

# 2021 ANNUAL MONITORING REPORT (YEAR 2)

## DEVIL'S GATE OFF-SITE MITIGATION PROJECT

LOS ANGELES COUNTY, CALIFORNIA

USACE FILE No. SPL-2014-00591

CDFW TRACKING No. 1600-2015-0263-R5

RWQCB FILE No. 15-053



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# TABLE OF CONTENTS

<b>1.0 PROJECT OVERVIEW .....</b>	<b>1</b>
1.1 Permit File Numbers .....	1
1.2 Project Description.....	1
1.3 Monitoring and Reporting Tasks.....	4
1.4 Status Summary .....	4
<b>2.0 MITIGATION SITE EXISTING CONDITIONS .....</b>	<b>5</b>
2.1 Location.....	5
2.2 Existing Habitat .....	5
<b>3.0 MITIGATION ACTIVITIES.....</b>	<b>6</b>
3.1 Cattle Exclusion Fencing.....	6
3.2 Invasive Species Management and Considerations.....	6
3.3 Planting Areas .....	6
3.4 Preservation Areas .....	6
<b>4.0 MONITORING AND PERFORMANCE STANDARDS .....</b>	<b>8</b>
4.1 Planting Area Success Criteria.....	8
4.2 Performance Monitoring Methods.....	9
4.3 Inspections for Mitigation Maintenance .....	10
<b>5.0 RESULTS .....</b>	<b>12</b>
5.1 Performance Monitoring .....	12
5.1.1 Mulefat and Willow Cover .....	12
5.1.2 Cal-IPC High Broad-Leaved Invasive Species Cover .....	12
5.1.3 Survivorship.....	12
5.2 Mitigation Maintenance Inspections.....	12
5.2.1 Erosion .....	12
5.2.2 Target Non-Native Invasive Plant Species Mapping .....	15
5.2.3 Cattle Exclusion Fencing.....	17
5.2.4 Hydrologic Conditions .....	17
<b>6.0 SUMMARY AND MANAGEMENT RECOMMENDATIONS.....</b>	<b>18</b>
6.1 Performance Monitoring Summary .....	18
6.1.1 Mulefat and Willows Cover and Survivorship.....	18
6.1.2 Cal-IPC High Broad-Leaved Invasive Species Cover .....	18

6.2 Management Recommendations .....	18
6.2.1 Biological Resources.....	18
6.2.2 Infrastructure and Facilities .....	19
<b>7.0 REFERENCES .....</b>	<b>20</b>

**LIST OF TABLES**

Table 1. Performance Standards for Planting Areas.....	9
Table 2: Maintenance Inspection Types and Actions .....	10
Table 3. Year 2 Performance Monitoring Results – Absolute Cover of Mulefat and Willow and Absolute Cover of Non-Native Invasive Broad-Leaved Plant Species within the Mitigation Site .....	13
Table 4. Year 2 Performance Monitoring Results – Percent Survivorship of Mulefat and Willow within the Mitigation Site.....	13

**LIST OF FIGURES**

Figure 1: Petersen Ranch Mitigation Bank Location Map.....	2
Figure 2: Mitigation Site Location Map.....	3
Figure 3: Mitigation Site As-Built Plan .....	7
Figure 4: Mitigation Site Monitoring Locations .....	11
Figure 5 : Mulefat and Willow Mortality Map .....	14
Figure 6 : Target Non-Native Invasive Plants within Mitigation Site Planting Areas .....	16

**LIST OF APPENDICES**

- Appendix A – Mitigation Site Observed Species List
- Appendix B – Annual Monitoring Data
- Appendix C – Photo Monitoring and Transect Photos

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## LIST OF ACRONYMS

BEI	Bank Enabling Instrument
Cal-IPC	California Invasive Plant Council
CDFW	California Department of Fish and Wildlife
GPS	Global Positioning System
HMMP	Habitat Mitigation and Monitoring Plan
LACFCD	Los Angeles County Flood Control District
NNIP	Non-Native Invasive Plant
RWQCB	Regional Water Quality Control Board
USACE	United States Army Corps of Engineers
WOUS	Waters of the United States
WRA	WRA, Inc.

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## 1.0 PROJECT OVERVIEW

This is the second annual report for the Devil's Gate Off-Site Mitigation Project as required under the terms of the approved Devil's Gate Off-Site Mitigation Project Habitat Mitigation and Monitoring Plan (HMMP; WRA 2018). The United States Army Corps of Engineers (USACE) permit authorizing the HMMP requires the annual reports be submitted to the USACE, the California Department of Fish and Wildlife (CDFW), and the California Department of Fish and Wildlife (CDFW) (Permitting Agencies) by October 1<sup>st</sup> throughout the five-year maintenance and monitoring period.

Restoration activities at the Devil's Gate Off-Site Mitigation Project Site were completed as outlined in the as-built memo submitted to the Permitting Agencies and dated April 23, 2019 (WRA 2019). This report includes information on the site conditions, continued restoration activities, performance monitoring, and management recommendations.

### 1.1 Permit File Numbers

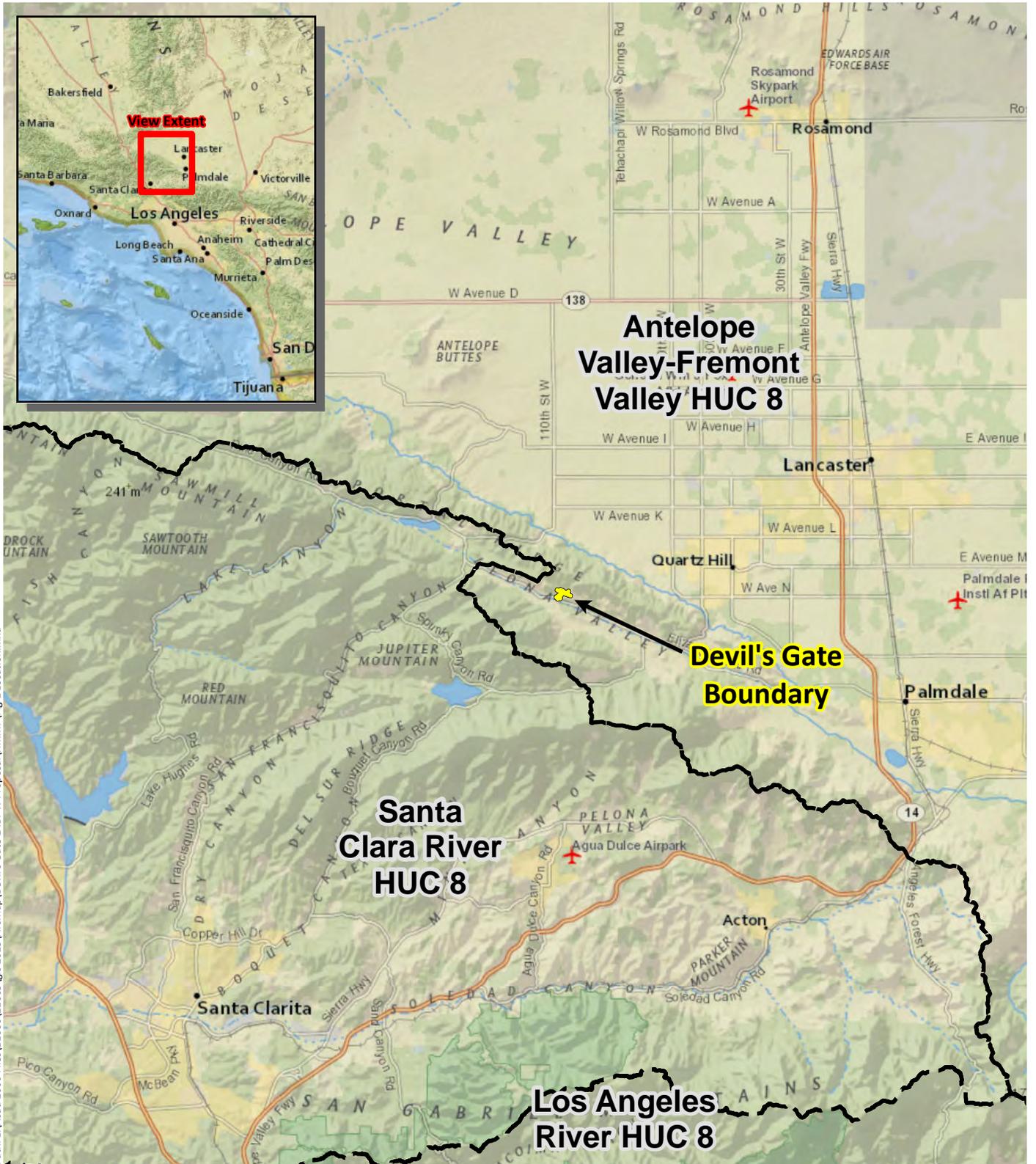
- U.S. Army Corps of Engineers Section 404 (File No. SPL-2014-00591)
- California Department of Fish and Wildlife Section 1602 Streambed Alteration Agreement (Notification No. 1600-2015-0263-R5)
- Los Angeles Regional Water Quality Control Board Section 401 Water Quality Certification (File No. 15-053)

