



**H. T. HARVEY & ASSOCIATES**

Ecological Consultants

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**Calero County Park Pond and Wetland  
Restoration Project—  
Year 4 (2020) Monitoring Report**

**Project # 3753-07**

Prepared for:

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## Section A. General Project Information

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The Calero County Park Pond and Wetland Restoration Project (project) is a priority for the implementation of the Conservation Strategy of the Santa Clara Valley Habitat Plan (VHP) (ICF 2012). The Santa Clara Valley Habitat Agency constructed the project in partnership with the Santa Clara County Parks and Recreation Department and is currently in the fourth year of the 5-year postconstruction monitoring and management period. The project was constructed to restore and establish pond and wetland habitats at two locations (the pond mitigation site and wetland mitigation site) in Calero County Park, located in the eastern foothills of the Santa Cruz Mountains in the Alamos Creek watershed (Section E, Figures 1 and 2). Compensatory mitigation credits and project objectives are described in full in the *Calero County Park Pond and Wetland Restoration Project Mitigation and Monitoring Plan* (MMP) (H. T. Harvey & Associates 2016). The project's objectives are as follows:

### **Pond Mitigation Site—**

- Restore breeding habitat for the California red-legged frog (*Rana draytonii*) and California tiger salamander (*Ambystoma californiense*) by deepening a 1,500 square foot portion of the pond, increasing seep water inflow, planting wetland vegetation, controlling aquatic predators, and excluding cattle from a portion of the pond. The deepened pond will also restore breeding habitat for common amphibians such as the Pacific tree frog (*Hyla regilla* [formerly known as *Pseudacris sierra*]) and western toad (*Anaxyrus boreas*).
- Restore seasonal wetland and freshwater marsh habitats by excluding cattle from a portion of the pond and planting native wetland vegetation. These actions will restore multiple wetland functions, including sediment filtration, nutrient filtration, and erosion protection. In addition, this restoration will provide habitat for Mt. Hamilton thistle (*Cirsium fontinale* var. *campylon*), foraging and dispersal habitat for the California red-legged frog, and foraging habitat for seasonal wetland associated birds.
- Establish seasonal wetland habitat by converting upland habitat to wetlands to establish multiple wetland functions, including sediment filtration, nutrient filtration, erosion protection, provision of habitat for Mt. Hamilton thistle, breeding, foraging and dispersal habitat for the California red-legged frog, and foraging habitat for seasonal wetland associated birds.
- Establish functional basking habitat for the western pond turtle (*Actinemys marmorata*) by installing anchored basking logs in the deepened open water portion of the pond.
- Improve climate change resiliency of pond habitat by increasing the water storage capacity of the pond and by increasing the springbox/seep inflow rate to the pond.
- Continue to provide water for cattle that graze the surrounding Calero County Park.

## **Wetland Mitigation Site—**

- Restore seasonal wetland and freshwater marsh habitats by removing sediment, planting native wetland vegetation, and excluding cattle. These actions will restore multiple wetland functions, including sediment filtration and nutrient filtration, and will provide foraging and dispersal habitat for the California red-legged frog, as well as foraging habitat for seasonal wetland associated birds.
- Establish seasonal wetland habitat by converting upland habitat to wetlands to establish multiple wetland functions including sediment filtration, nutrient filtration, and erosion protection. In addition, the establishment of this habitat will provide foraging and dispersal habitat for the California red-legged frog, and foraging habitat for seasonal wetland associated birds.
- Improve climate change resiliency of wetland habitat by increasing the water storage capacity of the wetland.
- Continue to provide water for cattle that graze the surrounding Calero County Park.

Project construction commenced on September 14, 2016, and was completed on December 14, 2016. The *Calero County Park Pond and Wetland Restoration Project As-built Notification Report* (H. T. Harvey & Associates 2017a) provides detailed information about project construction.

This report presents the results of the Year 4 (2020) monitoring in relation to the ecological performance standards outlined in the project's MMP. Monitoring results will also inform management activities to direct maintenance and potential remedial measures to ensure that the project's objectives are fulfilled. In accordance with the requirements of the MMP, this report was prepared in the format of the U.S. Army Corps of Engineers (USACE) South Pacific Division Mitigation Monitoring Report Form (USACE 2014).

## **A.1 Project Name**

Calero County Park Pond and Wetland Restoration Project

## **A.2 DA File Number(s)**

The project permit numbers are as follows:

- USACE File No. 2012-00302S
- Regional Water Quality Control Board, California Integrated Water Quality System (CIWQS) Place No. 824397 (bkw) and CIWQS Regulatory Measure No. 406031
- California Department of Fish and Wildlife (CDFW) Lake and Streambed Alteration Agreement No. 1600-2016-0140-R3
- CDFW Natural Community Conservation Plan Permit No. 2835-2012-002-03

- U.S. Fish and Wildlife Service (USFWS) Federal Fish and Wildlife Permit No. TE94345A-0
- Santa Clara Valley Water District Encroachment Permit File No. 33407
- County of Santa Clara License Agreement dated 9/6/16

### **A.3 Project Type**

Permittee responsible mitigation

### **A.4 Permittee, Bank, or In-Lieu Fee Sponsor Name and Work Phone Number**

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408.779.7261

### **A.5 Permittee, Bank, or In-Lieu Fee Sponsor Mailing Address**

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### **A.9 Agent E-Mail Address**

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## Section B. Notice of Commencement/Completion of Compensatory Mitigation Project

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### B.1 Commencement

Y:  N:

Project construction commenced on September 14, 2016. The *Calero County Park Pond and Wetland Restoration Project As-built Notification Report* (H. T. Harvey & Associates 2017a) describes the project timeline in greater detail.

### B.2 Completion

Y:  N:

Project construction was completed on December 14, 2016. The *Calero County Park Pond and Wetland Restoration Project As-built Notification Report* (H. T. Harvey & Associates 2017a) describes the project timeline in greater detail.

### B.3 Financial Assurance Remains in Place

Y:  N:

### B.4 Requesting Release of a Financial Assurance?

Y:  N:

### B.5 Name of Contractor (If Any)

D-Line Constructors and their subcontractor Confluence Restoration constructed the project and are performing ongoing maintenance. The project hydrologist is cbec and they are performing ongoing maintenance and monitoring.

### B.6 Phone Number of Contractor (If Any)

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510.251.6400

Ryan Yarbrough, Confluence Restoration  
831.588.9738

Gavin Downs, cbec  
916.248.5548

## Section C. Mitigation Monitoring Status

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### C.1 Final Monitoring Completed and Verification Requested?

Y:  N:

### C.2 Date of Monitoring Reported

This monitoring report summarizes monitoring conducted during the calendar year 2020, which is Year 4 of the short-term (i.e., 5-year) postconstruction ecological monitoring period set forth in the MMP.

### C.3 Monitoring Report Number

Monitoring report number 4. Monitoring reports were previously prepared in Years 1, 2, and 3 (H. T. Harvey & Associates 2017b, 2018, and 2019).

### C.4 Management and Maintenance Activities Completed

The following is a list of the management and maintenance activities completed during Year 4 (2020) along with dates that each activity was conducted:

- Controlled weeds including Italian thistle (*Carduus pycnocephalus*) via hand removal and bagging, black mustard (*Brassica nigra*), purple star thistle (*Centaurea calcitrapa*), bull thistle (*Cirsium vulgare*) and sow thistle (*Sonchus asper*) via hand removal, and Harding grass (*Phalaris aquatica*) and white top (*Lepidium draba*) via string-trimming (April 7, 2020 and May 7, 2020)
- Controlled weeds including yellow star thistle (*Centaurea solstitialis*) and purple star thistle via hand removal and bagging, and bull thistle, stinkwort (*Dittrichia graveolens*), and Himalayan blackberry (*Rubus armeniacus*) and via hand removal (July 6, 2020)
- Controlled weeds by mowing Himalayan blackberry and hand removal and bagging of stinkwort (November 3, 2020)
- Removed sediment from spring box (July 6, 2020 and November 3, 2020)
- Seep inflow was diverted from the pond on November 3, 2020 and restored on December 9, 2020

### C.5 Adaptive Management Activities Completed

No additional adaptive management activities were completed this year.

## C.6 Performance Standards

The project’s MMP describes performance standards during the 5 years of short-term postconstruction ecological monitoring. Table 1 contains the Year 4 performance standards and an evaluation of whether Year 4 monitoring results met the performance standards. Section C.7 contains further discussion of the results relative to the performance standards.

**Table 1. Year 4 Performance Standards and Results**

<b>Performance Standard</b>	<b>Year 4 Goal</b>	<b>Goal Met in Year 4?</b>	<b>Year 4 Results</b>
Target Hydrologic Regime	A portion of the pond mitigation site will be inundated by at least 2 feet of water through August 31, if average or above-average rainfall year. No quantifiable criteria apply for the wetland site.	NA	Year 4 was a below average water year and was the driest recorded water year in the last 30 years. Thus the target hydrologic regime performance standard does not apply to Year 4. The maximum pond water depth did not exceed 2 feet on August 31, 2020 (depth was 0 feet on August 31, 2020).
Sedimentation and Geomorphic Stability	The pond and wetland mitigation sites and springbox-seep water collection structures will demonstrate minimal sedimentation and geomorphic stability.	Yes	Little to no appreciable sedimentation occurred at the pond mitigation and wetland mitigation sites. Cattle grazing and maintenance of the outlet structure caused small, localized sedimentation in the pond mitigation site. Overall, the pond and wetland mitigation sites continued to show minimal sedimentation from Year 1 and are geomorphically stable.
California Red-legged Frog/ California Tiger Salamander/ Western Pond Turtle	At the pond mitigation site, successful breeding of California red-legged frog in at least one monitoring year; continued successful breeding of California tiger salamander; and continued occurrence of the western pond turtle (criteria do not apply to wetland site)	No	California red-legged frogs have not been observed during Years 1–4. The target hydrologic regime for California red-legged frog was not achieved in Year 4 due to the very dry water year. California tiger salamander demonstrated successful breeding in Years 1-3, but successful breeding was not observed in Year 4. Failure to observe California tiger salamander breeding may be the result of delayed sampling timing due to Covid-19 restrictions, or lack of breeding in 2020 due to the very dry water year. Western pond turtles continued to occur at the pond mitigation site.
Aquatic Predator Presence/ Absence	Abundance of bullfrogs and Louisiana red swamp crayfish will be below baseline conditions at the pond mitigation site and minimal predator occurrence at the wetland mitigation site (no management is required at the wetland mitigation site).	Yes	The abundance of aquatic predators at the pond mitigation site in Year 4 was similar to baseline conditions in Year 1. Predator control seining occurred on August 6, 2020 and the pond dried out without draining during the summer, effectively controlling for aquatic predators. Seep flow to the pond was diverted on November 3, 2020, to further

Performance Standard	Year 4 Goal	Goal Met in Year 4?	Year 4 Results
	In Year 1 (baseline), 27 adult bullfrogs, hundreds of bullfrog larvae, and thousands of Louisiana red swamp crayfish were observed at the pond mitigation site.		dry out soil below the pond for further control of potential estivating crayfish. Seep flow was restored on December 9, 2020.
Mt. Hamilton Thistle Abundance	A stable or increasing population of Mt. Hamilton thistle at the pond mitigation site (criterion does not apply to the wetland site).	Yes	The spatial extent and percent cover of Mt. Hamilton thistle increased from Year 1 to Year 4. The abundance and percent cover of the population increased from Year 1 to Year 4, although the abundance and percent cover decreased from Year 3 to Year 4.
Wetland Vegetation Cover	60% in planting zones; less than 50% in open water pond habitat; at least three wetland species will be present	Yes	The average percent cover of wetland vegetation was 60.2% at the pond mitigation site and 75.0% at the wetland mitigation site. Wetland vegetation percent cover increased and was relatively stable at the pond and wetland mitigation sites, respectively. No vegetation cover was observed in the open water portion of the pond mitigation site. More than three wetland species were present at each mitigation site.
Invasive Plant Cover	Less than 5%	Yes	Invasive plant cover was less than 5% at each mitigation site and across the mitigation sites combined. Some patches of and individual invasive plants were observed at the pond mitigation site.
Wetland Delineation	NA	NA	A wetland delineation will be performed in Year 5. Wetland conditions were observed to be maturing in the target wetland mitigation areas.
Water for Cattle	Sufficient water to support the same grazing intensity of the Reserve lands as the existing conditions.	Yes	Water was available year-round for cattle via the spring-fed trough at the pond mitigation site and another spring away from the mitigation site. Tank and secondary trough below pond were dry by mid-summer. Water connection from a large municipal tank is currently in development to help available water consistently keep up with cattle demand.

