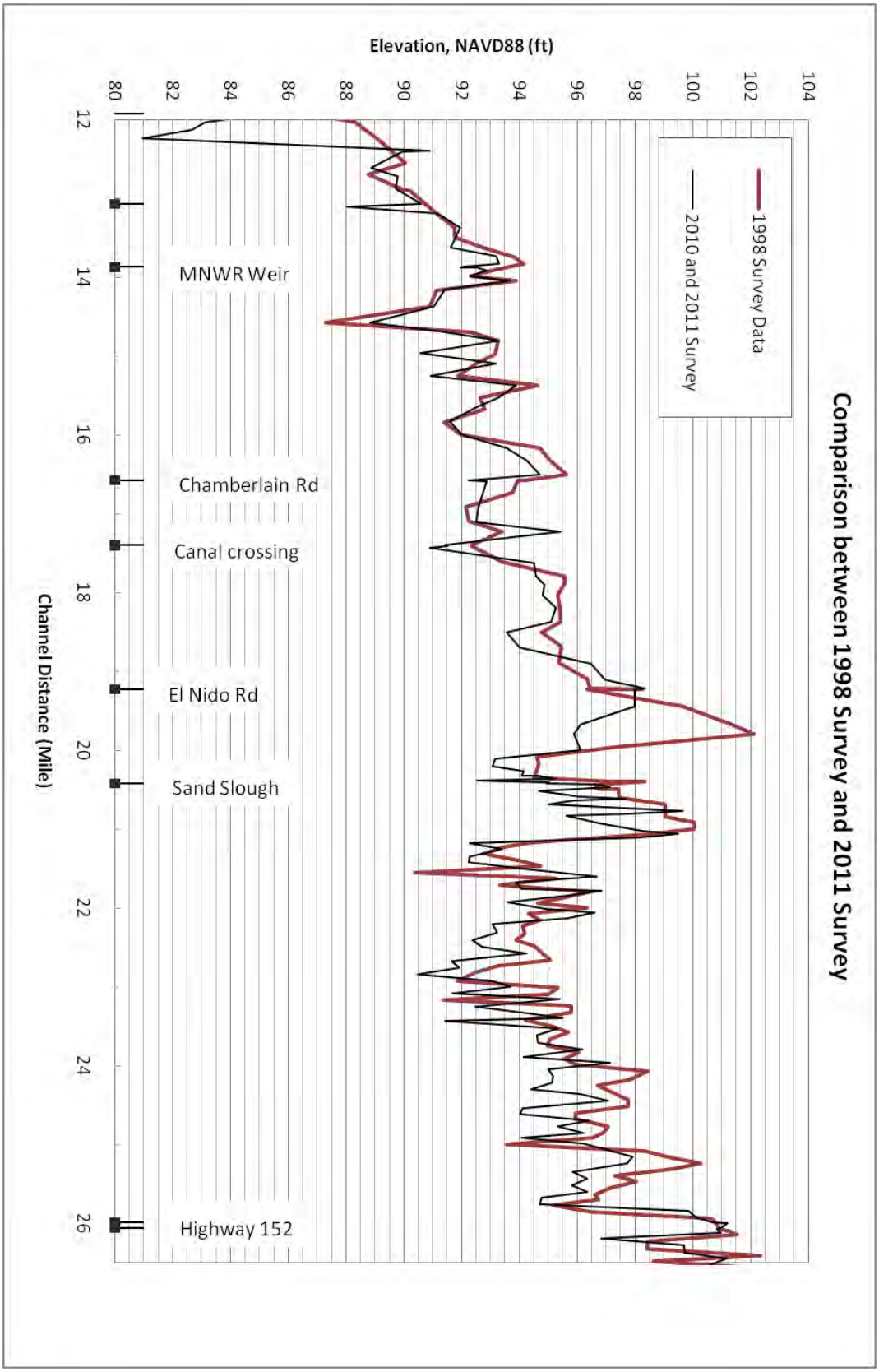



Figure 1-2. Comparison between the 1998 and 2010/2011 bed profile surveys.

# 2 Methods

We constructed a cross section based hydraulic model in HEC-RAS 4.1 (US Army Corps of Engineers, 2010) between the Eastside Bypass Control Structure on the Eastside Bypass to Sack Dam on the San Joaquin River. There are 4 basic pieces of information needed to construct such a model: river geometry, structure characteristics, hydraulic roughness, and boundary conditions. The starting HEC-RAS model used in this study is to the same used in the previous study of the low flow elevations in the vicinity of Sand Slough Control Structure (Reclamation, 2015).

1. River geometry is the above water and below water geometry of the stream, floodplain and levees. For this study, we obtained the 2008 LiDAR for the entire reach from California Department of Water Resources (CDWR). Two separate boat surveys were performed by Reclamation in April 2010 and in January 2011 to obtain the below water geometry of the stream channel. The cross section locations used in the study are shown in Appendix A, Figure 8-1.
2. Structure characteristics are geometric and operational criteria for bridges, weirs, and control structures located on the river. Original as-built design drawings of the Eastside Bypass Control Structure, the Sand Slough Control Structure, and the MNWR weir were used to provide the necessary information for the HEC-RAS model. Information on the bridges was obtained from the MEI (2008) hydraulic modeling study.
3. Hydraulic roughness is the resistance of the channel and overbank topography to the flow. The hydraulic roughness is related to the bed material, bed forms, vegetation, and channel planform. In one-dimensional models such as HEC-RAS, the hydraulic roughness is often used as a calibration parameter because it incorporates several difficult–to-measure physical properties into one parameter. In this study, boat surveys of the water surface elevations performed in April 2010 and January 2011 from Highway 152 to just upstream of the Eastside Bypass Control Structure were used as the data to which the model was calibrated. The channel roughness values were adjusted such that the model results were consistent with the measured water surface elevation data.
4. Boundary conditions in the model consist of water surface elevations at the downstream end of the simulated reaches for each modeled flow. We set the boundary condition downstream of the Eastside Bypass Control Structure using information from the MEI (2008) hydraulic model modeling study. We also set a boundary condition just downstream of the Reach 4b1 headgates for the alternatives that allowed flow to enter Reach 4b1. Rating curves used downstream of the Eastside Bypass Control Structure and the Reach 4b1 headgates are shown in Figure 2-1 and Figure 2-2, respectively.

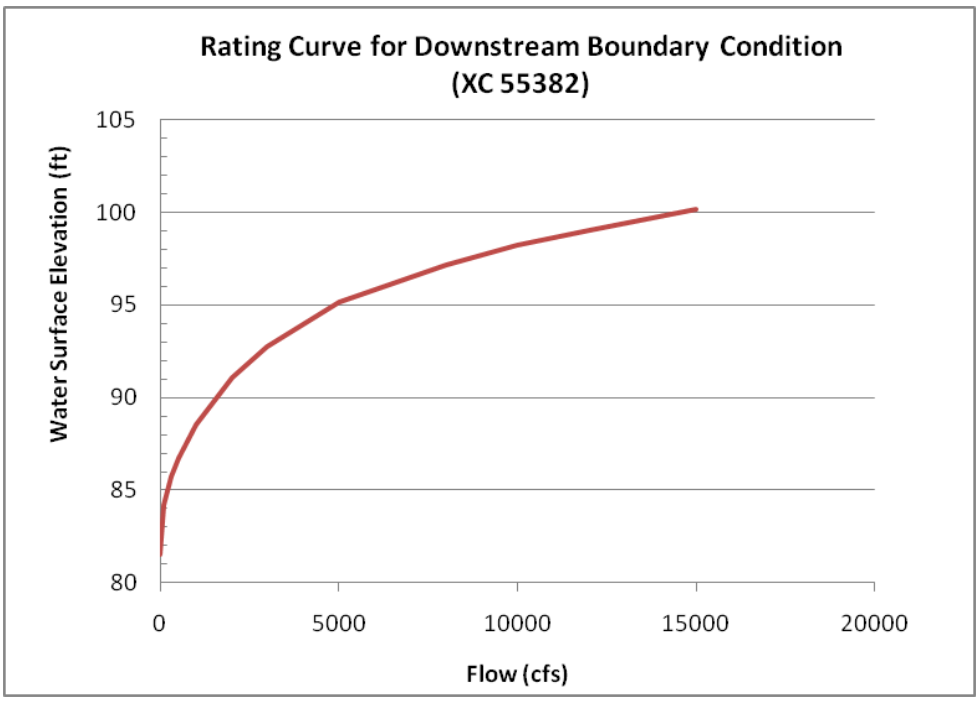



Figure 2-1. Rating curve used for downstream boundary condition at XC 55382, which is just downstream of Eastside Bypass Control Structure.