This annual report is prepared pursuant to the above permits, as set forth by the HMMP prepared by WRA, Inc. (WRA), dated October 17, 2018.

### 1.2 Project Description

The Devil's Gate Off-Site Mitigation Project (Project) serves as an off-site mitigation project for the Los Angeles County Flood Control District (LACFCD) Devil's Gate Sediment Removal and Maintenance Project, which was proposed to remove vegetation and 1.7 million cubic yards (cy) of sediment from a 65.56-acre area within the reservoir above the Devil's Gate Dam (Impact Site). The Sediment Removal Project will directly impact 1.52 acres of USACE jurisdictional wetlands and 32.54 acres of USACE non-wetland Waters of the United States (WOUS). LACFCD proposed to compensate for these temporary and permanent impacts through a combination of on-site and off-site mitigation projects, as required by the USACE Section 404 Permit (SPL-2014-00591), the CDFW Lake or Streambed Alteration Agreement (1600-2015-0263-R5), and the RWQCB Section 401 Certification (15-053). On-site mitigation objectives are described in the Devil's Gate Sediment Removal and Management Project Habitat Mitigation and Monitoring Plan (ECORP 2018).

LACFCD satisfied the off-site mitigation requirement by engaging Land Veritas Corp (Bank Sponsor) to implement the Project in a 31.55-acre portion of the Petersen Ranch Mitigation Bank (Bank). The Bank is in northern Los Angeles County near Leona Valley, California (Figure 1). The Project took place at and surrounding a large sag pond (Pond D) on the east end of the Bank (Mitigation Site; Figure 2). Mitigation actions focused on enhancing existing seasonal wetlands that support mulefat (*Baccharis salicifolia*) and willow (*Salix* sp.) populations, creating new mulefat/willow dominated habitats, and preserving alluvial scrub areas around Pond D. The created, restored, and preserved communities are of a similar type and provide similar or greater functions to those affected at the Impact Site.

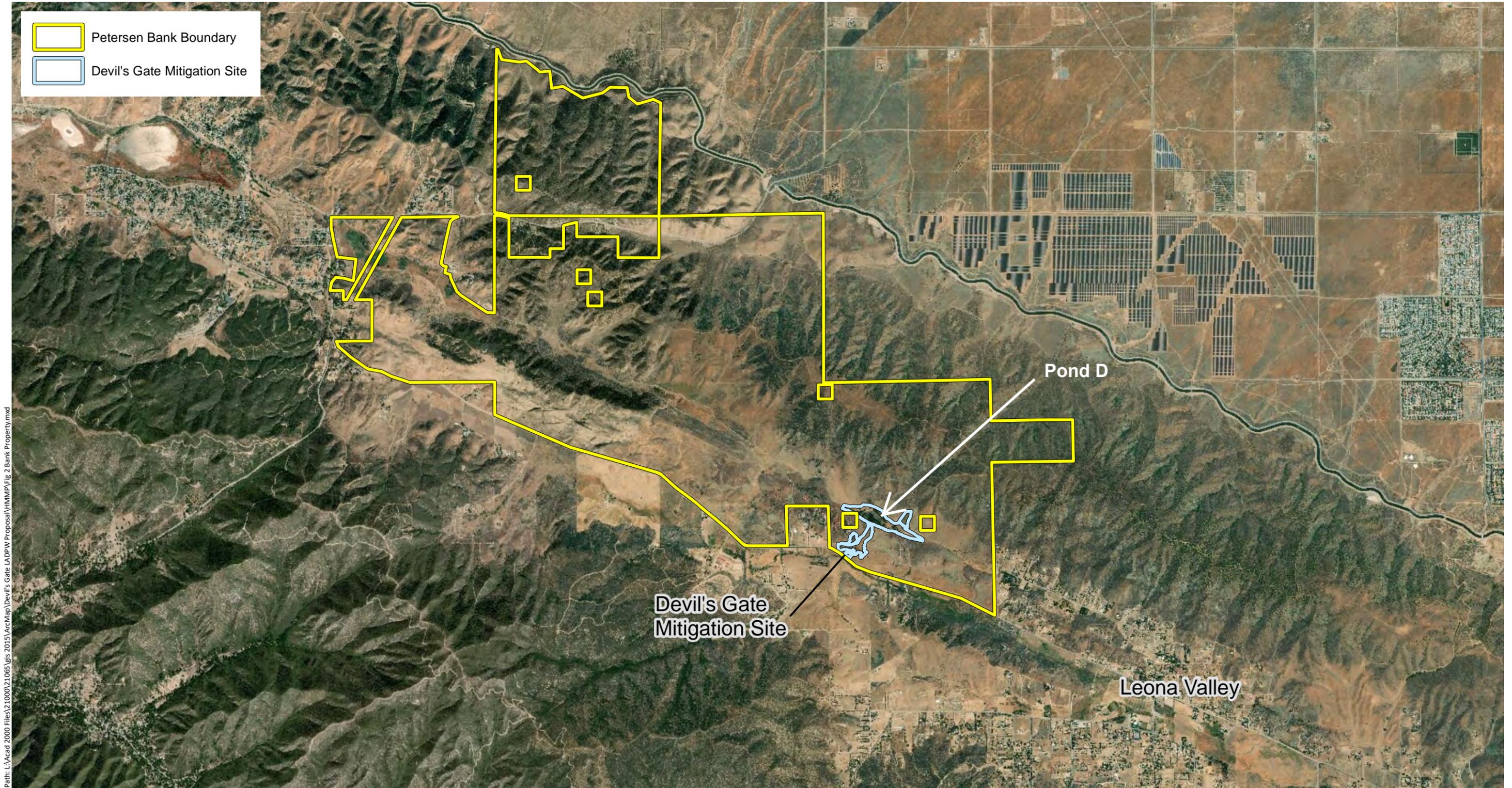


Sources: National Geographic, WRA | Prepared By: czumwalt, 8/2/2018

**Figure 1. Location Map**

Petersen Ranch Mitigation Bank  
 Los Angeles County, California





Path: L:\Acad 2000 Files\21000\21065\gis\2015\ArcMap\Devil's Gate LADPW Proposal\HMMP\Fig 2 Bank Property.mxd

Sources: 2016 DigitalGlobe Aerial, WRA | Prepared By: czumwalt, 8/2/2018

**Figure 2. Bank Property Map**

Petersen Ranch Mitigation Bank  
Los Angeles County, California



### **1.3 Monitoring and Reporting Tasks**

This report addresses the Year 2 monitoring and reporting requirements of the Mitigation Site outlined in the HMMP, including the management and maintenance tasks completed this year, a description of the overall condition of the Mitigation Site, and the status of maintenance activities; performance monitoring activities and results; and management and maintenance activities proposed for the upcoming year, including proposed remedial actions.