### C.7 Short Statement on Whether the Performance Standards Are Being Met (Monitoring Methods, Results and Discussion, and Management Recommendations)

Monitoring methods, results and discussion, and recommended management activities are provided below for each performance standard.

## **C.7.1 Methods**

Monitoring methods are discussed below for each performance standard and are in accordance with the project's MMP.

### ***C.7.1.1 Target Hydrologic Regime***

Hydrologic monitoring at the pond and wetland mitigation sites was conducted by cbec eco-engineering (cbec) by continuously measuring water levels, direct rainfall, and pond seep inflows. On January 27, 2017, cbec's hydrologists installed water level loggers at the pond outlet structure, the pond seep trough, the wetland weir, and the wetland upper pool. Additionally, cbec installed a barometer and a weather station at the pond outlet structure to record air temperature, relative humidity, and direct rainfall using a tipping bucket. This weather station failed during 2020 and the 2020 data were lost. Steps to replace the weather station are currently underway. To define the relationship between seep trough water levels and seep trough outflow to the pond and estimate seep contributions to the pond throughout the monitoring year, cbec established a rating curve. On November 12, 2019, Confluence Restoration installed a staff plate on the pond outlet structure at the pond mitigation site to assist in visual estimates of water levels. Appendix B contains additional information on monitoring methods of the target hydrologic regime.

### ***C.7.1.2 Sedimentation and Geomorphic Stability***

cbec's hydrologists qualitatively observed sedimentation and geomorphic stability during monitoring and maintenance visits on April 14 and October 9, 2020. Additional details on monitoring methods for sedimentation and geomorphic stability are provided in Appendix B.

### ***C.7.1.3 California Red-Legged Frog/California Tiger Salamander/Western Pond Turtle***

H. T. Harvey & Associates wildlife ecologists conducted surveys for special-status wildlife species at both the pond and wetland mitigation sites to evaluate the performance standards for the California red-legged frog, California tiger salamander, western pond turtle, and aquatic predator abundance. Surveys were conducted in accordance with the methods described in the MMP, which follow the most recent wildlife agency protocols (USFWS 2005, USFWS and CDFW 2003). In addition, Julie King of the Santa Clara Valley Habitat Agency conducted a visual western pond turtle survey during a site visit on April 18, 2020. The survey type, survey date, observer, and level of effort (where applicable) are presented in Table 2 in the Results and Discussion Section below.

### ***C.7.1.4 Aquatic Predator Abundance***

The abundance of aquatic predators encountered during each of the special-status wildlife surveys and egg mass surveys was recorded. Any captured nonnative animals were dispatched.

### **C.7.1.5 Mt. Hamilton Thistle Abundance**

H. T. Harvey & Associates' restoration ecologists Ryan Hegstad and Vicki Chang conducted a survey for Mt. Hamilton thistle at both the pond and wetland mitigation sites on May 13, 2020, during the blooming period for this species. The survey was conducted in accordance with the methods described in the MMP and consisted of: (1) recording the total number of Mt. Hamilton thistle individuals; (2) counting the number of thistle individuals in flower at the time of monitoring (excluding individuals solely in bud); (3) mapping the spatial extent of the population using a Global Positioning System unit; (4) estimating the percent cover of Mt. Hamilton thistle within the area encompassed by the population using the quadrat sampling method (Bonham 1989); (5) qualitatively assessing the condition of Mt. Hamilton thistle individuals within the population; and (6) taking photographs to document onsite conditions.

### **C.7.1.6 Wetland Vegetation Percent Cover**

H. T. Harvey & Associates' restoration ecologists Vicki Chang and Ryan Hegstad conducted wetland vegetation monitoring at the wetland mitigation site on May 13, 2020 and at the pond mitigation site on May 20, 2020. The monitoring dates differed for each site to coincide with the respective peak of the growing season for each site. Percent cover of planted and naturally recruited vegetation was determined by species using the quadrat sampling method (Bonham 1989) along permanent transects established within the pond and wetland mitigation sites (Section E, Figures 3 and 4). Quadrat sampling locations were selected by generating random numbers to dictate the distance along each transect and the perpendicular distance from that transect in alternating directions. The number of quadrats sampled was verified to be sufficient by examining the variability of vegetative cover relative to the number of quadrats sampled (Kershaw 1973) (Appendix A). Cover was estimated to the nearest whole percent. Average percent cover of vegetation was also recorded in the open water habitat at the pond mitigation site to determine if the vegetation cover exceeded the performance standard for open water. All species in quadrats were identified using the Jepson manual (Baldwin et al. 2012). Wetland species were defined as those having a wetland indicator status of facultative (FAC), facultative wetland (FACW), or obligate (OBL) based on the *National Wetland Plant List v3.3 Species Detail Tool* (USACE 2018), regardless of whether they were native or nonnative. The average percent wetland vegetation cover and number of wetland species observed at the pond and wetland mitigation sites were evaluated separately and collectively.

### **C.7.1.7 Invasive Plant Cover**

H. T. Harvey & Associates restoration ecologist Ryan Hegstad conducted a focused visual survey for invasive plant species at the pond and wetland mitigation sites on May 20, 2020. As in previous monitoring years, plant species were considered invasive if they were rated as highly invasive by California Invasive Plant Council (Cal-IPC) or if they had a moderate Cal-IPC rating and were deemed by a qualified restoration ecologist to adversely affect habitat quality (Cal-IPC 2020). Per the MMP, the overall cover of invasive plant populations was visually estimated for the pond and wetland mitigation sites separately and collectively. The results of the invasive plant cover surveys were used to prepare a map depicting the extent of invasive plant species at the pond and wetland mitigation sites.

### **C.7.1.8 Wetland Delineation**

In accordance with the MMP, a wetland delineation will be conducted at the end of the 5-year monitoring period; therefore, a wetland delineation was not conducted in Year 4.

### **C.7.1.9 Water for Cattle**

Water availability for cattle was determined on the basis of observations of water infrastructure and conversations with Santa Clara County Parks and Recreation Department staff.

### **C.7.1.10 Photodocumentation**

Photodocumentation was conducted during wetland vegetation monitoring and Mt. Hamilton thistle abundance monitoring of the wetland mitigation site on May 13, 2020 and of the pond mitigation site on May 20, 2020 from permanent locations identified in the *Calero County Park Pond and Wetland Restoration Project As-built Notification Report* (H. T. Harvey & Associates 2017a). Mt. Hamilton thistle photodocumentation was conducted on May 13, 2020 from the locations established in the Year 1 monitoring report (H. T. Harvey & Associates 2017b). Additional photographs were taken throughout Year 4 to record observations and events that may affect the success of mitigation. Photographs are provided in Section D and the locations of the photodocumentation points are shown on Figures 3 and 4 in Section E.

## **C.7.2 Results and Discussion**

Monitoring results are provided below for each performance standard. These results are also summarized above in Table 1.

### **C.7.2.1 Target Hydrologic Regime**

**Pond Mitigation Site**—The hydrologic regime performance standard applies only to the pond mitigation site and calls for a depth of inundation of at least 2 feet through August 31 of each monitoring year that exhibits average or above average precipitation. This standard is intended to achieve the target hydrologic regime that supports high quality breeding habitat for the California red-legged frog and California tiger salamander. Water Year 2020 had below average precipitation; Year 4 was the driest water year in the past 30 years (Appendix B). Because Year 4 was a below average water year, the performance standard for target hydrologic regime does not apply.

Water levels at the pond mitigation site did not reach maximum capacity in Year 4. Peak capacity was reached on April 7, 2020, which correlated with when the seep flow sustained maximum estimated flows. The Year 4 peak water level was the lowest since the start of monitoring, likely due to the very dry conditions. Water levels drew down at a consistent rate from the peak on April 7 through early June, and draw down increased while water was being pumped for cattle from the water trough. The pond completely dried out on July 26, 2020. The maximum pond water depth did not exceed 2 feet on August 31, 2020 (water depth was 0 feet).

**Wetland Mitigation Site**—Although there are no performance standards for hydrologic regime at the wetland mitigation site, water levels were monitored to inform management and track wetland habitat establishment. The constructed portion of the lower wetlands was dry for most of the year, with wet stints in December and April. Still, saturated soil conditions were observed in portions of the lower wetland area during field visits through October 9, 2020. Water levels in the upper wetland pond remained above the berm spill over elevation until June 28, 2020. After that time, water level dropped below the berm by approximately 0.03 feet. Appendix B provides additional discussion of monitoring results for the target hydrologic regime.

### ***C.7.2.2 Sedimentation and Geomorphic Stability***

A small amount of sediment continues to gather in the lowest sections of the pond near the outlet structure. Relative to the sedimentation observed in previous years (0.7 ft of sedimentation in Year 2 and 1.5 ft in Year 3) there has been little to no appreciable sedimentation in Year 4. The source of this sediment at the pond site may be from cattle or human activity in the periodically inundated and unvegetated portions of the pond where fencing does not exclude cattle. A small, localized pile of sediment was also observed in the pond caused by outlet structure work conducted in 2019. This minor sedimentation did not obstruct the function of the pond outlet structure. A bank slope that slumped in the southern portion of the pond mitigation site was observed to be naturally revegetating and appeared to be stable. No sources or evidence of sedimentation were noted in the upper pool of the wetland site (Figure 4). Earthen banks on the lower basin of the upper wetland pool were cracking due to the natural expansion and contraction of the clay.

Overall, these observations demonstrate that the pond and wetland mitigation sites continued to show minimal sedimentation from Year 1 and are geomorphically stable. Additional discussion of monitoring results for sedimentation and geomorphic stability is provided in Appendix B.