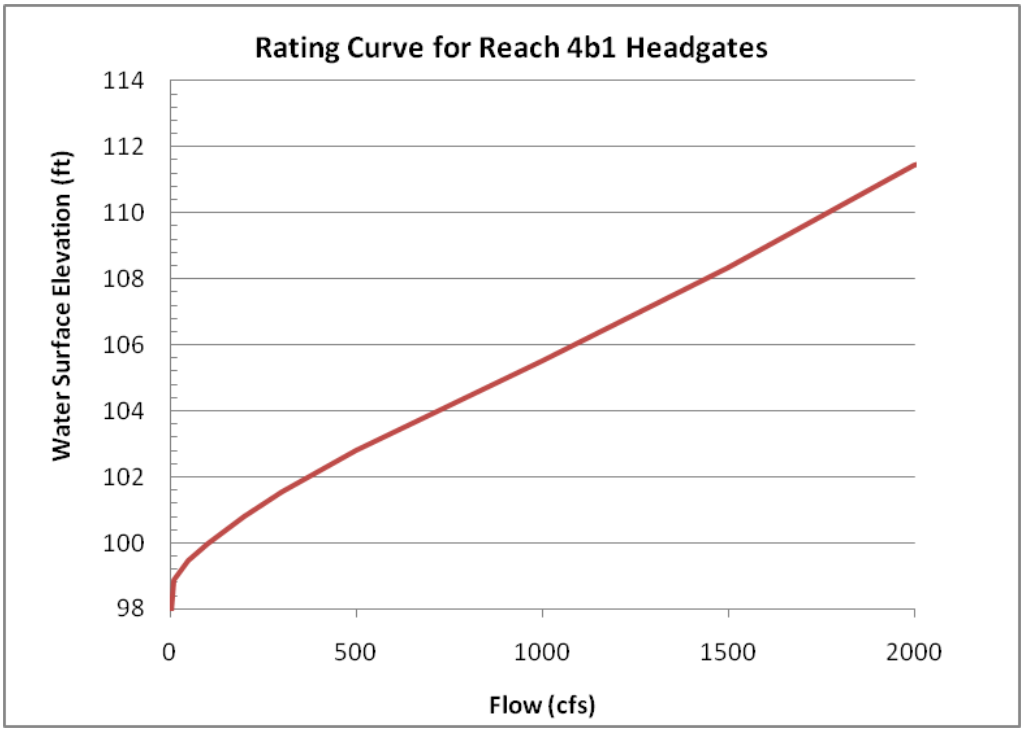



Figure 2-2. Rating curve used for upstream of Reach 4b1 headgates for cases with flow into Reach 4b1.

# 3 Calibration

Hydraulic roughness values in the main channel were calibrated based upon water surface elevation data collected on April 10, 2010 and January 17-18, 2011 in Reach 4a and the Eastside Bypass. The measured flow rate at the San Joaquin River Near Dos Palos (SDP) stream gage at the upstream end of Reach 4a is shown in Figure 3-1 and Figure 3-2 for April 10, 2010 and January 17, 2011, respectively. The measured flow rates at the Eastside Bypass Near El Nido (ELN) stream gage near El Nido Rd on the Eastside Bypass are shown in Figure 3-3 for January 18, 2011. Data for April 10, 2010 are not shown for the El Nido stream gage because the gage is not considered reliable for low flows. One reason the El Nido gage is not reliable at low flows is due to its location just 4 miles upstream of the MNWR weir. As will be shown, when the stop logs of the MNWR weir are in place, the low flow water surface elevations increase by up to 5 feet at the weir, and the backwater from the weir can extend upstream almost 8 miles. We estimate that the MNWR weir can significantly affect the rating curve at the El Nido gage for flows of 2,000 cfs and below, thereby impacting the reliability of the stream gage record for flows below 2,000 cfs.

On April 10, 2010, the flow rate was assumed to be 730 cfs in Reach 4a and the Eastside Bypass. The flow rate was assumed to be 1,200 cfs on January 17, 2011 in Reach 4a and 2,250 cfs on January 18, 2011 in the Eastside Bypass.

Two of the twelve openings at the MNWR weir were assumed to be closed during the flows of April 10, 2010 based upon a photograph taken at the weir that showed significant debris blockage of two openings (Figure 3-4). On January 17, 2011 all twelve openings were assumed fully open.

A channel roughness of 0.04 and floodplain roughness of 0.065 were used throughout the Bypass reach to match the measured water surface profiles (Figure 8-2, Appendix A). The only exception is in a heavily vegetated reach from the Sand Slough Control structure to about 1 mile upstream. We used a channel roughness of 0.1 for the cross sections where vegetation is blocking flow in the main channel. A picture of the April 10, 2010 channel at approximately 2,000 ft upstream of the Sand Slough is given in Figure 3-5 and shows the dense vegetation along the main channel.

The match between the simulated water surface elevations and the measured data of January 17-18, 2011 is considered excellent. The average difference in Reach 4a between the simulated and measured was less than 0.1 ft for Reach 4a and the Eastside Bypass. The standard deviation was less than 0.2 ft. Comparison between the measured and simulated data for the April 10, 2010 data was not as consistent. The average difference between the measured and simulated water surface elevations in Reach 4a was -0.78 ft. One possible reason for the discrepancy between the measured and simulated data for the April 10, 2010 flows is that the vegetation density could have been greater in April 2010 since those were the first interim flows released in the reach, and there may have been more vegetation in the channel, increasing its roughness and perhaps creating flow blockages. We assumed that the more recent 2011 data would be more reflective of current conditions, and therefore we did not try to alter the channel roughness to match the April 2010 data.

Table 3-1. Comparison between measured and simulated water surface elevations for the data collected on April 10, 2010 and January 17, 2011.

| Date | Average Difference (ft) | | Standard Deviation (ft) | |
|---|---|---|---|---|
| | Eastside | Reach 4a | Eastside | Reach 4a |
| April 10, 2010 | -0.085 | -0.78 | 0.22 | 0.2 |
| January 17-18, 2011 | -0.041 | -0.06 | 0.16 | 0.09 |

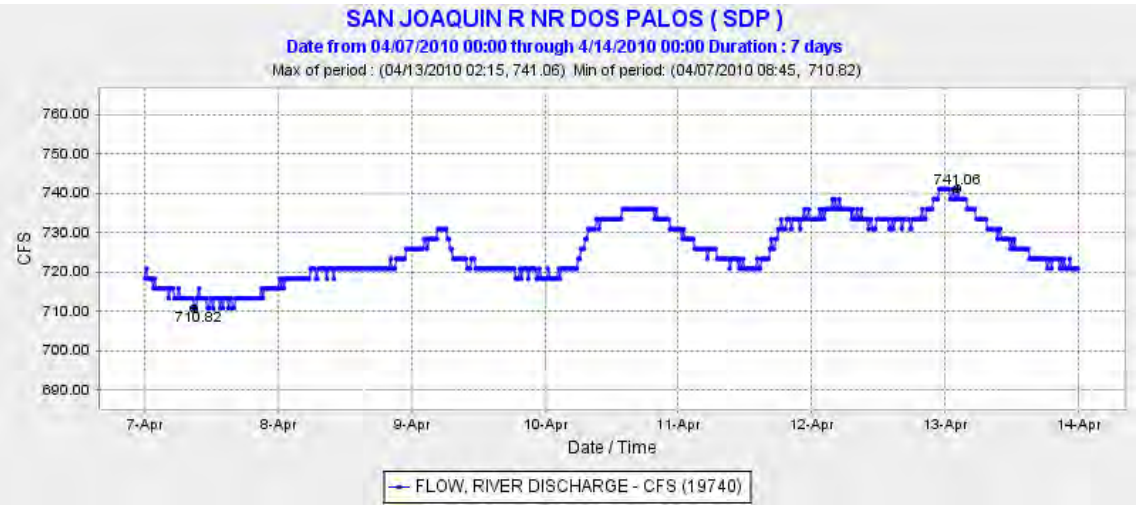



Figure 3-1. Flows on San Joaquin River near Dos Palos (downstream of Sack Dam) for April 2010.

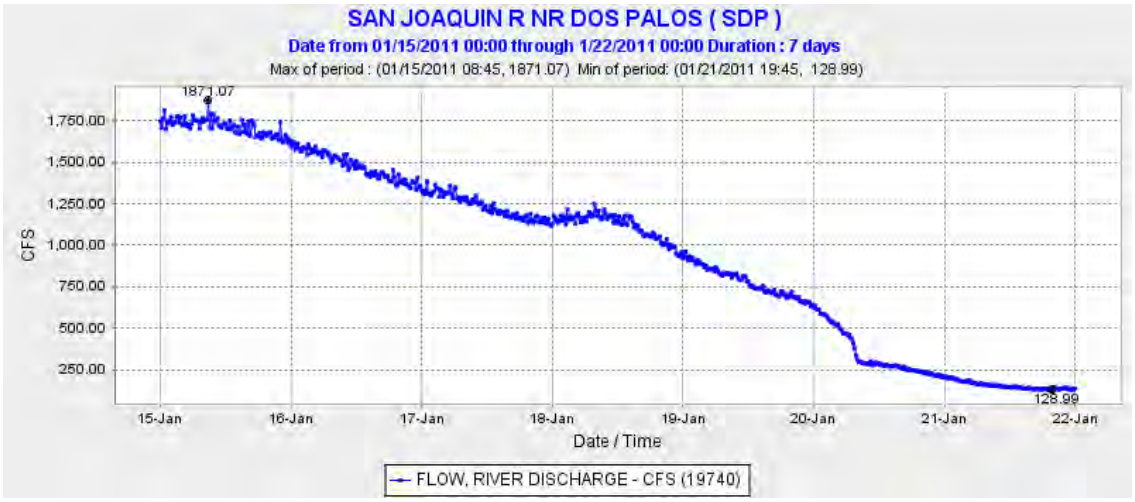



Figure 3-2. Flows on San Joaquin River near Dos Palos (downstream of Sack Dam) for January 2011.

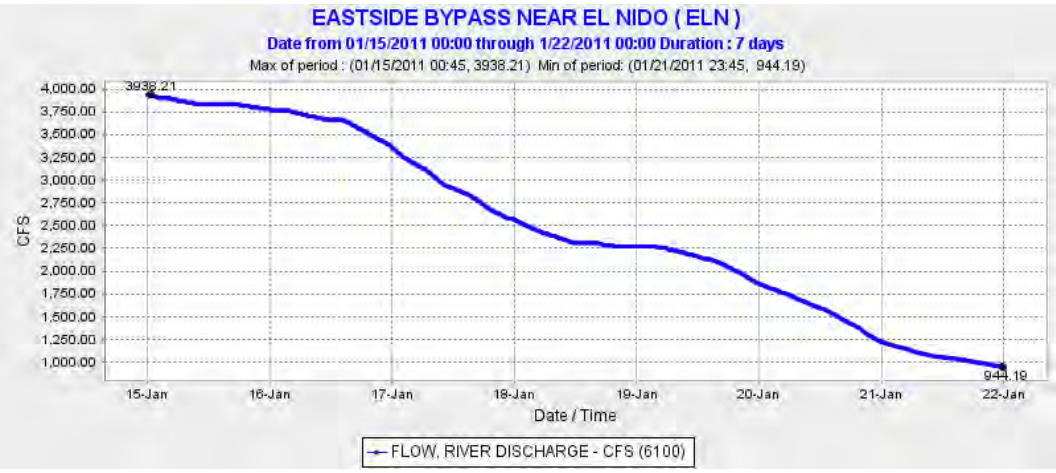



Figure 3-3. Flows on San Joaquin River near El Nido (on Eastside Bypass) for January 2011.