### **1.4 Status Summary**

Habitat restoration and enhancement activities were completed in April 2019, as described in the as-built report letter dated April 23, 2019. This includes planting of over 10,000 willow and mulefat live stakes and installation of cattle exclusion fencing. The mitigation site is now in Year 2 of the management and monitoring period, which will continue until the final (Year 5) performance standards have been met. As presented in this report, the Mitigation Site is meeting all Year 2 performance standards.

## 2.0 MITIGATION SITE EXISTING CONDITIONS

### 2.1 Location

The Mitigation Site is located approximately 32 miles north of the Impact Site within the agency approved Petersen Ranch Mitigation Bank. The 31.55-acre Mitigation Site is located within the eastern portion of the Bank (Figure 2) (Figure 2). The Mitigation Site lies within Phase D of the Bank Property which is part of the larger, 4,103-acre Bank. Within Phase D, a large sag pond (Pond D) and associated wetland complex had been identified as having opportunities for improving the existing habitat. Opportunities include establishment and enhancement of wetlands, non-wetland WOUS and associated buffer habitats. The buffer habitats will be restored and enhanced to not only provide protection for the on-site aquatic resources but also to improve the overall function of the watershed. Additional details describing the mitigation bank can be found in the Bank Enabling Instrument (BEI) (Land Veritas Corp. 2016) and in the Biological Resource Inventory (BEI Exhibit H).

### 2.2 Existing Habitat

A biological inventory was conducted by WRA at the Bank Property in January and February of 2013 (WRA 2013). In total, 11 biological communities were identified within the Mitigation Site: two wetlands and waters communities, four riparian communities, two sensitive terrestrial communities, and three non-sensitive terrestrial communities. Descriptions of the two communities targeted for restoration at the Mitigation Site are included below. In addition, a running list of observed plant species is included as Appendix A.

Mulefat thickets (*Baccharis salicifolia* Shrubland Alliance, G5 S4, 1602 and Porter Cologne jurisdictional habitat). The Mulefat Thickets Alliance is widespread in canyon bottoms, floodplains, irrigation ditches, lake margins, and stream channels (Sawyer et. al, 2009). This alliance covered 6.21 acres of the Mitigation Site. Mulefat thickets integrate with Fremont cottonwood (*Populus fremontii*) forest, arroyo willow (*Salix lasiolepis*) thickets, stretchberry (*Forestiera pubescens*) thickets, and Mexican rush (*Juncus mexicanus*) marshes. Mulefat comprised greater than 50 percent relative cover in the shrub layer. Typically, mulefat was the only species in the shrub layer. In rare instances, other shrub species included arroyo willow, elderberry (*Sambucus nigra* ssp. *caerulea*), and stretchberry. Herbaceous groundcover was composed of Mexican rush, clustered field sedge (*Carex praegracilis*), stinging nettle (*Urtica dioica*), riggut brome (*Bromus diandrus*), and ruderal weeds.

Red willow thickets (*Salix laevigata* Woodland Alliance, G3 S3, 1602 and Porter Cologne jurisdictional habitat). Red willow thickets are widespread and occur in ditches, floodplains, lake edges, and low gradient depositions along streams (Sawyer et. al, 2009). This alliance covered 0.65 acres of the Mitigation Site. Red willow comprised greater than 50 percent relative cover in the tree canopy, or greater than 30 percent relative cover in the tree canopy if arroyo willow was in the subcanopy. The understory shrub layer often contained mulefat. Herbaceous groundcover was composed of Mexican rush, clustered field sedge, stinging nettle, water smartweed (*Persicaria amphibia*), riggut brome, and ruderal weeds.

## 3.0 MITIGATION ACTIVITIES

The Project involved installing cattle exclusion fencing, removing and managing invasive plant species, planting mulefat and willow, and supplementing hydrology when necessary to sustain the restored habitat, as well as guaranteeing the long-term legal protection of the Mitigation Site with a conservation easement.

The locations of the cattle exclusion fencing, planting areas, and preservation areas are shown in Figure 3.

### 3.1 Cattle Exclusion Fencing

A wildlife-friendly cattle exclusion fence was installed around the designated planting areas to prevent livestock from grazing on riparian plants. Alignment of the cattle exclusion fencing was adjusted during installation to avoid sensitive habitat while providing full constructability.

### 3.2 Invasive Species Management and Considerations

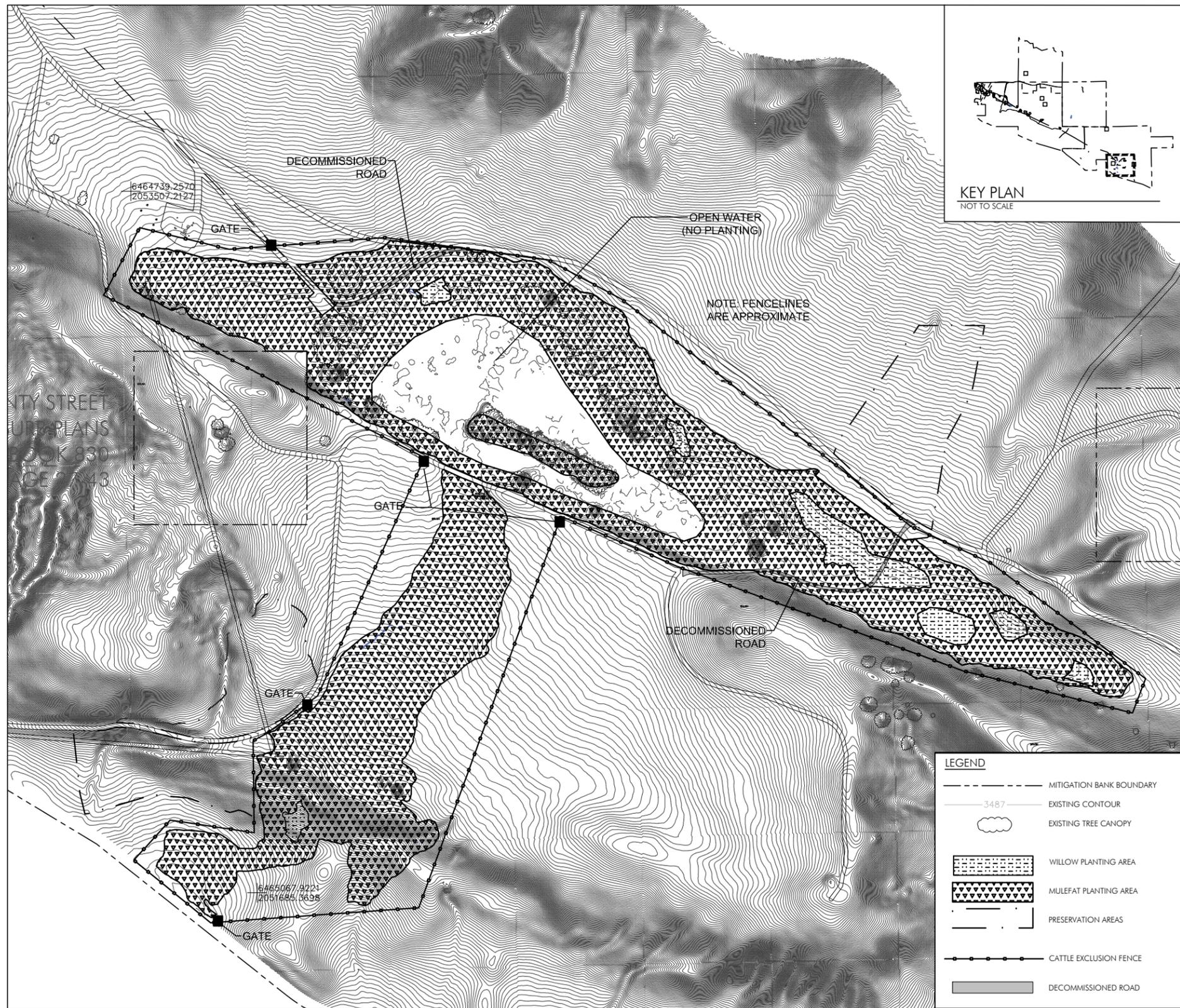
Initial weed eradication efforts included targeted grow kill cycles, and control of any non-grass invasive species present within the designated planting areas (including CAL-IPC moderate and limited species).