### ***C.7.2.3 California Red-Legged Frog/California Tiger Salamander/Western Pond Turtle***

**California Red-Legged Frog**—No California red-legged frogs or egg masses were observed in either the pond or wetland mitigation sites during Year 4 monitoring (Table 2). There have been no documented observations of the California red-legged frog at the pond or wetland mitigation sites in Years 1–4. The closest known occurrence of the California red-legged frog at the time of project construction was approximately 1.4 miles south of the pond in Cherry Creek (H. T. Harvey & Associates 2016).

**California Tiger Salamander**—California tiger salamanders were not observed during the California tiger salamander larval surveys in either the pond or wetland mitigation site in Year 4 (Table 2). By contrast, California tiger salamander larvae were observed in Years 1–3. A lack of breeding in Year 4 may have been caused by the very dry conditions observed at the site (see section C.7.2.1), as individuals of this species may not waste reproductive effort by trying to breed during a very dry year. However, the lack of observed larvae during surveys in Year 4 does not conclusively indicate a lack of California tiger salamander in the pond or wetland due to timing of the surveys: timing of the second larval survey was relatively late in the year due to delays from Covid-19 protocols, and California tiger salamander larvae may have metamorphosed and dispersed out of the wetland and pond sites by the time the survey was conducted.

**Western Pond Turtle**—The pond mitigation site continued to provide suitable western pond turtle habitat. Western pond turtles were observed at the pond mitigation during early season monitoring events (Table 2).

Wildlife results are detailed in Table 2.

**Comparison to Performance Standards**—The MMP performance standards call for successful breeding of California red-legged frog at the pond mitigation site. The target hydrologic regime to support California red-legged frog breeding was not achieved at the pond mitigation site in Year 4 due to the very dry water year (see section C.7.2.1), and no California red-legged frogs were observed in Year 4. Furthermore, California red-legged frogs were not observed during Years 1–3. Therefore, the California red-legged frog performance standard has not been met.

Additionally, the MMP performance standards call for the continued successful breeding of California tiger salamander at the pond mitigation site and continued occurrence of the western pond turtle at the pond mitigation site. While the performance standard of continued successful breeding of California tiger salamander was met in Years 1-3, no breeding of California tiger salamanders was observed during Year 4 monitoring events. Thus, the California tiger salamander performance standard was not met. This may be due to the target hydrologic regime to support California tiger salamander not being achieved due to the very dry water year (see section C.7.2.1), although it is also possible that the delay in conducting larval California tiger salamander surveys due to Covid-19 protocols caused us to miss California tiger salamander larvae before they metamorphosed and left the pond. Western pond turtles continued to be observed in Year 4 and met the western pond turtle performance standard.

#### **C.7.2.4 Aquatic Predator Abundance**

Aquatic predators were observed in both the pond and wetland mitigation sites during dipnet and seine surveys, and visual encounter surveys for special-status species (See Table 2).

The MMP performance standard for aquatic predators pertains only to the pond and requires draining the pond to control predators if annual monitoring determines an increase in bullfrog or Louisiana red swamp crayfish abundance relative to the previous year's monitoring. Predator abundance was similar to what was observed during Year 1 – 3 monitoring. Due to the very dry water year, the mitigation pond was completely dry by July 26, 2020, which effectively controlled for aquatic predators as though the pond had been drained. In addition, seining for bullfrogs took place in the upper pool at the wetland mitigation site in early August, and one bullfrog was dispatched. The seep inflow was also diverted from the pond mitigation site on November 3, 2020, in order to further draw down groundwater to decrease survival of potential estivating Louisiana red swamp crayfish in burrows under the pond. Seep flow was restored on December 9, 2020.

**Table 2. Wildlife and Aquatic Predator Surveys—Level of Effort and Results**

<b>Date</b>	<b>Survey Type</b>	<b>Observer</b>	<b>Pond Mitigation Site</b>	<b>Wetland Mitigation Site</b>
February 11, 2020	California red-legged frog egg mass survey	Steve Carpenter	<u>Results:</u> 5 adult western pond turtles; no California red-legged frog egg masses	<u>Results:</u> no wildlife observed; no California red-legged frog egg masses observed
April 18, 2020	Visual western pond turtle survey	Julie King (SCVHA)	<u>Results:</u> 8 adult western pond turtles, 1 adult bullfrog	<u>Results:</u> many bullfrog larvae
April 24, 2020	California red-legged frog and California tiger salamander larval dipnet survey	Steve Carpenter	<u>Results:</u> multiple western pond turtles, multiple bullfrog adults, and multiple Louisiana red swamp crayfish; no California red-legged frog or California tiger salamander larvae	<u>Results:</u> NA
July 1, 2020	California red-legged frog and California tiger salamander larval dipnet survey	Christian Knowlton and Matt Louder	<u>Results:</u> 1 adult bullfrog, many bullfrog tadpoles, and many Louisiana red swamp crayfish observed; no California red-legged frogs or California tiger salamander were observed	<u>Results:</u> several adult bullfrogs, and several bullfrog tadpoles observed; no California red-legged frogs or California tiger salamander were observed
August 6, 2020	Special-status-species and aquatic predator abundance survey and aquatic predator control	Christian Knowlton and Jazmine Jensen	<u>Results:</u> NA (pond was dry)	<u>Results:</u> 1 bullfrog captured and dispatched; 1 bullfrog metamorph was observed but not captured; 2 dragon fly larvae, 5 damsel fly larvae and 100 notonectids observed

**Comparison to Performance Standards**—Aquatic predator performance standards at the pond mitigation site are based on the baseline of Year 1 survey results. Year 4 aquatic predator abundance must be below the Year 1 (baseline) survey results to meet the performance standard. The Year 1 survey results found a baseline of 27 adult bullfrogs, hundreds of bullfrog larvae, and thousands of Louisiana red swamp crayfish at the pond mitigation site. The abundance of aquatic predators at the pond mitigation site in Year 4 was similar to Year 1 and effective aquatic predator control was implemented. Thus, Year 4 aquatic predator abundance met the performance standard.

#### **C.7.2.5 Mt. Hamilton Thistle Abundance**

The abundance of Mt. Hamilton thistle in the seep wetland population at the pond mitigation site decreased from 125 individuals in Year 3 to 96 individuals in Year 4. Twenty-nine individuals were flowering during Year 4 monitoring (Section D, Photo 44) and many others were in bud. The Mt. Hamilton thistle population increased by 0.01 acre between Year 3 and Year 4 and encompassed approximately 0.05 acre (Section E; Figure 3). Within the Mt. Hamilton thistle population extent, Mt. Hamilton thistle average percent cover decreased by 4.3% from Year 3 to 37.0% in Year 4. Overall health and vigor of individuals in the population was good in Year 4. The majority of plants were large, mature individuals, but there were some small, recently-germinated seedlings. No Mt. Hamilton thistle were observed at the wetland mitigation site during Year 4 monitoring. Photodocumentation of the Mt. Hamilton thistle population is included in Section D.

The seep wetland Mt. Hamilton thistle population at the pond mitigation site was subjected to cattle grazing prior to this project. This population was protected during project construction and has been protected from cattle grazing since September 2016. The remaining potential threats to this population include competition with surrounding wetland vegetation, especially cattail (*Typha* sp.). Other potential plant competitors include native species including coyote brush (*Baccharis pilularis*) and broadfruit bur reed (*Spartanium eurycarpum*), and nonnative species such as alta fescue (*Festuca arundinacea*), Italian wildrye (*Festuca perennis*), prickly lettuce (*Lactuca serriola*), curly dock (*Rumex crispus*), and sow thistle (*Sonchus asper*), that were observed near the Mt. Hamilton seep wetland population at the pond mitigation site. Additionally, the hydrology of the portion of the seep wetland where the Mt. Hamilton thistle population is located is supported by inflow that is collected in a springbox and conveyed over the Almaden-Calero Canal in a steel pipe; maintenance of this water source is critical to supporting this population of Mt. Hamilton thistle.

**Comparison to Performance Standards**—The MMP calls for a stable or increasing population of Mt. Hamilton thistle at the pond mitigation site. The Mt. Hamilton thistle population in the seep wetland at the pond mitigation site decreased in abundance and percent cover, but increased in extent between Year 3 and Year 4. This type of fluctuation is to be expected in naturally occurring populations as older plants senesce and seedlings have more room to recruit in future years. In addition, fewer individuals may have germinated in Year 4 due to the very dry conditions. Overall, the Mt. Hamilton thistle population remains on a positive trajectory in abundance, percent cover, and surface area relative to Year 1. In Year 4 relative to Year 1, thistle abundance remained relatively constant (Year 1= 111 individuals; Year 4=96 individuals), the percent thistle cover within the population footprint increased by a factor of 2 (Year 1=19.5%; Year 4=37.0%), and the surface area of the

population expanded by a factor of 3 (Year 1=0.03 acres; Year 4=0.05 acres). Therefore, the performance standard was met.

### C.7.2.6 Wetland Vegetation Percent Cover

Wetland vegetation cover was high at both the pond and wetland mitigation sites during vegetation monitoring. The average percent cover of wetland vegetation was 60.2% at the pond mitigation site, 75.0% at the wetland mitigation site, and 66.1% for the pond and wetland mitigation sites combined. The observed wetland vegetation cover increased at the pond mitigation site and decreased slightly at the wetland mitigation site from Year 3 to Year 4 (Table 3). No vegetation was observed in the open water at the pond mitigation site. The pond and wetland mitigation site continued a temporal trend of increasing cover of wetland vegetation since Year 1 (Table 3). Both sites exhibited high plant species richness. Twenty-one wetland species were observed at the pond mitigation site, 19 wetland species were observed at the wetland mitigation site, and 28 wetland species were observed in total across the pond and wetland mitigation sites during quadrat sampling (Table 3).

**Table 3. Wetland Vegetation Percent Cover and Number of Wetland Species**

Year	Site	Wetland Vegetation Cover	Wetland Vegetation Cover Performance Standard	Number of Wetland Species <sup>1</sup>	Wetland Species Number Performance Standard
Year 1	Pond mitigation site	34.9%	15%	18	3
	Wetland mitigation site	57.0%	15%	17	3
Year 2	Pond mitigation site	60.9%	25%	19	3
	Wetland mitigation site	72.1%	25%	19	3
Year 3	Pond mitigation site	45.2%	40%	21	3
	Wetland mitigation site	75.8%	40%	19	3
Year 4	Pond mitigation site	60.2%	60%	24	3
	Wetland mitigation site	75.0%	60%	17	3

<sup>1</sup> Wetland indicator status based on the Arid West 2016 Regional Wetland Plant List (USACE 2018).

Upland species cover was low and wetland species were the dominant vegetation cover at the pond and wetland mitigation sites. Creeping spike rush (*Eleocharis macrostachya*) provided the most wetland cover at the pond mitigation site (14.8%) and at the wetland mitigation site (27.7%). Complete vegetation monitoring results for each site, including species accumulation curves, are provided in Appendix A.

