



## PROJECT DESCRIPTION

<b>Project:</b>	Zacharias Ranch Mitigation Bank
<b>Lead Agency Name and Address:</b>	Sacramento County 827 7th Street Sacramento, CA 95814
<b>Applicant:</b>	Westervelt Ecological Services, LLC 3636 American River Drive, Suite 120 Sacramento, CA 95864
<b>Applicant Contact:</b>	Brighton Heard Senior Conservation Planner 225-247-4646 <a href="mailto:bheard@westervelt.com">bheard@westervelt.com</a>
<b>Project Location:</b>	580.15 acres within unincorporated Sacramento County
<b>Sacramento County General Plan Designation:</b>	Agriculture Cropland (AG Crop), Natural Preserve (NAT PRES)
<b>Sacramento County Zoning Classification:</b>	Agricultural 80 Acres (AG-80), Recreation (O)

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## List of Acronyms

AB	Assembly Bill
Bank	Zacharias Ranch Mitigation Bank
BMP	best management practices
Cal-IPC	California Invasive Plant Council
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CNPS	California Native Plant Society
CRPR	California Rare Plant Rank
CVRWQCB	Central Valley Regional Water Quality Control Board
DCC	Delta Cross Channel
Delta	Sacramento-San Joaquin Delta
DPR	Department of Parks and Recreation
DSC	Delta Stewardship Council
DWR	California Department of Water Resources
FEMA	Federal Emergency Management Agency
GPS	global positioning system
NAHC	Native American Heritage Commission
NAVD	North American Vertical Datum
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NRCS	Natural Resources Conservation Service
RD	Reclamation District
SSJDD	Sacramento-San Joaquin Drainage District
SHPO	State Historic Preservation Officer
SLC	State Lands Commission
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geologic Survey
WES	Westervelt Ecological Services, LLC

## 1. INTRODUCTION

The Sacramento-San Joaquin Delta (Delta) was at one time the largest wetland complex on the West Coast until conversion to agricultural and urban development began in the 1830's and quickly accelerated with the passing of the Swampland Act of 1850. Today, the Delta is considered one of the most highly modified estuarine ecosystems in the world (Nichols et. al. 1986). Significant reductions (greater than 60 percent) of freshwater flows into the San Francisco Bay and changes in flow patterns resulting from water management have substantially altered the biological communities of the Delta. Freshwater tidal wetlands in the Delta have been reduced to only 3 percent of their historical extent (Whipple et. al. 2012), eliminating important habitat for many federally and state-protected species. Disruption of flow patterns and loss of freshwater tidal wetlands have most noticeably affected migratory, spawning, and rearing habitat for native fishes that occupy the Delta for all or a portion of their life cycle.

Westervelt Ecological Services, LLC (WES) is proposing the Zacharias Ranch Mitigation Bank (Bank) located in Sacramento County and situated at the downstream edge of the Upper Mokelumne basin and within the Snodgrass Slough watershed (Project Site) (**Figures 1 through 3**; all figures are contained in **Appendix A**). This location provides an ideal site for restoration due to its location at the confluence of major waterways with consequential flooding, and supports many native, resident fish species of the north Delta. Additionally, restored tidal marsh habitat along this Delta backwater area will connect to the other large-scale ecological restoration and conservation projects in the immediate vicinity. Historically, the Project Site supported tidal freshwater marsh and floodplain riparian habitat until it was cut off from tidal influence, drained, and graded in the 1930's to support agricultural uses. Returning the Project Site to its historical habitat of tidal freshwater marsh would support many protected species and provide critical food support for resident and out-migrating fish.

The Project is proposing to re-establish approximately 490 acres of tidal freshwater wetland and preserve, rehabilitate, and enhance existing riparian forest, open water/aquatic bed and emergent marsh totaling 81 acres within the Project Site (**Figure 4**).

## 2. PROJECT LOCATION

The Bank is located off Twin Cities Road, roughly two miles northeast of the City of Walnut Grove in the southwestern portion of Sacramento County, California (**Figure 1**). The Bank is bounded by Twin Cities Road to the south, Snodgrass Slough to the west and north, and Railroad Cut to the east. The Railroad Cut feature is part of the Stone Lakes National Wildlife Refuge (Refuge). Snodgrass Slough is downstream of Morrison Creek and Stone Lakes, and functions as a tidal backwater of the Mokelumne River.

The Bank is in Courtland and Bruceville U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle maps, Township 5 North, Range 4 East, Sections 1, 2, and 11-14 (approximate center coordinates: World Geodetic System [WGS84] Latitude: 38.297°, Longitude: -121.503°) (**Figure 2**).

### 3. PURPOSE AND NEED

#### 3.1. Purpose of the Proposed Project

The Project would be able to serve a wide variety of mitigation as identified in federal, state and local permits issued to public and private clients. Mitigation credits would serve to offset unavoidable impacts on resources regulated by the federal Clean Water Act sections 404 and 401 and the federal Endangered Species Act. The Bank will also serve to support aquatic species and offset adverse impacts to Essential Fish Habitat (Chinook salmon), and shaded riverine aquatic habitat.

#### 3.2. Need for the Proposed Project

Environmental impacts on listed species continue in the Delta region from private and public water and infrastructure projects, creating a strong need for wetlands, floodplain, and aquatic species habitat restoration. In response to the effects on wetlands, waters of the United States, and listed species generated by projects in the Delta—as well as similar projects along waterways and urban development throughout the Central Valley, WES proposes establishment of the Zacharias Ranch Mitigation Bank. The re-establishment of over 550 acres of freshwater tidal wetland and floodplain riparian habitats will create credits for permits required for public and private development impacts.

### 4. REGIONAL SETTING

The rich, productive soils in the Delta led to massive reclamation efforts to support agricultural development beginning in the early 1900's. The Project Site was part of the Glanville Tract, Reclamation District 1002, which was established in 1912. Prior to site-specific reclamation efforts, the Project Site was owned by the Earhardt Gun Club and used for waterfowl hunting. Beginning in the 1930's, the Zacharias family constructed the berm along Snodgrass Slough and began farming. Historical aerial photographs and topographic maps trace the development from marshlands to crop fields around the 1930's with several pump houses appearing between 1940 and 1952, and the irrigation ditch system developing over time until reaching its current arrangement in the 1980s (**Figure 5 and Figure 6**). The Project Site has remained in agricultural production for nearly 100 years. The site also exists within Wilton Rancheria historic Tribal lands. Wilton Rancheria has been encouraged to participate as a co-steward of the Bank.

#### 4.1. Surrounding Land Uses

Surrounding lands include irrigated farm fields, vineyards, and remnants of tidal marshland along sloughs and irrigation canals. The Refuge is located immediately east and northeast of the Project Site, and large blocks of conserved lands occur in the immediate surroundings.

## 4.2. General Plan and Zoning

The Sacramento County General Plan identifies existing and planned land use for the Project Site and surrounding areas as agriculture (Sacramento County 2011). Most of the Project Site is designated as Agriculture Minimum 80 acres (AG-80) pursuant to the Sacramento County Code (zoning regulations), which permits conservation and mitigation banking as an allowable use with a use permit. Additionally, three of the Project Site parcels are zoned Recreation (O). APN-146-0030-025 and APN-146-070-014 have General Plan land use designations of Natural Preserve (NAT PRES).

## 4.3. Williamson Act Contract

At present, the Project Site is enrolled in a Williamson Act Contract as an Agricultural Preserve (Contract #74-AP-035), that excludes open space uses. After coordination with Sacramento County, a reapplication will be filed to enroll the Project in a Williamson Act Contract that does not exclude open space uses.

# 5. BASELINE SITE CONDITIONS

The Project Site retains some natural topography, hydrology, and vegetation despite past land leveling. Baseline site conditions are described below.

## 5.1. General Site Conditions

The Project Site is used primarily for agriculture. Fields are present on the landside of the berms and are characterized by leveled, irrigated, and planted terrain. Typically, row crops are planted in the agricultural fields and recently have included tomato, watermelon, corn, sorghum, and disked open ground. Freshwater emergent marsh habitat is concentrated in the southern portion of the Project Site with scattered patches along Snodgrass Slough and Railroad Cut. Open water is typically prevalent in the fall and winter, transitioning to aquatic bed habitat in the spring and summer; this habitat is found along Snodgrass Slough and Railroad Cut. Riparian habitat occurs along the Snodgrass Slough berm. Agricultural ditches are found through the property and run east to west and convey irrigation water or tail water for agricultural purposes. Ruderal habitat occurs along the edges of agricultural fields, elevated berms, and road edges. The property includes ornamental habitat located near the center of the Project Site.

The Project Site includes anthropogenic structures including buildings, irrigation pumps, power and telephone poles and lines, culverts and tide gates.

## 5.2. Hydrology

The Project Site is centrally located within the Central Valley Ecoregion at the downstream edge of the Upper Mokelumne 8-digit sub-basin (HUC 18020109) and within the Snodgrass Slough 10-digit watershed (HUC 1804001210). The Upper Mokelumne Watershed stretches from the outlet of Camanche Dam to its confluence with the San Joaquin River-Stockton Deepwater Shipping Channel. In its lower course, the Mokelumne watershed is used heavily for irrigation and provides

water for the east San Francisco Bay Area through the Mokelumne Aqueduct. Several major tributaries of the river have been developed for the generation of hydroelectric power.

Tidal flows from the Delta and surface/backwater from the Cosumnes and Mokelumne rivers are the main contributing water sources to Snodgrass Slough. Flooding occurs when the Mokelumne and Cosumnes river systems back up into the slough channel. The Stone Lake and Morrison Creek watersheds provide limited contribution through a managed outfall.

Historically, Snodgrass Slough was part of the Sacramento River watershed and served as the primary conduit allowing tidal flows in and out of the lower Sacramento River basin (Whipple et al. 2012).