### 3.3 Planting Areas

Planting areas are within and immediately surrounding areas that previously supported sparse or scattered stands of mulefat, willow, and other riparian species. These areas were planted with 9,338 mulefat live stakes and 1,106 mixed red and arroyo willow live stake plantings to achieve an average density of 500-stems per acre, similar to existing high density mulefat and willow stands within the Mitigation Site. All plantings were live pole cuttings harvested from plants within the Bank to preserve local genetics. Willow plantings were focused in the wettest portion of the Mitigation Site, primarily around Pond D, as well as a few other locations where groundwater seeps were sufficient to support the species; mulefat plantings are therefore more widespread throughout the Mitigation Site. In total, 27.67 acres were planted.

### 3.4 Preservation Areas

Two distinct preservation areas are located in the northeast and southwest of the Mitigation Site. They are dominated by California buckwheat (*Eriogonum fasciculatum*) in the northeast, and Parish's sagebrush (*Artemisia tridentata* ssp. *parishii*), thick leafed yerba santa (*Eriodictyon crassifolium*), and California buckwheat in the southwest. In total, 6.60 acres have been preserved. These areas are located on alluvial fans and ephemeral drainages that receive periodic sediment and surface flows and support high quality habitat for xeric riparian communities.

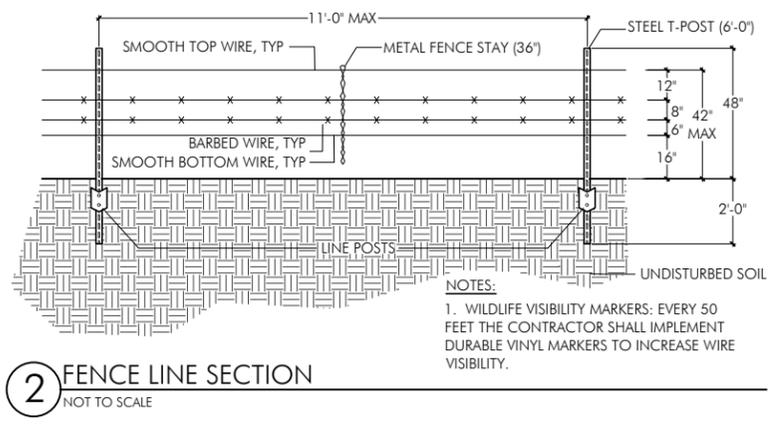
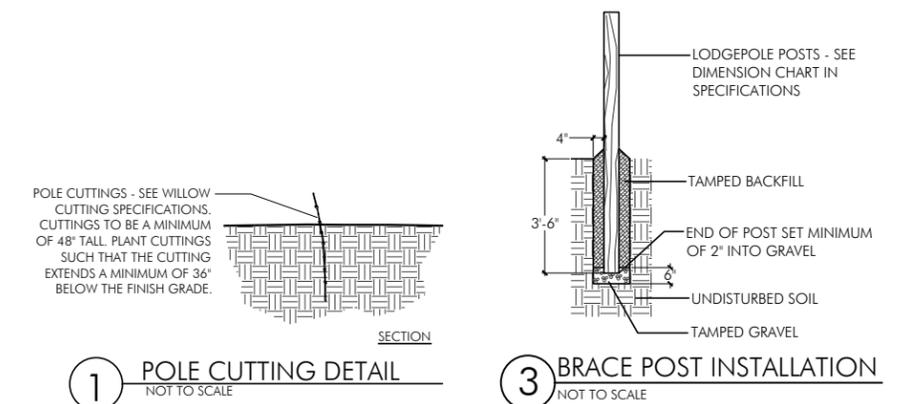


**MULEFAT AREA PLANT SCHEDULE**

BOTANICAL NAME	COMMON NAME	CONTAINER SIZE	QUANTITY
BACCHARIS SALICIFOLIA	MULEFAT	4' LIVE STAKE	9,338

**WILLOW AREA PLANT SCHEDULE**

BOTANICAL NAME	COMMON NAME	CONTAINER SIZE	QUANTITY
SALIX LAEVIGATA	RED WILLOW	4' LIVE STAKE	885
SALIX LASIOLEPIS	ARROYO WILLOW	4' LIVE STAKE	221



NOTES:  
 1. WILDLIFE VISIBILITY MARKERS: EVERY 50 FEET THE CONTRACTOR SHALL IMPLEMENT DURABLE VINYL MARKERS TO INCREASE WIRE VISIBILITY.

PLANTING AND FENCING PLAN



WRA JOB #21065				
DATE: 04/20/2019				
DESIGNED BY: RBB/RFP				
DRAWN BY: RFP				
CHECKED BY: RBB	NO.	DATE	BY	REVISIONS

**PETERSEN RANCH  
 MITIGATION BANK**  
 LEONA VALLEY, LOS ANGELES COUNTY CA

**FIGURE 3: DEVIL'S GATE  
 OFFSITE MITIGATION  
 AS-BUILT PLAN**

## **4.0 MONITORING AND PERFORMANCE STANDARDS**

This section details annual performance standards and monitoring methods. Monitoring will be conducted annually throughout the monitoring and maintenance period in order to demonstrate success of the mitigation activities. Monitoring will be conducted in spring or early summer, and will be timed to follow the blooming periods of target weed species, so that any necessary control measures can be implemented prior to the invasive species setting seed. Percent cover of mulefat and willow species within the Mitigation Site will be assessed using plots spaced along four permanent 50-meter transects. Survivorship of planted mulefat and willow stakes will be assessed by surveying irrigation lines and counting dead plants. Target invasive plant species will be mapped annually and treated on an as-needed basis. Success will be evaluated based on achieving the target standards presented below.

Restoration and enhancement activities were completed at the Mitigation Site in April 2019; this report therefore summarizes the second year of annual monitoring.

### **4.1 Planting Area Success Criteria**

Success criteria for mulefat and willow installed in the planting areas are based on survival rates and absolute cover assessed by visual estimation during the five-year monitoring period. Absolute cover of mulefat and willow is assessed in planting areas using the methods outlined in Section 4.2. Additionally, absolute cover of California Invasive Plant Council (Cal-IPC) rated High broad-leaved plant species will be assessed in conjunction with mulefat and willow cover. The criteria that are used to assess the success of the Mitigation Site are shown in Table 1.

**Table 1. Performance Standards for Planting Areas**

PERFORMANCE STANDARD	MONITORING YEAR					MONITORING FREQUENCY
	1	2	3	4	5	
By year 2, the planting areas must contain 10% or more absolute cover of mulefat or willow, or demonstrate 80% survivorship.		X				Annually
By year 3, the planting areas must contain 25% or more absolute cover of mulefat or willow, or demonstrate 80% survivorship			X			Annually
By year 4, planting areas must contain 40% or more absolute cover of mulefat or willow.				X		Annually
By year 5, planting areas must contain 68% or more absolute cover of mulefat or willow					X	Annually
Percent cover of Cal-IPC rated high broad leaved invasive plant species must cover no more than 10% absolute cover of the Mitigation Site.		X	X	X	X	Annually

## 4.2 Performance Monitoring Methods

The Mitigation Site planting areas were monitored for cover and survivorship of willow and mulefat plantings, and cover of Cal-IPC High-rated broad-leaved invasive species (“invasive weeds”). Absolute cover of willow, mulefat, and invasive weeds was monitored in planting areas using four permanent transects. Survivorship of planted willow and mulefat stakes was assessed within the planting areas.

Permanent 50-meter transects were established within planting areas (Figure 4). Transects were permanently marked in the field using T-posts. Global Positioning System (GPS) points were recorded to repeat transect monitoring in future years, and photos were taken at the start and end of each transect. Each 50-meter transect was surveyed by walking a 2.5 meter wide belt transect and recording species and species cover class<sup>1</sup> every 5 meters, resulting in 10 sampling plots per transect. Species and species cover class were recorded within each plot in order to assess the performance standards outlined in Table 1. A photograph was taken of each plot.