**Comparison to Performance Standards**—Wetland cover exceeded the Year 4 wetland vegetation percent cover performance standard of 60% cover at both the pond and wetland restoration sites independently and when combined (Table 3). Both the pond and wetland mitigation sites met the Year 4 performance standard of an increasing temporal trend of wetland vegetation since Year 1, although the pond mitigation site had the highest percent cover of wetland vegetation in Year 2 and the wetland site very slightly decreased in wetland vegetation in Year 4 compared to Year 3 (Table 3). No vegetation cover was observed in the open water portion of the pond mitigation site; therefore, the open water portion of the pond mitigation site met the Year 4 performance standard of vegetation cover of less than 50%. The number of wetland species observed at the

pond and wetland mitigation sites achieved the Year 4 performance standard of having at least 3 wetland species present at each (Table 3).

### C.7.2.7 Invasive Plant Cover

Invasive plant cover was low at the pond and wetland mitigation sites during Year 4. Black mustard (*Brassica nigra*, Cal-IPC rating “moderate”), purple star-thistle (*Centaurea calcitrapa*, Cal-IPC rating “moderate”), yellow star-thistle (*Centaurea solstitialis*, Cal-IPC rating “high”), whitetop (*Lepidium draba*, Cal-IPC rating “moderate”) and Himalayan blackberry (Cal-IPC rating “high”) were observed in low abundance at the pond mitigation site during the focused visual survey on May 20, 2020 (Section E, Figure 3). The overall cover of these populations was visually estimated to be below the 5% cover performance standard for the pond mitigation site (Table 4). The majority of these species were present at the site prior to construction and were targeted during management and maintenance of nonnative plant species during Year 4 (see Section C.4). Minimal invasive plant cover was observed at the wetland mitigation site; therefore, no mapping was conducted at this site during the May 20, 2020 survey.

**Table 4. Invasive Plant Cover**

Site	Focused Visual Survey Cover Estimate <sup>1,2</sup>	Year 4 Invasive Plant Cover Performance Standard <sup>1</sup>
Pond mitigation site	<5%	
Wetland mitigation site	<5%	
Combined	<5%	<5%

<sup>1</sup> Species that were rated as highly invasive by California Invasive Plant Council (Cal-IPC) or species rated as moderately invasive and were deemed by a qualified restoration ecologist to adversely affect habitat quality were defined as invasive (Cal-IPC 2020).

<sup>2</sup> The overall cover of invasive plant populations was visually estimated during the focused visual survey and mapped in accordance with the MMP.

**Comparison to Performance Standards**—The cover of invasive plant species met the performance standard of less than the 5% total cover at the pond mitigation site and the wetland mitigation site (Table 4).

### C.7.2.8 Wetland Delineation

A wetland delineation will be conducted at the end of the 5 year monitoring period; therefore, no wetland delineation was conducted in Year 4. Wetland conditions were observed to be establishing in the target wetland areas during Year 4.

### C.7.2.9 Water for Cattle

Water was available year-round for cattle via the spring-fed trough at the pond mitigation site, while the tank and secondary trough below the pond were dry by mid-summer. The spring-fed trough combined with another spring located outside the mitigation site were generally sufficient to keep up with cattle demand, but occasional issues with either the spring-fed trough or the other spring resulted in insufficient water relative to cattle demand for short periods. Currently, an additional water connection from a large municipal tank is being

developed with County Parks in order to ensure consistently sufficient available water to meet cattle demand, and to help better disperse cattle, which tend to congregate near water sources.

### **C.7.2.10 Photodocumentation**

Photographs from established photodocumentation points and additional locations taken throughout Year 4 monitoring are provided in Section D. Photodocumentation points are shown on Figures 3 and 4 in Section E.

## **C.7.3 Recommended Management Activities**

Management recommendations for the upcoming monitoring year are provided below for relevant performance standards.

### **C.7.3.1 Target Hydrologic Regime and Sedimentation and Geomorphic Stability**

cbec and H. T. Harvey & Associates prepared the following recommendations for the target hydrologic regime and sedimentation/geomorphic stability:

- Sediment should continue to be removed from the springbox during and after the rainy season to optimize seep flow to the pond mitigation site.
- Debris and sediment should continue to be removed from the constructed log jams located just upstream of the springbox. While sedimentation rates are low at the log jams, we recommend annual cleanout work to ensure maximum spring water input to the pond.
- Accumulated silt should continue to be cleaned out of the seep troughs each fall. While sedimentation rates are low at the seep troughs, we recommend annual cleanout work to ensure maximum spring water input to the pond.
- Measures should be taken to reduce human impacts on the side slopes of the pond when soils are saturated. Disturbance may compromise the bentonite pond liner, which could result in increased permeability in the pond bed and potentially lower water levels. Pond maintenance and management personnel should be educated on the design of the pond liner and, if possible, should wear mud shoes (e.g., mudders available through Forestry Suppliers) or use plywood walking platforms when entering the pond to reduce impacts on the pond liner and side slopes. Personnel should continue to use the designated access location on the south side of the pond to limit impacts on the pond liner and side slopes.

In addition to the recommendations provided above, cbec and H. T. Harvey & Associates identified the following future considerations for target hydrologic regime and sedimentation and geomorphic stability:

- Erosion of the County Parks roadway/trail upslope from the springbox caused deposition throughout the drainage all the way downslope to the springbox during water year 2019. Although recent deposition was not observed during water year 2020, conditions of the trail/roadway do not appear

to have been improved in 2020. Continuing to clean out the trail gravel from upstream of the springbox is advised. Also, consider suggesting best management practices and roadway construction techniques to County Parks on the roadway/trail to minimize roadway erosion and deposition of trail gravel between the roadway/trail and the springbox.

- The abundance and extent of ground squirrel burrows should be monitored along the berm at the pond mitigation site to confirm that berm integrity is not compromised.
- The gage that continuously measures water levels at the outlet structure in the lower wetland area at the wetland mitigation site was dry during much of Year 4. It is presently installed on the outlet structure with its measurement point just above the sill of the outlet structure. The gage should be relocated to the side of the outlet structure and recessed into the soil to better capture the entire water level drawdown.
- The weather station and rain gage at the pond outlet structure failed prior to any data being collected for this year. Therefore, hydrology data collected at a nearby public gage has been used for hydrology analyses in this report, scaled to estimate on-site rainfall at the project site. However, the conversion of the data from the public gage to the site is based on long-term comparisons, and the actual rainfall at the pond site might differ by a few inches or more in any given year depending on how storms move through the area. If in the future County Parks or the Habitat Agency wish to do more in-depth water balance or hydrologic performance at the pond site, then we recommend replacement of the on-site rain gage with a telemetry capable station to allow for real time trouble shooting and minimize the potential for lost data.

### **C.7.3.2 Aquatic Predator Abundance**

Over 4 years of monitoring, populations of invasive aquatic predators at the pond site (bullfrog and Louisiana red swamp crayfish) have remained approximately stable (see Section C.7.2.4). These populations are likely being replenished from outside, adjacent sources. The pond site is an open system that is adjacent to the Almaden-Calero Canal to Calero Reservoir, and is at the upstream end of a tributary to Alamitos Creek, which likely act as sources for invasive aquatic predators (particularly bullfrogs) that can disperse short distances overland to the pond. Any effort to create a barrier between the mitigation site and these sources to prevent overland dispersal by these invasive aquatic predators would likely also become a barrier to dispersal for California red-legged frogs. Therefore, H. T. Harvey & Associates recommends ongoing maintenance to maintain populations of invasive aquatic predators at low enough levels that allow them to co-occur with California red-legged frog and California tiger salamander. This includes controlling the population of adult bullfrogs prior to their start of breeding in May-June via bullfrog removal and dispatching (i.e., gigging and/or shooting). It also includes managing water levels so that the pond completely dries out during each year that invasive aquatic predators are observed in the pond to further disrupt their breeding and reduce habitability of the pond. In Year 4, the pond dried out completely by August 11, 2020. The seep inflow to the pond at the pond mitigation site was diverted to the storage tank on November 3, 2020 to further dry down groundwater

levels below the pond to help control potential aestivating crayfish. Seep flow was restored on December 9, 2020.

Although bullfrog egg masses were not detected during any surveys, bullfrog larvae were observed, indicating that breeding occurred. H. T. Harvey & Associates recommends that future bullfrog egg mass surveys be scheduled when surveys are most likely to detect bullfrog egg masses based on site conditions, which, based on the Year 3 monitoring results, may be earlier in the spring than previously expected (i.e. May).

#### **C.7.3.3 Mt. Hamilton Thistle Abundance**

H. T. Harvey & Associates recommends that nonnative plant species, such as curly dock, continue to be removed from the seep wetland area of the pond mitigation site to reduce competition between nonnative vegetation and the Mt. Hamilton thistle.

#### **C.7.3.4 Invasive Plant Cover**

H. T. Harvey & Associates recommends that the following species be considered invasive plant species and targeted for control or removal during vegetation management activities because their spread could compromise attainment of vegetation success criteria: Black mustard, whitetop, yellow star-thistle, and purple star-thistle. Naturalized, nonnative species with a moderate invasiveness rating and which are commonly found in similar wetland and mesic California annual grassland habitats in the region (e.g., Bermuda grass, Italian ryegrass, hyssop loosestrife [*Lythrum hyssopifolia*], and Harding grass) should not be targeted for control or removal because the associated ground disturbance may be substantial and negatively affect wetland habitat functions.

The existing Himalayan blackberry patch at the pond site is a relatively small population and may have utility for wildlife habitat in its current location on the berm next to the pond. H. T. Harvey & Associates wildlife biologists have observed that Himalayan blackberry thickets can provide shaded shelter for California red-legged frog. In addition, we do not expect that this species would inhibit California tiger salamander reproduction in the pond unless it were to fully surround the pond, in which case it may affect dispersal of this species. We recommend that these factors be considered when making decisions about Himalayan blackberry removal.

The MMP describes that all species with a Cal-IPC rating of moderate or high will be considered invasive plant species. We continue to recommend that the monitoring methods for invasive plant cover be adjusted during future years as follows: include all species with a high Cal-IPC invasiveness rating; if species have a moderate Cal-IPC invasiveness rating, they should only be considered invasive if deemed by a qualified restoration ecologist to adversely affect habitat quality.

#### **C.7.3.5 Water for Cattle**

Compaction from cattle activity at the spring-fed concrete trough that is outside the cattle exclusion fencing at the pond mitigation site is undermining the trough; we recommend building up the area around the trough to

prevent any long-term damage. In addition, we recommend that when water is not available from the trough at the wetland mitigation site, water be transported to this trough from troughs or the water storage tank at the pond mitigation site, rather than allowing cattle to access the wetland mitigation site.

## C.8 Conclusions and Adaptive Management Activities Proposed

Year 4 was a very dry and below average water year. Therefore, the target hydraulic regime performance standards do not apply to Year 4 and the pond water depth did not exceed 2 feet on August 31, 2020. The pond and wetland mitigation sites continued to show minimal sedimentation from Year 1 and are geomorphically stable. Water was available year-round for cattle via the spring-fed trough at the pond mitigation site. Currently, County Parks is working with the rancher to develop an additional water connection from a large municipal tank in order to ensure consistently sufficient available water to meet cattle demand, and to help better disperse cattle, which tend to congregate near water sources.