Snodgrass Slough is now a dead-end tidal waterway in the Delta that also acts as a backwater channel of the Cosumnes and Mokelumne rivers. Snodgrass Slough receives limited flow from South Stone Lakes and Morrison Creek, through one-way overflow culverts with flap gates at Lambert Road. Flood events occur when high flows from the Mokelumne and Cosumnes river systems backup into Snodgrass Slough. The eastern edge of the Project Site is bordered by Railroad Cut, a borrow ditch created during construction of an elevated railroad grade.

A constructed farm berm separates the Project Site from Snodgrass Slough. Water onsite is managed for irrigation and drainage purposes. The segment of Railroad Cut adjacent to the Project Site is isolated from tidal influence of Snodgrass Slough by an earthen road crossing at the north entrance and by gated culverts in the south crossing. Water levels in Railroad Cut are managed by the farmers to supply irrigation and to drain fields for planting.

Water for irrigation is transferred from Snodgrass Slough via a culvert and an external water control structure in the northwest corner of the Project Site to a supply ditch north of the fields and then into Railroad Cut. A series of east to west-oriented ditches are filled from and drain to Railroad Cut. Irrigation water is distributed from these ditches to the crops using mobile diesel pumps.

The east-west ditches also serve to drain the Project Site; a large pump on the northeast corner of the Project Site lifts the water over the berm and back into Snodgrass Slough. Culverts with water control structures in the southern crossing of Railroad Cut can be used to drain floodwater as well.

The northern section of the farm berm is at a lower elevation than the rest of the berm. This lower section functions to allow floodwaters from extreme events to enter the Project Site in a slow, controlled manner that reduces pressure on the remaining berms and decreases the possibility of a berm failure. In recent history, the Project Site flooded in 1986, 1997, 2006, 2007, 2017, and 2023. The effects of 2022-2023 winter storms support the proposed restoration and conservation efforts. In 2023, there were numerous breach locations in the farm berms; the challenges to rebuild the berms including cost, resources, and inability to plant crops demonstrate the diminishing capacity of the Project Site to remain in agricultural production.

The local tidal range is estimated with Mean Higher High Water (MHHW) at 6.1 feet and Mean Lower Low Water (MLLW) at 3.6 feet (NAVD 88) based on level loggers deployed onsite and calculated in relation to nearby government-operated tide gauges. Snodgrass Slough is tidally influenced by the Delta and is also connected to the Sacramento River through the Delta Cross Channel (DCC). Tidal fluctuations vary seasonally and with operations of the DCC. The DCC is a gated and constructed feature that diverts fresh water from the Sacramento River into the interior Sacramento-San Joaquin River Delta for the Central Valley Project (CVP) and State Water Project (SWP); it is operated by the Bureau of Reclamation (Reclamation). Reclamation closes the DCC gates during high water to prevent flood stages in the San Joaquin section of the Delta. The Project Site is east and north of where the DCC connects Snodgrass Slough to the Sacramento River. Tidal swings are influenced by the DCC gate status, with open gate conditions muting the tides slightly. The DCC gate is usually closed December 1 to May 20. The DCC gate is occasionally closed for fisheries protection during migration periods (October 1 to November 30 and May 21 to June 15).

#### **5.2.1. Water Source(s)**

The Project Site is separated from tidal waters (and minor flood waters) of Snodgrass Slough by a constructed farm berm. Water onsite is managed for irrigation and drainage purposes. Water for irrigation is transferred from Snodgrass Slough via a culvert and an external water control structure in the northwest corner of the Project Site to a supply ditch north of the fields and then into the Railroad Cut. Irrigation water is distributed from these ditches to the crops using mobile diesel pumps. East and west ditches serve to drain the Project Site; a large pump on the northeast corner of the property lifts the water over the berm and back into Snodgrass Slough. Culverts with water control structures in the southern crossing of the Railroad Cut can be used to drain floodwater as well.

#### **5.2.2. Water Rights**

The Project Site has riparian water rights confirmed with no reservations on the preliminary title report (see Title Report in separate Exhibit D). The Project Site has been irrigated for agricultural uses (farming and grazing) and wildlife enhancement (waterfowl hunting) by using water diverted from Snodgrass Slough, which is tidally influenced by the Sacramento River. Historical aerial imagery depicts active farming from as early as 1937. Existing diversion points would be used to provide irrigation of restoration plantings during the first growing season. Following tidal connection, the diversion points would no longer be used.

### **5.3. Topography**

The Project Site's topography is relatively flat. Most of the topographic surface used for crops has a gentle elevation range from 2 to 7 feet NAVD. The surrounding farm berms generally range from 9 to 13 feet NAVD, and interior water delivery ditches are at approximately minus 3 feet NAVD. Centrally located fields slope gently from north to south, and from a central ridge to both eastern and western edges (**Figure 7**).

Elevations transition from those supporting riparian communities in the north to an intertidal range to shallow subtidal depths in the south. The results of onsite topographic data collection as part of the restoration design planning process are described in Section VII.

#### 5.4. Soils

Geology in the vicinity of the Project Site is composed of Quaternary alluvium and marine and deposits (Pliocene to Holocene) consisting of alluvium, lake, playa, and terrace deposits; unconsolidated and semi-consolidated.

Project Site soils are classified and mapped as Egbert clay, Dierssen sandy clay loam, and Fluvaquents by the Natural Resource Conservation Service (NRCS) Soil Survey (NRCS 2023). Egbert clay is found in the southern and western portions of the Project Site at low-lying elevations and Dierssen sandy clay loam occurs at higher elevations in the north and east.

Egbert clay is poorly drained and typically associated with floodplains and marshes (swamps). These soils have shallow depths to the water table, fine surface texture, slow permeability, and slow runoff that contributes to frequent flooding in its unaltered condition.

Dierssen sandy clay loam is typical of transitions between floodplain and uplands soils. Cemented silica hardpans are present and promote ponding. Clay subsoil layers above the hardpans also contribute to the formation of a perched water table.

Riparian islands with Snodgrass Slough are mapped as Fluvaquents with organic substratum. All mapped soil units are typically vegetated by riparian and wetland species. Soil types found on the site are known to support the vegetative communities proposed for restoration.

Subsurface soil conditions were evaluated, 9 test pits were excavated to depths of 2 to 9.5 feet below existing grade. The test pits encountered organic soils at the ground surface ranging from 1.5- to 4.5-feet thick. The surface organic soil consisted of high-plasticity, organic silt and organic clay. Relatively high Atterberg limits and low maximum dry densities indicate that the soils are relatively light, organic-rich and highly expansive. The organic soils were underlain by mineral soils to the maximum depth of the test pits. The mineral soils generally consisted of lean clay, sandy lean clay, sandy silt, and clayey sand.

#### 5.5. Existing Aquatic Resources

Aquatic resources have been delineated within a 579-acre study area. A formal aquatic resources delineation report was prepared and submitted to the U.S. Army Corps of Engineers (USACE) for verification on October 3, 2023 and a Jurisdictional Determination was issued February 29, 2024. The existing aquatic resources on the Project Site include the following three aquatic habitat types: freshwater emergent marsh, open water/aquatic bed, and riparian. Approximate acreages of each aquatic resource type are listed in **Table 1** and shown in **Figure 8**.

Table 1. Existing Aquatic Resources	
Aquatic Resource	Approximate Acreage*
Open water/aquatic bed	14
Freshwater emergent marsh	12
Riparian	37
<b>TOTAL</b>	<b>63</b>
* Acreages are approximate and will be verified by USACE.	

## 5.6. Upland Vegetation Communities

Existing upland vegetation communities mapped on the Project Site include agricultural field, ruderal, ornamental, and developed. These habitats occur throughout the Project Site.

## 5.7. Special-Status Species

Existing habitat on the Project Site has the potential to support several special-status plant, wildlife, and fish species. Proposed restoration activities would enhance and create additional habitat for special-status species and is expected to increase potential use of the Project Site by many of these species. A list of threatened and endangered species that may occur on the proposed project location or may be affected by the proposed project has been obtained from the IPaC online tool (2024-0105903).

### 5.7.1. Special-Status Plants

Several special-status plant species have been previously documented or have the potential to occur on the Project Site based on the presence of suitable habitat (i.e., riparian and freshwater marsh). Focused surveys for special-status plants were most recently conducted on the Project Site on Jun 8 and August 18, 2023.

- **Delta tule pea** (*Lathyrus jepsonii* var. *jepsonii*) - CRPR 1B.2, one CNDDDB occurrence documented in 1988 on the west edge of the Project Site along the shore of Snodgrass Slough
- **Sanford's arrowhead** (*Sagittaria sanfordii*) - CRPR 1B.2, one CNDDDB occurrence documented in 2009 within the existing marsh habitat at the south end of the Project Site.
- **Side-flowering skullcap** (*Scutellaria lateriflora*) – CRPR 2B.2, one CNDDDB occurrence documented in 2009 within the existing marsh habitat at the south end of the Project Site.
- **Woolly rose-mallow** (*Hibiscus lasiocarpus* var. *occidentalis*) - CRPR 1B.2, four CNDDDB occurrences along the west edge of the Project Site nested in tules along the edge of Snodgrass Slough. One additional CNDDDB occurrence at the south end of the Project Site within the existing marsh habitat.

- **Suisun marsh aster** (*Symphyotrichum lentum*) - California Rare Plant Rank (CRPR) 1B.2, an individual was observed on an emergent log during 2021 biological surveys.
- **Bolander's water-hemlock** (*Cicuta maculata* var. *bolanderi*), CRPR 2B.1 rare plant
- **Bristly sedge** (*Carex comosa*) – CRPR 2B.1 rare plant
- **Delta mudwort** (*Limosella australis*) - CRPR 2B.1 rare plant
- **Marsh skullcap** (*Scutellaria galericulata*) - CRPR 2B.2 rare plant
- **Mason's lilaeopsis** (*Lilaeopsis masonii*) - a California rare plant and a CNPS 1B.1 rare plant
- **Pappose tarplant** (*Centromadia parryi* ssp. *parryi*) - CRPR 1B.2 rare plant
- **Saline clover** (*Trifolium hydrophilum*) - CRPR 1B.2 rare plant
- **Watershield** (*Brasenia schreberi*) - CRPR 2B.3 rare plant

### 5.7.2. *Special-Status Wildlife*

Existing aquatic and upland habitats on the Project Site have the potential to support the following several special-status wildlife species. Future restored conditions would increase the quality and availability of habitat for many of these species.