Survivorship surveys were conducted to supplement mulefat and willow cover data and to identify areas that may need maintenance. Survivorship surveys were conducted concurrently with the vegetation cover monitoring and weed mapping. Individual dead mulefat and willow stakes were tallied, and the total number of surviving plants was calculated by subtracting the number of observed dead mulefat or willow stakes from the total number of live stakes installed for each species, not including stakes that have been

<sup>1</sup> Cover classes are as follows: 0=<1%, 1=1-5%, 2=5-25%, 3=25-50%, 4=50-75%, 5=75-95%, 6=95-100%

replaced. Percent survivorship was then calculated for mulefat and willow by dividing the total number of surviving plants by the total number of live stakes installed for each species, not including stakes that have been replaced.

### 4.3 Inspections for Mitigation Maintenance

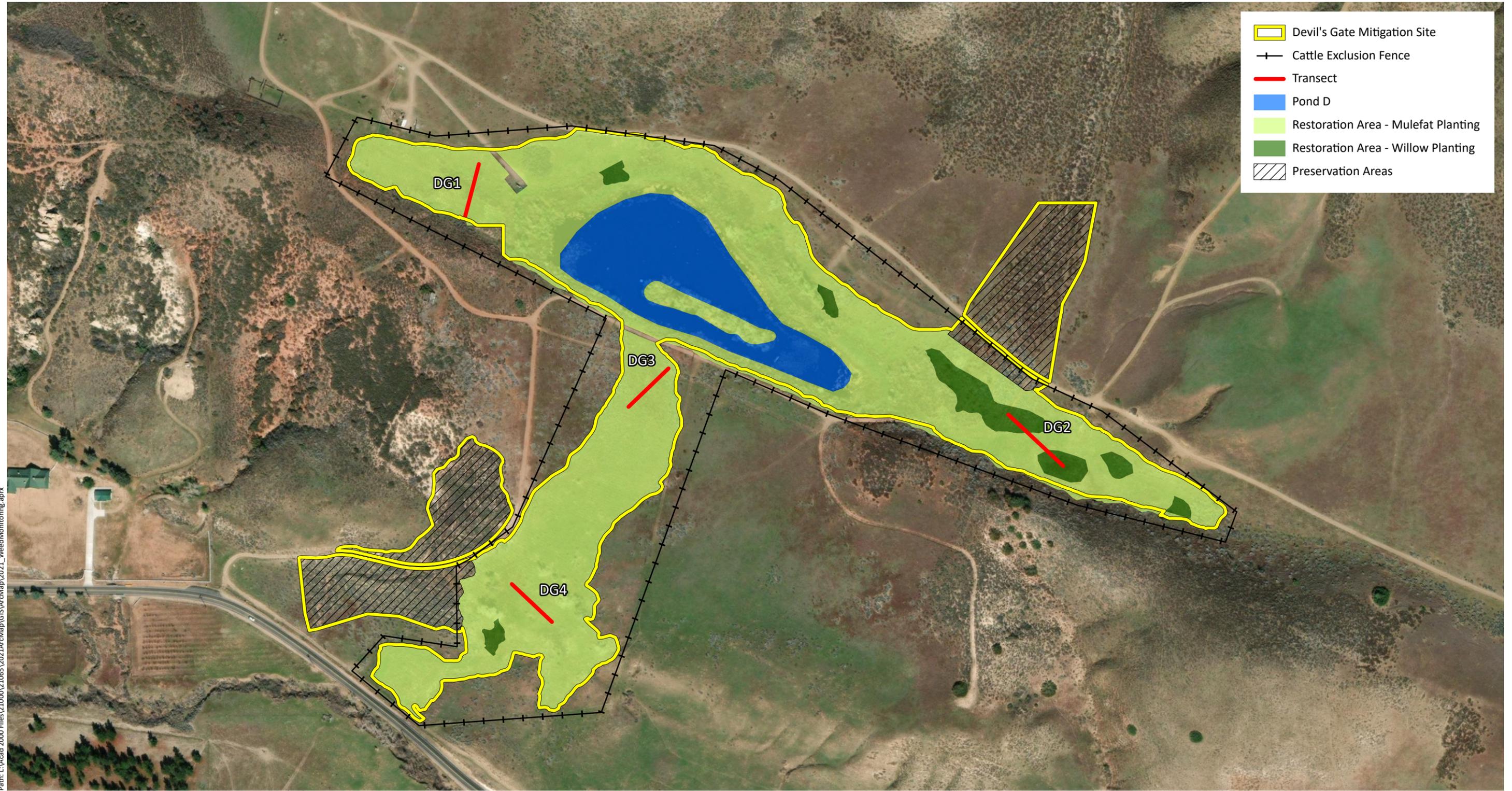
Maintenance inspections and activities during the five-year plant establishment period in the created and enhanced riparian areas are required to facilitate the restoration (Table 2). These conditions will be checked multiple times per year and if deficiencies are noted, they will be assessed, documented, and remedied as quickly as necessary to prevent further damage per the corresponding maintenance action listed in Table 2.

**Table 2: Maintenance Inspection Types and Actions**

Inspection Type	Corresponding Maintenance Action
Signs of erosion	Repair of slopes and installation of erosion protections
Non-native invasive plants (NNIPs) mapping	Plant removal or management to control establishment and spread
Condition of cattle exclusion fencing	Fence repair
Proper hydrologic conditions	Adjust water augmentation

Mapping of non-native, invasive plant (NNIP) species targeted for management was conducted concurrently with the survivorship monitoring surveys. Two WRA biologists traversed the entire planting area on foot, and mapped each target NNIP species occurrence that was encountered. The targets of the survey were NNIP species rated Cal-IPC High, Moderate, or Limited that are specifically known to be nuisance species either regionally or locally. Mapping was not conducted within preservation areas.

Other species that are not of regional or local concern were not mapped, but their presence was recorded in the Mitigation Site Species List (Appendix A).



**Figure 4. Mitigation Site Monitoring Locations**

## 5.0 RESULTS

Year 2 monitoring activities were completed at the Mitigation Site in June 2021. Currently the Mitigation Site is meeting all Year 2 success criteria (Table 3, Table 4). In addition, the Mitigation Site is performing well enough to meet all success criteria for Year 3 of the performance monitoring period (see Table 1 for Year 3 performance standards). Appendix A presents all species observed within the Mitigation Site during both transect and site-wide surveys.

### 5.1 Performance Monitoring

The complete annual monitoring data for the four monitoring transects is included in Appendix B and is summarized in Table 3. Survivorship data is summarized below in Table 4 and depicted below in Figure 5. Photo monitoring photos and transect photos are included in Appendix C.

#### 5.1.1 Mulefat and Willow Cover

Cover of mulefat and willow is variable at the four monitoring transects, averaging 33% absolute cover (Table 3). Mulefat was more abundant than willow within the monitoring transects and was the dominant woody riparian species. Other native species with notable absolute cover within transects included beardless wild rye (*Elymus triticoides*; 11.3%), tarragon (*Artemisia dracunculus*; 10.6%), field sedge (*Carex praegracilis*; 8.1%), and western vervain (*Verbena lasiostachys*; 8.9%).

#### 5.1.2 Cal-IPC High Broad-Leaved Invasive Species Cover

Percent cover of Cal-IPC rated high broad leaved invasive plant species was 0.0% across all transects (Table 3). One Cal-IPC High-rated broad-leaved invasive species individual, perennial pepperweed (*Lepidium latifolium*), was noted elsewhere in the Mitigation Site's planting areas (see Section 5.2.2 and Figure 6), outside of the sampling transects.

#### 5.1.3 Survivorship

Survivorship for mulefat, willow, and combined was over 99% (Table 4). Annual monitoring survivorship surveys detected minimal amounts of dead mulefat or willow plantings, with only eight dead mulefat and ten dead willows observed. The results of Year 2 mortality mapping are shown in Figure 5.