Vegetation monitoring results from Year 4 indicate that the pond and wetland mitigation sites are meeting the project's objectives. Monitoring showed increasing levels of wetland vegetative cover at the wetland site and relatively stable wetland vegetation cover at the pond site. Wetland conditions were observed to be establishing quickly in the target wetland areas and wildlife were observed using wetland and aquatic habitats at the pond and wetland mitigation sites. Invasive plant species remained at low densities and below 5% across the pond and wetland mitigation sites. Aquatic predators remained similar to Years 1–3 and were effectively controlled primarily via seining and the gradual, natural drying of the pond.

All applicable Year 4 performance standards were achieved, with the exception of the California red-legged frog standard which calls for documented successful breeding in at least one monitoring year and the California tiger salamander performance standard which requires continued successful breeding in each year. California red-legged frogs have not been observed in Years 1-4. Because no individuals of this species have been recorded within 1.4 miles of the site (H. T. Harvey & Associates 2016), it is possible that the lack of California red-legged frog detections reflects the distance of the site from extant occurrences and failure of dispersants from those occurrences to have found this pond. In time, dispersing California red-legged frogs from other populations are likely to eventually find and colonize the pond. California tiger salamander breeding was observed in Years 1-3. However, no California tiger salamander breeding was observed in Year 4. California tiger salamanders may not have bred this year due to the very dry conditions, or breeding may not have been observed due to the delayed of larval surveys as a result of Covid-19 protocols.

H. T. Harvey & Associates recommends that ongoing management and maintenance activities continue in 2021 to increase the likelihood that the pond and wetland mitigation sites continue to meet the project's objectives and achieve the project's performance standards. These activities should include sediment removal from the springbox and constructed logjams at the pond mitigation site, aquatic predator control at the pond mitigation site, and invasive and nonnative plant species control and removal at both the pond and wetland mitigation sites.

## Section D. Photodocumentation

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**Photo 1. Year 1 Conditions at Photo Point 1a during Vegetation Monitoring at the Wetland Mitigation Site (August 8, 2017)**



**Photo 2. Year 4 Conditions at Photo Point 1a during Vegetation Monitoring at the Wetland Mitigation Site (May 13, 2020)**



**Photo 3. Year 1 Conditions at Photo Point 1b during Vegetation Monitoring at the Wetland Mitigation Site (August 8, 2017)**



**Photo 4. Year 4 Conditions Looking East from Photo Point 1b during Vegetation Monitoring at the Wetland Mitigation Site (May 13, 2020)**



**Photo 5. Year 1 Conditions at Photo Point 2 during Vegetation Monitoring at the Wetland Mitigation Site (August 8, 2017)**



**Photo 6. Year 4 conditions at Photo Point 2 during Vegetation Monitoring at the Wetland Mitigation Site (May 13, 2020)**



**Photo 7. Year 1 Conditions at Photo Point 3 during Vegetation Monitoring at the Wetland Mitigation Site (August 8, 2017)**



**Photo 8. Year 4 Conditions at Photo Point 3 during Vegetation Monitoring at the Wetland Mitigation Site (May 13, 2020)**



**Photo 9. Year 1 Conditions at Photo Point 4 during Vegetation Monitoring at the Wetland Mitigation Site (August 8, 2017)**



**Photo 10. Year 4 Conditions at Photo Point 4 during Vegetation Monitoring at the Wetland Mitigation Site (May 13, 2020)**



**Photo 11. Year 1 Conditions at Photo Point 5 during Vegetation Monitoring at the Wetland Mitigation Site (August 8, 2017)**



**Photo 12. Year 4 Conditions at Photo Point 5 during Vegetation Monitoring at the Wetland Mitigation Site (May 13, 2020)**



**Photo 13. Year 1 Conditions at Photo Point 6 during Mt. Hamilton Thistle Abundance Monitoring at the Pond Mitigation Site (August 8, 2017)**



**Photo 14. Year 4 Conditions at Photo Point 6 during Mt. Hamilton Thistle Abundance Monitoring at the Pond Mitigation Site (May 13, 2020)**



**Photo 15. Year 1 Conditions at Photo Point 7a during Vegetation Monitoring at the Pond Mitigation Site (August 8, 2017)**



**Photo 16. Year 4 Conditions at Photo Point 7a during Vegetation Monitoring at the Pond Mitigation Site (May 20, 2020)**



**Photo 17. Year 1 Conditions at Photo Point 7b during Vegetation Monitoring, Showing the Wetland Establishment Area at the Pond Mitigation Site (August 8, 2017)**



**Photo 18. Year 4 Conditions at Photo Point 7b during Vegetation Monitoring, Showing the Wetland Establishment Area at the Pond Mitigation Site (May 20, 2020)**



**Photo 19. Year 1 Conditions at Photo Point 7c during Vegetation Monitoring at the Pond Mitigation Site (August 8, 2017)**



**Photo 20. Year 4 Conditions at Photo Point 7c during Vegetation Monitoring at the Pond Mitigation Site (May 20, 2020)**



**Photo 21. Year 1 Conditions at Photo Point 8 during Vegetation Monitoring at the Pond Mitigation Site (August 8, 2017)**



**Photo 22. Year 4 Conditions at Photo Point 8 during Vegetation Monitoring at the Pond Mitigation Site (May 20, 2020)**



**Photo 23. Year 1 Conditions at Photo Point 9 during Vegetation Monitoring at the Pond Mitigation Site (August 8, 2017)**



**Photo 24. Year 4 Conditions at Photo Point 9 during Vegetation Monitoring at the Pond Mitigation Site (May 20, 2020)**



**Photo 25. Year 1 Conditions at Photo Point 10 during Vegetation Monitoring at the Pond Mitigation Site (August 8, 2017)**



**Photo 26. Year 4 Conditions at Photo Point 10 during Vegetation Monitoring at the Pond Mitigation Site (May 20, 2020)**



**Photo 27. Year 1 Conditions at Photo Point 11 during Vegetation Monitoring, Where the Hillside Seep Collection Ditch was Enhanced in the Seep Collection Area (August 8, 2017)**



**Photo 28. Year 4 Conditions at Photo Point 11 during Vegetation Monitoring, Where the Hillside Seep Collection Ditch was Enhanced in the Seep Collection Area (May 20, 2020)**



**Photo 29. Year 1 Conditions at Photo Point 12 during Vegetation Monitoring, Where the Hillside Seep Collection Ditch was Enhanced in the Seep Collection Area (August 8, 2017)**



**Photo 30. Year 4 Conditions at Photo Point 12 during Vegetation Monitoring, Where the Hillside Seep Collection Ditch was Enhanced in the Seep Collection Area (May 20, 2020)**



**Photo 31. Year 1 Conditions at Photo Point 13 during Vegetation Monitoring, at an Existing Seep in the Seep Collection Area That Was Not Disturbed During Construction (August 8, 2017)**



**Photo 32. Year 4 Conditions at Photo Point 13 during Vegetation Monitoring, at an Existing Seep in the Seep Collection Area That Was Not Disturbed During Construction (May 20, 2020)**



**Photo 33. Year 1 Conditions at Photo Point 14 during Vegetation Monitoring, Where Debris Jams Were Installed in the Seep Collection Area (August 8, 2017)**



**Photo 34. Year 4 Conditions at Photo Point 14 during Vegetation Monitoring, Where Debris Jams Were Installed in the Seep Collection Area (May 20, 2020)**



**Photo 35. Year 1 Conditions at Photo Point 15 during Vegetation Monitoring, with a Log Debris Jam Installed in the Seep Collection Area (August 8, 2017)**



**Photo 36. Year 4 Conditions at Photo Point 15 during Vegetation Monitoring, with a Log Debris Jam Installed in the Seep Collection Area (May 20, 2020)**



**Photo 37. Year 1 Conditions at Photo Point 16 during Vegetation Monitoring, at an Existing Seep in the Seep Collection Area That Was Not Disturbed During Construction (August 8, 2017)**



**Photo 38. Year 4 Conditions at Photo Point 16 during Vegetation Monitoring, at an Existing Seep in the Seep Collection Area That Was Not Disturbed During Construction (May 20, 2020)**



**Photo 39. Year 1 Conditions at Photo Point 17 during Mt. Hamilton Thistle Abundance Monitoring at the Pond Mitigation Site. (August 8, 2017)**



**Photo 40. Year 4 Conditions at Photo Point 17 during Mt. Hamilton Thistle Abundance Monitoring at the Pond Mitigation Site (May 13, 2020)**



**Photo 41. Year 1 Conditions at Photo Point 18 during Mt. Hamilton Thistle Abundance Monitoring at the Pond Mitigation Site. Note flowering Mt. Hamilton Thistle Individuals (August 8, 2017)**



**Photo 42. Year 4 Conditions at Photo Point 18 during Mt. Hamilton Thistle Abundance Monitoring at the Pond Mitigation Site (May 13, 2020)**



Photo 43. A Western Rattlesnake (*Crotalus oreganus*) near the Mt. Hamilton thistle population (May 13, 2020)



Photo 44. Mt. Hamilton Thistle in Flower (May 13, 2020)

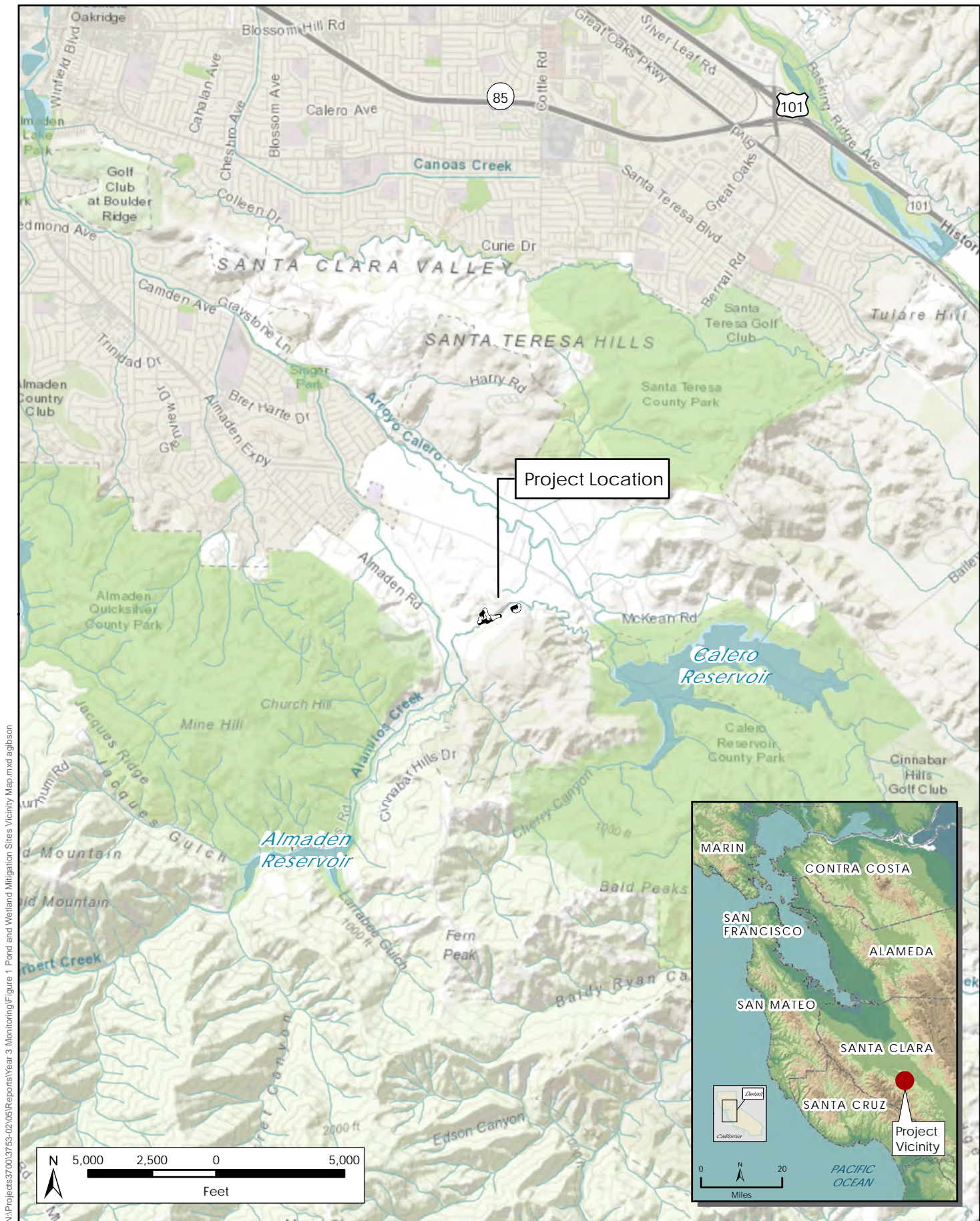


Photo 45. Mt. Hamilton Thistle Flower Head with a Bee (May 13, 2019)

