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Pacheco Creek Restoration Project
Year 1 (2024) Annual Monitoring Report

Project 4291-04

Prepared for:

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January 13, 2025

[1]Photo credit Barry Baba, Triangle Land Restoration

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Section 1. Introduction

1.1 Project Overview

The Santa Clara Valley Habitat Agency (Habitat Agency) constructed the Pacheco Creek Restoration Project (project) as part of the implementation of the Conservation Strategy of the Santa Clara Valley Habitat Plan (Habitat Plan) (ICF International 2012). The project was designed to mitigate for unavoidable impacts to, and to conserve and protect, waters of the U.S. and habitat types within Pacheco Creek Reserve that are covered by the Habitat Plan (ICF International 2012). The project's Mitigation and Monitoring Plan (MMP) describes the specific habitat objectives and sets forth performance and final success criteria to evaluate the success of the project during a 10-year post-construction monitoring period (H. T. Harvey & Associates 2023). Implementation of the MMP is required by the project's state and federal agency permits:

- U.S. Army Corps of Engineers (USACE) Section 404 Regional General Permit SPN-2012-00302S (File No. SPN-2020-00399)
- Central Coast Regional Water Quality Control Board (RWQCB) Section 401 Water Quality Certification No. 34322WQ06
- California Department of Fish and Wildlife (CDFW) Lake and Streambed Alteration Agreement (LSAA) No. EPIMS-SCL-35691-R3

The project is located east of State Route 152 in the Diablo Range in southeastern Santa Clara Valley (Figures 1 and 2). The total project area is 162.4 acres and includes Pacheco Creek Reserve (owned by the Habitat Agency), a trail easement held by County Parks, and a Bureau of Reclamation (BOR) easement containing the Pacheco Conduit. The Santa Clara Valley Water District (Valley Water) also issued a site access permit for project implementation (No. 23506). Pacheco Creek is an intermittent stream with a dynamic channel and floodplain that is primarily influenced by the upstream Pacheco Reservoir and its associated North Fork Dam.

1.1.1 Jurisdictional Habitat Enhancement, Restoration, and Creation

Construction was completed in spring 2024 by Triangle Land Restoration (Triangle); earthwork was completed by October 2023 and revegetation was completed by March 2024. A summary of enhanced, restored, and created habitats in the project area is presented in Table 1. Waters of the U.S. present within the project include wetlands and other waters (stream, pond, coastal and valley freshwater marsh [CVFM], and seasonal wetland) (Figures 2). Waters of the State present within the project include waters of the U.S. and riparian habitats within top of bank (willow riparian forest and scrub, mixed riparian forest and woodland, and central California sycamore alluvial woodland [SAW]). Habitats within CDFW jurisdiction include all waters of the State as well as all riparian habitats outside top of bank. Upland buffers include any habitats that are not aquatic, wetlands, or riparian (i.e., California annual grassland, oak woodland, and forest) and are therefore not considered jurisdictional by USACE, RWQCB, or CDFW.

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Figure 1. Vicinity Map
Pacheco Creek Restoration Project
Year 1 Annual Monitoring Report (4291-04)
December 2024

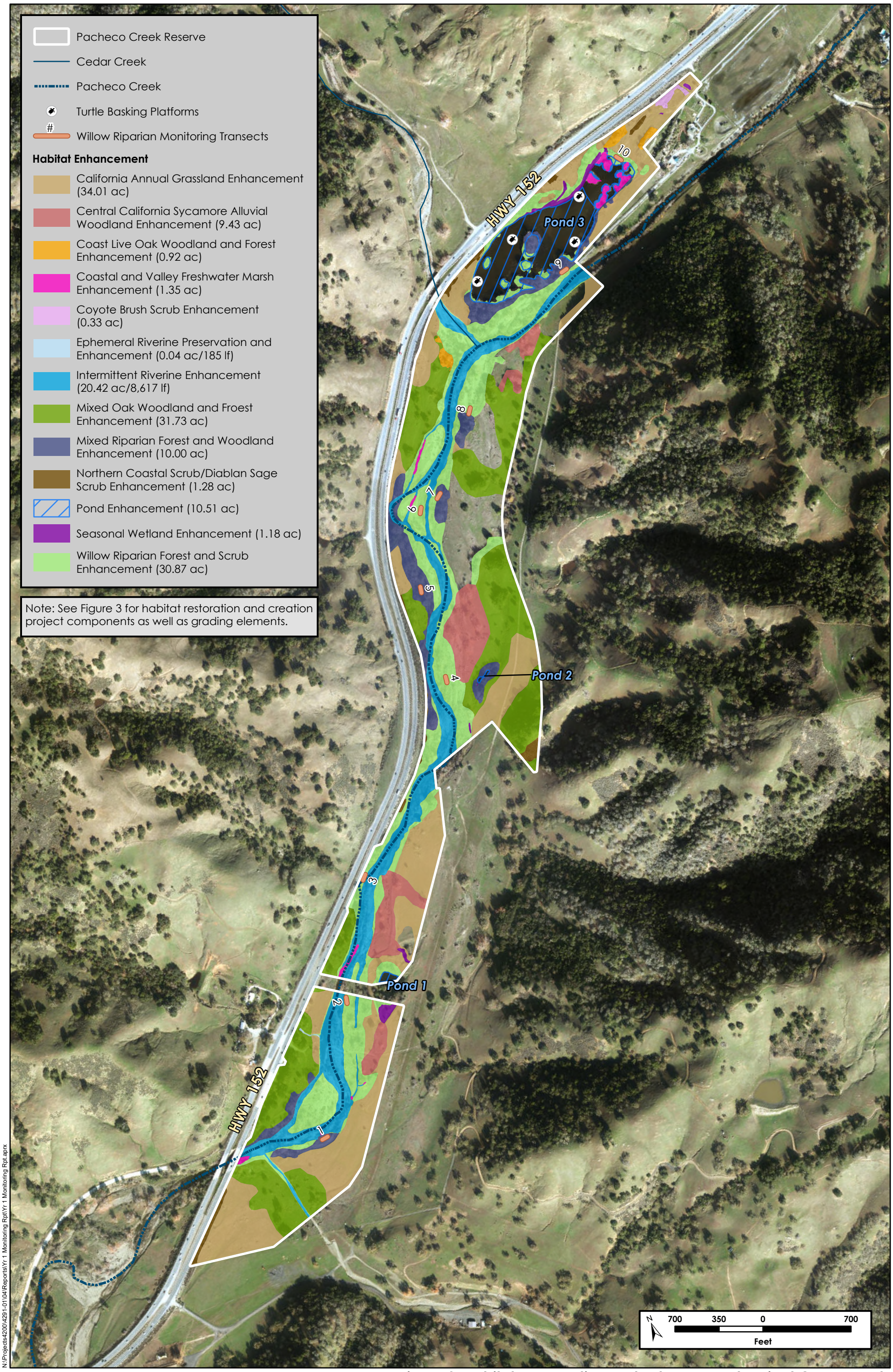

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Figure 2. Habitat Preservation and Enhancement Project Components
Pacheco Creek Restoration Project
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Table 1. Jurisdictional Habitat Enhancement, Restoration, and Creation Summary

Land Cover Type	Preservation/ Enhancement	Restoration	Creation
Willow Riparian Forest and Scrub	30.87 acres		
Mixed Riparian Forest and Woodland	10.00 acres		
Central California Sycamore Alluvial Woodland	9.43 acres	9.62 acres	
Seasonal Wetland	1.18 acres		0.38 acre
Coastal and Valley Freshwater Marsh	1.35 acres	1.00 acre	
Pond (Open Water)	10.51 acre		
Riverine (Intermittent Stream)	8,617 linear feet		
Riverine (Ephemeral Stream)	0.83 acre/2,405 linear feet	2.21 acres/6,386 linear feet	0.77 acre/ 2,223 linear feet

Preservation, enhancement, and restoration of these habitats was designed to improve and provide suitable habitat for specific special-status wildlife species including the federally threatened and CDFW Species of Special Concern (SSC) California red-legged frog (*Rana draytonii*), CDFW SSC and federally proposed threatened northwestern pond turtle (*Actinemys marmorata*), the state threatened tricolored blackbird (*Agelaius tricolor*), and the state and federally endangered least Bell's vireo (*Vireo bellii pusillus*). The project also aims to provide and improve in-stream aquatic habitat and floodplain habitat for the federally threatened South Central California Coast (SCCC) steelhead (*Oncorhynchus mykiss*) Distinct Population Segment (DPS). Further detail on the as-built habitats and impacts at the site are documented in the project's Biological As-built Report (H. T. Harvey & Associates 2024).

1.2 Monitoring and Reporting Requirements

The regulatory agency permits and the MMP require 10 years of post-construction monitoring conducted by qualified restoration ecologists and fluvial geomorphologists to assess the temporal trajectory of habitat establishment relative to the long-term objectives. The monitoring schedule for the 10-year period is shown in Table 2. Monitoring requirements for Year 1 include assessment of the target hydrologic regime, geomorphic conditions, pig and cattle exclusion, invasive species cover, and Year 1 vegetation data collection in the SAW habitat restoration areas, willow and mixed riparian areas, seasonal wetlands, and CVFM areas.

Annual monitoring reports will be submitted to the RWQCB, CDFW, U.S. Fish and Wildlife Service, National Marine Fisheries Service, and USACE. This report documents Year 1 annual monitoring conducted by H. T. Harvey & Associates restoration ecologists and cbec ecoengineering ecohydrologists.

Table 2. Ecological Performance Standards and Final Success Criteria Monitoring Schedule

Performance Standard	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10 (Final)
Target Hydrologic Regime	X	X	X	X	X		X			X
Visual Geomorphic[1] Assessment	X	X	X	X	X	X	X	X	X	X
Repeat Topographic Survey[2]		X			X					X
Pig and Cattle Exclusion[3]	X	X	X	X	X	X	X	X	X	X
Invasive Plant Cover – Habitat Preservation, Enhancement, Restoration, and Creation	X	X	X	X	X		X			X
Survival of planted California sycamores (Sycamore Alluvial Woodland [SAW] restoration)	X	X	X	X	X					
Survival of all other Planted Trees and Shrubs (SAW restoration)	X	X	X	X	X					
Average health and vigor of planted trees and shrubs (SAW restoration)	X	X	X	X	X					
Average height of planted California sycamores	X	X	X	X	X					
Average percent cover of woody plant species (SAW restoration)					X		X			X
Survival of Installed Willow Stakes	X	X	X							
Woody understory cover in willow riparian forest and scrub and mixed riparian forest and woodland	X	X	X	X	X		X			X
Percent cover of wetland species in created seasonal wetland habitat	X	X	X	X	X					
Percent cover of native wetland vegetation in restored coastal and valley freshwater marsh	X	X	X	X	X					
Shannon-Wiener diversity in the restored coastal and valley freshwater marsh					X					
Shannon-Wiener diversity in the created seasonal wetland					X					
Seasonal wetland creation delineation					X					
Coastal valley freshwater marsh restoration and enhancement delineation					X					

Performance Standard	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10 (Final)
Percent cover of vegetation in soil placement areas, secondary channel grading areas, created seasonal wetland fringe, and any other temporarily disturbed grading areas	X									
Photo documentation[1]	X	X	X	X	X	X	X	X	X	X
Ecological trend characteristics	X	X	X	X	X		X			X
Monitoring of VHP-Covered Wildlife Species	X	X	X	X	X		X			X

[1] Visual geomorphic assessment are scheduled to occur annually; however, they may be determined to be unnecessary in years with little to no flow, based on the judgment of the monitoring geomorphologist. A summary of geomorphic assessment results will only be submitted in monitoring reports in Years 1–5, 7, and 10.