Figure 3-4. Merced National Wildlife Refuge Weir April 10, 2010. Note the two left weir bays blocked by debris.

Figure 3-5. Looking downstream at heavy brush blocking the main channel in lower portion of Reach 4a, April 10, 2010 approximately 2000 ft upstream of the Sand Slough Control Structure.

# 4 Conceptual Designs

We developed conceptual designs for the excavation of bed material from the reach upstream and downstream of El Nido Road for the purpose of decreasing the water surfaces in the Eastside Bypass and in the area of the Sand Slough Control Structure. Recent extensive excavation of material upstream of El Nido Road by private landowners is visible in Figure 4-1.

A channel was excavated within the existing low flow channel using the template shown in Figure 4-2. A compound channel with a 50 ft wide base was excavated to an elevation of 94.5 ft at the El Nido Rd crossing with a downstream slope of approximately 0.00017. The cut channel extends approximately 2000 ft downstream and 3000 ft upstream of El Nido Rd. For 40 ft on either side of the low flow, the existing low flow channel was excavated to 2 ft above the invert of the low flow channel. The banks of the 50-ft wide cut channel were designed to be a 3H:1V. The amount of material excavated to accomplish this low flow channel configuration is approximately 12,000 cubic yard of excavation downstream of El Nido Rd. The resulting HEC-RAS cross sections are shown in Figure 4-3.

Some minor amounts of excavation may also be necessary upstream of El Nido Rd which is an area where excavation has repeatedly occurred in the past and will likely continue. This makes is difficult to estimate the amount of required excavation, but it is likely that little additional excavation would be necessary.

We also analyzed four alternatives for the road crossing at El Nido Road in the Eastside Bypass using HEC-RAS:

1. Culverts with 30 foot wide total opening
2. Bridge with 60 ft wide total opening
3. Bridge with 160 ft wide total opening
4. Low Flow crossing with no bridge, which is similar to the current condition.

The criteria used in the preliminary road crossing design were:

1. Velocities had to be less than 6 ft/s through the structure at all flow rates (50 to 16000 cfs), to correspond to NMFS 2008 criteria for culvert crossings, as listed in the *Anadromous Salmonid Passage Facility Design* manual.
2. For the bridge options (1 to 3), the road deck had to be at or above elevation 100.0 ft so that it remains passable when the MNWR weirs are raised to 98.5 ft and the river flow is 150 cfs. It would also just be passable if MNWR raises their weirs to the maximum elevation of 100 ft.
3. For the low flow crossing (Option 4), the depth of flow had to be near 1 ft at a flow of 175 cfs.
4. Structure designs had to account for potential scour within the structure.
5. The structure had to result in lower water surface elevations by 2 ft immediately upstream of the road crossing compared to existing conditions at a flow of 150 cfs.

The conceptual designs for each of the four options are described in detail in the following sections.

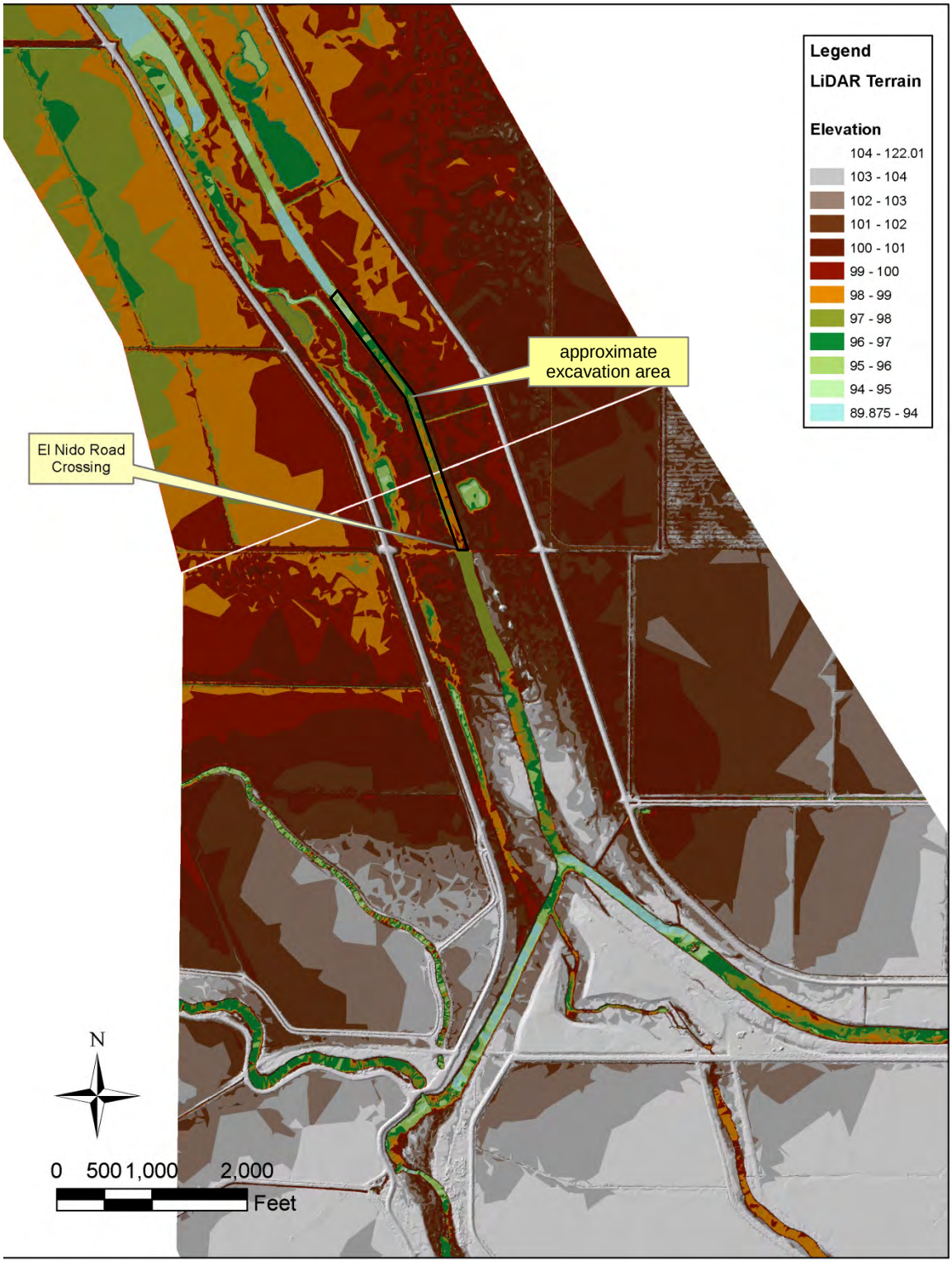



Figure 4-1. Ground elevations in NAVD 88 ft near El Nido Road crossing based upon 2008 LiDAR survey.

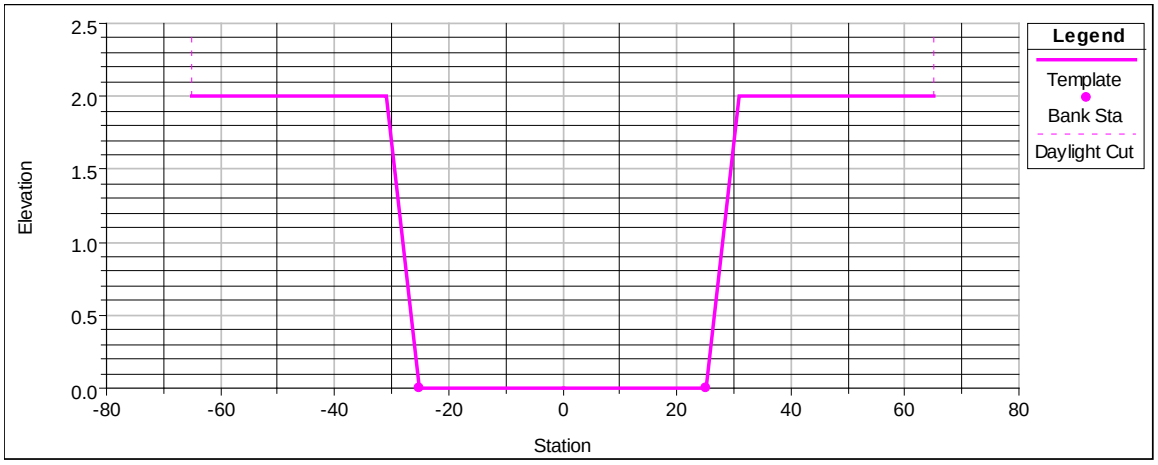



Figure 4-2. Channel cut template used in channel excavation includes a 50 foot channel base with 3:1 side slopes, and a 40 foot wide bench inset 2 feet on each side of the channel.

### *4.1 Culverts with 30 ft wide total opening*

This design assumes that two concrete box culverts 15 ft wide and 4 ft high, with a invert opening elevation of 95 ft on the upstream side and 94.5 ft on the downstream side, are constructed at the El Nido Crossing. The deck elevation is at 100 ft. The cross section on the upstream side of the culverts is shown in Figure 4-4.