- **Giant garter snake** (*Thamnophis gigas*) – State and federally threatened
- **Western pond turtle** (*Actinemys marmorata*) – State species of special concern
- **Swainson's hawk** (*Buteo swainsoni*) – State threatened
- **Tricolored blackbird** (*Agelaius tricolor*) – State threatened
- **Song sparrow** (Modesto population) (*Melospiza melodia*) – State Species of Special Concern
- **Western yellow-billed cuckoo** (*Coccyzus americanus*) – State endangered and federally threatened
- **California black rail** (*Laterallus jamaicensis coturniculus*) – State threatened and fully-protected
- **Greater sandhill crane** (wintering only) (*Grus canadensis tabida*) – State threatened
- **Heron rookery** – State fully-protected

Western pond turtle, Swainson's hawk, song sparrow, and a heron rookery have been observed on or near the Project Site.

### 5.7.3. *Special-Status Fish*

Several special-status fish species are known to occupy and migrate through the Snodgrass Slough/Mokelumne River drainage system. Special-status fish that are known to occur in the adjacent waterways and are expected to use future restored habitats onsite include the following species:

- **California Central Valley steelhead** (*Oncorhynchus mykiss*) – Federally threatened
- **Sacramento River Winter-Run Chinook Salmon** (*Oncorhynchus tshawytscha*) – State and federally endangered
- **Central Valley Spring-Run Chinook Salmon** (*Oncorhynchus tshawytscha*) – State and federally threatened
- **Central Valley Fall-run Chinook Salmon** (*Oncorhynchus tshawytscha*) – Species of Concern
- **North American green sturgeon** (*Acipenser medirostris*) – Federally threatened
- **Delta smelt** (*Hypomesus transpacificus*) – State and federally threatened
- **Longfin smelt** (*Spirinchus thaleichthys*) – State threatened and federal proposed for listing as endangered

### 5.8. Non-Native Invasive Species

Currently, the site has several established invasive plant species populations that are included on the California Invasive Plant Council (Cal-IPC) inventory list. The Cal-IPC inventory includes non-native invasive plant species that are considered an ecological threat to the habitat function of public and private lands that support native ecosystems.

Several invasive non-native species ranked as “High” or “Alert” that occur on the Project Site include, Brazilian waterweed (*Egeria densa*), fennel (*Foeniculum vulgare*), Himalayan blackberry (*Rubus armeniacus*), pampas grass (*Cortaderia selloana*), perennial pepperweed (*Lepidium latifolium*), water hyacinth (*Eichornia crassipes*), water primrose (*Ludwigia peploides*), and six petal waterprimrose (*Ludwigia hexapetala*). Plant species ranked as “Moderate” or “Limited” include American pokeweed (*Phytolacca americana*), Bermuda grass (*Cynodon dactylon*), bur clover (*Medicago polymorpha*), bull thistle (*Cirsium vulgare*), Canary Island date palm (*Phoenix canariensis*), curly dock (*Rumex crispus*), cutleaf geranium (*Geranium dissectum*), foxtail grass (*Festuca myuros*), Hysopp loosestrife (*Lythrum hyssopifolia*), Italian ryegrass (*Festuca perennis*), poison hemlock (*Conium maculatum*), rabbitsfoot grass (*Polypogon monspeliensis*), ripgut brome (*Bromus diandrus*), short-pod mustard (*Hirschfeldia incana*), slender oats (*Avena barbata*), soft brome (*Bromus hordeaceus*), stinkwort (*Dittrichia graveolens*), and wild oats (*Avena fatua*).

Invasive species will be managed as part of the restoration effort. Engaging a full tidal prism exchange and design of channel depths may hinder the accumulation of nuisance invasive floating vegetation. However, invasive exotic plants are ubiquitous in Delta waterways and continue to be an ongoing management issue throughout the watershed. These species limit space for native plants, grow rapidly within warm water temperatures, and provide habitat for invasive non-native piscivorous fish species, such as bass (California Department of Parks and Recreation 2022).

The California State Parks’ Division of Boating and Waterways recognizes that there are no known natural controls for these species in the Delta; therefore, due to their ability to proliferate, it is unlikely that eradication will occur from the Delta waterways (California Department of Parks and Recreation 2022). For more than 20 years, the Division of Boating and Waterways has

implemented an Aquatic Invasive Plant Control Program that includes methods to control and manage invasive floating and submersed aquatic vegetation primarily through ongoing and targeted herbicide treatments and mechanical removal (targeting floating vegetation).

## 6. PROJECT COMPONENTS AND ELEMENTS

### 6.1. Design Objectives

The primary goal of the Bank’s restoration efforts is to return tidal influence to re-establish 490 acres of freshwater marsh and expand the floodplain of Snodgrass Slough. Habitat restoration and permanent protections provided by the Bank will contribute to recovery efforts for Chinook salmon by providing Essential Fish Habitat and Shaded Riverine Aquatic habitat.

The following objectives will support achievement of Bank goals:

- Construct two breaches in the existing berm along Snodgrass Slough that allow unobstructed tidal flow into the Bank’s interior. The number and sizing of breaches was determined using iterations of hydrologic and hydraulic modeling (see Section VII.C below) and with consideration of sensitive resources including cultural and biological. In general, earthwork and excavation is limited to the extent feasible to avoid impacts to sensitive resources.
- Excavate approximately 31,000 linear feet of multi-dimensional main and fringe tidal channels to support the flow and ebb of tides for full tidal excursions and exchange to provide habitat for fish, and transport nutrients to support the food web in the connected waterways.
- Create topographic complexity by contouring agricultural fields for diversification of plant and habitat assemblages associated with tidal freshwater marsh. Low mounds will be constructed across the marsh plain to provide elevated habitat for initial tule establishment and refugia for sea level rise.
- Promote habitat resiliency through management and maintenance activities.
- Limit trespass and other unauthorized uses of the Project Site.

### 6.2. Restoration Concept

The concept is to re-establish a freshwater tidal marsh complex within the interior of the Project Site and protect existing habitat along Snodgrass Slough and exterior farm berms. Post-restoration conditions will reflect natural conditions found in the North Delta and replicate historic habitats mapped on and surrounding the Project Site, and nearby reference sites. A series of open water features, including subtidal channels, will be excavated within the re-established marsh plain. The tidal marsh complex will connect directly to Snodgrass Slough via two breaches in the berm. Material generated excavating the channels and breaches will be used to create varying topography for diversification of aquatic communities.

Tidal exchange with the re-established marsh will promote nutrient exchange, provide downstream food-web support for aquatic species including salmonids, provide potential juvenile

rearing habitat for Central Valley steelhead, and export organic carbon off-site into Snodgrass Slough and surrounding Delta waterways.

Vegetation establishment will be accomplished through a variety of planting methods, including container plantings, cuttings, propagules such as tule rhizomes, on-site transplants, and seeding. Planted areas will not require irrigation once exposed to the restored tidal prism. Contract-grown plantings will be from plant material sourced on-site or in the surrounding area, as feasible.

Restoration would expand available juvenile rearing habitat and/or increase food web support for the following fish species:

- Sacramento River winter-run Chinook salmon
- Central Valley spring-run Chinook salmon
- Central Valley fall-run Chinook salmon

### **6.3. Construction Activities**

#### **6.3.1. Construction Personnel and Equipment**

Large earth-moving equipment will be delivered to the Project Site at the commencement of construction, and removed when construction is complete. A maximum of 15 employees will construct the Project. Fuel will be delivered to dedicated staging areas in the site on an as-needed basis. Construction activities may occur every day of the week, similar to adjacent agricultural activities.

Construction activities will be conducted using heavy equipment, which may include excavators, scrapers, bulldozers, skip loaders, skid-steer loaders, compactors, front end loaders belly-dump trucks and water trucks.

Construction equipment, staging and employee parking will be restricted to designated staging areas contained within the Project Site. A project-specific Storm Water Pollution Prevention Plan (SWPPP) will be prepared, and all contractors will be trained appropriately. All construction personnel will also have training in avoidance and minimization of potential impacts to sensitive environments or species.

#### **6.3.2. Access and Staging**

Access for construction will occur from Lambert Road into the north end of the site. The preliminary drawings show the internal access routes along the eastern farm berm road and through the center of the Project Site. Multiple potential locations for construction staging have been identified at this stage of planning; for final design, the location and extent of staging area will be refined and limited to the minimum area necessary.

A Special Use Permit on adjacent USFWS property will be required to construct the Project. No access easements to public roadways will be necessary.

### **6.3.3. Utility Relocation**

Two agricultural pumps for water management will be removed during construction and one will be retained. The functional power line to the agricultural pump and power lines running to neighbors will be retained. An abandoned power line ran south through the center of the Project Site and has recently been removed.

### **6.3.4. Site Preparation and Construction Sequence**

The Project Site will remain in agricultural production until the final construction plans are completed and all permits and approvals are obtained. Portions of the Project Site may be used to grow (farm) tule and other plants for revegetation efforts. Construction and planting will occur over two seasons. Earth-moving and planting within the interior of the Project Site will occur in the first season to allow vegetation to establish and soils to stabilize prior to breaching.

Construction activities will generally follow the sequence outlined below.

- Implementation of Environmental Commitments (Appendix B);
- Mobilize equipment onsite;
- Clear and grub, as needed;
- Salvage and stockpile vegetation for reuse in the designated staging area where it can be cared for until final planting or placement;
- If the existing, abandoned utility pole alignment that runs south through the center of the Project Site has not been removed prior to construction, the power lines will be removed and the poles will be retained as raptor roosting or nesting platforms.
- Excavate channels followed by the placement and contouring of excavated material onsite;
- Planting or transplanting of wetland vegetation;
- Seeding bare soil to provide habitat and erosion control.
- Maintaining re-vegetated areas for one growing season for plants to establish.
- Removing large culverts and tide gates in the southern crossing of Railroad Cut.
- Breaching the berm at low tide to reintroduce full tidal hydrology.