[2] Repeat topographic surveys at monitoring cross sections and longitudinal profiles are tentatively scheduled for Years 2, 5 and 10 but the timing is subject to adjustment on the basis of observed peak flow events that activate the secondary channel network and drive geomorphic change.

[3] Monitoring of cattle exclusion and photo documentation will be collected annually in Years 1–10 but will only be submitted in monitoring reports in Years 1–5, 7, and 10.

Section 2. Monitoring Methods

Monitoring and data analysis required for Year 1 (2024) was conducted by H. T. Harvey & Associates (H. T. Harvey) restoration ecologists and cbec's ecoengineers in accordance with the project's MMP. Monitoring results were compared to the performance standards and used to develop maintenance recommendations. Detailed methods are provided below.

2.1 Target Hydrologic Regime

The hydrologic regime of the secondary channels was assessed through comparison of scaled U. S. Geological Survey (USGS) discharge records for Pacheco Creek (downscaled to the portion of the watershed above the project area) to the inundation discharge thresholds that were previously calculated for the side channels based upon hydraulic modeling of the as-built topographic condition (cbec 2024). In addition, field observations conducted by cbec staff (Michael Founds) on February 4, 2024, during elevated flow conditions were used to validate the expected inundation state of the side channels.

2.2 Geomorphic Condition

A visual assessment of the geomorphic condition of the projects fluvial features was conducted by a cbec geomorphologist (Chris Hammersmark) during site visits on May 10, 2024, and August 9, 2024. The main channel, secondary channels (particularly the constructed inlets), adjacent floodplain areas, and the Post Assisted Log Structures (PALS) were the focus of the visual assessments.

2.3 Pig and Cattle Exclusion

The pig exclusion fencing alignments were walked by the project restoration ecologists from H. T. Harvey & Associates (i.e., Dana DeLew, Kate Drake, Jenna Shikuzawa, and Carly Sussman) during the monitoring of different habitats from July 17 through September 27, 2024, to determine if they were intact and functioning as designed. In addition, cattle exclusion was monitored via regular site visits and communication with neighbors.

2.4 Invasive Plant Cover

Restoration ecologists conducted a visual survey for invasive plant species in Year 1 during each monitoring event within each target habitat area from July 17 through September 27, 2024. Per the MMP, invasive species are defined as those categorized as highly invasive by the California Invasive Plant Council (Cal-IPC) (Cal-IPC 2024). During the survey, all observed invasive plants that were covering an area more than 20 square meters with more than 30% cover were mapped by species. The average percent cover of invasive species was visually

estimated by habitat type and by preservation/enhancement, restoration, and creation areas within each habitat type, as appropriate.

2.5 California Sycamore Alluvial Woodland Restoration Area

2.5.1 Survival of Planted Trees and Shrubs

Monitoring of planted tree and shrub survival within the SAW habitat restoration areas was conducted by the restoration ecologists (Dana DeLew and Audeline Kurniawan) on September 27, 2024. Field counts of all surviving plants were made and compared to the number of plants initially installed, as documented in the Biological As-built Report (H. T. Harvey & Associates 2024). Percent survival was calculated by California sycamore (*Platanus racemosa*); all other trees; shrubs; and by individual species using the following equations:

> Percent Survival = (Number of Individuals Alive at Monitoring / Total Number Individuals Installed During Initial Installation) * 100%.

2.5.2 Health and Vigor of Planted Trees and Shrubs

The health and vigor of all installed trees and shrubs was documented concurrently with plant survival monitoring on September 27, 2024. Health and vigor were assessed by considering factors such as plant color, bud development, new growth, herbivory, drought stress, fungal/insect infestation, and physical damage. Health and vigor were rated on a scale of 1–3 using the rating system shown in Table 3.

Table 3. Tree and Shrub Health and Vigor Qualitative Ratings

Qualitative Rating	Numerical Values	Observations
High health and vigor	3	67–100% healthy foliage, stem, and root crown
Medium health and vigor	2	34–66% healthy foliage, stem, and root crown
Low health and vigor	1	0–33% healthy foliage, stem, and root crown

2.5.3 Height of Planted California Sycamores

The average height of installed California sycamores was monitored on September 27, 2024. Each planted California sycamore tree was measured using a stadia rod. Average tree height of California sycamores was calculated using the following formula:

> Average Tree Height = Sum of Tree Heights Measured / Total Number of Trees Measured.

2.5.4 Woody Vegetation Cover

Monitoring of woody plant species percent cover in the SAW habitat restoration areas is not required in Year 1 and was therefore not performed. Woody vegetation cover monitoring will begin in Year 5, per the MMP.

2.6 Willow Riparian and Mixed Riparian Enhancement Area

2.6.1 Survival of Installed Willow Stakes

Willow stake survival was monitored by restoration ecologists Dana DeLew and Carly Sussman within the willow riparian planting areas on October 18, 2024. The survivorship of willow stakes was determined by field counts of all surviving stakes compared to the number of stakes initially installed, as documented in the Biological As-built Report. Percent survival was calculated using the following equation:

> Percent Survival of Willow Stakes = (Total Number of Individual Willow Stakes Alive at Monitoring / Total Number of Individual Willow Stakes Installed During Initial Installation) * 100%.

2.6.2 Woody Understory Vegetation Cover

Understory woody canopy cover was monitored by restoration ecologists Dana DeLew and Carly Sussman in willow riparian forest and scrub and mixed riparian forest and woodland areas on September 24 through 26, 2024. Understory woody cover is defined as any vegetative cover present between 0 and 10 feet above ground level. Understory woody cover was quantified using the line-intercept method (Bonham 1989) and a stadia rod. Cover above 10 feet was not included in understory woody riparian cover monitoring. Permanent 50-foot transect markers were installed during Year 1 monitoring and their locations are shown in Figure 2. Transect endpoints were recorded using GPS mapping and marked in the field with a metal u-post and aluminum tag. The number of transects used was calculated based on the amount of variation observed during collection such that the collection of additional transects is not likely to substantially alter the average (Kershaw 1973). If additional transects are determined to be necessary during later years of monitoring, additional permanent transects will be added and monitored. The average percent cover provided by native woody species in total, and by individual species, was calculated across all transects using to the following formula:

> Average Percent Cover of Native Woody Vegetation = (Sum of Intercept Lengths of Native Woody Vegetation / Total Length of Transects) * 100%.

2.7 Ecological Trend Characteristics

2.7.1 Willow Riparian and Mixed Riparian Woody Plant Recruitment

During understory cover monitoring, the restoration ecologists made qualitative observations of the abundance and distribution of woody recruits within the willow riparian forest and scrub, mixed riparian forest and woodland, and SAW restoration areas.

2.7.2 California Sycamore Recruitment

A site visit to assess the presence of naturally recruited California sycamore seedlings is required by the MMP to be conducted in the late spring/early summer. Surveys for sycamore seedling were limited to incidental inspections conducted by project restoration ecologists, Habitat Agency restoration ecologist Nathan Hale, and

Triangle resource ecologist Hannah Page. No sycamore seedling recruits were observed, but a full and complete inspection of the restoration area was not conducted. A more focused survey for California sycamore seedlings will be performed in Year 2. During that time, any observed seedling will be documented and mapped using GPS mapping software to allow for future monitoring of the recruited seedlings.

2.8 Created Seasonal Wetland and Restored Coastal Valley Freshwater Marsh Areas

2.8.1 Seasonal Wetland Vegetation Cover

Wetland vegetation percent cover monitoring within the created seasonal wetland was conducted by restoration ecologists Jenna Shikuzawa and Kate Drake on July 17, 2024. Percent cover of planted and naturally recruited wetland vegetation was determined by species using the quadrat sampling method (Bonham 1989). Quadrat locations were placed in a random-stratified fashion within the created seasonal wetland. The number of quadrats employed was determined based on the point where additional samples did not substantially change the average cover value obtained (Kershaw 1973). Wetland vegetation was defined as species with a facultative, facultative wetland, or obligate wetland indicator rating in the *Arid West 2022 Regional Wetland Plant List* (USACE 2024). Percent cover of all noninvasive wetland species within each quadrat was estimated to the nearest whole percent. For comparison, a reference seasonal wetland was monitored in Year 1. The reference site is onsite and shown in Figure 3. The same sampling methods were employed for the seasonal wetland reference site. Total average cover of all species and all non-invasive wetland species were then calculated among all quadrats and compared between the created seasonal wetland and the seasonal wetland reference site.

2.8.2 Coastal and Valley Freshwater Marsh Vegetation Cover

Wetland vegetation percent cover monitoring within the restored CVFM was conducted by restoration ecologist Dana DeLew using high-resolution aerial imagery. The aerial imagery was collected by Triangle habitat resource manager Barry Baba on September 17, 2024. This imagery was geo-rectified into State Plane NAD83 Zone 3 (ft) projection using ground control points. An H. T. Harvey restoration ecologist and geographic information system (GIS) analyst then used the September 2024 imagery and GIS software (ArcGIS Pro) to assess percent cover of wetland vegetation in the restored CVFM area (Figure 3). Specifically, the restoration ecologist drew a polygon around each observable plant or contiguous group of plants in the CVFM. Polygons were identified by species based on observations made in the field. Some species that overlapped were not differentiable in the aerial imagery, so groups of these species were digitized together. Total percent cover in the CVFM was then calculated by dividing the total aerial vegetation cover (summed across polygons) by the total area of CVFM restoration. Percent cover of individual species in the CVFM was also calculated by dividing the sum of each species' aerial cover by the total area of CVFM.

2.8.3 Shannon-Weiner Diversity

Year 1 monitoring does not include this metric per the MMP. This metric will be calculated for the restored CVFM, created seasonal wetland, and seasonal wetland reference site in Year 5.