### 5.2 Mitigation Maintenance Inspections

#### 5.2.1 Erosion

There were no indications of erosion observed at the Mitigation Site this year. Therefore, no maintenance activities were implemented to address erosion issues.

**Table 3. Year 2 Performance Monitoring Results – Absolute Cover of Mulefat and Willow and Absolute Cover of Non-Native Invasive Broad-Leaved Plant Species within the Mitigation Site**

PERFORMANCE METRIC	DG1	DG2	DG3	DG4	AVERAGE	YEAR 2 PERFORMANCE STANDARD	YEAR 2 PERFORMANCE STANDARD MET?
Mulefat and Willow Total Absolute Cover	48.8%	15.5%	45.8%	22.1%	33.0%	>10%	Yes
Cal-IPC High Cover*	0.0%	0.0%	0.0%	0.0%	0.0%	<10%	Yes

\*Broad-leaved plant species rated High per Cal-IPC (grasses excluded)

**Table 4. Year 2 Performance Monitoring Results – Percent Survivorship of Mulefat and Willow within the Mitigation Site**

SCIENTIFIC NAME	COMMON NAME	NUMBER OF OBSERVED MORTALITIES	TOTAL NUMBER OF LIVE STAKES INSTALLED	TOTAL NUMBER OF STAKES REPLACED IN YEAR 1	TOTAL NUMBER OF SURVIVING PLANTS	PERCENT SURVIVORSHIP	YEAR 2 PERFORMANCE STANDARD MET?
<i>Baccharis salicifolia</i>	Mulefat	8	9,338	0	9,330	99.9%	N/A
<i>Salix</i> spp.	Willow	10	1,106	0	1,096	99.1%	
<b>Combined</b>		<b>18</b>	<b>10,444</b>	<b>0</b>	<b>10,426</b>	<b>99.8%</b>	<b>Yes</b>

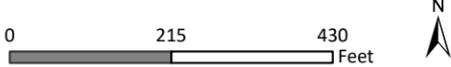


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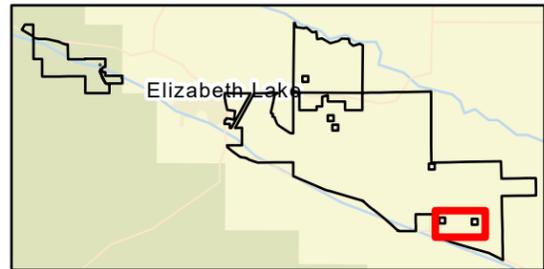
Sources: 2016 DigitalGlobe Aerial, WRA | Prepared By: njander, 9/27/2021

**Figure 5: Mulefat and Willow Mortality Map**

Petersen Ranch Mitigation Bank  
Los Angeles County, California



	Devil's Gate Mitigation Site
Individual Mortality	
	Mule fat ( <i>Baccharis salicifolia</i> ) (8)
	Willow ( <i>Salix</i> spp.) (10)



## 5.2.2 Target Non-Native Invasive Plant Species Mapping

Several NNIP species of concern were observed within the Mitigation Site and were targeted for management. Management actions were rapidly deployed to control the spread of these species and are detailed below.

Three Cal-IPC High grasses are present: red brome, cheatgrass, and medusahead (*Elymus caput-medusae*). Red brome and cheatgrass were the most abundant of the Cal-IPC High species present at the Mitigation Site, and both are locally abundant in the region and within the Bank property. These species are managed within the Mitigation Site to promote the establishment of native species. Conversely, only one medusahead skeleton from the previous season was observed within the Mitigation Site; no new recruitment was observed this year. Medusahead populations are small and localized within the Bank property and are the subject of eradication efforts by Land Veritas staff to prevent recruitment into the Mitigation Site.

Perennial pepperweed, a broad-leaved plant species ranked High by Cal-IPC, was observed at the Mitigation Site this year. Although perennial pepperweed has been documented within the Petersen Ranch Mitigation Bank in the past, this is the first time it has been observed within the Mitigation Site. Given the extent of its presence, the novelty of the observation is likely due to the visual similarity of perennial pepperweed and hairy whitetop (*Lepidium appelianum*), another broad-leaved plant species rated Limited by CAL-IPC, while the two species are in their vegetative stages. Land Veritas staff have been trained or retrained on the identification of these two species and have begun working on controlling populations of perennial pepperweed.

Several occurrences of Russian knapweed (*Rhaponticum repens*; Cal-IPC Moderate) were observed within the Mitigation Site. This species has been targeted for removal and Ranch staff were given specific management and removal directions to ensure this species is controlled utilizing best practices.

The results of the Year 2 target NNIP species mapping are shown on Figure 6.

In addition to the NNIPs targeted for management, other NNIPs of regional or local concern are also present within the Mitigation Site, including:

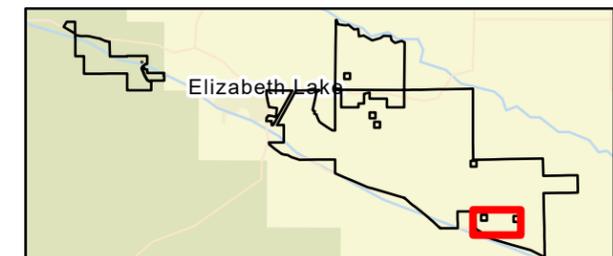
- Three Cal-IPC Moderate species: one non-native grass (ripgut brome) and two broad-leaved species (bull thistle [*Cirsium vulgare*] and short-pod mustard [*Hirschfeldia incana*]);
- Two Cal-IPC Limited species: hairy whitetop (*Lepidium appelianum*) and horehound (*Marrubium vulgare*); and
- One unrated broad-leaved species of regional or local concern is present within the Mitigation Site: annual yellow sweetclover (*Melilotus indicus*).

Land Veritas staff have been trained on the identification of these species and appropriate control strategies to facilitate rapid weed management efforts upon observation during regular surveys of the Mitigation Site throughout the year.



**Figure 6. Target Non-Native Invasive Plants within Mitigation Site Planting Areas**

\*Not surveyed for NNIPs.



### **5.2.3 Cattle Exclusion Fencing**

Installation of the cattle exclusion fencing and associated gates was completed concurrent with restoration activities in early 2019. The fence remains intact, cattle have been successfully excluded from the Mitigation Site, and no major repairs to the fence have been required.

### **5.2.4 Hydrologic Conditions**

Irrigation maintenance has been conducted concurrently with regular site maintenance. Only a limited number of irrigation repairs have been necessary thus far, and the irrigation system continues to function properly. Repairs included:

- A few large couplings were replaced and/or reconnected throughout the year; and
- Minor repairs to tubes and emitters were completed as part of regular irrigation system maintenance.

No significant impacts to site hydrology due to the issues were observed as the repairs were made quickly after being discovered.

## 6.0 SUMMARY AND MANAGEMENT RECOMMENDATIONS

### 6.1 Performance Monitoring Summary

#### 6.1.1 Mulefat and Willows Cover and Survivorship

The Year 2 performance standard is: The planting areas must contain 10% or more absolute cover of mulefat and/or willow, or demonstrate 80% survivorship. The Year 2 annual monitoring revealed that the average cover of mulefat and willow across the Mitigation Site is 33.0% (Table 3); which surpasses the Year 2 performance standard. In addition, survivorship of the installed mulefat and willow stakes were assessed to be 99.8% (Table 4), which also surpasses the Year 2 performance standard.

Though the Mitigation Site is meeting the Year 2 performance standards, the annual monitoring data indicates low cover of mulefat and willow at transects DG2 and DG4. The likely reason for the low cover at DG2 is prolonged ponding, and despite the low cover of mulefat, this transect had the highest willow cover. Additionally, the transect is dominated by native species. Year 2 annual monitoring at DG2 revealed the total absolute cover of native species is 77.0%, with the dominant native species consisting of beardless wild rye (31.0% absolute cover), western vervain (6.6% absolute cover), and red willow (6.5% absolute cover). While DG4 is meeting the Year 2 performance standards, the margin of success is narrow, and the associated portion of the Mitigation Site should be monitored closely in order to ensure successful establishment of installed live stakes. It should be noted that portions of DG4 with lower mulefat cover are dominated by other native perennials including tarragon, gumweed, and foothill needle grass (*Stipa lepida*).