### **6.3.5. Grading and Excavation Activities**

Marsh plain grading would be a major phase of Project implementation and would require site preparation and mobilization. During marsh plain grading, water and vegetation would be managed so that soils are as dry as possible to increase earthmoving efficiency and reduce costs.

Layout of channel excavations will occur using a survey-grade global positioning system (GPS) system and laser level to create sub-inch accuracy. There are four types of geometries for the constructed tidal channels. All channels are designed within varying side slopes and invert elevations of 0 feet NAVD88.

<b>Table 2. Summary of Channel Properties – Preliminary Design</b>					
<b>Channel Geometry</b>	<b>Top Width (ft)</b>	<b>Bottom Width (ft)</b>	<b>Side Slope (approx. range)</b>	<b>Total Approximate Length (ft)</b>	<b>Approximate Volume (bcy)</b>
Type 1	30	16	2 to 3:1	10,905	30,000
Type 2	38	24	2 to 3:1	13504	41,000
Type 3	44	30	2 to 3:1	5,928	21,000
Type 4	64 to 88	50	2 to 3:1	323	5,000

Approximately 100,000 cubic yards (cy) of material excavated during channel construction will be beneficially reused to construct around 200 habitat mounds. Mounds have a range of 1 to 3 feet above the existing ground surface; mounded features have been located close to areas of excavation to minimize the construction footprint. The reuse of excavated material for habitat mounds will provide balanced cut and fill.

Two breaches will connect the tidal floodplain and channels to Snodgrass Slough, a northern and a southern breach. The northern breach on the northwest side of the Project Site will have a bottom width of 50 feet at elevation of approximately 4 feet NAVD88. The northern breach has 3:1 side slopes. The southern breach will connect Railroad Cut canal on the east side of the Project Site to Snodgrass Slough in the south. The southern breach bottom width is approximately 80 feet at an invert elevation of approximately -4 feet NAVD88 to match the geometry of Railroad Cut. The southern breach also has 3:1 side slopes.

The excavation of the breaches will likely occur in two stages: removal of material above 7 feet first (high tide level), and then removal of material below elevation 7 feet NAVD88 (intertidal level). Removal in stages will allow for hauling away some material before connecting to Snodgrass Slough. Vegetation located at breach locations and at channel connections with Railroad Cut will be removed; suitable vegetation will be salvaged as feasible. Any remaining debris will be removed and disposed of at an appropriate facility.

#### **6.3.6. Planting Plan**

The revegetation phase of construction would follow marsh-plain grading. Water would be used to flood graded marsh areas and managed to encourage vegetation establishment. Once the breaches are excavated, no irrigation will be necessary. Revegetation efforts will focus on establishment of tule within the marsh floodplain, providing herbaceous cover to stabilize areas exposed through grading, and complementary planting of culturally significant native species.

Tule will be planted in clusters at elevations ranging from 1 foot below MLLW to 1 foot below MHW. In addition, other tule propagules including salvaged tule clumps, collected seed, and rhizomatous material will be spread across the constructed mounds and other appropriate elevations. Tule plugs will be planted 3-ft on center. Exact locations will be determined following grading so that planting locations correspond with suitable areas.

In addition to species planted/seeded for habitat re-establishment purposes, culturally significant plants may be installed in coordination with the Wilton Rancheria. Appropriate native species such as, but not limited to, willow (*Salix* spp.), dogwood (*Cornus* spp.), wild rose (*Rosa californica*), sedges (*Carex* spp.), rushes (*Juncus* spp.) and native grasses could be planted and/or seeded within the Project Site, as suitable.

Vegetation establishment would be accomplished through a variety of planting methods, including container plantings, cuttings, and seeding. While vegetation in low-lying areas likely would not require irrigation when exposed to the restored tidal prism, container plantings in the riparian floodplain zones could require supplemental water for establishment after installation. Plantings would be sourced from onsite or the surrounding area whenever possible, ensuring that plants are locally adapted to site conditions and likely developing self-sustaining populations through natural recruitment.

To the extent feasible, container stock and seed will be secured from commercial growers with local ecotypes; however, in the event that local ecotypes are not available, seed from other California riparian ecotypes will be substituted. Cuttings will be collected from onsite or from nearby sites.

#### **6.4. Post-Construction Project Components**

Post-construction Project components would be limited to the following monitoring and land management activities to maintain restored habitat conditions.

##### **6.4.1. *Habitat Establishment (Project Outcome) Monitoring***

The site would be monitored on a regular basis during the habitat establishment period to ensure that the site is performing as designed and anticipated. Activities during the habitat establishment period may include corrective measures, if necessary, to address potential problems identified during ongoing monitoring of the site.

##### **6.4.2. *Long-term Operations and Management Monitoring***

The site would continue to be monitored and managed on a regular basis in perpetuity to ensure the Project's desired ecological benefits and trajectory are maintained into the future. The need for corrective actions after the site has stabilized is anticipated to be minor.

##### **6.4.3. *Adaptive Management Monitoring.***

The site would be monitored by various scientists, tribal representatives, and agencies to determine the following:

- If the site is functioning as intended
- If certain physical attributes could be changed to enhance ecosystem function
- If any potential problems are developing that may require corrective measures
- If monitoring or maintenance/management protocols need to be modified to ensure they are accomplishing their intended purposes

## 7. APPROVALS, PERMITS, AGREEMENTS AND CONSULTATIONS

**Table 2** lists the anticipated permits and approvals for construction and operation of the proposed Project. Depending on the final design of the Project and the affected environmental resources, local, state and federal agencies involved in the environmental review for this Project may include, but are not limited to, the following.

<b>Table 2. Anticipated Project Permits, Agreements and Consultations</b>	
<b>Agency</b>	<b>Permit/Authorization</b>
<b>Federal Agencies</b>	
U.S. Army Corps of Engineers (USACE)	<ul style="list-style-type: none"> <li>National Environmental Policy Act (NEPA) lead agency</li> <li>Bank Signatory (USACE Permit/Tracking No. SPK-2020-00886)</li> <li>Clean Water Act section 404 Nationwide Permit No. 27</li> <li>Clean Water Act section 10 Rivers and Harbors Act (breaches into Snodgrass Slough)</li> <li>National Environmental Policy Act lead agency</li> </ul>
U.S. Fish and Wildlife Service (USFWS)	<ul style="list-style-type: none"> <li>Federal Endangered Species Act section 7 consultation (expected under programmatic biological opinion for restoration)</li> <li>Special Use Permit from Stone Lakes National Wildlife Refuge</li> </ul>
National Marine Fisheries Service (NMFS)	<ul style="list-style-type: none"> <li>Federal Endangered Species Act section 7 consultation (expected under programmatic biological opinion for restoration)</li> <li>Essential Fish Habitat coordination</li> <li>Bank Signatory</li> </ul>
State Historic Preservation Officer (SHPO)	<ul style="list-style-type: none"> <li>Section 106 Consultation as required for cultural resources</li> </ul>
Federal Emergency Management Agency (FEMA)	<ul style="list-style-type: none"> <li>Conditional Letter of Map Revision</li> </ul>
United States Environmental Protection Agency	<ul style="list-style-type: none"> <li>Bank Signatory</li> </ul>
United States Coast Guard	<ul style="list-style-type: none"> <li>If needed for work within and adjacent to navigable waters</li> </ul>
<b>State Agencies</b>	
California Department of Fish and Wildlife (CDFW)	<ul style="list-style-type: none"> <li>Fish and Game Code section 1600 Lake and Streambed Alteration Agreement</li> </ul>
Central Valley Regional Water Quality Control Board (CVRWQCB)	<ul style="list-style-type: none"> <li>Clean Water Act section 401 Water Quality Certification</li> <li>Clean Water Action section 402 National Pollutant Discharge Elimination System Statewide Construction General Permit</li> <li>Bank Signatory</li> </ul>
State Lands Commission (SLC)	<ul style="list-style-type: none"> <li>Consultation regarding proposed restoration</li> </ul>
Delta Stewardship Council (DSC)	<ul style="list-style-type: none"> <li>Certification of Consistency with <i>The Delta Plan</i></li> </ul>
<b>Local Agencies</b>	
Sacramento County	<ul style="list-style-type: none"> <li>California Environmental Quality Act (CEQA) lead agency</li> <li>Assembly Bill 52 tribal consultation</li> </ul>

<b>Table 2. Anticipated Project Permits, Agreements and Consultations</b>	
<b>Agency</b>	<b>Permit/Authorization</b>
	<ul style="list-style-type: none"> <li>Williamson Act contract amendment</li> <li>Grading permit</li> </ul>
Wilton Rancheria	<ul style="list-style-type: none"> <li>Memorandum of Agreement with USACE and SHPO regarding tribal issues. Memorandum of Agreement on tribal access, use, and/or maintenance support, as appropriate</li> </ul>

## 8. PUBLIC OUTREACH

In addition to coordination with local, state, and federal agencies to obtain required project permits, WES has conducted early engagement with public agencies, local tribes, and adjacent landowners to obtain input on the project design and identify concerns related to future proposed land uses.

### 8.1. Local Tribes

The Wilton Rancheria Tribe will provide direction for protection of cultural resources during design and construction. As part of the planning process, a 3-acre area within the Project Site has been identified for repatriation of cultural artifacts. This area is protected by the Conservation Easement but is not counted toward credit generation. Activities that may occur within the repatriation area include digging to bury a recovered resource, seeding, planting, pruning, plant gathering, and vegetation management. Tribes will be allowed access to the Project Site for ceremony, education, and collection.

## 9. ENVIRONMENTAL COMMITMENTS

WES has identified the following environmental commitments to reduce the environmental impacts of the Project. Additional avoidance and minimization measures may be required by state and federal agencies as conditions of project permits.

### 9.1. Air Quality Environmental Commitments

WES will implement the following measures to reduce emissions and control dust during construction activities.