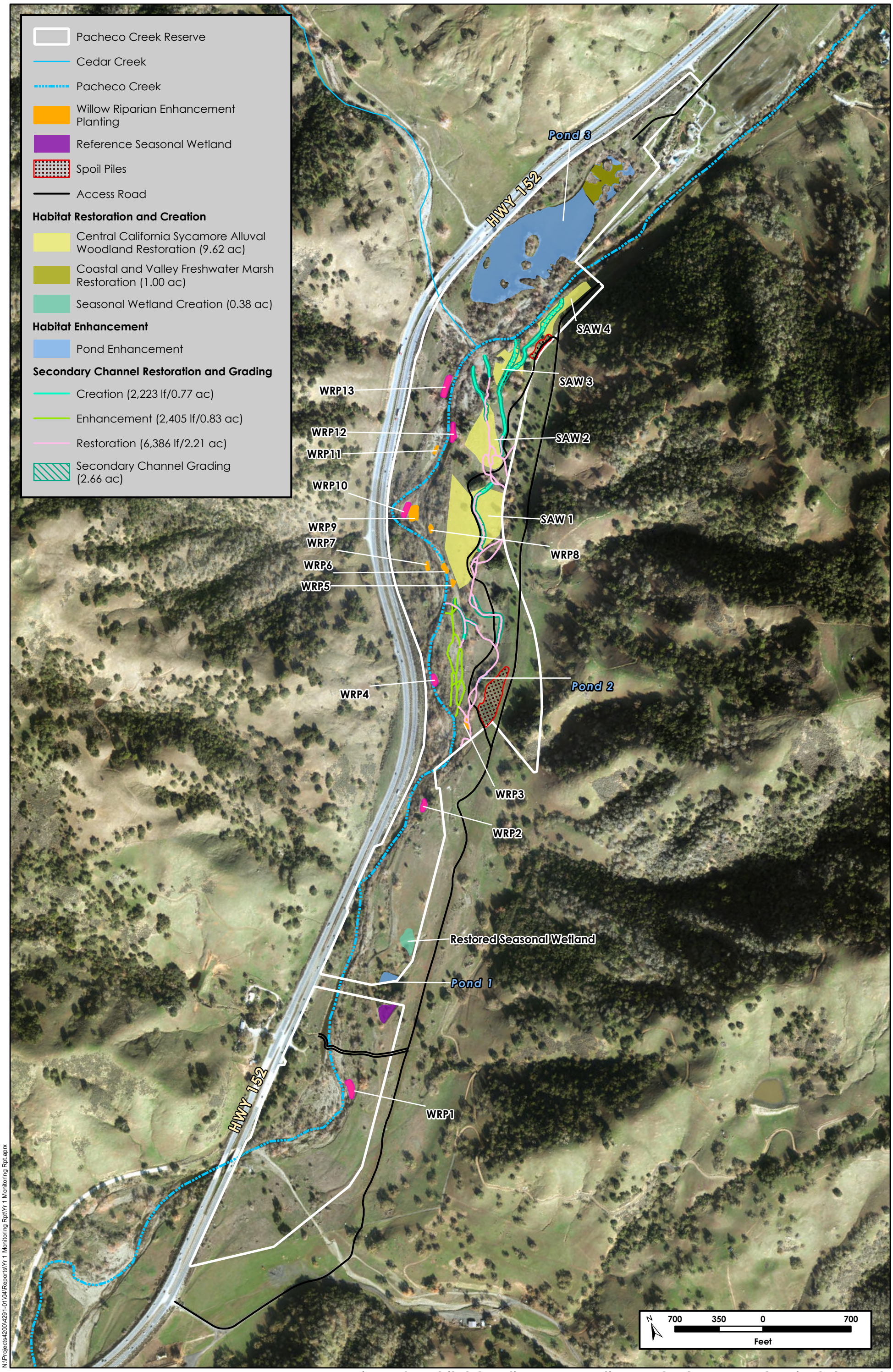

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Figure 3. Habitat Creation, Preservation, and Enhancement Project Elements
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2.8.4 Wetland Surface Area

Year 1 monitoring does not include this metric per the MMP. This metric will be evaluated in Year 5.

2.9 Temporarily Disturbed Areas

Vegetation cover monitoring in all temporarily disturbed areas including the spoils placement areas, secondary channel grading area side slopes, and the created wetland fringe was conducted by restoration ecologists Jenna Shikuzawa and Kate Drake on August 6, 2024. Percent cover of planted and naturally recruited vegetation was determined by species using the quadrat sampling method using quadrats placed in random stratified fashion (Bonham 1989). The number of quadrats sampled was at the point where additional samples did not substantially change the average cover value obtained (Kershaw 1973). Each distinct temporarily disturbed area was monitored and evaluated separately.

2.10 Wildlife Monitoring

2.10.1 California Red-Legged Frog, California Tiger Salamander, and Northwestern Pond Turtle

H. T. Harvey & Associates' wildlife ecologists Emily Malkauskas, Dani Christensen, and Steve Carpenter conducted surveys for special-status wildlife species at the ponds in the project area to evaluate the presence or absence of California red-legged frog, California tiger salamander, northwestern pond turtle, and aquatic predator abundance. Surveys were conducted in accordance with the methods described in the MMP. Night surveys were not conducted for safety reasons (i.e., the presence of feral pigs throughout the property posed a safety threat to biologists). The methods described in the MMP follow the most recent wildlife agency protocols (USFWS 2005, USFWS and California Department of Fish and Game 2003). The survey type, survey date, observer, and level of effort (where applicable) are presented in Table 13 in the Results and Discussion Section, below.

2.10.2 American Bullfrog Presence/Absence

The abundance of aquatic predators encountered during each of the special-status wildlife surveys was recorded. Nonnative animals were not dispatched during these surveys.

2.10.3 Tricolored Blackbird

H. T. Harvey & Associates wildlife ecologists also conducted surveys at the mitigation ponds to evaluate the presence or absence of tricolored blackbird. Surveys were conducted on April 2, 2024, and May 15, 2024, in accordance with the methods described in the MMP.

2.11 Maintenance

H. T. Harvey & Associates conducted a maintenance monitoring site visit to qualitatively assess site conditions and provide maintenance recommendations on June 4, 2024.

2.12 Photo Documentation

Photo documentation was conducted during Year 1 monitoring from the photo points established in the Biological As-Built Report (H. T. Harvey & Associates 2024). Locations of photo points are shown in Figure 4.

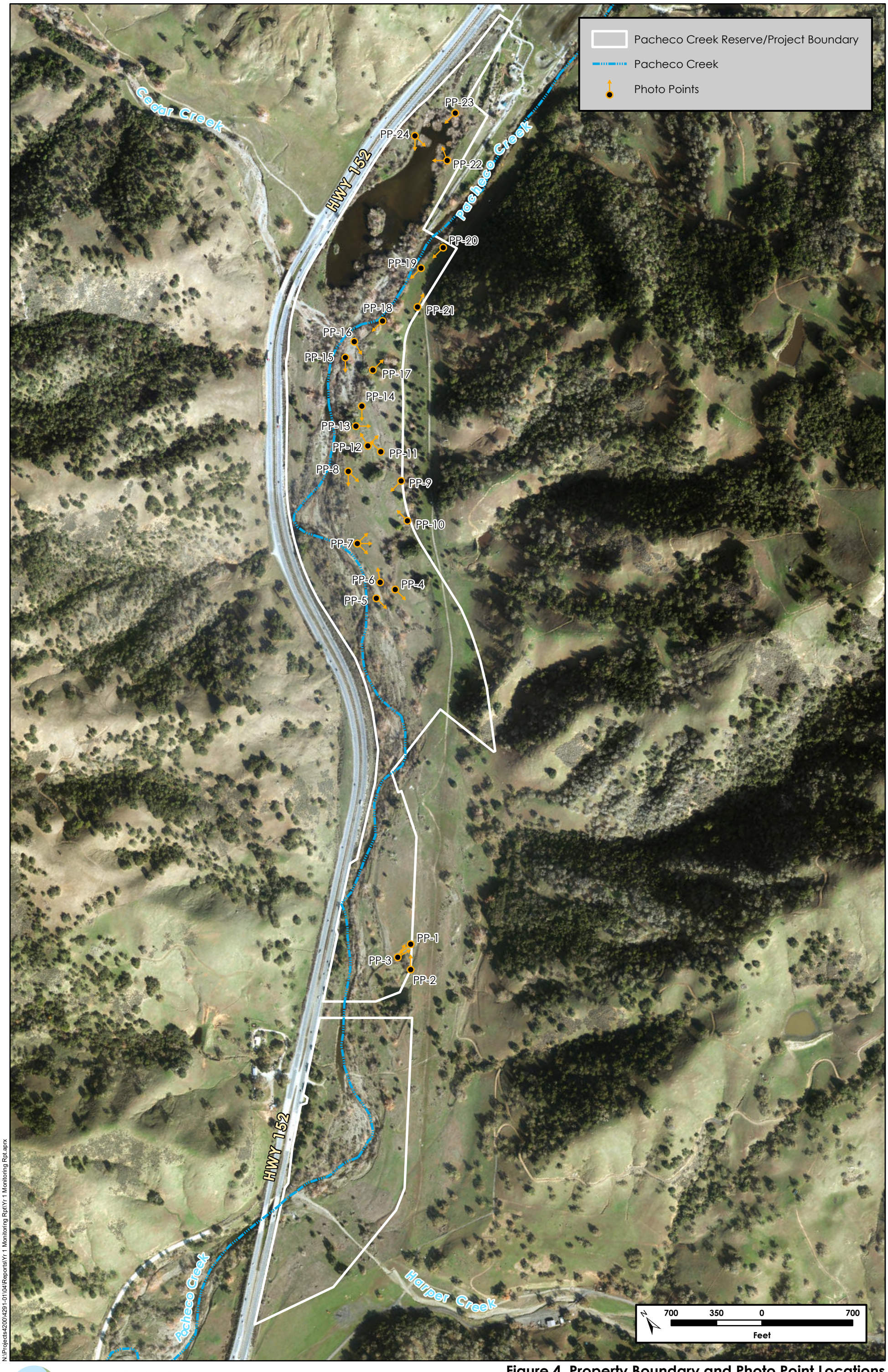

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Figure 4. Property Boundary and Photo Point Locations
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Section 3. Results and Discussion

The habitat mitigation performance criteria for Year 1 are described in the MMP (H. T. Harvey & Associates 2023). Year 1 performance criteria and results are summarized below in Table 4.

Table 4. Year 1 Ecological Performance Standards

Performance Standard[1]	Year 1 Criterion	Year 1 Result	Met in Year 1?
Target Hydrologic Regime	Secondary channel network largely activated during ≥3-year flow events	No ≥3-year event occurred in Year 1; however. secondary channel network activated several times at ~500 cfs (1- to 2-year recurrence interval)	N/A
Geomorphic Conditions	Healthy physical processes and geomorphic dynamism supporting attainment of target hydrologic regime in secondary channels	Fluvial processes are occurring as expected	Yes
Pig and Cattle Exclusion	Cattle are excluded from mitigation area; pigs are excluded from fenced areas	Pigs and cattle excluded; strategic flash grazing implemented	Yes
Invasive Plant Cover	< 10%	5%	Yes
Survival of planted trees and shrubs (Sycamore Alluvial Woodland [SAW] restoration)			
- Survival of planted California sycamores	N/A (Replace all dead plants)	26%	N/A
- Survival of all other planted trees and shrubs	N/A (Replace all dead plants)	57%	N/A
Average health and vigor of planted trees and shrubs (SAW restoration)	>2	2.0	No
Average height of planted California sycamores	N/A (baseline data collection)	3.0 ft	N/A
Survival of Installed Willow Stakes	70%	16%	No
Woody understory cover (willow riparian forest and scrub and mixed riparian forest and woodland)	N/A (baseline data collection)	33.4%	N/A
Percent cover of non-invasive wetland vegetation (created seasonal wetland)	N/A (baseline data collection)	90% of reference wetland cover (68.1% cover)	N/A

Performance Standard[1]	Year 1 Criterion	Year 1 Result	Met in Year 1?
Percent cover of native wetland vegetation (restored coastal and valley freshwater marsh [CVFM])	N/A (baseline data collection)	10%	N/A
Percent cover of vegetation in all temporarily disturbed areas (e.g., spoils placement areas, secondary channel slopes, created seasonal wetland transition zone slope)	70%	74.3% in spoils placement area 71.7% in wetland fringe 62.8% in secondary channel slopes.	Met in spoils placement and wetland fringe. Not met on secondary channel slopes.