## Section E. Maps

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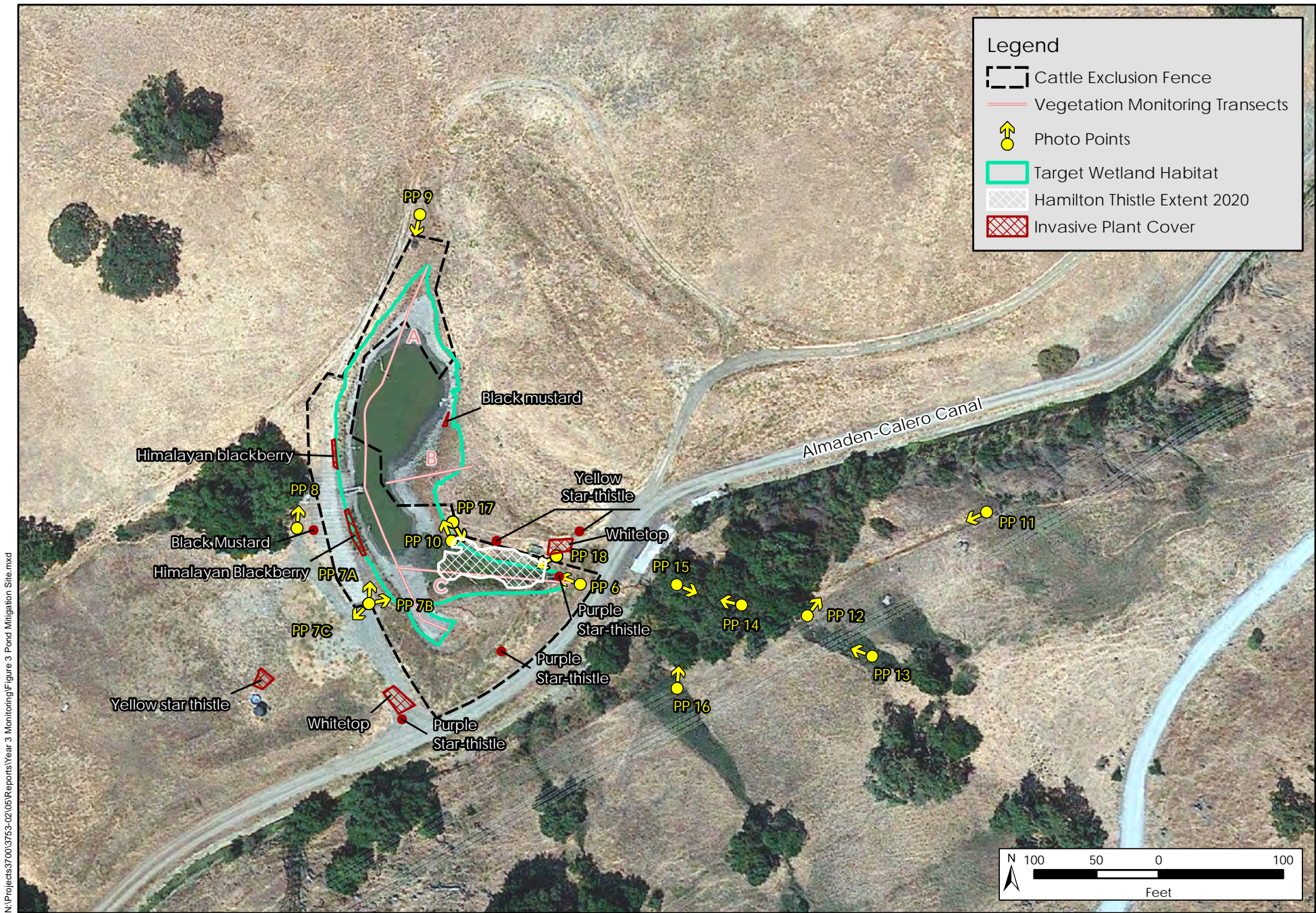
Figures 1–4 are included below.



N:\Projects\3700\3753-02\05\Reports\Year 3 Monitoring\Figure 1 Pond and Wetland Mitigation Sites Vicinity Map.mxd sglbison

Figure 1. Pond and Wetland Mitigation Sites Vicinity Map  
 Calero County Park Pond and Wetland Restoration Project  
 Year 4 Monitoring Report (3753-07)  
 December 2020





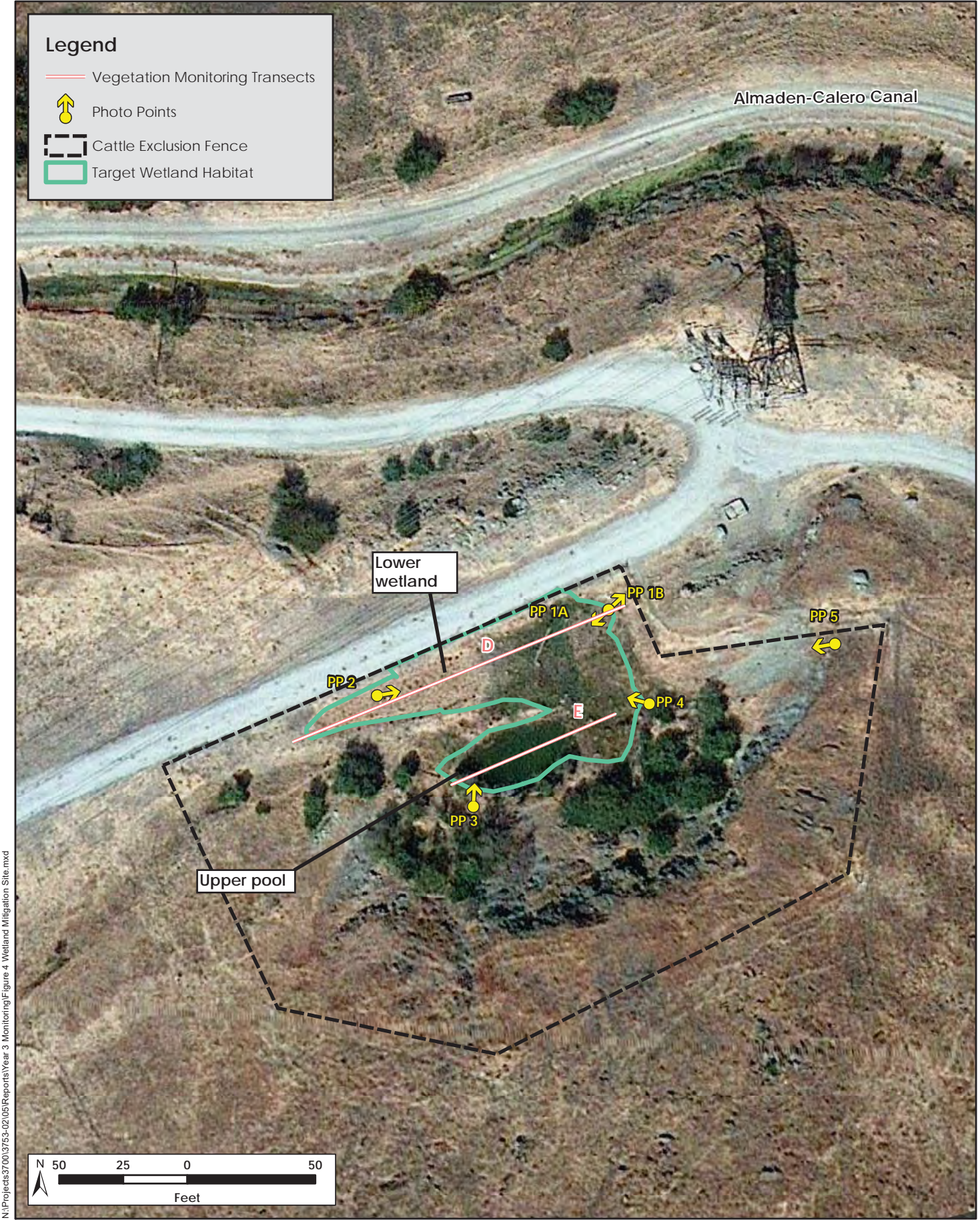
N:\Projects\3700\3753-02\05\Reports\Year 3 Monitoring\Figure 3 Pond Mitigation Site.mxd



**H. T. HARVEY & ASSOCIATES**

Ecological Consultants

Figure 3. Pond Mitigation Site  
 Calero County Park Pond and Wetland Restoration Project  
 Year 4 Monitoring Report (3753-07)  
 December 2020



N:\Projects\3700\3753-02\05\Reports\Year 3 Monitoring\Figure 4 Wetland Mitigation Site.mxd



**H. T. HARVEY & ASSOCIATES**  
Ecological Consultants

**Figure 4. Wetland Mitigation Site**  
Calero County Park Pond and Wetland Restoration Project  
Year 4 Monitoring Report (3753-07)  
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## Section F. References

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## Appendix A. Wetland Vegetation Monitoring Results