- Water all active construction areas at least twice daily.
- Cover all trucks hauling soil, sand, and other loose materials to and from the Project Site.
- Plant vegetative ground cover in disturbed areas as soon as possible.
- Cover inactive storage piles.
- Restrict unnecessary vehicle idling to 5 minutes.

## 9.2. Biological Resources Environmental Commitments

WES will implement the following measures to avoid and minimize impacts to biological resources.

- Work shall not begin until all necessary permits and authorizations are finalized. A copy of all applicable agency permits and authorizations will be maintained by the construction foreman on the Project Site for the duration of activities.
- General and in-water construction work windows shall be implemented in accordance with permits and authorizations. Initiation of construction will be limited to May 1 through October 1, outside the flood season and during the active period for giant garter snakes. Additionally, all in-water work will occur from June 1 – October 1 to limit effects on out-migrating salmonids.
- A qualified ecologist or biologist will observe construction activities on a daily basis. The ecologist/biologist will have authority to stop construction activities if situations arise that could be detrimental to special-status species. Construction will be allowed to resume only after corrective actions have alleviated the potential for detrimental activities.
- All construction staging activities will occur within designated staging areas, to be identified by the project ecologist/biologist. This staging area will be located no closer than 300 feet from any existing threatened or endangered species habitat (e.g., Swainson’s hawk nesting areas, giant garter snake aquatic habitat), and will be marked in the field and on the construction plans.
- All refueling and maintenance activities will occur within the staging area. Any spill of hazardous materials will be cleaned up immediately, in accordance with all federal, state, and local regulations. Additional measures to minimize impacts to the site will be identified in the Stormwater Pollution Prevention Plan (SWPPP), which will be prepared and implemented prior to the initiation of construction.
- Erosion-control best management practices will be implemented as needed, including but not limited to, grading during the dry season, compaction of berms and upland spoils, and seeding and mulching areas of exposed soil, per the project-specific SWPPP.
- Employees and contractors performing construction activities will receive environmental sensitivity training. Training will include review of environmental laws and information about sensitive species that may be encountered during construction including giant garter snake, western pond turtle, Swainson’s hawk, and other nesting migratory birds. Work crews will be instructed about the status of special-status species potentially occurring on site and the need to protect these species and habitats. If new construction personnel are added to the Project, the contractor will ensure the personnel receive the mandatory training before starting work. A representative will be appointed during the employee education program to be the contact for any employee or contractor who might inadvertently kill or injure a listed species or who finds a dead, injured, or entrapped individual.

- Significant earth moving activities will not be conducted in the Project area within 24 hours of predicted storm or within 24-hours after a storm (defined as 0.5-inch of rain or more).
- No pets will be permitted at the Project Site to avoid harassment, killing, or injuring of wildlife.

### **9.2.1. *Swainson’s Hawk and other Migratory Birds and Raptors***

- **Nest Surveys:** There are suitable bird and raptor nesting trees within the Project Site. A minimum of two nest surveys will be conducted by a qualified ecologist/biologist within one month of the start of ground disturbing activities (including staging and grubbing) that occur during the nesting season (March 1 – August 31). At least one survey will be conducted within 3 days prior to the start of ground disturbance. Surveys for nesting birds will be conducted within 300 feet of proposed construction activities and within 0.25 mile for nesting raptors, including Swainson’s hawk.
- **Avoidance of Occupied Habitat:** If no active nests are found during the focused nest surveys, then no further mitigation will be required. If active nests are found, Project activities will be prohibited within 100 feet of occupied bird nests and within a considerable distance of an active raptor nest (including Swainson’s hawk) to prevent nest abandonment. If site-specific conditions or the nature of the covered activity indicate that a smaller buffer could be used, WES will coordinate with the appropriate wildlife agency(s) to determine the appropriate buffer size. Additional monitoring may be required if buffer sizes are reduced to ensure that adverse impacts are avoided. An onsite biological monitor shall verify that no-disturbance buffers are implemented and adequate to avoid take until the nestlings are verified to be no longer dependent on the nesting habitat.

### **9.3. Cultural Resources Environmental Commitments**

- If cultural artifacts are unexpectedly discovered during construction, work in the immediate vicinity (100 feet) of the find will be halted and an assessment will be made by a qualified archaeologist. Cultural artifacts include archaeological (pre-history) and historical objects. Objects may include, but are not limited to, pottery shards, rock implements or flakes, projectile points (e.g., arrowheads), mortar and pestles, adobe foundations and/or walls, pioneer metal work (e.g., square nails). Additional features indicating archaeological significance include dark friable soils containing shells, animal bones and other refuse deposits.
- If human remains are discovered during construction, work in the immediate vicinity (100 feet) of the find will be halted and the Solano County Coroner will be notified immediately. A qualified archaeologist will be brought in for an assessment. If the County Coroner determines that the human remains are of Native American origin, then the County Coroner will notify the California Native American Heritage Commission within 24 hours from the initial determination.
- If cultural artifacts or human remains are discovered during construction, USACE and Solano County will be notified within 48 hours.

#### 9.4. Hazardous Materials Environmental Commitments

- WES will prepare a SWPPP prior to construction. The SWPPP will include information on hazardous material storage and handling measures. The SWPPP also will include a list of possible hazardous materials that will be used on the site (such as diesel fuel), requiring spill prevention kits in equipment, creation of containment areas if hazardous materials are stored on site, and procedures to follow in the unlikely event of a spill.
- All refueling and maintenance activities will occur within designated staging areas.
- Inspect all equipment for oil and fuel leaks every day prior to use. Equipment with oil or fuel leaks will not be used onsite until the leak is fixed.
- Any spill of hazardous materials will be cleaned up immediately, in accordance with all federal, state and local regulations.
- Spark arresters will be required on all construction equipment.
- All vehicles and construction equipment will carry fire extinguishers.

#### 9.5. Hydrology and Water Quality Environmental Commitments

- The Applicant will prepare a SWPPP that will describe best management practices to be used during construction and through site re-vegetation to minimize erosion and protect water quality.
- Erosion control best management practices (BMPs) will be implemented as needed, including but not limited to the following: grading during the dry season, compaction of berms and upland spoils, and seeding and mulching areas of exposed soil.

### 10. SCHEDULE

WES will be coordinating closely with agency partners throughout 2024 to support the development of the mitigation document package that will be submitted to agency partners for review and approval. WES is seeking permit approvals by mid to late 2024 with initial construction activities targeted for summer 2025.

Grading of tidal channels and marsh mounds, removal/decommissioning of farm-related infrastructure, tule planting, and herbaceous seeding is targeted for summer of 2025. The breaches along Snodgrass Slough will be excavated in summer 2026 once vegetation has had a season to establish. The exact dates for start of construction will consider work windows for sensitive species and habitats, the results of pre-construction surveys, and weather-generated conditions. Completed activities will be detailed in the annual report following the first phase, and an as-built report will be submitted following the completion of all construction and planting.

General and in-water construction work windows will be implemented in accordance with permits and authorizations. Initiation of construction would be limited to May 1 through October 1, outside of the flood season and during the active period for giant garter snake. Additionally, all in-water work will occur from June 1 to October 1 to limit effects on out-migrating salmonids.

## 11. REFERENCES

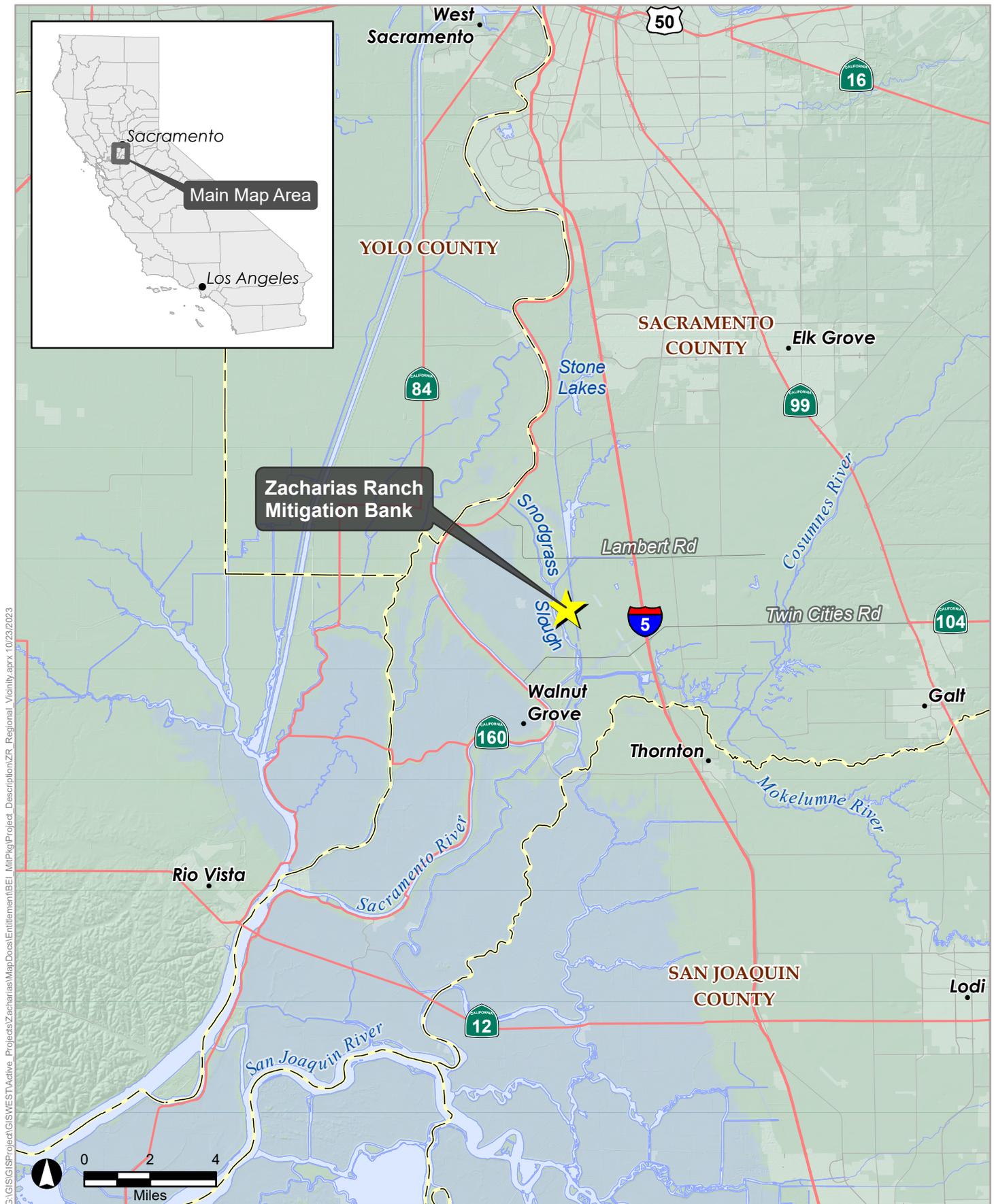
California Department of Parks and Recreation. 2022. News Release March 4, 2022: Division of Boating and Waterways Begins Control Efforts in the Delta for Aquatic Invasive Species. Available online at: <https://www.parks.ca.gov/NewsRelease/950>.