The culverts become pressurized at a flow of approximately 475 cfs. The road is overtopped by about 0.5 ft of depth at a flow of 700 cfs. The maximum flow velocity through the culverts occurs at a flow of 700 cfs, and is approximately 5 ft/s.

The current ground elevations are at the El Nido Crossing are approximately 98 ft, and it is likely that a high flow will cause deposition at the site of the proposed structure and return the bed elevations to this elevation or higher. The elevation of the top of the proposed culvert opening is 99 ft; therefore, it is possible that the culverts become completely plugged with sediment.

The upstream and downstream faces of the roadway would have to be protected with rock to prevent erosion during structure overtopping. Sufficient rock should be placed along the upstream and downstream face to protect from approximately 10 ft of abutment scour as determined by Froehlich's equation of abutment scour in HEC-RAS (Froehlich, 1989). Rock only needs to be placed within the existing low flow channel. There could also be a concrete apron placed upstream and downstream of the culvert in the area of high velocities to eliminate scour.

### 4.2 Bridge with 160 ft wide total opening

This design assumes that a bridge with a 160 ft wide opening is constructed over the existing low flow channel. The piers are spaced 20-ft on center. The deck elevation is at 102.0 ft, and the soffit is at 100.5 ft (Figure 4-5).

The bridge becomes pressurized at a flow between 475 and 700 cfs, and it becomes overtopped at a flow of approximately 2200 cfs. The maximum velocity through the bridge opening occurs at flow of 1500 cfs, when it reaches 2.7 ft/s.

The bridge pier and abutment scour was computed with HEC-RAS assuming a bed material size of 0.5 mm. Froehlich's equation was used for the pier and abutment scour. Contraction scour was added to the pier and abutment scour (Froehlich, 1989; Froehlich, 1991). The resulting maximum scour occurs at a flow of 2200 cfs and is 5.5 ft of scour at the piers and 9.5 ft of scour at the abutments.

### 4.3 Bridge with 60 ft wide total opening

This design assumes that a bridge with a 60 ft wide total opening is constructed over the existing low flow channel. The piers are spaced 20-ft on center. The deck elevation is at 100 ft, and the soffit is at 98.5 ft (Figure 4-6).

The bridge becomes pressurized at a flow between 300 and 475 cfs, and it becomes overtopped at a flow of approximately 700 cfs. The maximum velocity through the bridge opening occurs at flow of 1500 cfs, when it reaches 4 ft/s.

The bridge pier and abutment scour was computed with HEC-RAS assuming a bed material size of 0.5 mm. Froehlich's equation was used for the pier and abutment scour. Contraction scour was added to the pier and abutment scour. The resulting maximum scour occurs at a flow of 2200 cfs and is 6.4 ft of scour at the piers and 10 ft of scour at the abutments. Because of the narrow opening, it has the potential to cause significant abutment scour, which may be greater than the 10 ft computed using Froehlich's equation.

### 4.4 Low flow crossing

The low flow crossing is shown in Figure 4-7. Flow depths are approximately 0.5 ft at a flow of 50 cfs and become over 2 ft at a flow of 300 cfs or greater. It is assumed that the road base outside the low flow channel is raised to 99 ft. The water surfaces for the low flow crossing will be very similar to the other alternatives except for a flow of 50 cfs where they will be approximately 0.6 ft higher just upstream of El Nido Road.

The low flow crossing creates an average flow depth of approximately 0.5 ft at flows of 50 cfs or less. However, local variability across the gravel road will likely increase the maximum flow depth to near 1 ft after the first flow. It was not possible to simultaneously meet the criteria of a flow depth of over 1 ft at a flow of 50 cfs and maximum flow depth of 1 ft or less at a flow of 175 cfs.

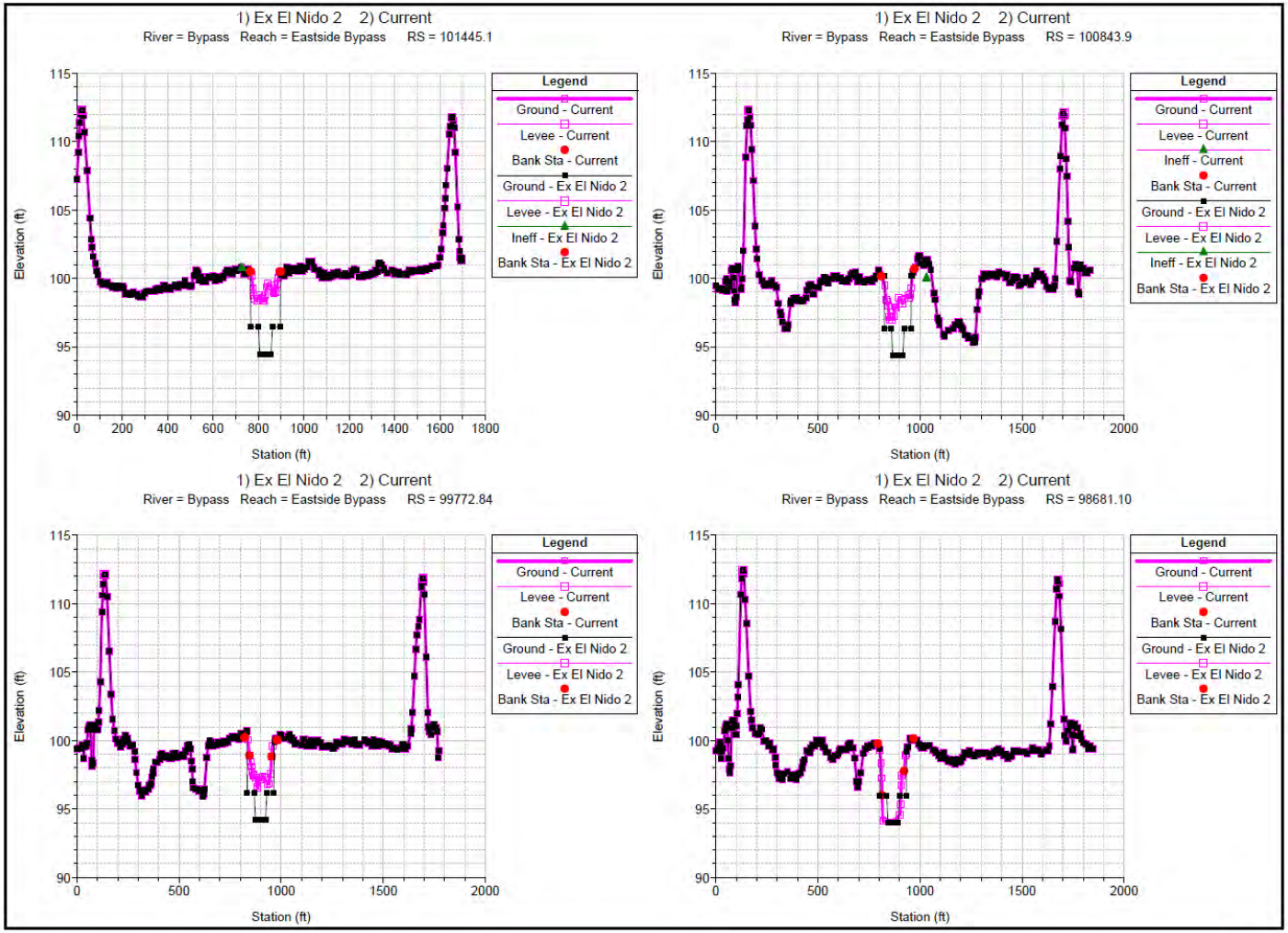



Figure 4-3. Cross section excavation downstream of El Nido Road for all crossing options. Purple represents current conditions and black represents proposed cross section for each option.