**The Mitigation Site is meeting the Year 2 performance standard for absolute cover of mulefat and willow and survivorship.**

#### 6.1.2 Cal-IPC High Broad-Leaved Invasive Species Cover

The Year 2 performance standard for non-native invasive cover at the Mitigation Site is: Percent cover of Cal-IPC rated High broad-leaved invasive plant species must cover no more than 10% absolute cover of the Mitigation Site. As shown in Table 3, no Cal-IPC High rated broad-leaved plant species have been recorded in the monitoring transects. One Cal-IPC High rated broad-leaved invasive species individual, perennial pepperweed, was documented outside of the sampling transects within the planting areas; however, the absolute cover of this individual plant was not enough to affect Mitigation Site performance. The location of this individual can be seen in Figure 6.

**The Mitigation Site is meeting the Year 2 performance standard for percent absolute cover of Cal-IPC rated High broad-leaved invasive plant species.**

### 6.2 Management Recommendations

#### 6.2.1 Biological Resources

NNIPs surrounding each planted stake are cleared in the spring and managed throughout the growing season. It is recommended that NNIP treatment within the Mitigation Site continue in conjunction with invasive species treatments across the rest of the Bank Property.

Specific NNIP management actions may include:

- Regular qualitative surveys for target NNIP species by Land Veritas staff;
- Implementation of best management practices for individual NNIP species as issues arise;
- Focused eradication efforts of target NNIP species documented in the Mitigation Site, such as perennial pepperweed and medusahead;
- Regular training of Land Veritas staff on identification of target and other NNIP species of concern.

### ***6.2.2 Infrastructure and Facilities***

The Mitigation Site's infrastructure and facilities will be subject to regular standard maintenance to ensure proper function. Land Veritas staff will complete regular and frequent walk-throughs of the Mitigation Site to identify potential maintenance needs, including the condition of the cattle exclusion fencing and the functioning of the irrigation system. Issues will be immediately addressed and repaired. Land Veritas staff will also survey the Mitigation Site for evidence of erosion following large rain events, and implement erosion mitigation strategies as appropriate.

## 7.0 REFERENCES

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- WRA 2018                WRA, Inc. 2018. Devil’s Gate Off-Site Mitigation Project Habitat Mitigation and Monitoring Plan. Petersen Ranch Mitigation Bank. Los Angeles County, California. October 2018.
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## APPENDIX A – MITIGATION SITE OBSERVED SPECIES LIST

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Scientific Name	Common Name	Origin	Form	Rarity Status <sup>1</sup>	CAL-IPC Status <sup>2</sup>	Wetland Status <sup>3</sup>
<i>Acmispon americanus</i> var. <i>americanus</i>	Spanish lotus	native	annual herb	-	-	UPL
<i>Artemisia douglasiana</i>	California mugwort	native	perennial herb	-	-	FAC
<i>Artemisia tridentata</i> ssp. <i>parishii</i>	Parish's sagebrush	native	shrub	-	-	-
<i>Artemisia tridentata</i> ssp. <i>tridentata</i>	Big sagebrush	native	shrub	-	-	-
<i>Asclepias fascicularis</i>	Milkweed	native	perennial herb	-	-	FAC
<i>Astragalus douglasii</i> var. <i>douglasii</i>	Douglas's milkvetch	native	perennial herb	-	-	-
<i>Avena barbata</i>	Slim oat	non-native (invasive)	annual, perennial grass	-	Moderate	-
<i>Baccharis pilularis</i>	Coyote brush	native	shrub	-	-	-
<i>Baccharis salicifolia</i> ssp. <i>salicifolia</i>	Mule fat	native	shrub	-	-	FAC
<i>Bolboschoenus maritimus</i> ssp. <i>paludosus</i>	Saltmarsh bulrush	native	perennial grasslike herb	-	-	OBL
<i>Bromus diandrus</i>	Ripgut brome	non-native (invasive)	annual grass	-	Moderate	-
<i>Bromus hordeaceus</i>	Soft chess	non-native (invasive)	annual grass	-	Limited	FACU
<i>Bromus rubens</i>	Red brome	non-native (invasive)	annual grass	-	High	UPL
<i>Bromus tectorum</i>	Cheat grass	non-native (invasive)	annual grass	-	High	-
<i>Carex praegracilis</i>	Field sedge	native	perennial grasslike herb	-	-	FACW
<i>Castilleja subinclusa</i> ssp. <i>subinclusa</i>	Long leaf paintbrush	native	perennial herb	-	-	-

Scientific Name	Common Name	Origin	Form	Rarity Status <sup>1</sup>	CAL-IPC Status <sup>2</sup>	Wetland Status <sup>3</sup>
<i>Cirsium vulgare</i>	Bullthistle	non-native (invasive)	perennial herb	-	Moderate	FACU
<i>Corethrogyne filaginifolia</i>	Common sandaster	native	perennial herb	-	-	-
<i>Croton setiger</i>	Turkey-mullein	native	perennial herb	-	-	-
<i>Cucurbita foetidissima</i>	Missouri gourd	native	perennial herb, vine	-	-	-
<i>Datura wrightii</i>	Jimsonweed	native	perennial herb	-	-	UPL
<i>Descurainia sophia</i>	Herb sophia	non-native (invasive)	annual herb	-	Limited	-
<i>Distichlis spicata</i>	Salt grass	native	perennial grass	-	-	FAC
<i>Eleocharis macrostachya</i>	Spike rush	native	perennial grasslike herb	-	-	OBL
<i>Elymus caput-medusae</i>	Medusa head	non-native (invasive)	annual grass	-	High	-
<i>Elymus condensatus</i>	Giant wild rye	native	perennial grass	-	-	FACU
<i>Elymus glaucus</i>	Blue wildrye	native	perennial grass	-	-	FACU
<i>Elymus triticoides</i>	Beardless wild rye	native	perennial grass	-	-	FAC
<i>Ericameria linearifolia</i>	Interior goldenbush	native	shrub	-	-	-
<i>Ericameria nauseosa</i>	Rubber rabbitbrush	native	shrub	-	-	-
<i>Erigeron canadensis</i>	Canada horseweed	native	annual herb	-	-	FACU
<i>Erigeron foliosus</i> var. <i>foliosus</i>	Thread stemmed fleabane	native	perennial herb, shrub	-	-	-
<i>Eriogonum davidsonii</i>	Davidson buckwheat	native	annual herb	-	-	-
<i>Eriogonum fasciculatum</i>	California buckwheat	native	shrub	-	-	-
<i>Erodium cicutarium</i>	Red stemmed filaree	non-native (invasive)	annual herb	-	Limited	-
<i>Erythranthe guttata</i>	Seep monkeyflower	native	perennial herb (rhizomatous)	-	-	OBL
<i>Euphorbia albomarginata</i>	Rattlesnake sandmat	native	perennial herb	-	-	-