Sacramento County. 2011. Sacramento County General Plan. November.

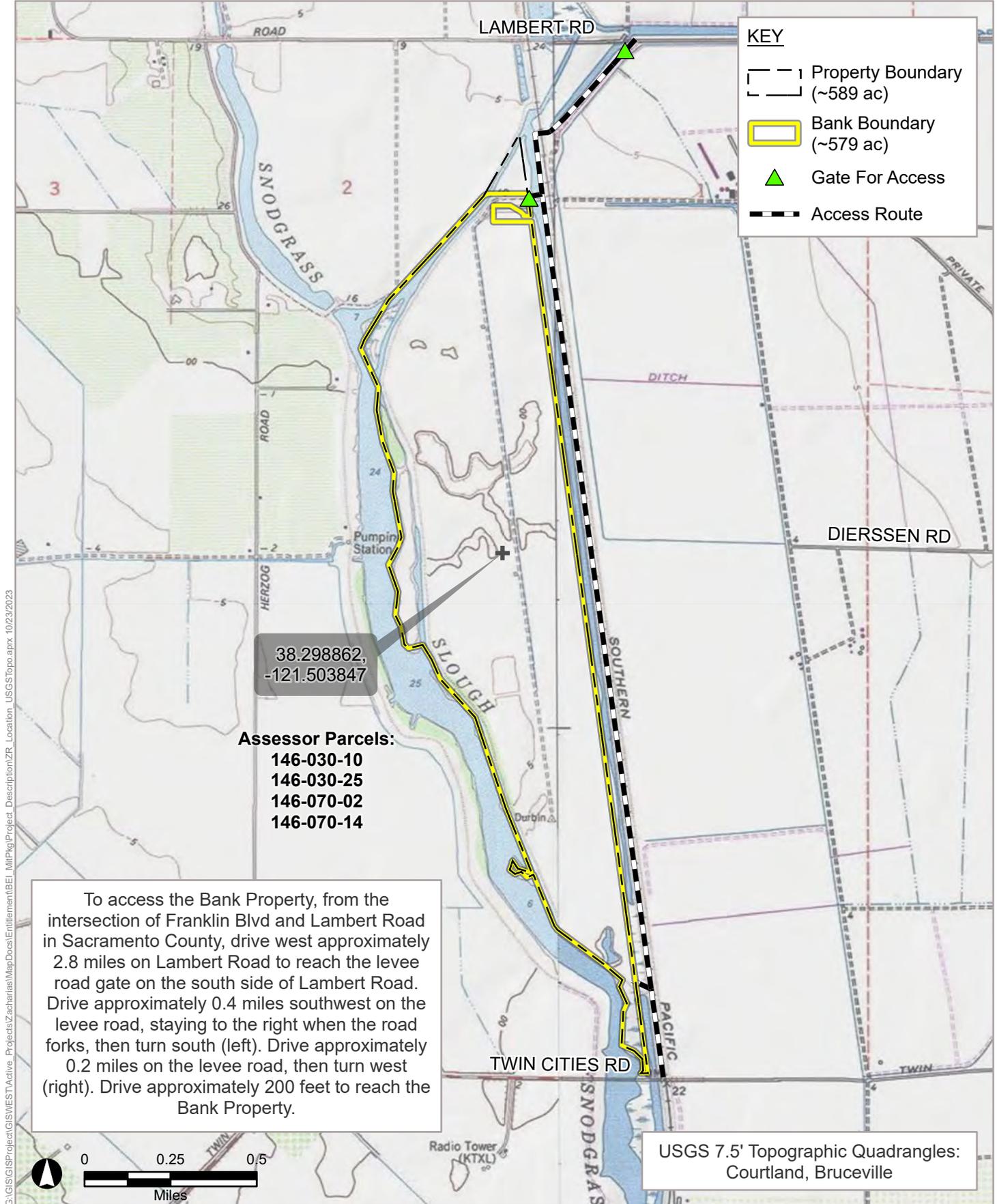
Whipple, A., R. M. Grossinger, D. Rankin, B. Stanford, and R. A. Askevold. Sacramento-San Joaquin Delta Historical Ecology Investigation: Exploring Pattern and Process. San Francisco Estuary Institute Contribution No. 672. Richmond, California.

# **APPENDIX A**

## **Figures**



**Figure 1**  
Regional Vicinity  
Zacharias Ranch Mitigation Bank



**KEY**

- Property Boundary (~589 ac)
- Bank Boundary (~579 ac)
- Gate For Access
- Access Route

38.298862,  
-121.503847

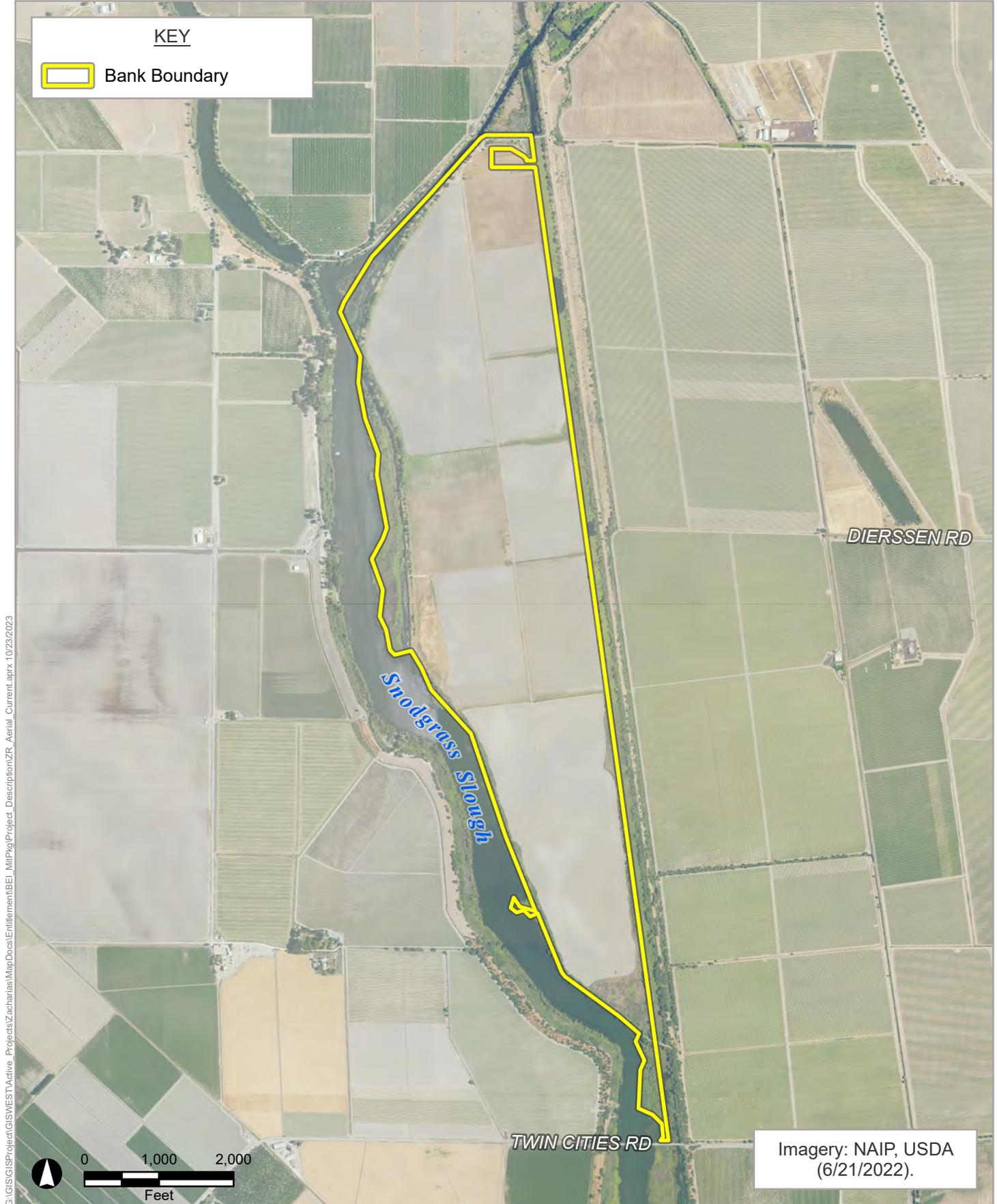
- Assessor Parcels:**
- 146-030-10
  - 146-030-25
  - 146-070-02
  - 146-070-14

To access the Bank Property, from the intersection of Franklin Blvd and Lambert Road in Sacramento County, drive west approximately 2.8 miles on Lambert Road to reach the levee road gate on the south side of Lambert Road. Drive approximately 0.4 miles southwest on the levee road, staying to the right when the road forks, then turn south (left). Drive approximately 0.2 miles on the levee road, then turn west (right). Drive approximately 200 feet to reach the Bank Property.