[1] There are no performance criteria for woody plant recruitment in riparian enhancement and SAW restoration areas or SAW recruitment. These metrics are only used to assess project trends and to inform maintenance decisions.

3.1 Target Hydrologic Regime

The secondary channel network was designed to be well inundated during a 3-year recurrence interval event (2,201 cfs at the site), with some of the inlets designed to become inundated at flows as low as 500 cfs, to account for potential deposition as the channels geomorphologically adjust. Hydraulic modeling of the as-built topographic condition verified that the constructed secondary channels became inundated as anticipated with the northernmost inlet (Secondary Channel 1, Figure 5) activating at flows slightly lower than the design (cbec 2024). Figure 6 shows the discharge data observed at the USGS Dunneville gage scaled to the project site. Comparing the calculated inundation thresholds to the scaled hydrograph indicates that half of the secondary channel inlets (secondary channels 1 and 6-8) were inundated for approximately 6.2 days occurring during five discrete discharge peaks (Table 5). The remaining secondary channel inlets were inundated for 1.1-4.5 days.

Table 5. Inundation Statistics Summary for the Secondary Channel Inlets.

Secondary Channel Inlet	Estimated Inundation Flow (cfs)	# of Individual Inundation Periods	Total Days of Inundation
1	500	5	6.2
2	1,083	5	1.6
3	663	4	4.5
4	1,045	5	1.8
5	1,177	3	1.1
6	500	5	6.2
7	500	5	6.2
8	500	5	6.2

A visual assessment of the project site was conducted when discharge in Pacheco Creek was elevated, and inundation of the secondary channel network was directly observed (Figure 7). A majority of the secondary channel network was inundated during the site visit, but flows remained within the banks of the channels and significant floodplain inundation was not observed. The secondary channel network is performing hydrologically as expected.

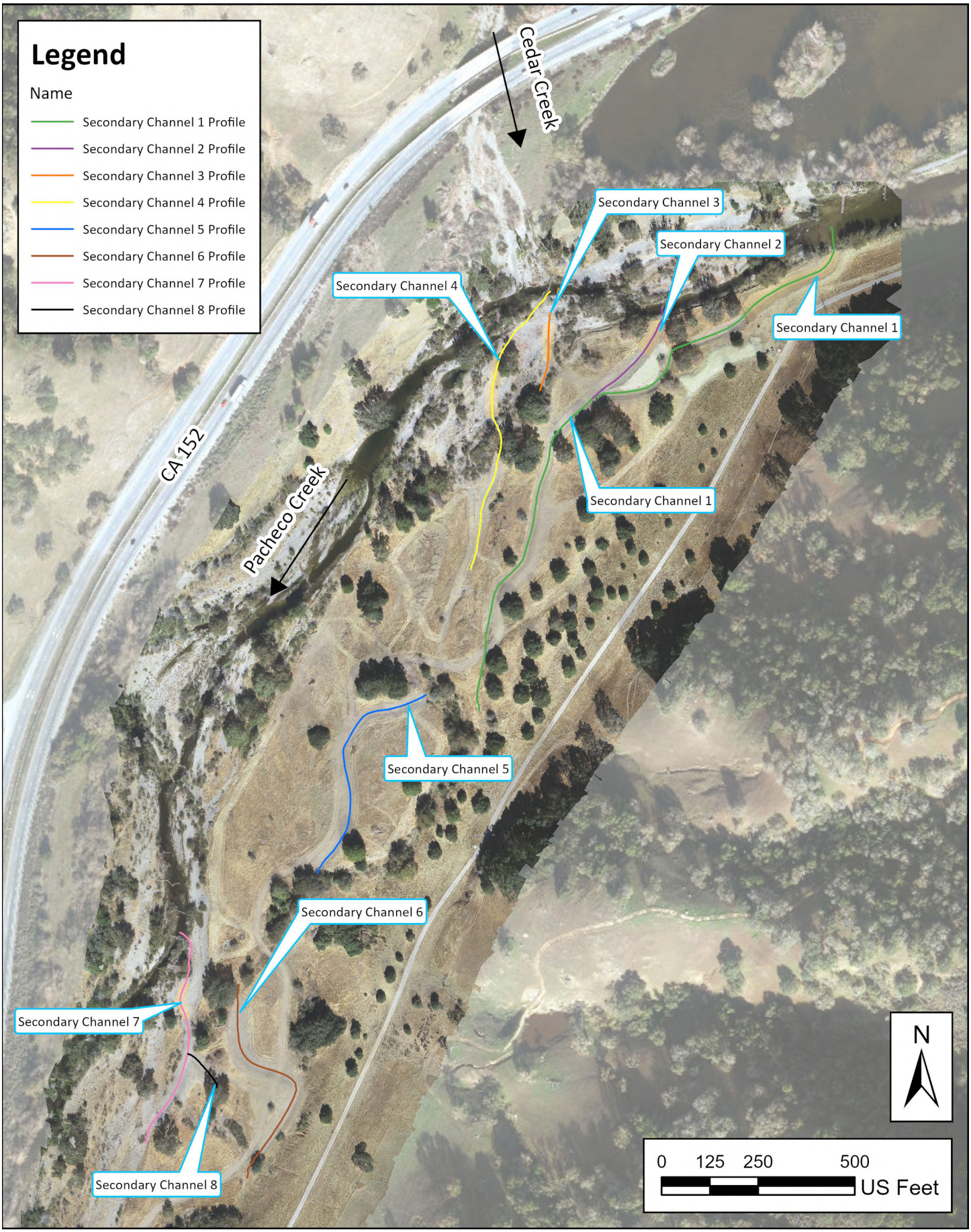

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Figure 5. Secondary Channel Restoration and Creation
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Figure 6. Pacheco Creek Hydrograph Scaled to the Project Site

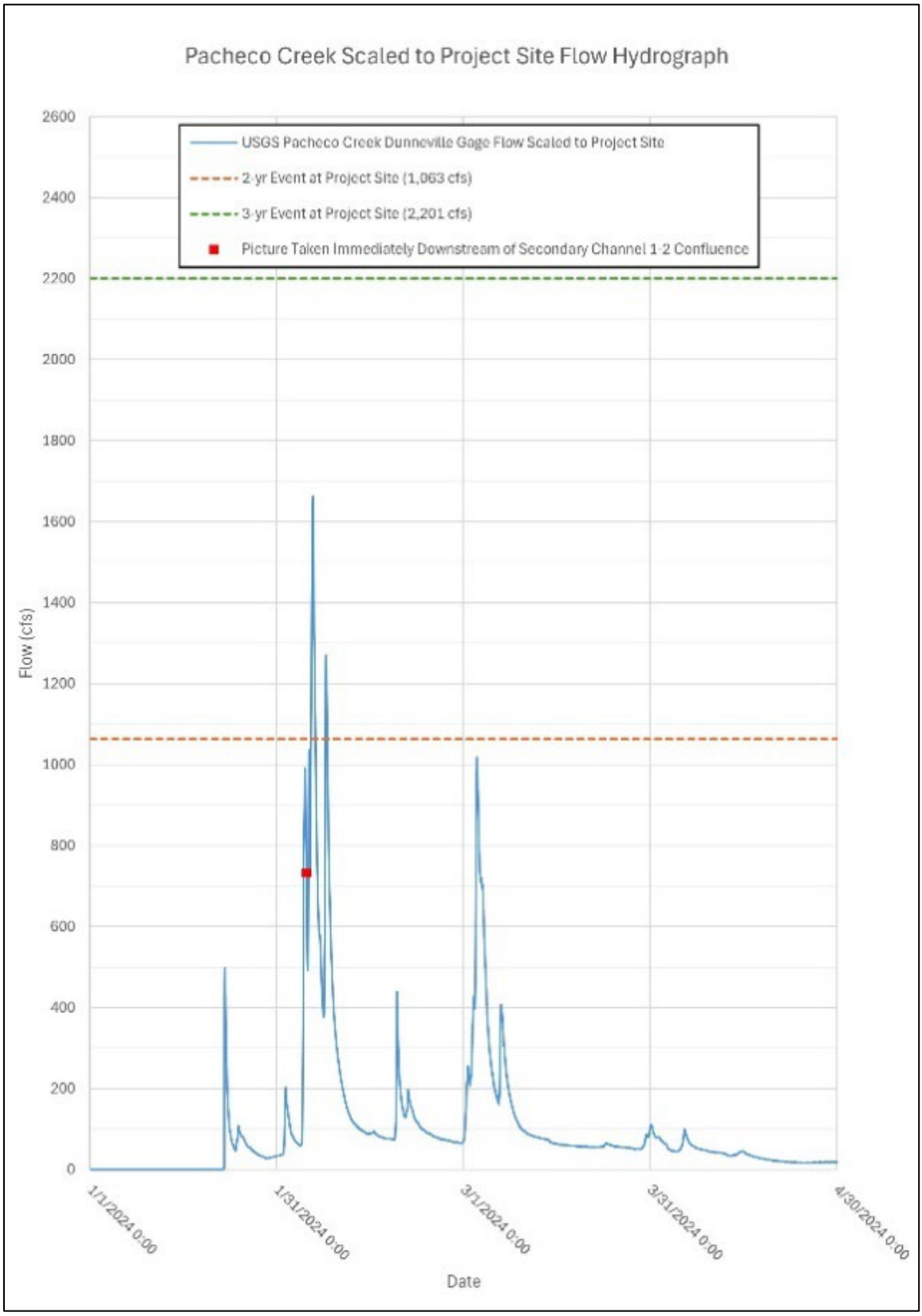


Figure 7. Visual Comparison of the Primary Secondary Channel under Different Discharge Conditions

3.2 Geomorphic Condition

Visual geomorphic assessments were conducted of the main channel, secondary channels, adjacent floodplain areas and PALS on May 10, 2024, and August 9, 2024. The secondary channel inlets showed evidence that they had become inundated, but largely appeared to match the as-built topographic condition. While the secondary channel network was inundated, the discharge events were not large enough (i.e., they were less than a 3-year return interval) or of a long enough duration to perform much geomorphic work within these features. No significant deposition or scour was observed at any of the inlets. At various locations within the secondary channel network small depositional features (i.e., bars) composed primarily of fine sediment (sand) were observed suggesting that fluvial processes are occurring as expected.

Assessment of the main channel and PALS indicated more change than that observed in the secondary channel network. A majority of the PALS were partially or completely destroyed through the course of the wet season. The posts located on the downstream side of the structure were often missing for the destroyed PALS. The depth of post penetration and the size of material used in the PALS have been hypothesized as possible reasons for the failure of many of the structures. In a handful of locations, PALS persisted and are providing more complex habitat conditions than were present prior to project implementation.