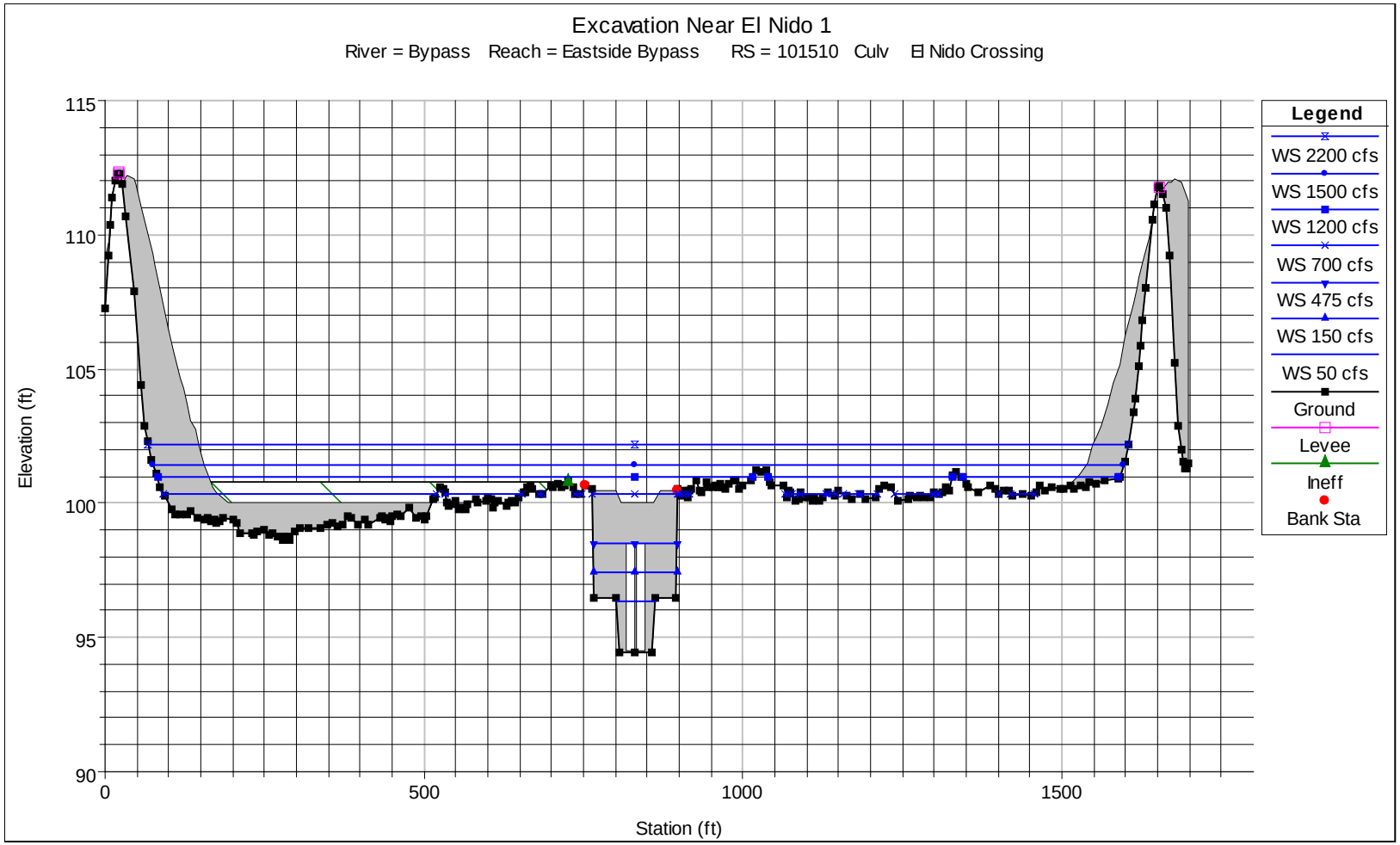



Figure 4-4. Cross Section for El Nido Option 1- culverts with 30 ft wide total opening.

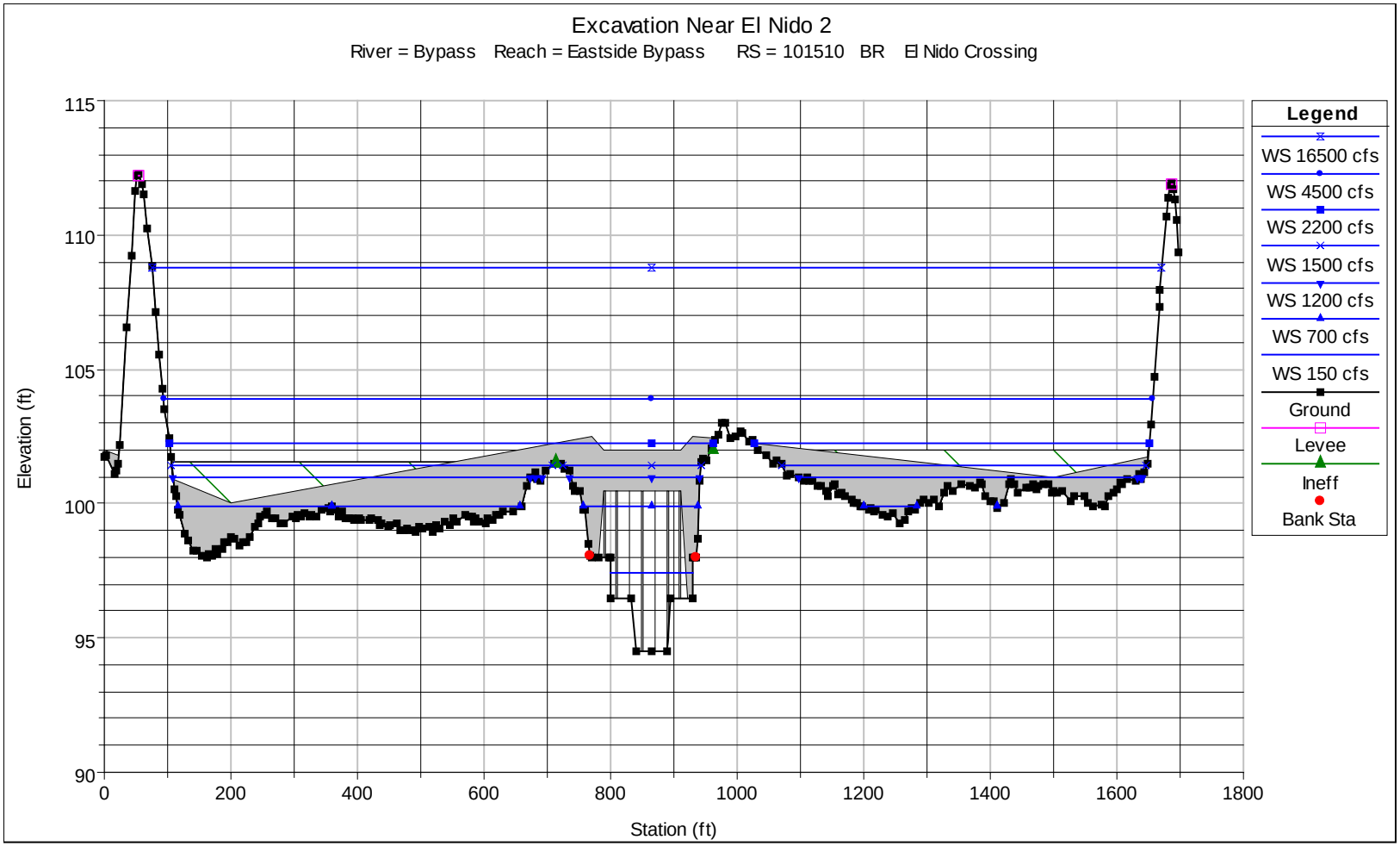



Figure 4-5. Cross Section for El Nido Option 2- bridge with 160 ft wide opening.

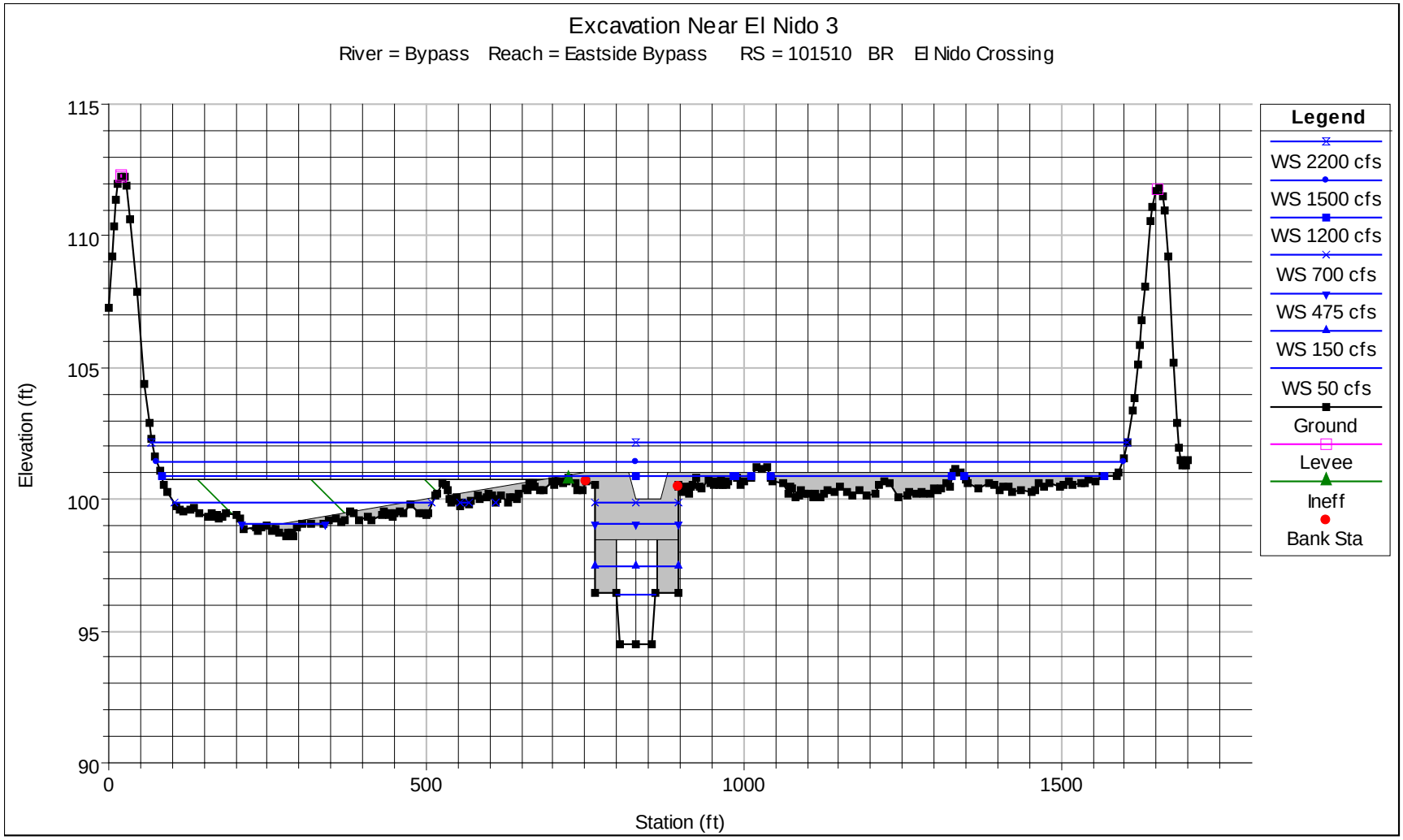



Figure 4-6. Cross Section for El Nido Option 3- bridge with a 60-ft wide total opening.