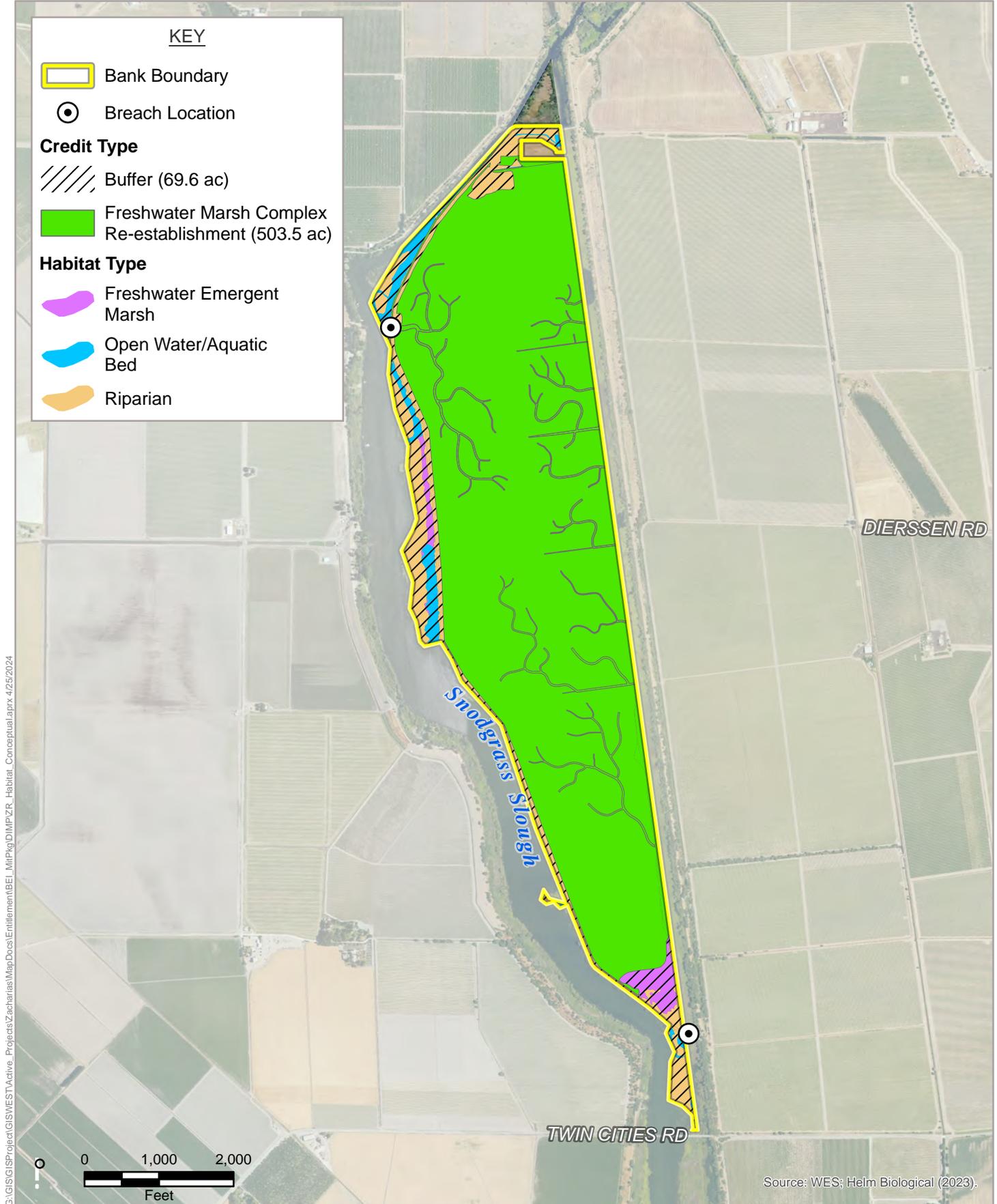
USGS 7.5' Topographic Quadrangles:  
Courtland, Bruceville

**Figure 2**  
Bank Location (USGS Quad)  
Zacharias Ranch Mitigation Bank



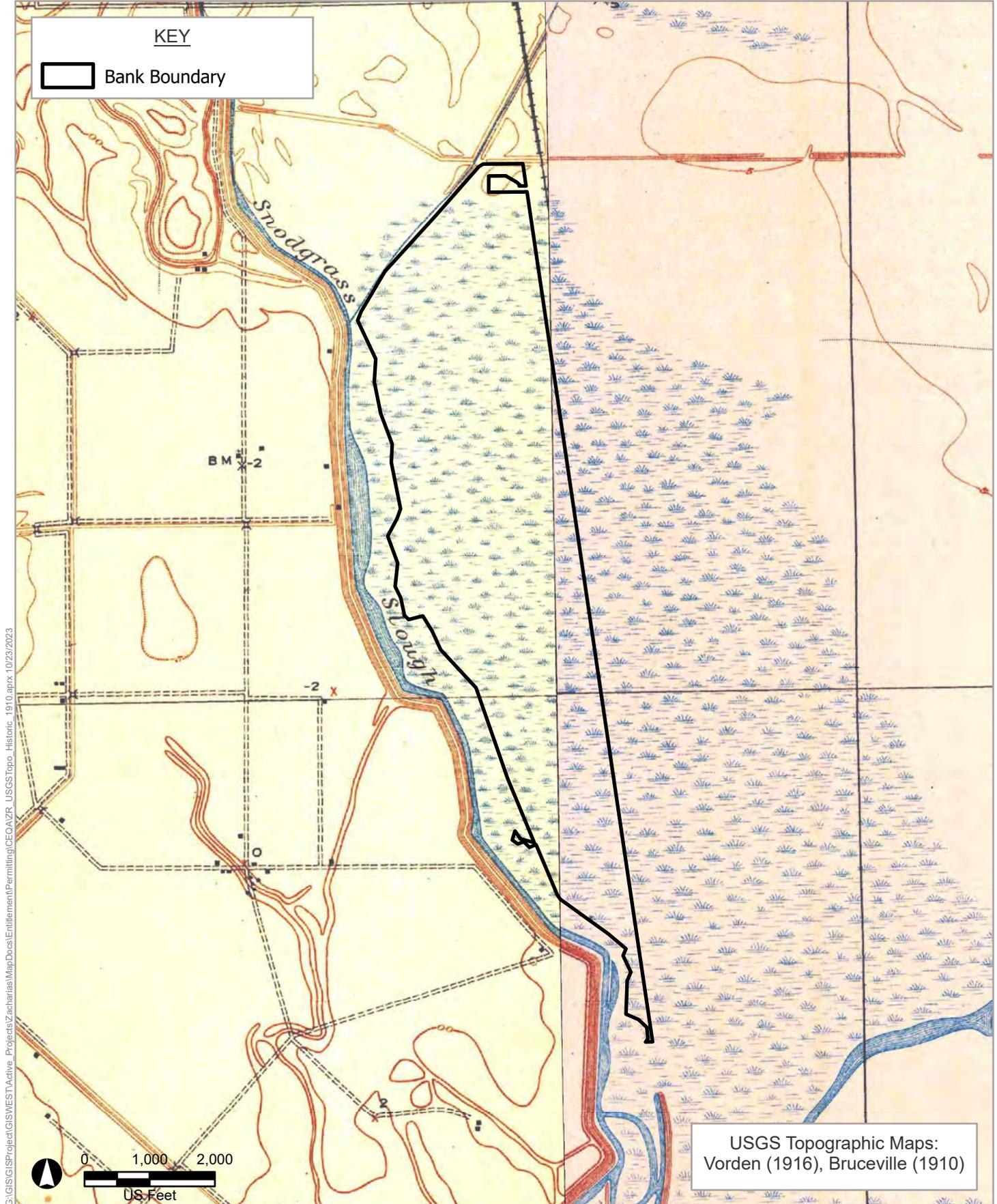
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**Figure 3**  
Aerial Overview  
Zacharias Ranch Mitigation Bank