3.3 Pig and Cattle Exclusion

No pig trespass or damage was observed in fenced exclusion areas. Cattle were successfully excluded from the restoration site for the majority of the year. One short grazing event was implemented within the southernmost portion of the site from late September through December 2024. This grazing event involved placement of a few cows and calves into the Pacheco Creek reserve. Their grazing intensity was primarily concentrated at the southwest portion of the site within weed dominated oak woodland, California annual grassland, and a small amount of willow riparian forest (Figure 3). The cattle were introduced to reduce years of ungrazed thatch and therefore reduce fire risk and improve conditions for germination of native seeds. Cattle will be removed mid-winter.

A few wayward cattle were also able to access the site from under the overpass at Cedar Creek this winter, when other cattle were intentionally onsite. Cattle accessed the site where an offsite fence to restrict cattle movement from the northwest was temporarily breached. Habitat Agency staff identified the issue, and the grazer has collected their cows and resolved the exclusion.

3.4 Invasive Plant Cover

The average percent cover of invasive species across the site was 5%, and therefore the Year 1 performance criterion was met. Invasive plant species cover was approximately 6% in the willow and mixed riparian enhancement areas, 1% in the SAW restoration areas, 2% in the created seasonal wetland, and up to 7% in the CVFM. Invasive species data was also collected during monitoring of the temporarily disturbed areas, and was

0% in the created seasonal wetland fringe, 1% in the spoils placement areas, and 5% in the secondary channel grading areas. Three invasive species were observed: yellow star thistle (*Centaurea solstitialis*), red brome (*Bromus madritensis* ssp. *rubens*), and floating water primrose (*Ludwigia peploides*). Floating water primrose was observed intermingled with a non-invasive knotweed (*Persicaria* spp.); therefore, the percent cover of this species is likely overestimated in the results (Section 3.8.2). All four species are categorized as highly invasive by Cal-IPC (Cal-IPC 2024). Stinkwort was observed scattered across the entire site and was more concentrated directly along the sides of the channel, in patches in the riparian understory, and in the southwestern corner of the created seasonal wetland. Yellow star thistle was also observed scattered across the site and was more concentrated in upland areas, in patches in the riparian understory, and in the western portion of the created seasonal wetland. Red brome was observed sparsely throughout the secondary channel grading area. Floating water primrose was observed in the CVFM areas in Pond 3. Additionally, five nonnative species were observed growing in the SAW areas and the seasonal wetland: stinkwort (*Dittrichia graveolens*), fennel (*Foeniculum vulgare*), poison hemlock (*Conium maculatum*), black mustard (*Brassica nigra*), and Italian thistle (*Carduus pycnocephalus*). All five species are rated as being moderately invasive by Cal-IPC and are therefore not considered invasive per the MMP, however they should continue to be removed to reduce competition with native species.

3.5 California Sycamore Alluvial Woodland Enhancement Area

3.5.1 Survival of Planted Trees and Shrubs

Survival of all planted tree and shrub species, excluding California sycamore, across all SAW habitat restoration areas was 56%. Percent survival by species is provided in Table 6. Most planted species had moderate survival rates, with 7 out of 8 species having greater than 50% survival. The percent survival of California sycamore was very low at 26%, with 82 surviving trees out of the 315 initially installed. Percent survival of California sycamore is reported separately from other planted trees per the MMP, as it was anticipated that California sycamore would have substantially lower survival rates than other species due to the particular set of abiotic factors required for establishment of this species. Low survival rates were likely due to rodent herbivory, low health and vigor of the original nursery seedlings, and drought stress due to harsh soil and climate conditions. There is no performance criterion for planted tree and shrub survival in Year 1; however, the MMP requires that all dead plants be replaced (Table 4).

Table 6. Percent Survival of Planted Trees and Shrubs Excluding California Sycamores

Scientific Name	Common Name	# of Living Plants	# of Plants Initially Installed	% Survival
Trees				
Aesculus californica	California buckeye	26	50	52%
*Populus fremontii**	Fremont cottonwood	1	0	-
Quercus agrifolia	Coast live oak	11	15	73%
Quercus lobata	Valley oak	3	7	43%
Sambucus nigra	Blue elderberry	37	66	56%
Tree Total		**78**	**138**	**56%**

Scientific Name	Common Name	# of Living Plants	# of Plants Initially Installed	% Survival
Shrubs				
Artemisia californica	California sagebrush	14	22	64%
Baccharis salicifolia	Mulefat	51	88	58%
Rosa californica	California rose	50	88	57%
Shrub Total		**115**	**198**	**58%**
Overall Total		**193**	**336**	**57%**

*This species was not included on the initial planting list, therefore this species was excluded from survival calculations

3.5.2 Health and Vigor of Planted Trees and Shrubs

The average health and vigor of all planted species across all SAW habitat restoration areas was rated as "medium" with an average score of 2.0. The Year 1 performance criterion is an average score greater than 2, which was not met in Year 1 (Table 4). However, per the MMP, dead plants are included in this average and are given a score of 1. When the health and vigor of only living plants is evaluated, the average rating for all planted species is "high" with an average score of 2.5. There is no final success criterion for health and vigor, as the ratings are used only to assess trends and inform maintenance decisions. Average health and vigor ratings by species are presented in Table 7 and range from medium to high.

Table 7. Average Health and Vigor of Planted Trees and Shrubs

Scientific Name	Common Name	# Plants Observed	3	2	1 (living)	1 (dead)	Avg* Score	Avg* Rating
Trees								
Aesculus californica	California buckeye	34	8	10	8	8	1.8	Medium
Platanus racemosa	California sycamore	150	61	16	5	68	1.9	Medium
Populus fremontii	Fremont cottonwood	1	1	0	0	0	3.0	High
Quercus agrifolia	Coast live oak	13	8	3	0	2	2.5	High
Quercus lobata	Valley oak	3	2	1	0	0	2.7	High
Sambucus nigra	Blue elderberry	50	26	4	7	13	2.1	Medium
Tree Total		**251**	**106**	**34**	**20**	**91**	**2.0**	**Medium**
Shrubs								
Artemisia californica	California sagebrush	16	13	0	1	2	2.6	High
Baccharis salicifolia	Mulefat	79	38	5	8	28	2.0	Medium
Rosa californica	California rose	76	28	15	7	26	1.9	Medium
Shrub Total		**171**	**79**	**20**	**16**	**56**	**2.0**	**Medium**
Overall Total		**422**	**185**	**54**	**36**	**147**	**2.0**	**Medium**

*Avg= Average

3.5.3 Height of Planted California Sycamores

The average height of planted California sycamores was 3.0 feet across all four SAW habitat restoration areas (Table 8). There is no performance criterion for average height of California sycamores in Year 1; instead, Year 1 data will serve as a baseline for subsequent monitoring years (Table 4). Average heights were higher in SAW habitat restoration areas 1 and 3 than in SAW habitat restoration areas 2 and 4.

Table 8. Average Height of Planted California Sycamores by SAW Habitat Restoration Area

SAW Habitat Restoration Area	Average Height (ft)
1	3.3
2	2.0
3	3.1
4	2.9
Total	**3.0**

3.6 Willow Riparian and Mixed Riparian Enhancement Area

3.6.1 Survival of Installed Willow Stakes

The total survival of willow stakes across the site was very low (16%), with 19 surviving stakes out of the 116 initially installed (Table 9). The Year 1 performance criterion is at least 70% survival of all installed willow stakes, which was not met (Table 4). Survival was highest in willow riparian planting areas (WRP) 13 and 5 (60% and 56%, respectively). Seven out of 13 WRPs had 0% survival, likely due to difficulty installing stakes to sufficient depth to access groundwater because of the high proportions of gravels and rock in the soil. All willow stakes were either red willow (*Salix laevigata*) or arroyo willow (*Salix lasiolepis*) and were installed in willow riparian forest and scrub enhancement areas (Figure 2).

Table 9. Survival of Installed Willow Stakes

Willow Riparian Planting (WRP) Area	# Living Stakes	# Stakes Initially Installed	% Survival
WRP 1	1	9	11%
WRP 2	5	9	56%
WRP 3	0	10	0%
WRP 4	1	8	13%
WRP 5	0	5	0%
WRP 6	0	6	0%
WRP 7	0	9	0%
WRP 8	0	8	0%
WRP 9	0	20	0%
WRP 10	2	8	25%
WRP 11	0	4	0%

WRP 12	4	10	40%
WRP 13	6	10	60%
Total	**19**	**116**	**16%**

3.6.2 Woody Understory Vegetation Cover

The average percent cover of native woody understory vegetation within the willow riparian forest and scrub and mixed riparian forest and woodland areas was 33.4% (Table 10). There is no performance criterion for average percent cover of woody understory vegetation in Year 1; instead, Year 1 data will serve as a baseline for subsequent monitoring years (Table 4). Mulefat (*Baccharis salicifolia*) had the highest percent cover of all understory species at 27.1%.

Table 10. Percent Cover of Native Woody Vegetation

Scientific Name	Common Name	Percent Cover
Baccharis salicifolia	Mulefat	27.1%
Rosa californica	California rose	3.2%
Salix laevigata	Red willow	1.3%
Sambucus nigra	Blue elderberry	1.7%
Umbellularia californica	California bay	0.1%
Total Cover of Native Woody Vegetation		**33.4%**

3.7 Ecological Trend Characteristics

3.7.1 Willow Riparian and Mixed Riparian Woody Plant Recruitment

Minimal natural recruitment of woody understory species was observed during Year 1 monitoring. Recruitment was primarily observed in two species: California rose (*Rosa californica*) and mulefat. Recruitment was more commonly observed in the northern portions of the site.

3.8 Created Seasonal Wetland and Restored Coastal Valley Freshwater Marsh Areas

3.8.1 Seasonal Wetland Vegetation Cover

In Year 1, the average percent cover of non-invasive wetland vegetation in the created seasonal wetland was 68.1% (Table 11). The average percent cover of non-invasive wetland vegetation in the reference wetland was 74.9%. Therefore, cover in the created seasonal wetland was 90% of that in the reference wetland. There was no performance standard for the average percent cover of non-invasive wetland vegetation specified in the MMP for Year 1; instead, Year 1 data will serve as a baseline for subsequent monitoring years (Table 4).

Dominant wetland species in the created seasonal wetland included native tall flatsedge (*Cyperus eragrostis*) and toad rush (*Juncus bufonius*), and non-native, non-invasive hyssop loosestrife (*Lythrum hyssopifolia*) (Cal-IPC moderate) (Cal-IPC 2024). Of the planted/seeded species, tall flatsedge had the highest vegetation cover in Year 1; however, other planted/seeded species were observed to be spreading vegetatively within the created seasonal wetland, including common spikerush (*Eleocharis macrostachya*) and Baltic rush (*Juncus balticus*). Dominant wetland species within the reference seasonal wetland differed from the created seasonal wetland and included native common spikerush, and non-native Bermuda grass (*Cynodon dactylon*) and rabbitsfoot grass (*Polypogon monspeliensis*).