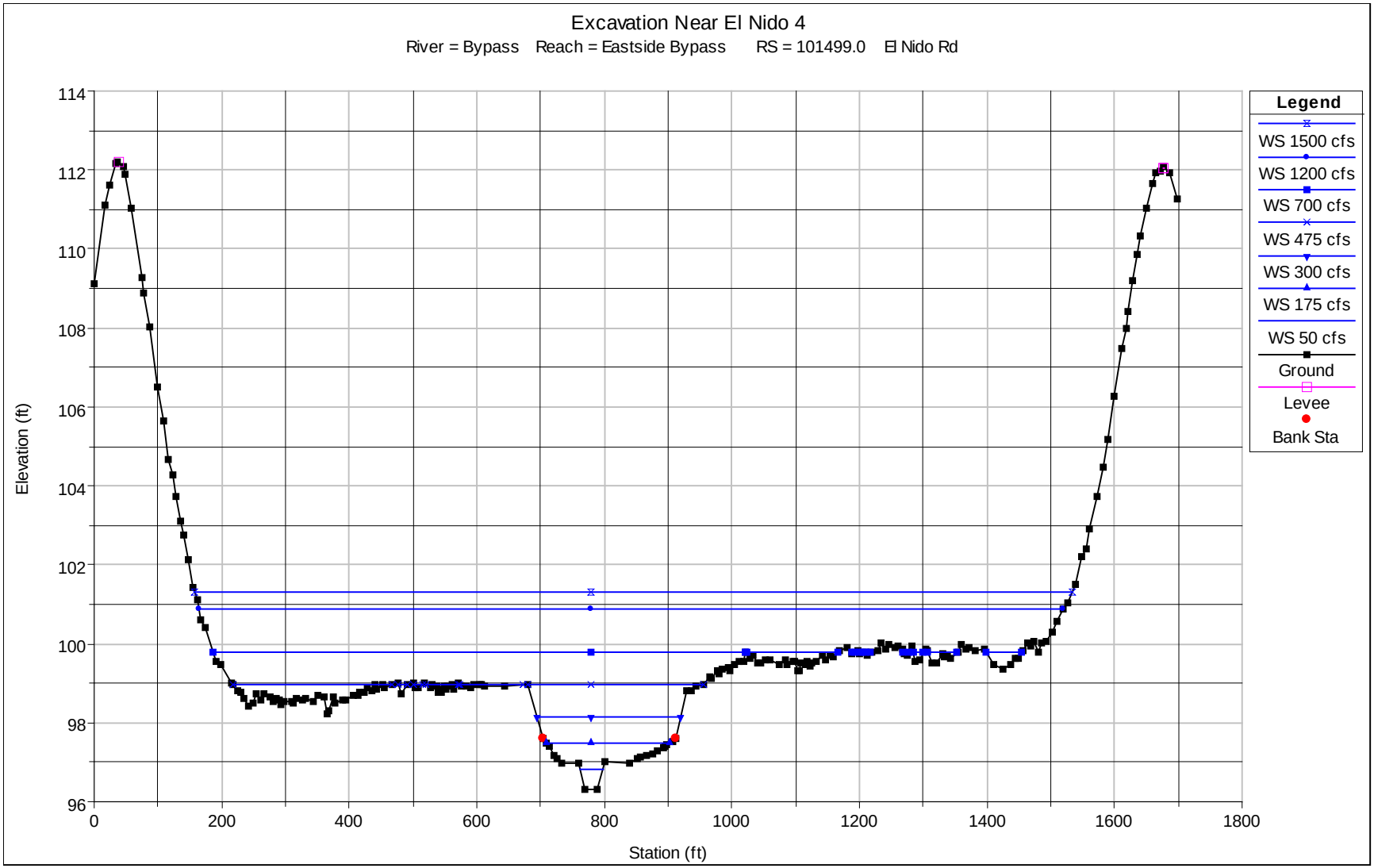



Figure 4-7. Cross Section for El Nido Option 4, the low flow crossing.

# 5 Hydraulic Results

The water surface elevations upstream of El Nido Road are given in Table 5-1. All road crossing options achieve the goal of lowering the low flow water surface elevations by 2 feet at a flow of 150 cfs (Table 5-1). The water surface just upstream of El Nido Rd at a flow of 150 cfs under current conditions with the MNWR stop logs removed is approximately 99.5 ft (NAVD 88 ft), while under all four options, the expected water surface would be 97.5 ft. With the MNWR stop logs in place, the water surface is expected to be 99.7 ft, with or without the El Nido road crossing options. The surrounding land on the southwest side of the levees, just upstream of the El Nido Road, is between 98.5 to 99 ft, and the land on the northeast side is 100 to 101 ft (Figure 4-1). Therefore, when the MNWR have installed their stop logs, the water surface elevation within the bypass will be near or exceeding the ground elevation outside the levees.

The water surface profiles for a flow of 50 cfs and 700 cfs are shown in Figure 5-1 and Figure 5-2, respectively. The water surface profile at a flow of 50 cfs is practically identical for Options 1 through 3, but the water surface under Option 4 just upstream of El Nido Road is approximately 0.6 ft higher than the other options. The water surface at 700 cfs is very similar between Options 2 through 4, but because of the small culvert opening for Option 1, the water surface is approximately 0.4 to 0.6 foot higher just upstream of El Nido.

The maximum water depth at all cross sections at a flow of 50 cfs is greater than 1 foot for all options (Figure 5-3).

Table 5-1. Water surface elevations in NAVD 88 ft just upstream of El Nido Rd in Eastside Bypass.

| **Alternative** | **Water Surface Elevations upstream of El Nido at Various Flow Rates (cfs)** | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **50** | **150** | **300** | **700** | **1300** | **2000** | **3000** | **4500** |
| Base geometry and Flow, MNWR stop logs removed | 99.0 | 99.5 | 99.9 | 100.6 | 101.2 | 102.2 | 102.9 | 103.9 |
| Base geometry and Flow, MNWR stop logs in place to bring pool to 98.5 ft | 99.1 | 99.7 | 100.3 | 100.8 | 101.4 | 102.3 | 102.9 | 103.9 |
| Excavated sand near El Nido, Option 1 | 96.4 | 97.5 | 98.5 | 100.6 | 101.5 | 102.2 | 102.8 | 103.9 |
| Excavated sand near El Nido, Option 2 | 96.4 | 97.5 | 98.3 | 99.9 | 101.1 | 102.3 | 102.9 | 103.9 |
| Excavated sand near El Nido, Option 3 | 96.4 | 97.5 | 98.3 | 100.1 | 101.4 | 102.3 | 102.9 | 103.9 |
| Excavated sand near El Nido, Option 4 | 97.0 | 97.5 | 98.3 | 99.9 | 101.1 | 102.3 | 102.9 | 103.9 |

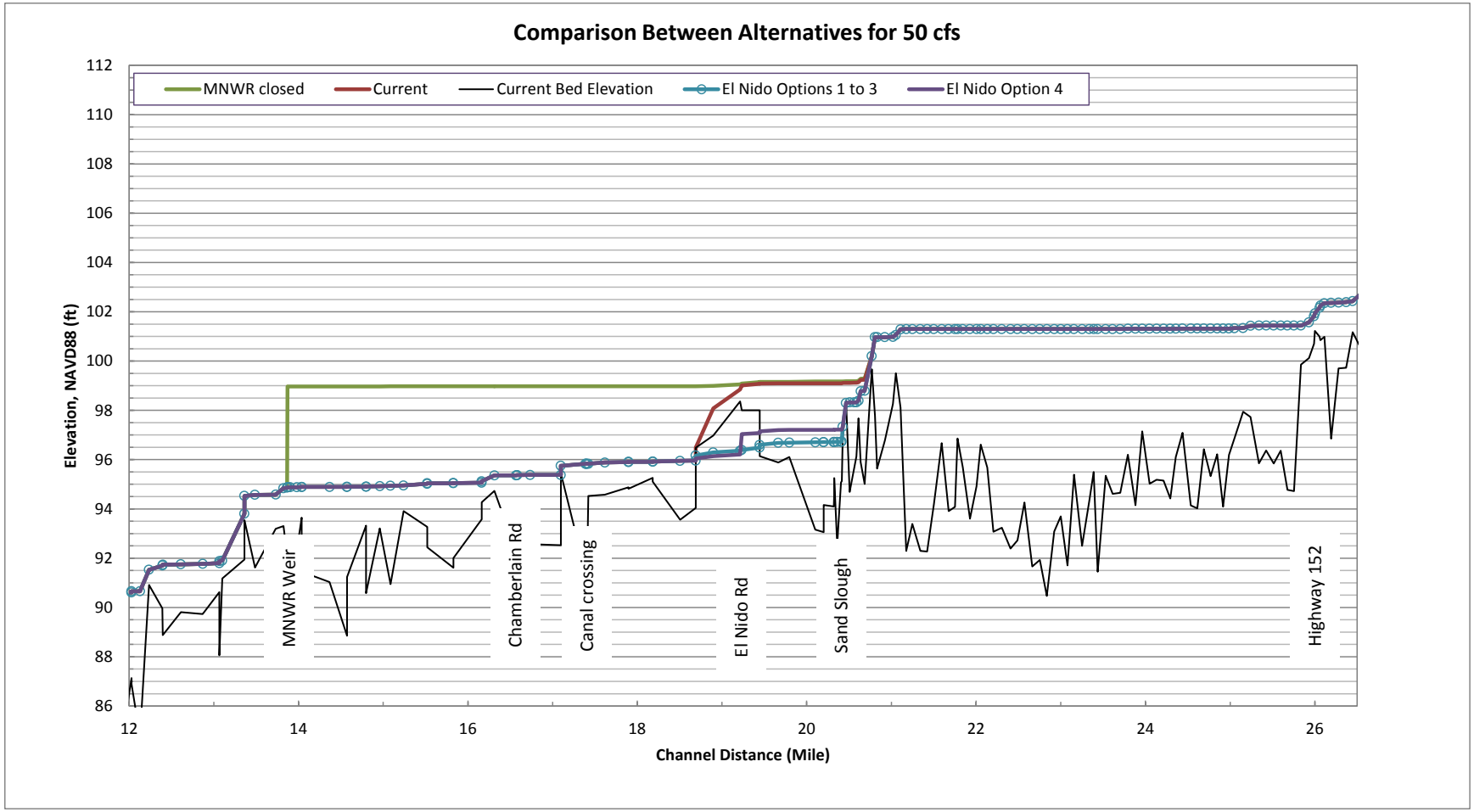



Figure 5-1. Comparison between Alternatives for 50 cfs. Note that the MNWR weir results in backwater upstream to Sand Slough Control Structure, which causes no impact in water surface elevations at El Nido Road with Option 1 in place. There are not significant differences in the water surface elevations between Option 1 through 4 at a flow of 50 cfs.