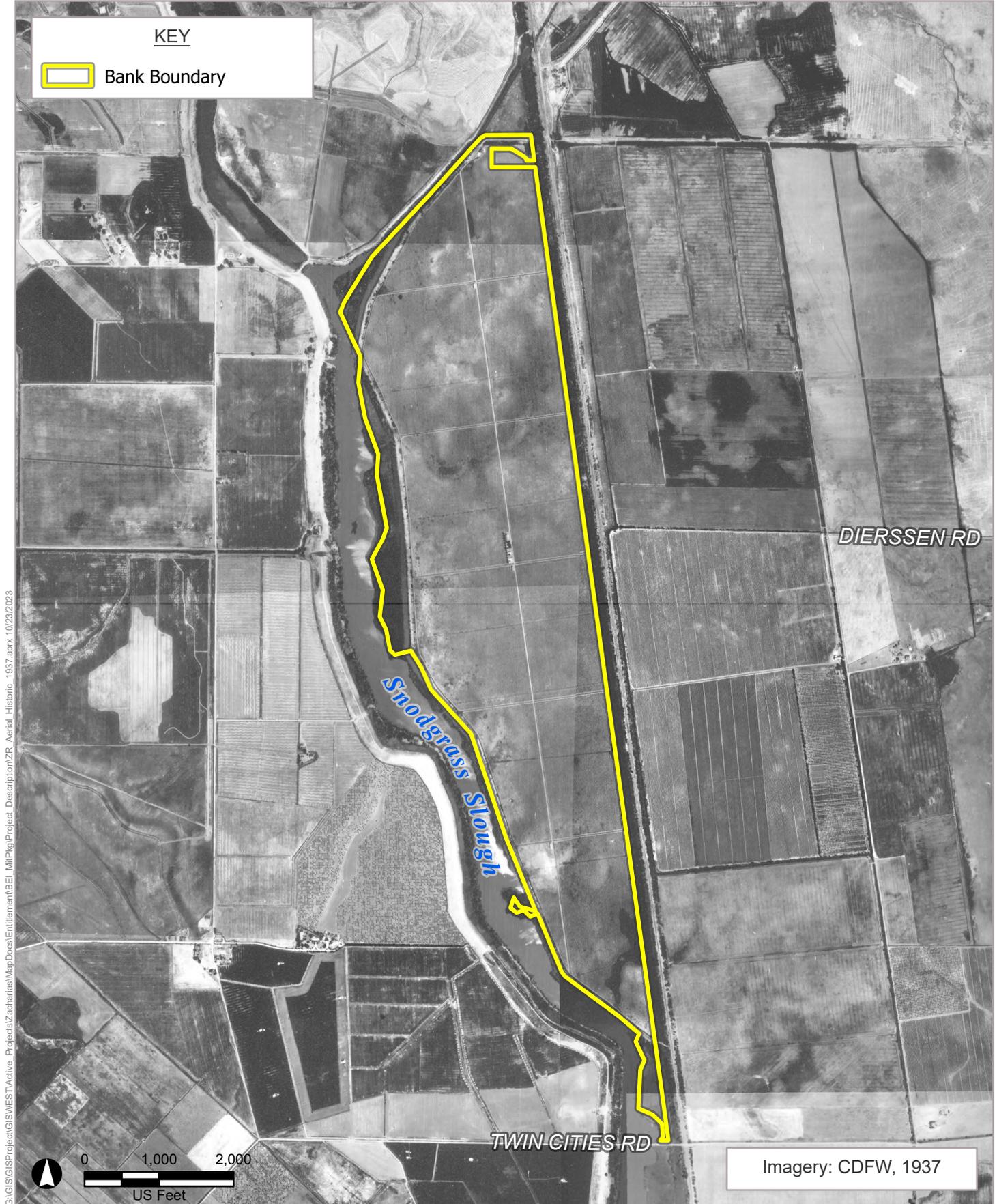


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**Figure 4**  
Project Concept Map  
Zacharias Ranch Mitigation Bank

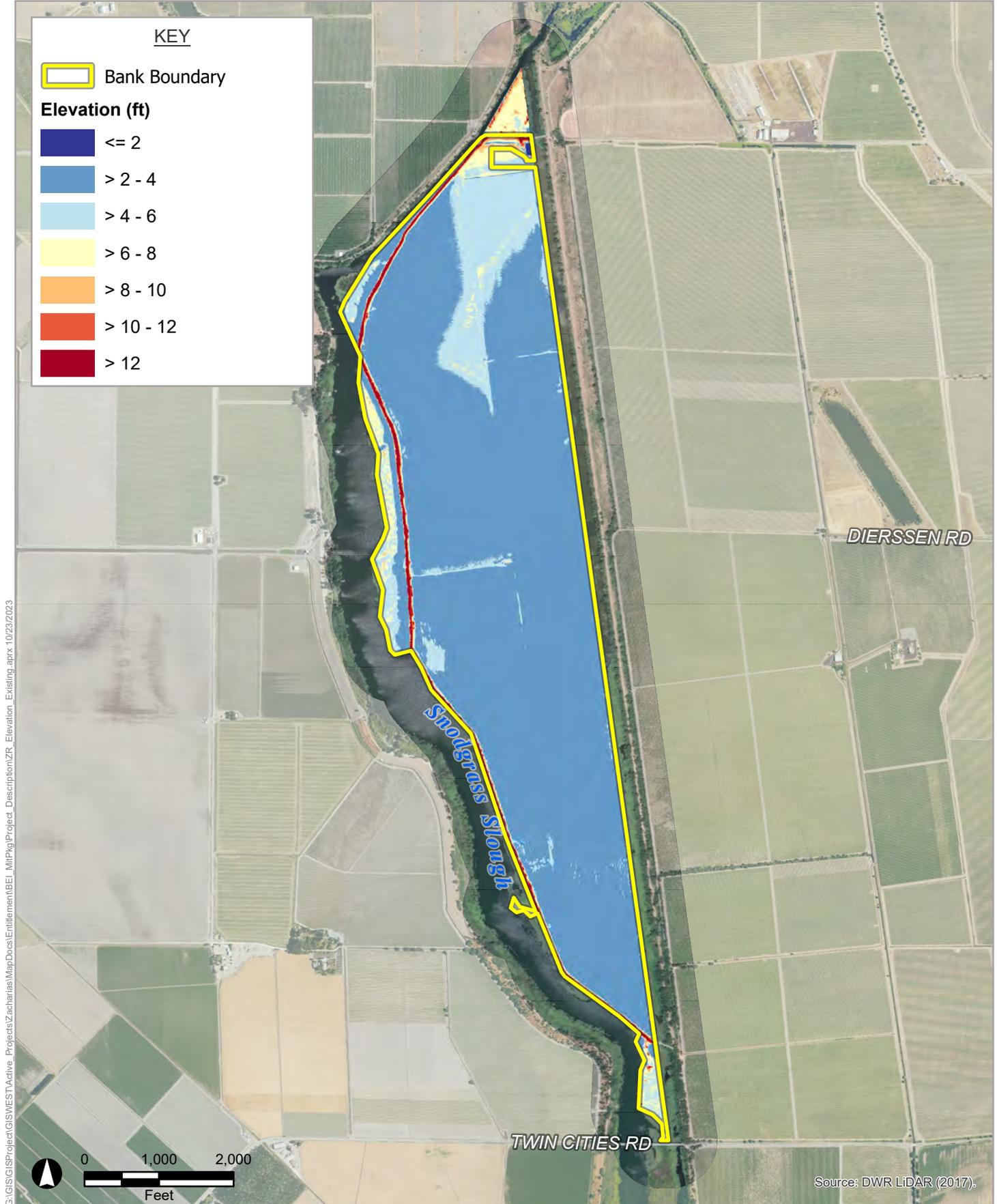


**Figure 5**  
 Historic Topographic Mapping - 1910/1916  
 Zacharias Ranch Mitigation Bank



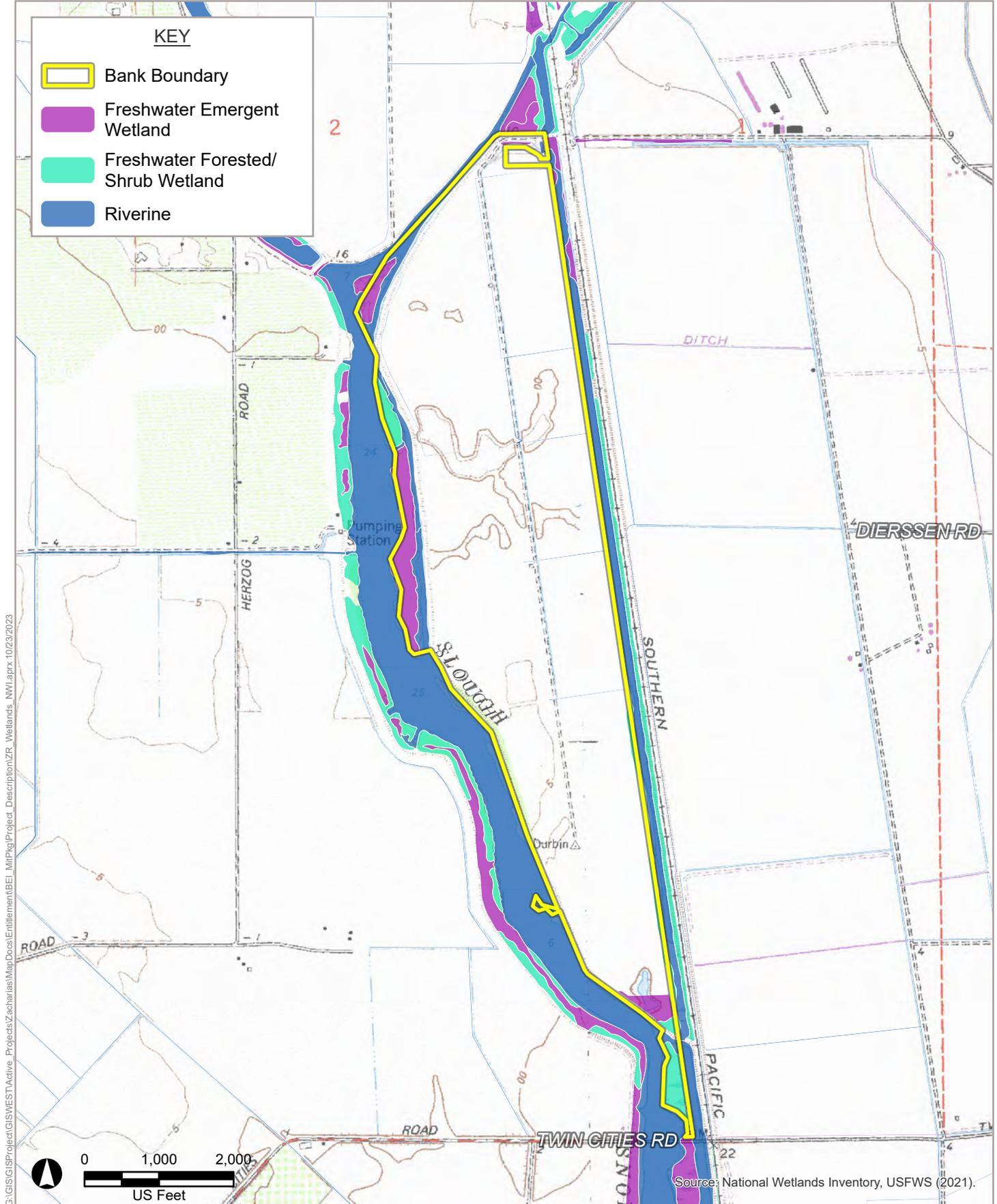
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**Figure 6**  
 Historic Aerial (1937)  
 Zacharias Ranch Mitigation Bank



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**Figure 7**  
Existing Site Elevations  
Zacharias Ranch Mitigation Bank



**Figure 8**  
National Wetlands Inventory  
Zacharias Ranch Mitigation Bank