Table 11. Average Vegetation Cover of Created and Reference Seasonal Wetland

Scientific Name	Common Name	Status (Cal-IPC Rating)[1]	Wetland Indicator Status[2]	Created Seasonal Wetland	Reference Seasonal Wetland
				Year 1 Average Vegetation Cover (%)	
Ammannia coccinea	Purple ammannia	Native	OBL	0.3	-
Anthemis cotula	Mayweed	Non-Native	FACU	0.1	-
Asclepias fascicularis	Narrow leaf milkweed	Native	FAC	-	0.1
*Artemisia douglasiana**	California mugwort	Native	FAC	0.1	-
Bromus hordeaceus	Soft brome	Non-Native (Limited)	FACU	0.1	-
Cynodon dactylon	Bermuda grass	Non-Native (Moderate)	FACU	-	15.7
*Cyperus eragrostis**	Tall flatsedge	Native	FACW	27.4	2.6
Dipsacus sativus	Fuller's teasel	Non-Native (Moderate)	UPL	-	0.3
Dittrichia graveolens	Stinkwort	Non-Native (Moderate)	UPL	0.1	-
*Eleocharis macrostachya**	Common spikerush	Native	OBL	6.3	37.9
*Elymus triticoides**	Creeping wild rye	Native	FAC	0.4	-
Epilobium brachycarpum	Tall annual willowherb	Native	FAC	1.7	1.1
*Grindelia camporum**	Common gumplant	Native	FACW	0.1	0.3
Helenium puberulum	Sneezeweed	Native	FACW	-	0.6
*Hordeum brachyantherum**	Meadow barley	Native	FACW	0.1	-
Hordeum marinum	Seaside barley	Non-Native (Moderate)	FAC	0.1	-

Scientific Name	Common Name	Status (Cal-IPC Rating)[1]	Wetland Indicator Status[2]	Created Seasonal Wetland	Reference Seasonal Wetland
				Year 1 Average Vegetation Cover (%)	
*Juncus balticus**	Baltic rush	Native	FACW	1.0	1.6
Juncus bufonius	Toad rush	Native	FACW	10.0	-
Juncus xiphioides	Iris leaved rush	Native	OBL	0.1	-
Lotus corniculatus	Bird's foot trefoil	Non-Native	FAC	-	0.1
Lysimachia arvensis	Scarlet pimpernel	Non-Native	FAC	0.2	-
Lythrum hyssopifolia	Hyssop loosestrife	Non-Native (Moderate)	OBL	15.9	-
Plantago lanceolata	English plantain	Non-Native (Limited)	FAC	-	8.6
Plantago major	Common plantain	Non-Native	FAC	-	0.1
Polypogon monspeliensis	Rabbitsfoot grass	Non-Native (Limited)	FACW	3.1	12.6
Rumex crispus	Curly dock	Non-Native (Limited)	FAC	0.1	-
Rumex pulcher	Fiddle dock	Non-Native	FAC	-	0.3
*Salix laevigata**	Red willow	Native	FACW	1.1	-
Setaria parviflora	Marsh bristlegrass	Native	FAC	-	9.0
Typha latifolia	Broadleaf cattail	Native	OBL	0.1	-
Total				**68.4**	**90.9**
Total Non-Invasive Wetland Cover[3]				**68.1**	**74.9**

[1] Cal-IPC = California Invasive Plant Council. Per the MMP, invasive plant species are defined as those categorized as highly invasive by the Cal-IPC (Cal-IPC 2024).

[2] Wetland indicator status is based on the Arid West 2022 Regional Wetland Plant List (USACE 2024). Status is abbreviated as follows: upland (UPL), facultative upland (FACU), facultative (FAC), facultative wetland (FACW), or obligate wetland (OBL).

[3] Per the MMP, wetland vegetation is defined as species with a facultative, facultative wetland, or obligate wetland indicator status.

* Planted/seeded species from the Pacheco Creek Restoration Project As-Built Report Notification Report (H. T. Harvey 2024)

3.8.2 Coastal and Valley Freshwater Marsh Vegetation Cover

3.8.2.1 Performance Criteria

Performance and final success criteria in the MMP for CVFM habitat was based on a reference marsh within the same area as the restoration area (Pond 3). Feedback received from the IRT in August 2023 indicated that these areas would not be suitable reference sites due to the likelihood that they may be impacted by restoration

actions (EPA 2023). The Habitat Agency suggested use of more generalized performance standards based on achieving the target habitat instead of comparison to a reference marsh. Further IRT feedback received in September 2024 requested that performance standards reflect substantial uplift over the existing condition prior to construction, and that off-site reference sites be identified to help inform regional interannual variation from climate change (EPA 2024).

Prior to restoration, habitat in this area consisted of open water/pond, with no vegetation. Therefore, establishing wetland vegetation cover sufficient to create CVFM habitat represents ecological uplift. To accomplish the habitat goals described in the MMP, vegetation should consist of fairly dense, tall freshwater emergent vegetation (such as tules [*Schoenoplectus* spp.], cattail [*Typha* spp,] and bur-reed [*Sparganium* spp.]), in order to provide suitable habitat for tricolored blackbird. Therefore, we propose to use the following revised performance and final success criteria for this habitat type:

Table 12. Proposed Revised Performance and Final Success Criteria for Restored Coastal and Valley Freshwater Marsh (CVFM)

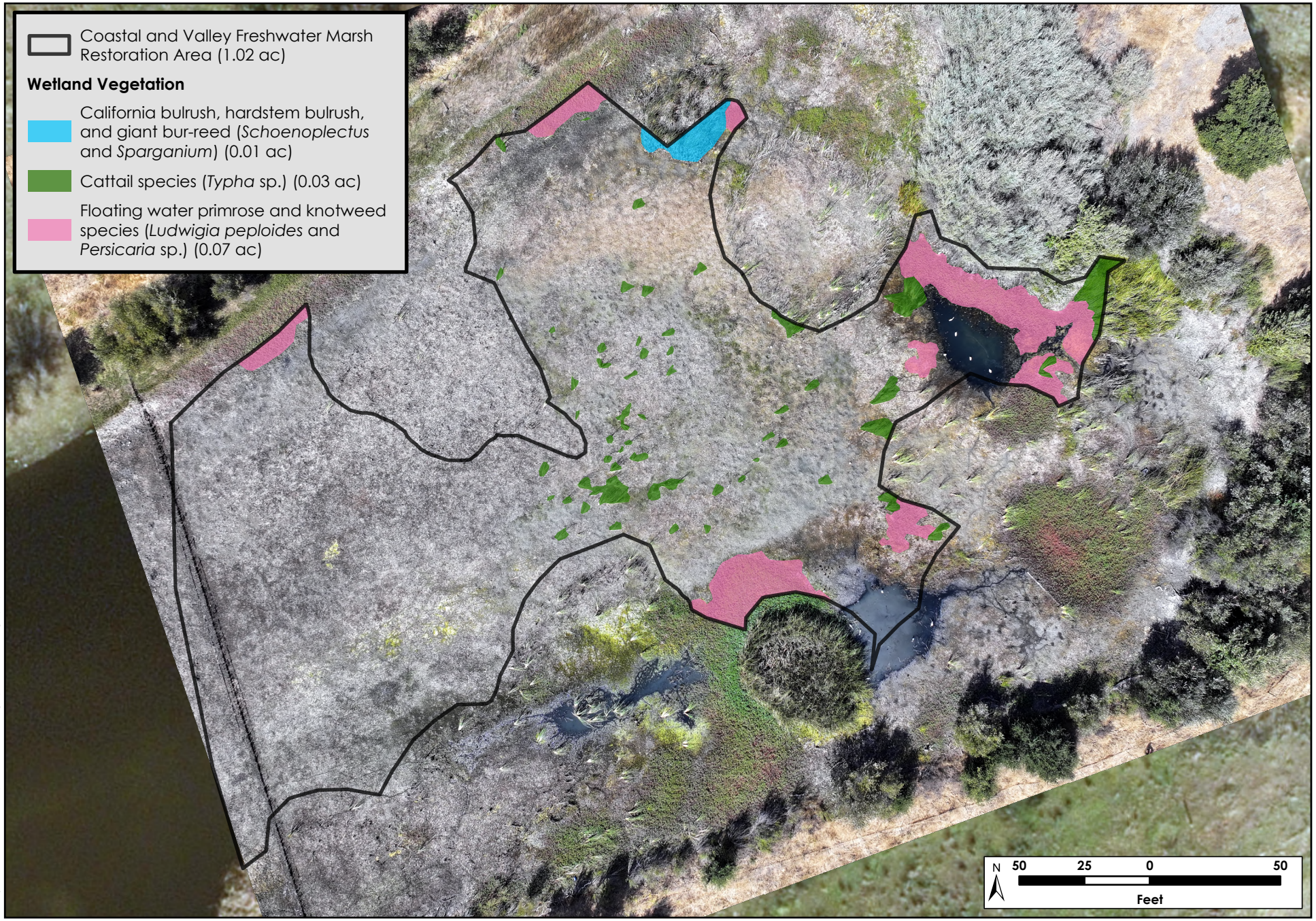
Performance Standard	Year 1	Year 2	Year 3	Year 4	Year 5
Percent cover of native tall emergent wetland vegetation (restored CVFM)	N/A (baseline data collection)	Increase relative to Year 1	Increase relative to Year 2	60%	75%*

*Indicates final success criterion

In addition, we have reviewed the region for suitable off-site references sites. Two reference sites have been identified: (1) CVFM habitat located on the fringes of the pond on the Habitat Agency's O'Connell property, approximately 3 miles downstream of the CVFM restoration area; and (2) CVFM habitat located at the Pajaro River Mitigation Bank. Although the latter is not accessible to the public, it is possible to review conditions via aerial imagery to identify regional trends as needed.

3.8.2.2 Results

The Year 1 percent cover of tall emergent vegetation in the CVFM was 3.4%, while total cover was 10% (Table 13; Figure 8). There is no performance standard for Year 1 (Table 4). Dominant species in the restored CVFM area were not tall emergent species; rather they included floating water primrose and an unknown knotweed species (*Persicaria* sp.). Floating water primrose is rated as being highly invasive (Cal-IPC 2024). However, because floating water primrose and knotweed were not visually separable in the aerial imagery, the percent cover of each species independently is not known.