### Plant Species Observed by Wetland Vegetation Monitoring Site

Scientific Name	Common Name	Native Status	Wetland Indicator Status <sup>1</sup>	Average Percent Cover	
				Pond	Wetland
<i>Acmispon americanus</i>	Spanish clover	Native	UPL	6.3	0.1
<i>Avena fatua</i>	Wild oat	Nonnative	UPL	-	0.1
<i>Brassica nigra</i>	Black mustard	Nonnative	UPL	0.1	-
<i>Bromus carinatus</i>	California brome grass	Native	UPL	1.5	0.2
<i>Bromus hordeaceus</i>	Soft brome	Nonnative	FACU	0.1	0.1
<i>Carex barbarae</i> <sup>2</sup>	Santa Barbara sedge	Native	FAC	-	2.2
<i>Carex serratodens</i>	Two-tooth sedge	Native	FACW	2.3	14.9
<i>Cirsium fontinale</i> var. <i>campylon</i>	Mt. Hamilton thistle	Native	OBL	0.3	-
<i>Convolvulus arvensis</i>	Field bindweed	Nonnative	UPL	0.1	-
<i>Cynodon dactylon</i>	Bermuda grass	Nonnative	FACU	5.7	-
<i>Cyperus eragrostis</i>	Tall cyperus	Native	FACW	0.6	0.9
<i>Eleocharis macrostachya</i> <sup>2</sup>	Creeping spike rush	Native	OBL	14.8	27.7
<i>Elymus glaucus</i> <sup>3</sup>	Blue wildrye	Native	FACU	0.8	0.2
<i>Epilobium brachycarpum</i>	Annual fireweed	Native	FAC	1.3	-
<i>Epilobium ciliatum</i>	Fringed willowherb	Native	FACW	0.1	-
<i>Erythranthe guttata</i>	Yellow monkey flower	Native	OBL	0.4	0.2
<i>Festuca arundinacea</i>	Alta fescue	Nonnative	FACU	<0.1	4.8
<i>Festuca perennis</i>	Italian rye grass	Nonnative	FAC	8.1	2.6
<i>Frangula californica</i>	California coffeeberry	Native	UPL	-	4.3
<i>Geranium dissectum</i>	Cutleaf geranium	Nonnative	UPL	<0.1	-
<i>Geranium</i> sp.	Geranium	Nonnative	UPL	<0.1	-
<i>Helenium puberulum</i>	Sneezeweed	Native	FACW	0.3	-
<i>Hemizonia congesta</i>	Hayfield tarweed	Native	UPL	0.6	-
<i>Hordeum brachyantherum</i>	Meadow barley	Native	FACW	-	0.4
<i>Hordeum marinum</i>	Seaside barley	Nonnative	FAC	0.2	0.1
<i>Hordeum murinum</i>	Foxtail barley	Nonnative	FACU	1.4	-
<i>Juncus effusus</i> <sup>2</sup>	Bog rush	Native	FACW	2.6	0.1
<i>Juncus patens</i> <sup>2</sup>	Common rush	Native	FACW	4.5	6.6

Scientific Name	Common Name	Native Status	Wetland Indicator Status <sup>1</sup>	Average Percent Cover	
				Pond	Wetland
<i>Juncus xiphioides</i> <sup>2</sup>	Iris leaved rush	Native	OBL	0.2	7.9
<i>Lepidium draba</i>	Whitetop	Nonnative	UPL	0.2	-
<i>Lotus corniculatus</i>	Bird's foot trefoil	Nonnative	FAC	0.0	-
<i>Lysimachia arvensis</i>	Scarlet pimpernel	Nonnative	FAC	0.3	0.3
<i>Lythrum hyssopifolia</i>	Hyssop loosestrife	Nonnative	OBL	0.3	-
<i>Medicago polymorpha</i>	California bur clover	Nonnative	FACU	0.1	-
<i>Melilotus indicus</i>	Annual yellow sweetclover	Nonnative	FACU	4.7	-
<i>Persicaria hydropiperoides</i>	Water pepper	Native	OBL	0.3	-
<i>Phalaris aquatica</i>	Harding grass	Nonnative	FACU	2.2	-
<i>Polypogon monspeliensis</i>	Rabbitsfoot grass	Nonnative	FACW	17.3	6.9
<i>Pseudognaphalium luteoalbum</i>	Jersey cudweed	Nonnative	FAC	0.1	-
<i>Rubus armeniacus</i>	Himalayan blackberry	Nonnative	FAC	1.1	-
<i>Rumex pulcher</i>	Fiddle dock	Nonnative	FAC	0.8	0.4
<i>Scirpus microcarpus</i>	Panicled bulrush	Native	OBL	-	1.2
<i>Sisyrinchium bellum</i>	Western blue eyed grass	Native	FACW	1.7	1.3
<i>Sonchus asper</i>	Spiny sowthistle	Nonnative	FAC	0.4	-
<i>Sparganium eurycarpum</i>	Broadfruit bur reed	Native	OBL	0.7	-
<i>Stipa pulchra</i>	Purple needle grass	Native	UPL	2.6	-
<i>Taraxacum officinale</i>	Common dandelion	Nonnative	FACU	0.5	-
<i>Torreyochloa pallida</i> var. <i>pauciflora</i>	Mannagrass	Native	OBL	-	1.2
<i>Trifolium hirtum</i>	Rose clover	Nonnative	UPL	0.6	-
<i>Veronica anagallis-aquatica</i>	Water speedwell	Nonnative	OBL	1.5	-
<b>Total Vegetation</b>				<b>87.6</b>	<b>84.8</b>
<b>Total Wetland Vegetation</b>				<b>60.1</b>	<b>75.0</b>

<sup>1</sup> Wetland vegetation cover is defined as the combined cover of native and nonnative species with a wetland indicator status of facultative (FAC), facultative wetland (FACW), or obligate (OBL) based on the Arid West 2016 Regional Wetland Plant List (USACE 2018). Species with a facultative upland (FACU) and upland (UPL) wetland indicator status are not considered wetland species.