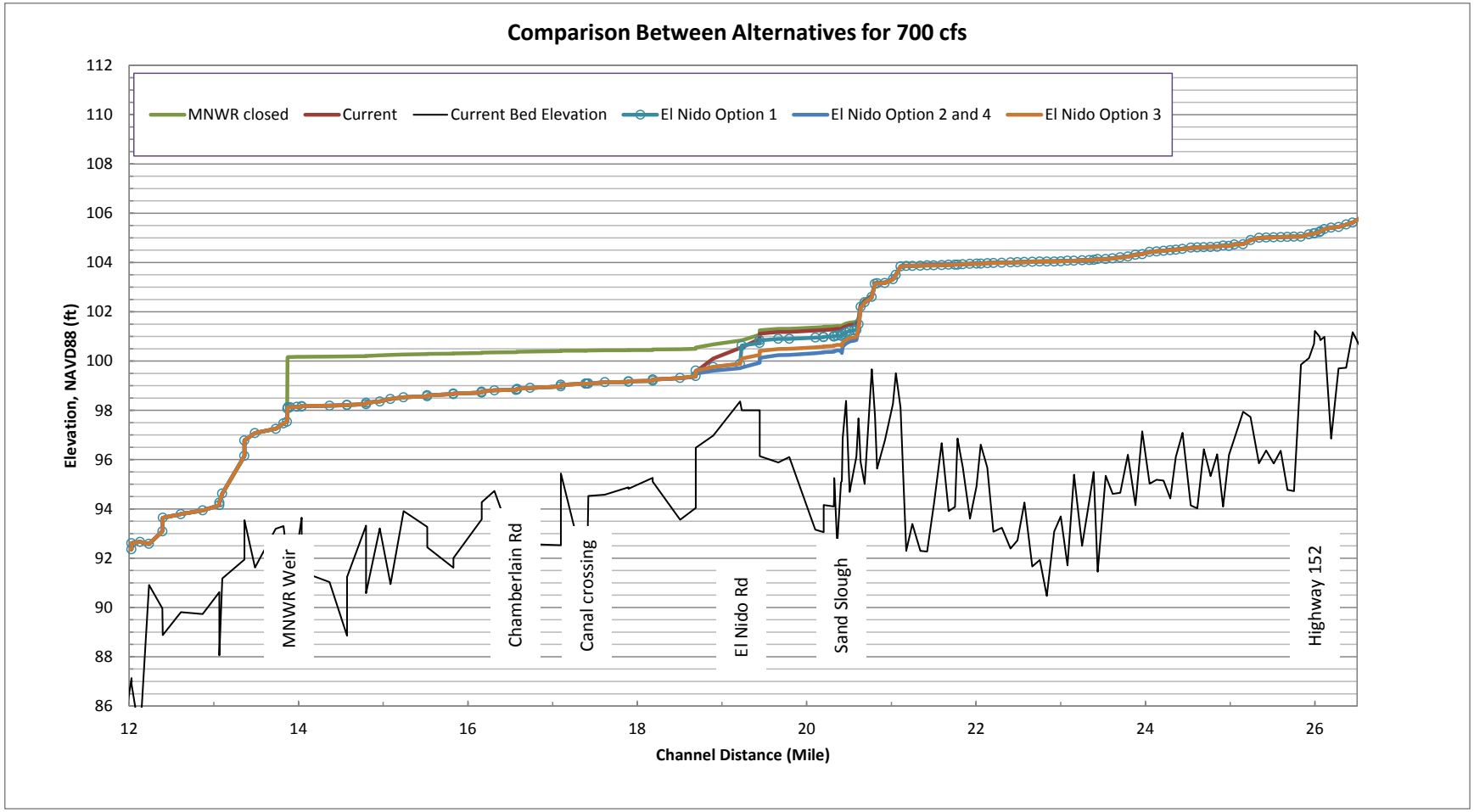



Figure 5-2. Comparison between alternatives for 700 cfs for Options 1 through 4.

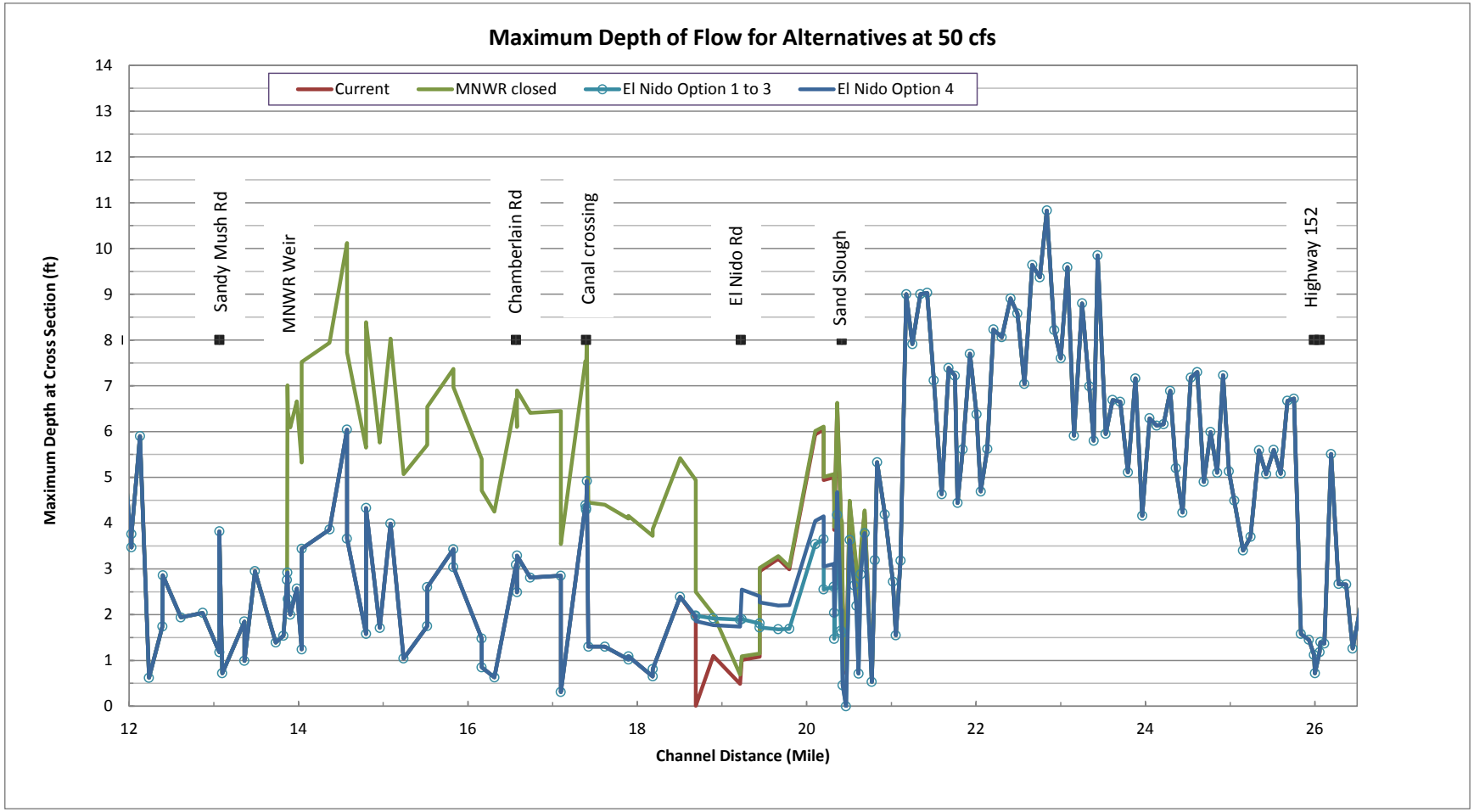



Figure 5-3. Maximum Depth of Flow Near El Nido Rd to Upstream of Sand Slough for El Nido Crossing Options 1 to 4 at 50 cfs.

# 6 Discussion

Based on the analysis of the four alternatives, the low flow crossing is recommended because it eliminates the possibility of sediment plugging the opening and creating a fish barrier and/or maintenance issues. In addition, current subsidence rates in this region may be as high as 0.5 ft/yr, and the life span of a bridge or culvert may be severely limited. The bridge deck elevations will decrease while the water surface elevations will remain relatively constant because the downstream portions of the Bypass are not subsiding as rapidly.

For all options, sedimentation upstream and downstream of El Nido is expected to continue. Each of the options will require extensive sediment excavation upstream, downstream, and within the structure after high flow events that occur as the result of flood releases through Chowchilla Bypass. These options discussed in this report are intended to only provide temporary decreases in the water surface elevation immediately upstream of El Nido Road.

The 1998 flood deposited sediment to an elevation of 102 ft, which is approximately 4 ft higher than the current road elevation. The sedimentation will continue in the bypass primarily because this area is actively subsiding due to groundwater pumping in the area, causing the slope of the Eastside Bypass to be close to zero, thereby reducing the transport capacity. Measured rates of subsidence are as high as 0.5 ft/yr as measured by surveys in 2010 through 2012.