Scientific Name	Common Name	Origin	Form	Rarity Status <sup>1</sup>	CAL-IPC Status <sup>2</sup>	Wetland Status <sup>3</sup>
<i>Euthamia occidentalis</i>	Western goldenrod	native	perennial herb	-	-	FACW
<i>Festuca myuros</i>	Rattail sixweeks grass	non-native (invasive)	annual grass	-	Moderate	FACU
<i>Grindelia camporum</i>	Gumweed	native	perennial herb	-	-	FACW
<i>Heliotropium curassavicum</i> var. <i>oculatum</i>	Seaside heliotrope	native	perennial herb	-	-	FACU
<i>Hirschfeldia incana</i>	Short-podded mustard	non-native (invasive)	perennial herb	-	Moderate	-
<i>Hordeum murinum</i> ssp. <i>leporinum</i>	Farmer's foxtail	non-native (invasive)	annual grass	-	Moderate	FACU
<i>Juncus mexicanus</i>	Mexican rush	native	perennial grasslike herb	-	-	FACW
<i>Juncus orthophyllus</i>	Straight leaved rush	native	perennial grasslike herb	-	-	FACW
<i>Juniperus osteosperma</i>	Utah juniper	native	tree, shrub	-	-	-
<i>Lactuca serriola</i>	Prickly lettuce	non-native	annual herb	-	-	FACU
<i>Lepidium appelianum</i>	Hairy whitetop	non-native (invasive)	perennial herb	-	Limited	UPL
<i>Lepidium latifolium</i>	Perennial pepperweed	non-native (invasive)	perennial herb	-	High	FAC
<i>Malacothamnus fasciculatus</i> var. <i>fasciculatus</i>	Chaparral bush mallow	native	shrub	-	-	-
<i>Malvella leprosa</i>	Alkali mallow	native	perennial herb	-	-	FACU
<i>Marrubium vulgare</i>	White horehound	non-native (invasive)	perennial herb	-	Limited	FACU
<i>Melilotus indicus</i>	Annual yellow sweetclover	non-native	annual herb	-	-	FACU
<i>Peucephyllum schottii</i>	Desert pine	native	shrub	-	-	-
<i>Poa bulbosa</i>	Bulbous blue grass	non-native	perennial grass	-	-	FACU
<i>Poa secunda</i>	Pine bluegrass	native	perennial grass	-	-	FACU

Scientific Name	Common Name	Origin	Form	Rarity Status <sup>1</sup>	CAL-IPC Status <sup>2</sup>	Wetland Status <sup>3</sup>
<i>Polygonum aviculare</i>	Prostrate knotweed	non-native	annual, perennial herb	-	-	FAC
<i>Polypogon monspeliensis</i>	Annual beard grass	non-native (invasive)	annual grass	-	Limited	FACW
<i>Populus fremontii</i> ssp. fremontii	Cottonwood	native	tree	-	-	FAC
<i>Pseudognaphalium luteoalbum</i>	Jersey cudweed	non-native	annual herb	-	-	FAC
<i>Rafinesquia californica</i>	California chicory	native	annual herb	-	-	-
<i>Rhaponticum repens</i>	Russian knapweed	non-native (invasive)	perennial herb	-	Moderate	-
<i>Rumex crispus</i>	Curly dock	non-native (invasive)	perennial herb	-	Limited	FAC
<i>Salix laevigata</i>	Red willow	native	tree	-	-	FACW
<i>Salix lasiolepis</i>	Arroyo willow	native	tree, shrub	-	-	FACW
<i>Sambucus nigra</i> ssp. caerulea	Blue elderberry	native	shrub	-	-	FACU
<i>Schoenoplectus acutus</i> var. occidentalis	Tule	native	perennial grasslike herb	-	-	OBL
<i>Senecio flaccidus</i>	Shrubby ragwort	native	shrub	-	-	-
<i>Sisymbrium altissimum</i>	Tumble mustard	non-native	annual herb	-	-	FACU
<i>Solanum xanti</i>	Nightshade	native	perennial herb, shrub	-	-	-
<i>Sonchus asper</i> ssp. asper	Prickly sow thistle	non-native	annual herb	-	-	FAC
<i>Sporobolus airoides</i>	Alkali sacaton	native	perennial grass	-	-	FAC
<i>Stachys albens</i>	Cobwebby hedge nettle	native	perennial herb	-	-	OBL
<i>Stephanomeria exigua</i>	Small wirelettuce	native	annual herb	-	-	-
<i>Stipa lepidula</i>	Foothill needle grass	native	perennial grass	-	-	-
<i>Tragopogon dubius</i>	Goat's beard	non-native	perennial herb	-	-	-

Scientific Name	Common Name	Origin	Form	Rarity Status <sup>1</sup>	CAL-IPC Status <sup>2</sup>	Wetland Status <sup>3</sup>
<i>Typha latifolia</i>	Broadleaf cattail	native	perennial herb (aquatic)	-	-	OBL
<i>Urtica dioica</i>	Stinging nettle	native	perennial herb	-	-	FAC
<i>Verbena lasiostachys</i>	Western vervain	native	perennial herb	-	-	FAC
<i>Xanthium strumarium</i>	Cocklebur	native	annual herb	-	-	FAC

▪ All species identified using the *Jepson eFlora* [Jepson Flora Project (eds.) 2021]; nomenclature follows *Jepson eFlora* [Jepson Flora Project (eds.) 2021]

<sup>1</sup> **California Native Plant Society. 2021. Inventory of Rare and Endangered Plants (online edition, v9-01 0.0). Sacramento, California. Online at: <http://rareplants.cnps.org/>; most recently accessed: September 2021**

FE: Federal Endangered  
 FT: Federal Threatened  
 SE: State Endangered  
 ST: State Threatened  
 SR: State Rare

Rank 1A: Plants presumed extinct in California

Rank 1B: Plants rare, threatened, or endangered in California and elsewhere

Rank 2: Plants rare, threatened, or endangered in California, but more common elsewhere

Rank 3: Plants about which we need more information – a review list

Rank 4: Plants of limited distribution – a watch list

<sup>2</sup> **California Invasive Plant Council. 2021. California Invasive Plant Inventory Database. California Invasive Plant Council, Berkeley, CA. Online at: <http://www.cal-ipc.org/paf/>; most recently accessed: September 2021**

High: Severe ecological impacts; high rates of dispersal and establishment; most are widely distributed ecologically.

Moderate: Substantial and apparent ecological impacts; moderate-high rates of dispersal, establishment dependent on disturbance; limited-moderate distribution ecologically

Limited: Minor or not well documented ecological impacts; low-moderate rate of invasiveness; limited distribution ecologically

Assessed: Assessed by Cal-IPC and determined to not be an existing current threat

<sup>3</sup> **U.S. Army Corps of Engineers. 2018. National Wetland Plant List, version 3.4. Engineer Research and Development Center. Cold Regions Research and Engineering Laboratory, Hanover, NH. Online at: <http://wetland-plants.usace.army.mil/>; most recently accessed: September 2021.**

OBL: Almost always found in wetlands

FACW: Usually found in wetlands

FAC: Equally found in wetlands and uplands

FACU: Usually not found in wetlands

UPL: Almost never found in wetlands

NL: Not listed, assumed almost never found in wetlands

NI: No information; not factored during wetland delineation

## APPENDIX B – ANNUAL MONITORING DATA

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## **APPENDIX C – PHOTO MONITORING AND TRANSECT PHOTOS**

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Pre-restoration photo of western lobe of Mitigation Site looking to the northwest.



Western lobe of Mitigation Site looking to the northwest. Taken September 10, 2020.



Western lobe of Mitigation Site looking to the northwest. Taken June 24, 2021.



Pre-restoration photo of the northern section of the Mitigation Site looking to the northeast.



Northern section of the Mitigation Site looking to the northeast. Taken September 10, 2020.



Northern section of the Mitigation Site looking to the northeast. Taken June 24, 2021.



Pre-restoration photo of southern section of Mitigation Site looking to the southeast.



Southern section of the Mitigation Site looking to the southeast. Taken September 10, 2020.



Southern section of the Mitigation Site looking to the southeast. Taken June 24, 2021.



Pre restoration photo of the Mitigation Site taken from the northeastern lobe looking to the northwest.



Mitigation Site taken from the northeastern lobe looking to the northwest. Taken September 11, 2020.



Mitigation Site taken from the northeastern lobe looking to the northwest. Taken June 24, 2021.



Transect DG1. Taken June 17, 2021.



Transect DG1. Taken June 17, 2021.



Transect DG2. Taken June 17, 2021.



Transect DG2. Taken June 17, 2021.



Transect DG3. Taken June 17, 2021.



Transect DG3. Taken June 17, 2021.



Transect DG4. June 16, 2021.



Transect DG4. Taken June 16, 2021.