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H. T. HARVEY & ASSOCIATES
Ecological Consultants

Figure 8. Coastal and Valley Freshwater Marsh Restoration Vegetation Cover
Pacheco Creek Restoration Project
Year 1 (2024) Annual Monitoring Report (4291-04)
December 2024

Table 13. Percent Cover of Coastal and Valley Freshwater Marsh Vegetation

Scientific Name	Common Name	Percent Cover
Ludwigia peploides and *Persicaria* sp.	Floating water primrose and knotweed species	6.6%
Schoenoplectus californicus, Schoenoplectus acutus, and *Sparganium eurycarpum*	California bulrush, hardstem bulrush, and giant bur-reed	0.7%
Typha sp.	Cattail species	2.7%
Total		**10.0%**

3.9 Temporarily Disturbed Areas

In Year 1, the average percent cover of vegetation was 74.3%, 62.8%, and 71.7% within the spoils placement areas, the secondary channel grading area side slopes, and the created wetland fringe, respectively (Table 14). Therefore, the Year 1 performance standard of 70.0% was met in Year 1 within the spoils placement areas and along the created wetland fringe but was not met along the secondary channel grading area side slopes (Table 4). Dominant vegetation was similar among the temporarily disturbed areas and included non-native species that typically occur in California annual grassland, such as wild oat (*Avena fatua*) and clustered clover (*Trifolium glomeratum*). Small fescue (*Festuca microstachys*), a species that was seeded in all temporarily disturbed areas, has also established at moderate densities within the secondary channel grading area side slopes and the created wetland fringe (Table 14).

The average percent cover of vegetation within the secondary channel grading area side slopes was likely hindered by hydrological conditions experienced within the secondary channels. As described above, the secondary channels were activated several times during 2024, which may have washed off some of the hydroseed mix and therefore reduced establishment of vegetation. We anticipate that the seed bank will continue to develop within this area in future monitoring years. Per the MMP, because the secondary channel side slopes did not meet its Year 1 performance standard, monitoring will be repeated in Year 2.

Table 14. Average Vegetation Cover of Temporarily Disturbed Areas

Scientific Name	Common Name	Status (Cal-IPC Rating)[1]	Spoils Placement Areas	Secondary Channel Grading Area Side Slopes	Created Wetland Fringe
			Year 1 Average Vegetation Cover (%)		
Avena fatua	Wild oat	Non-Native (Moderate)	15.3	16.4	31.3
*Bromus carinatus**	California brome	Native	-	1.0	-
Bromus diandrus	Ripgut brome	Non-Native (Moderate)	0.5	0.8	0.2
Bromus hordeaceus	Soft brome	Non-Native (Limited)	10.2	5.3	3.2

Scientific Name	Common Name	Status (Cal-IPC Rating)[1]	Spoils Placement Areas	Secondary Channel Grading Area Side Slopes	Created Wetland Fringe
			Year 1 Average Vegetation Cover (%)		
Bromus madritensis ssp. rubens	Red brome	Invasive (High)	-	0.1	-
Carduus pycnocephalus	Italian thistle	Non-Native (Moderate)	-	1.0	-
Centaurea melitensis	Tocalote	Non-Native (Moderate)	-	0.3	-
Centaurea solstitialis	Yellow star thistle	Invasive (High)	0.1	0.4	-
Croton setiger	Turkey-mullein	Native	-	1.0	0.3
Cynodon dactylon	Bermuda grass	Non-Native (Moderate)	0.1	-	-
Cyperus eragrostis	Tall flatsedge	Native	-	-	0.3
Dittrichia graveolens	Stinkwort	Non-Native (Moderate)	-	0.3	-
*Elymus glaucus**	Blue wildrye	Native	0.1	0.3	-
Erigeron canadensis	Canada horseweed	Native	-	0.5	-
*Eschscholzia californica**	California poppy	Native	-	0.8	-
*Festuca microstachys**	Small fescue	Native	4.3	11.3	11.0
Festuca myuros	Rattail sixweeks grass	Non-Native (Moderate)	-	0.2	-
Festuca perennis	Italian rye grass	Non-Native (Moderate)	8.6	1.8	0.3
Grindelia camporum	Common gumplant	Native	0.9	0.1	-
Heterotheca oregona	Oregon golden aster	Native	-	1.8	-
Hirschfeldia incana	Short podded mustard	Non-Native (Moderate)	6.4	2.0	1.7
*Hordeum brachyantherum**	Meadow barley	Native	0.1	-	-
Hordeum marinum	Seaside barley	Non-Native (Moderate)	9.5	2.5	3.8
Hordeum murinum	Foxtail barley	Non-Native (Moderate)	1.7	0.5	3.7
Juncus bufonius	Toad rush	Native	-	0.6	0.5
Logfia gallica	Narrowleaf cottonrose	Non-Native	-	0.3	-

Scientific Name	Common Name	Status (Cal-IPC Rating)[1]	Spoils Placement Areas	Secondary Channel Grading Area Side Slopes	Created Wetland Fringe
			Year 1 Average Vegetation Cover (%)		
*Lupinus succulentus**	Arroyo lupine	Native	0.7	2.2	0.8
Lythrum hyssopifolia	Hyssop loosestrife	Non-Native (Moderate)	-	-	0.2
Matricaria occidentalis	Valley mayweed	Native	-	-	0.2
Melilotus indicus	Annual yellow sweetclover	Non-Native	-	0.6	-
Polypogon monspeliensis	Rabbitsfoot grass	Non-Native (Limited)	0.4	0.8	4.0
Salix laevigata	Red willow	Native	-	-	1.7
*Stipa pulchra**	Purple needle grass	Native	-	0.1	-
Trifolium angustifolium	Narrow leaved clover	Non-Native	1.6	0.5	-
Trifolium campestre	Field clover	Non-Native	1.6	0.6	1.0
Trifolium glomeratum	Clustered clover	Non-Native	12.2	8.7	7.5
Total			**74.3**	**62.8**	**71.7**
Total Invasive Cover[2]			**0.1**	**0.5**	**0.0**

[1] Cal-IPC = California Invasive Plant Council (Cal-IPC 2024)

[2] Per the MMP, invasive plant species are defined as those categorized as highly invasive by the Cal-IPC.

* Seeded species from the Pacheco Creek Restoration Project As-Built Report Notification Report (H. T. Harvey 2024)

3.10 Wildlife Monitoring

California Red-Legged Frog–No California red-legged frogs or egg masses were observed in the ponds during Year 1 monitoring (Table 15). There are records of California red-legged frog occurring nearby and within the project site. Two observations of single adult California red-legged frogs in Pond 3 were reported in the spring of 2004 (CNDDB 2024).

Table 15. Wildlife and Aquatic Predator Surveys – Level of Effort and Results

Date	Survey Type	Observer	Pond Mitigation Site Results
April 2, 2024	California red-legged frog and California tiger salamander dipnet survey; tricolored blackbird, northwestern pond turtle, and aquatic predator visual survey	Emily Malkauskas, Steve Carpenter	One adult northwestern pond turtle observed basking at edge of Pond 1; predatory bullfrogs and fish observed at Ponds 1, 2 and 3

Date	Survey Type	Observer	Pond Mitigation Site Results
May 15, 2024	California red-legged frog and California tiger salamander dipnet survey; tricolored blackbird and northwestern pond turtle, and aquatic predator visual survey	Emily Malkauskas, Dani Christensen	Two adult northwestern pond turtles observed basking at edge of Pond 1; predatory bullfrogs and fish observed at Ponds 1, 2 and 3

California Tiger Salamander–No California tiger salamanders or egg masses were observed in the ponds during Year 1 monitoring (Table 15). California tiger salamander have not been observed at or very close to the project site. The nearest records of California tiger salamander occurrence are over 3 mi northwest of the site on the north side of State Route 152 and over 2.7 mi southeast of the site on the south side of State Route 152 (H. T. Harvey 2015; CNDDB 2024).

Northwestern Pond Turtle–The site provides suitable northwestern pond turtle habitat. Northwestern pond turtles were observed at Pond 1 during Year 1 monitoring (Table 15). Habitat Agency ecologist Nathan Hale observed this species basking on PALS material in the mainstem of Pacheco Creek on April 12, 2024. Habitat resource manager Triangle, Barry Baba, documented two Northwestern pond turtles utilizing one of the pond basking structures in Pond 3 on August 5, 2024 (Figure 9).

Figure 9. Northwestern pond turtles utilizing basking structures in Pond 3 on August 5, 2024.

Tricolored Blackbird–Tricolored blackbird nesting habitat has been present at Pond 3 in the form aquatic emergent vegetation. However, the area of CVFM was significantly reduced in size in the winter of 2023/2024 due to a combination of high flows and severe pig browse prior to installation of exclusion fencing. Therefore, the quality of tricolored blackbird nesting habitat was marginal. No tricolored blackbirds or evidence of nesting by this species was observed during Year 1 monitoring.

Wildlife results are further detailed in Table 15.

Comparison to Performance Standards – There are no performance standards or success criteria associated with wildlife use of the site. Surveys for VHP-covered species, including California red-legged frog, California tiger salamander, northwestern pond turtle, and tricolored blackbird, as well as invasive American bullfrogs (*Lithobates catesbeianus*), will be used to inform site management.

3.11 Maintenance

The maintenance contractor, Triangle, performed regular site maintenance. Maintenance activities included invasive species removal, including removal of stinkwort, yellow star thistle, and perennial pepperweed. Triangle also irrigated all plantings in the SAW habitat restoration areas approximately three times per month from April to October.

3.12 Photo Documentation

Photo documentation is presented in Appendix A.

Section 4. Maintenance Recommendations

Based on the results of Year 1 monitoring, the following actions are recommended for maintaining the site in Year 2 (2025):

- **Install replacement plants in the SAW habitat restoration areas.** The project's MMP requires replacement of all dead plants in Year 2. Replanting to 100% of initial planting numbers in SAW habitat restoration areas will facilitate rapid establishment of the target habitats and increase the likelihood that the site will achieve the performance and final success criteria by Year 10 (2033). In addition, as documented in the project's Biological As-built Report, fewer sycamore plantings were installed than planned in the MMP due to low percent survival of sycamore propagules in the nurseries. During nursery propagation there was extremely low establishment of sycamore scions in the nursery from genetically pure branch stakes, despite two seasons of collection and growing of plantings at two different nurseries. It is hypothesized that the source trees were experiencing drought stress at the time branch cuttings were taken in 2021-2023 for the nursery production, and that this may have decreased the creation of seedlings from cuttings and reduced the vigor of resultant seedlings. Therefore, additional sycamores, which have been grown from genetically pure branch stakes at Grassroots Ecology nursery throughout 2024, should be installed concurrent with replacement planting to achieve the target quantities of sycamores. The spatial layout of each missing sycamore was placed by project restoration ecologists during the 2023 planting. Replacement plants should coincide with the locations of dead/failed conspecific tree and shrubs to the extent feasible.

Table 16. Recommended Replacement Planting by SAW Habitat Restoration Area

SAW Area	# Dead Sycamores To Replace	# Additional Sycamores Needed	Total # Sycamores To Install	# Other Trees and Shrubs To Replace
SAW 1	53	419	472	220
SAW 2	7	108	115	68
SAW 3	7	42	49	9
SAW 4	1	49	50	11
Total	**68**	**618**	**686**	**308**

- **Install root protection cages during plant installation in the SAW habitat restoration areas.** Many dead or dying plants in the SAW restoration areas were observed to have damage to the root systems from rodent herbivory, likely from pocket gophers (*Thomomys* spp.). Therefore, wire mesh root protection cages (i.e., gopher baskets) should be installed with the new sycamore seedlings. Root protection cages should be made of hexagonal woven wire mesh (3/4-inch mesh size) with approximately a 5-year design life in the soil. The basket dimension should be at least double the size of the seedling root ball. Additionally, bark stripping was observed at the base of some plants, but did not appear to be the main cause of mortality. The monitoring ecologist and maintenance contractor

should continue to monitor plants for bark stripping or other forms of herbivory to determine whether trunk protection should also be implemented in the future.