For all options, the water surfaces upstream of El Nido Road are still subject to the operations of MNWR weir. If the stop logs are in place at the weir, the water surface upstream of El Nido Road can rise to an elevation of 99 ft at a flow of 50 cfs, which is currently the elevation of flow without the stop logs in place for the current condition. Therefore, if the low flow crossing option is constructed, but the MNWR has stop logs in place, there will be no reduction in the water surface elevations.

# 7 References


Froehlich, D.C. (1989). "Local Scour at Bridge Abutments," Proceedings of the 1989 National Conference on Hydraulic Engineering, ASCE, New Orleans, LA, pp. 13-18.

Froehlich, D.C. (1991). "Analysis of Onsite Measurements of Scour at Piers," Proceedings of the ASCE National Hydraulic Engineering Conference, ASCE, Colorado Springs, CO.

Mussetter Engineering, Inc.(MEI), (2008a). Conversion of Existing San Joaquin River Hydraulic Model from HEC-2 to HEC-RAS. Draft technical memorandum prepared for the California, Dept. of Water Resources, Fresno, California, April 17.

Reclamation (2009). "Geomorphology, Sediment Transport, and Vegetation Assessment," *Appendix N of Second Administrative Draft Program Environmental Impact Statement/Report of the San Joaquin River Restoration Project*, Technical Service Center, Denver, CO.

Reclamation (2015). *Reach 4A Conveyance in the Vicinity of Sand Slough*, San Joaquin River Restoration Project, Technical Service Center, Denver, CO, Technical Report No. SRH-2015-18.

US Army Corps of Engineers (2010). HEC-RAS River Analysis System User's Manual, Institute for Water Resources, Hydrologic Engineering Center, Davis, CA. CPD-68

# 8 Appendix A: Plan view cross section layout and Water Surface Profile Plots

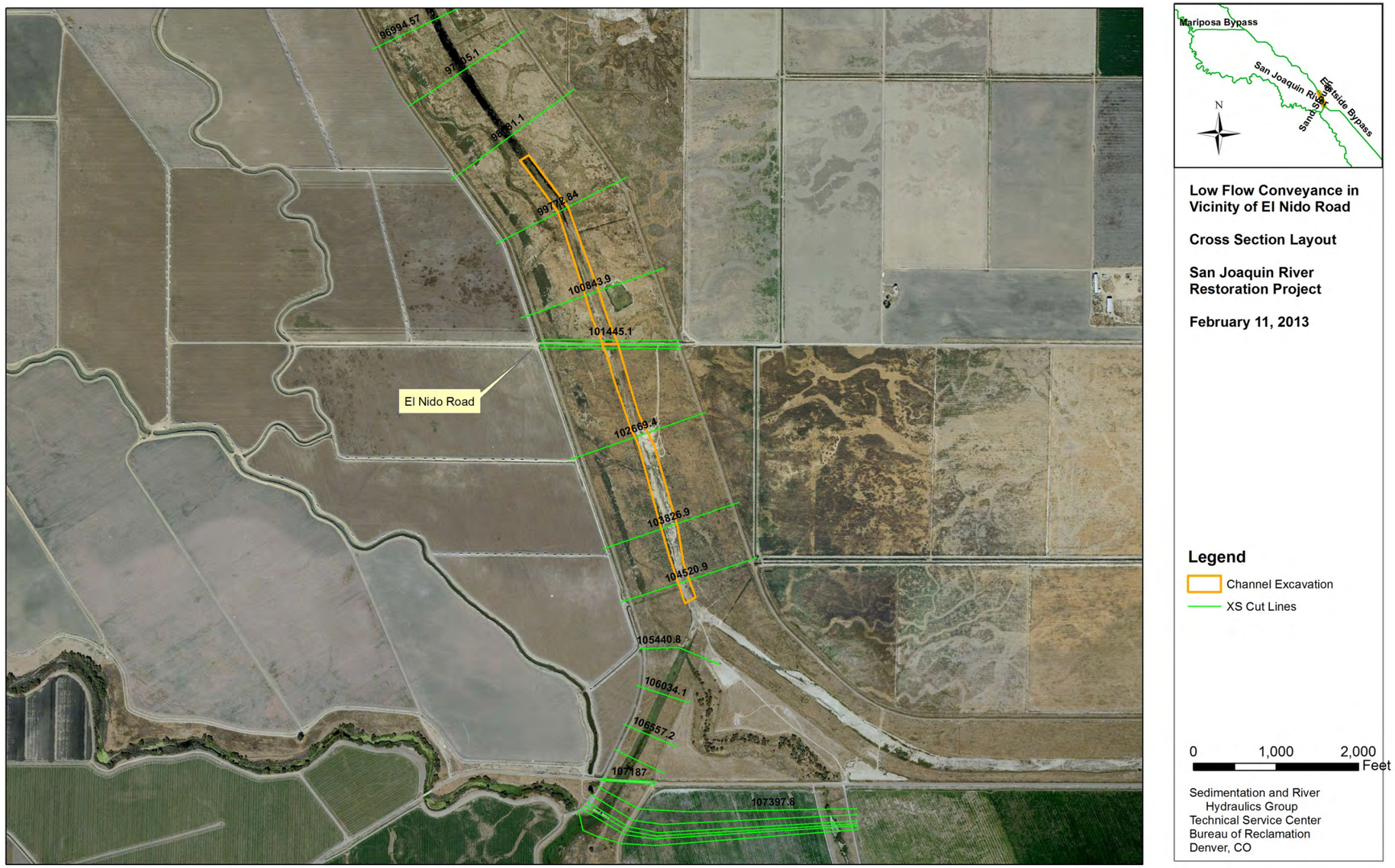



Figure 8-1. Cross section layout in vicinity of El Nido Rd.

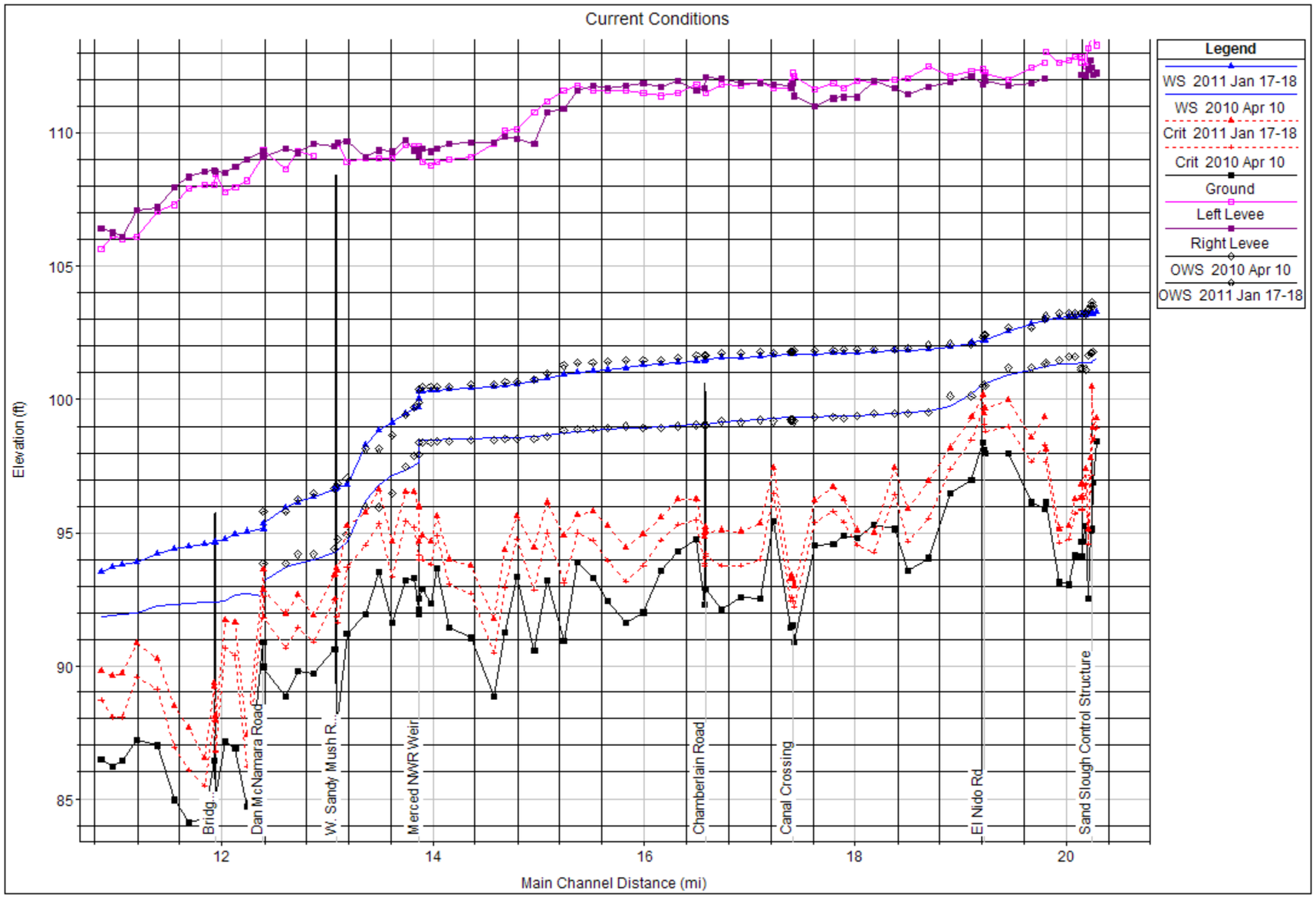



Figure 8-2. Comparison between Simulated and Measured Water Surface Elevations from Dan McNamara Rd to Highway 152 on the Eastside Bypass and San Joaquin River.