- **Increase the ratio of compost added to replacement planting holes.** For replacement plantings and sycamore installation, increase the ratio of compost in backfilled planting holes from 1:6 (compost to native soil) used during construction to 1:4, to increase water retention in soil.

- **Replenish coarse wood chip mulch in all irrigation basins in the SAW planting areas.** Replenish coarse wood chip much to a thickness of 3 inches in all irrigation basins to aid in soil moisture conservation. Continue to maintain wood chip mulch throughout the dry season.

- **Install replacement willow stakes in the willow riparian planting areas.** The performance criterion for survival of installed willow stakes was not met in Year 1. The project's MMP requires replacement of all dead willow stakes to 100% of the initial installation numbers. Therefore, 97 replacement willow stakes should be installed in willow riparian and mixed riparian forest and woodland areas (Table 8). We recommend that replacement plantings not be installed in former planting areas with 0% survival. Instead, additional stakes should be installed in areas with some stake survival, and new suitable locations should be identified by a restoration ecologist. We further recommend that some willow stakes be replaced with mulefat, which may have higher survival rates.

- **Review the irrigation system and approach.** The irrigation system and approach should be reviewed by the contractor to ensure that all SAW habitat restoration areas are adequately and consistently irrigated, and any leaks are quickly detected and resolved. Particularly, the lower average height in SAW Area 2 may reflect that insufficient irrigation is getting to portions of this area.

- **Irrigate all installed plants in the SAW habitat restoration areas.** All installed plants should be irrigated during Year 2 (2025). Irrigation should consist of watering two to three times per month with approximately 10 gallons per event during the dry season (approximately April through October), or as recommended by the monitoring ecologist.

- **Prevent grazing animals (e.g., cattle) from damaging young California sycamores.** If flash grazing is to be implemented for vegetation removal, a detailed survey should be conducted to locate and protect any naturally recruited California sycamore seedlings/saplings just prior to the flash grazing event. Seedling and sapling protection should be provided by temporary electric fencing or welded wire browse protection cages held in place by metal T-posts or 2-inch-wide lodge pole stakes during grazing events. The cages should be as large as required to protect them from browse during the grazing event and expanded or removed to prevent the trees from growing and becoming entangled in the cages.

- **Continue to control invasive plant species throughout the site and competing herbaceous vegetation in each irrigation basin.** Spread of invasive plant species could compromise attainment of the site's final success criteria. All invasive plant species should continue to be removed by hand, removing as much of the root and stem material as possible. If invasive plants are observed to be in flower or seed, the flower and/or seed heads should be cut, bagged, and removed off site. The

irrigation basins in the SAW habitat restoration areas should be kept weed free by maintaining a coarse wood mulch layer and manually removing invasive plants and weeds that become established. Invasive species removal should occur regularly in riparian enhancement areas as well as active revegetation areas.

- Yellow star thistle should be a priority species for control. Control should occur during multiple visits from spring through fall, following germination and growth, and prior to flowering and/or seed set, in the areas with the densest populations of invasive plant species. Yellow star thistle should be assessed and controlled in the late-spring, summer, and fall. Because red brome is also an invasive species, it is also a target for control. Red brome should be searched for and controlled in the spring, Red brome seed may also be collected and disposed of during yellow star thistle control events to avoid further spread. Although floating water primrose is also invasive, this species is easily spread by root fragments and likely to be outcompeted by tall emergent vegetation over time. Therefore, this species is not a key target for control.
- Non-invasive, non-native species such as fennel, stinkwort, poison hemlock, black mustard, and Italian thistle, should also be controlled in areas where they may compete with establishment of the target habitats or areas where they grow particularly densely. These species should be targeted for survey and removal in the spring, with the exception of stinkwort, which appears in summer and should be removed prior to going to seed in late summer/early fall.

Section 5. References

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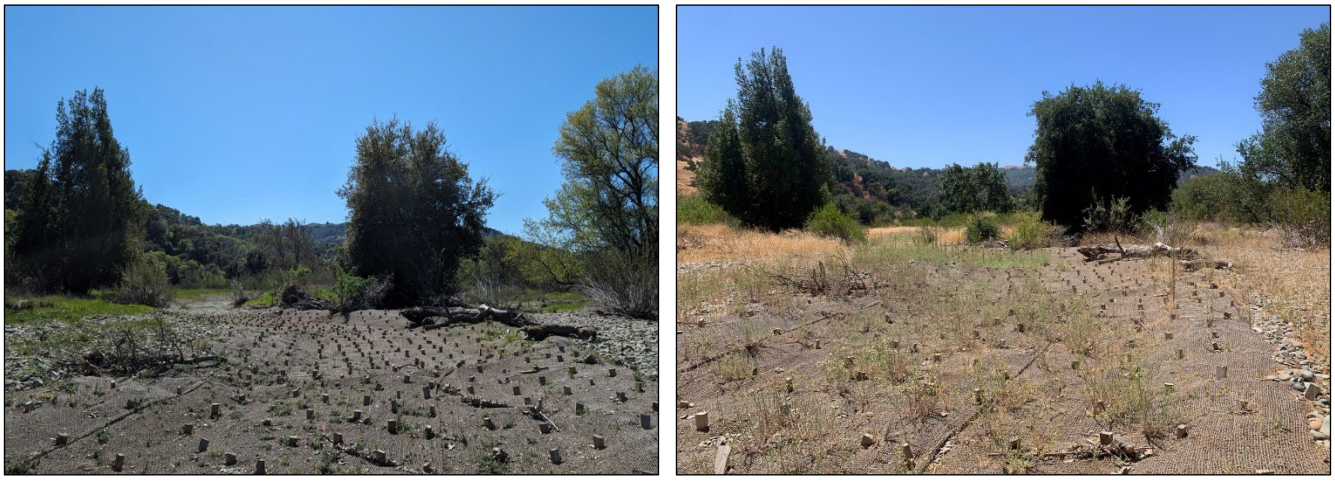
Appendix A. Photo Documentation

Photopoint 1. As-Built Conditions Looking Southwest, Showing Seasonal Wetland on March 20, 2024 (Left) and in Year 1 monitoring on July 17, 2024 (Right).

Photopoint 2. As-Built Conditions Looking North, Showing Seasonal Wetland on March 20, 2024 (Left) and in Year 1 monitoring on July 17, 2024 (Right).

Photopoint 3. As-Built Conditions Looking Northeast, Showing Seasonal Wetland on March 20, 2024 (Left) and in Year 1 monitoring on July 17, 2024 (Right).

Photopoint 4. As-Built Conditions Looking South, Showing Graded Secondary Channel 6 on March 20, 2024 (Left) and in Year 1 monitoring on August 6, 2024 (Right).



Photopoint 5. As-Built Conditions Looking South, Showing Graded Secondary Channel 7 on March 20, 2024 (Left) and in Year 1 monitoring on August 6, 2024 (Right).

Photopoint 6. As-Built Conditions Looking North, Showing SAW 1 From Southernmost Corner on March 20, 2024 (Left) and in Year 1 monitoring on September 27, 2024 (Right).

Photopoint 7. As-Built Conditions Looking East, Showing SAW 1 From West Fence Line on March 20, 2024 (Left) and in Year 1 monitoring on September 27, 2024 (Right).

Photopoint 8. As-Built Conditions Looking South, Showing SAW 1 From Northwest Corner on March 20, 2024 (Left) and in Year 1 monitoring on September 27, 2024 (Right).

Photopoint 9. As-Built Conditions Looking West, Showing SAW 1 From Northeast Corner on March 20, 2024 (Left) and in Year 1 monitoring on September 27, 2024 (Right).

Photopoint 10. As-Built Conditions Looking North, Showing SAW 1 From Southeast Corner on March 20, 2024 (Left) and in Year 1 monitoring on September 27, 2024 (Right).

Photopoint 11. As-Built Conditions Looking North, Showing SAW 2 From Southeast Corner on March 20, 2024 (Left) and in Year 1 monitoring on September 27, 2024 (Right).

Photopoint 12. As-Built Conditions Looking North, Showing SAW 2 From Southern Fenceline on March 20, 2024 (Left) and in Year 1 monitoring on September 27, 2024 (Right).

Photopoint 13. As-Built Conditions Looking East, Showing SAW 2 From Western Fenceline on March 20, 2024 (Left) and in Year 1 monitoring on September 27, 2024 (Right).

Photopoint 14. As-Built Conditions Looking South, Showing SAW 2 From Northern Corner on March 20, 2024 (Left) and in Year 1 monitoring on September 27, 2024 (Right).

Photopoint 15. As-Built Conditions Looking South, Showing Graded Secondary Channel 4 on March 20, 2024 (Left) and in Year 1 monitoring on August 8, 2024 (Right).

Photopoint 16. As-Built Conditions Looking South, Showing Graded Secondary Channel 3 on March 20, 2024 (Left) and in Year 1 monitoring on August 8, 2024 (Right).

Photopoint 17. As-Built Conditions Looking Northeast, Showing SAW 3 From Southern Corner on March 20, 2024 (Left) and in Year 1 monitoring on September 27, 2024 (Right).

Photopoint 18. As-Built Conditions Looking Southwest, Showing Graded Secondary Channel 2 through SAW 3 on March 20, 2024 (Left) and in Year 1 monitoring on August 8, 2024 (Right).

Photopoint 19. As-Built Conditions Looking Southwest, Showing Graded Secondary Channel 1 Adjacent to SAW 4 on March 20, 2024 (Left) and in Year 1 monitoring on August 8, 2024 (Right).

Photopoint 20. As-Built Conditions Looking Southwest, Showing SAW 4 From Outside Northeast Fenceline on March 20, 2024 (Left) and in Year 1 monitoring on September 27, 2024 (Right).

Photopoint 21. As-Built Conditions Looking Northeast, Showing SAW 4 From Southwest Corner on March 20, 2024 (Left) and in Year 1 monitoring on September 27, 2024 (Right).

Photopoint 22. As-Built Conditions Looking North, Showing Pond 3 From Southeast Bank Outside Fenceline on March 20, 2024 (Left) and in Year 1 monitoring on September 27, 2024 (Right).

Photopoint 23. As-Built Conditions Looking West, Showing Pond 3 From Bank Inside Fenceline on March 20, 2024 (Left) and in Year 1 monitoring on September 27, 2024 (Right).

Photopoint 23. As-Built Conditions Looking West, Showing Pond 3 From Bank Inside Fenceline, on March 20, 2024 (Left) and in Year 1 monitoring on September 27, 2024 (Right).

Photopoint 23. As-Built Conditions Looking Southeast, Showing Pond 3 From Peninsula Inside Fenceline on March 20, 2024 (Left) and in Year 1 monitoring on September 27, 2024 (Right).

Photopoint 24. As-Built Conditions Looking Southeast, Showing Pond 3 From Northwest Bank outside of Fenceline on March 20, 2024 (Left) and in Year 1 monitoring on September 27, 2024 (Right).