<sup>2</sup> Species was included in the project planting palette

<sup>3</sup> Species was included in the project seed mix

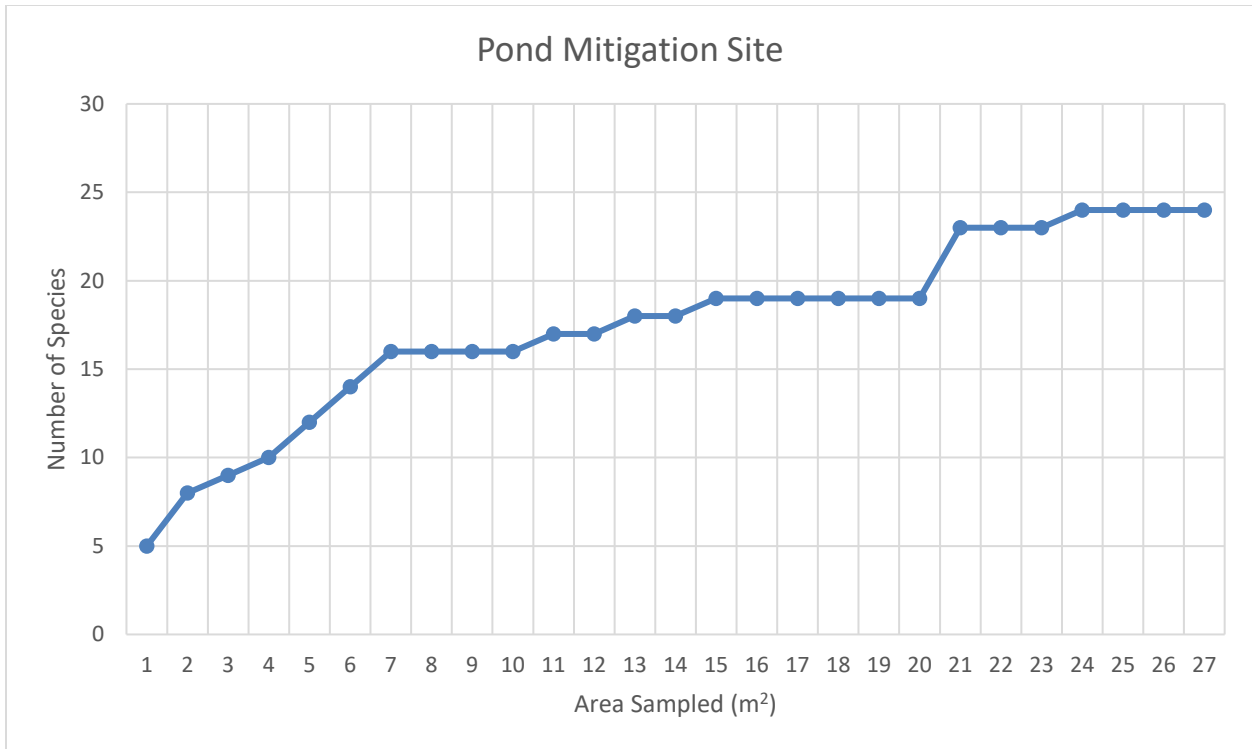


Figure A-1. Species Accumulation Curve for the Pond Mitigation Site

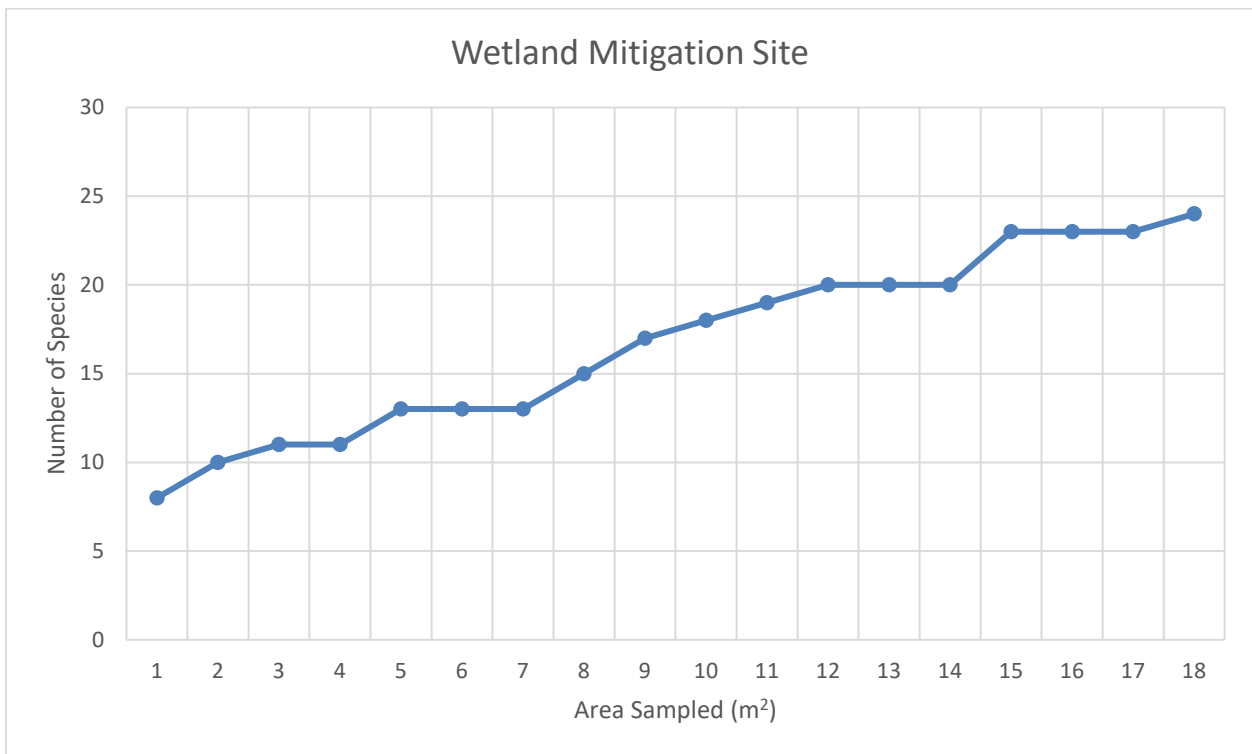


Figure A-2. Species Accumulation Curve for the Wetland Mitigation Site

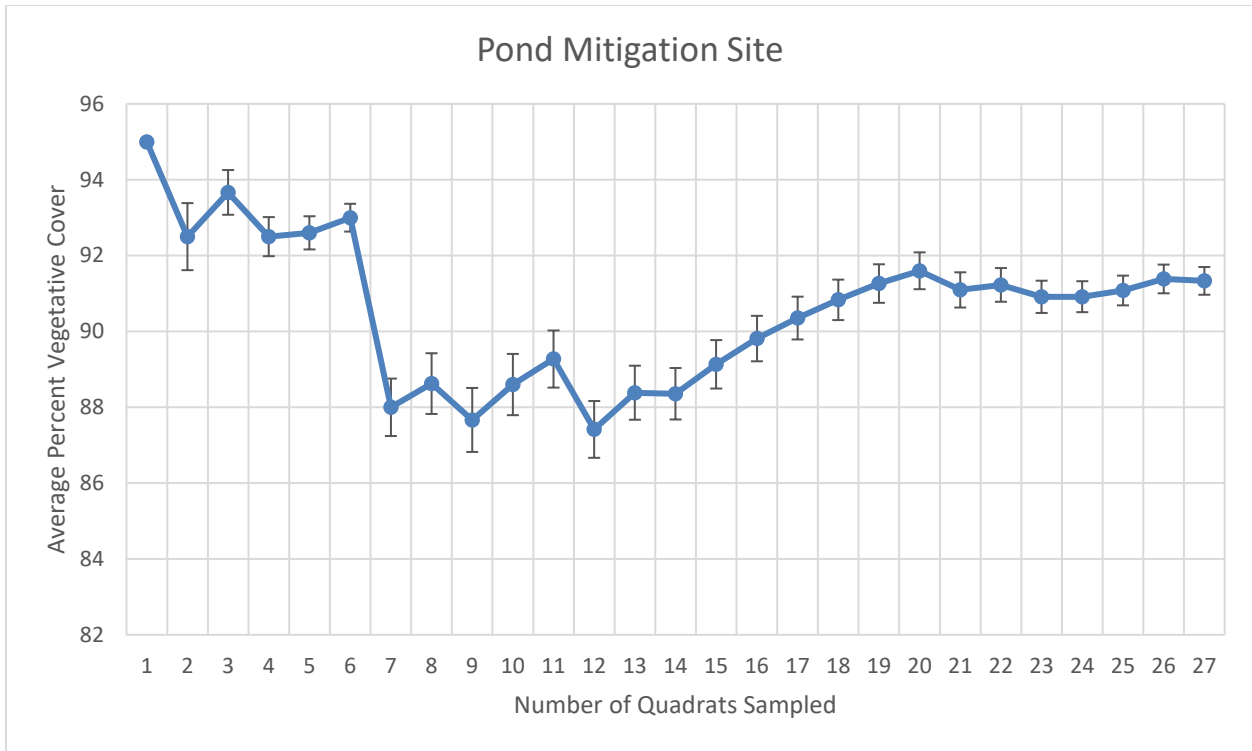


Figure A-3. Average Cover ( $\pm$  Standard Error of the Mean) as a Function of the Number of Quadrats Sampled at the Pond Mitigation Site

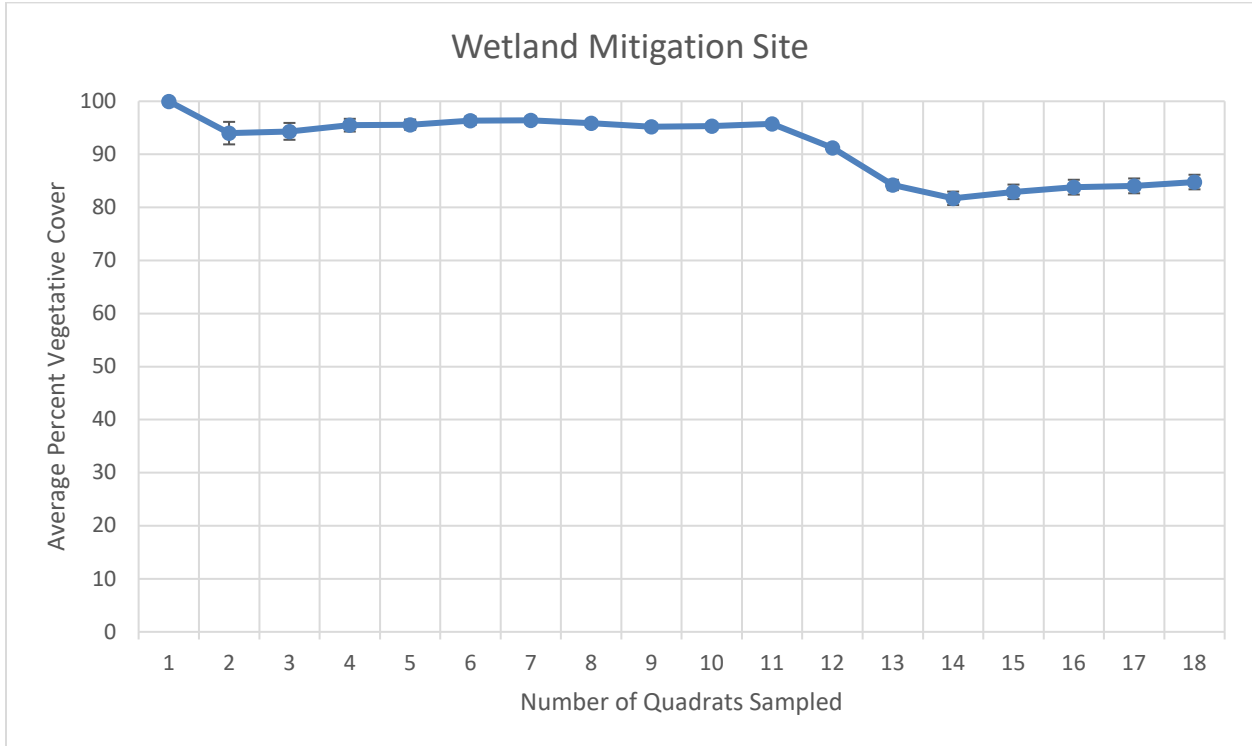


Figure A-4. Average Cover ( $\pm$  Standard Error of the Mean) as a Function of the Number of Quadrats Sampled at the Wetland Mitigation Site

Sampling intensity was determined to be sufficient for the pond and wetland mitigation sites by verifying that the average cover values were stable relative to the number of samples collected (Kershaw 1973). The average percent cover dropped substantially and standard error rose at quadrats 12 and 13 due to a lack of vegetative cover in open water. With this information, we concluded that the sampling effort was representative of the site and sufficient based on low level of standard error in our results.

## Appendix B. Year 4 Hydrologic Monitoring Report

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## TECHNICAL MEMORANDUM

<b>Date:</b>	November 19, 2020
<b>To:</b>	Kate Drake, Max Busnardo (HTH)
<b>From:</b>	Gavin Downs, Chris Campbell, Sam Diaz
<b>Project:</b>	15-1030-4 – Calero Mitigation Site Monitoring
<b>Subject:</b>	Year 4 Monitoring Report

### 1 INTRODUCTION

To support H.T. Harvey and Associates (HTH) during the long-term and maintenance monitoring of the Calero County Park Pond and Wetland Restoration Project, cbec eco-engineering (cbec) provided ongoing hydrologic monitoring at the pond and wetland mitigation sites. This technical memorandum documents monitoring efforts for Year 4.

### 2 LONG-TERM MONITORING

cbec continuously measured pond and wetland water levels, direct rainfall, and pond seep inflows to monitor the hydrologic regime at the pond and wetland mitigation sites. Figure 1 shows the location of the gages and monitoring transects.

The hydrologic regime at both sites was monitored with the goal of observing water levels and inflows to understand if the hydrologic performance standards were being met. Those standards are: (1) at least two feet of water in the pond through August 31 for average to above average precipitation to support California red-legged frog and California tiger salamander breeding; and (2) minimal sedimentation at both mitigation sites documented through repeat topographic cross section surveys.

#### 2.1 HYDROLOGIC REGIME

To monitor the hydrologic regime, water level loggers were installed at four locations: pond outlet structure (including a barometer); pond seep trough; wetland weir; and upper wetland. Additionally, a weather station installed at the top of the pond outlet structure recorded air temperature, relative humidity, and direct rainfall using a tipping bucket. Monitoring equipment were originally installed on January 27, 2017.

A rating curve was previously established to define the relationship between seep trough water levels and seep trough outflow to the pond. This rating curve was used to estimate seep contributions to the pond throughout the monitoring year. Additional flow measurements have been collected to verify the rating curve.

**Table 1. Seep inflow rating curve**

Height (ft)*	WSE (ft)	Time (sec)	V (ml)	Rate (cfs)	Notes
0.6	518.70	15	0	0.0000	just below bottom of outlet
0.58	518.72	15	125	0.0003	
0.55**	518.75	15	700	0.0022	near bottom of outlet
0.53	518.77	15	2150	0.005	
0.5	518.80	15	3725	0.009	~middle of outlet
0.48	518.82	15	4750	0.011	
0.46	518.84	15	6700	0.016	just below top of outlet
0.44	518.86	15	9325	0.022	above top of outlet
0.35	518.95	15	12000	0.028	lip of trough

\*measured from top of stilling pipe

\*\*average of three measurements

To understand local water year (WY) conditions, precipitation data near Gilroy was tabulated for a continuous 63-year period of record for WYs 1958 through 2020 and scaled to the project site. Table 2 includes the most current data since WY 2010 and a comparison to local precipitation measured at the pond in WYs 2017, 2018, 2019, and 2020. In Year 1 (i.e., WY 2017), precipitation was above normal and classified as a wet WY type. In Year 2, (i.e., WY 2018), precipitation was well below normal and classified as a very dry WY type and was the second driest WY behind WY 2014. In Year 3, (i.e., WY 2019), precipitation was above normal and classified as a wet WY type; it was the wettest year since monitoring began post-construction. In Year 4 (i.e., WY 2020), the precipitation was classified as very dry and was the driest year of the last 30 years.

The following field adjustments have been made to the gages in previous monitoring years and are reflected in the data. In mid-July of WY 2017 (likely 7/17/2017), the water level logger snapped in the upper wetland, sinking to the bottom. Water levels were adjusted with a -0.05 ft offset to reflect the logger elevation change in mid-July. All water level gages were restrung with stainless steel wire on October 5, 2017. This caused a second datum shift in the upper wetland gage of +0.22 ft, which was confirmed by a manual measurement at the time of download and measured water levels were adjusted accordingly.

In Year 3, monitoring and maintenance visits were made on March 22<sup>nd</sup>, July 30<sup>th</sup>, November 1<sup>st</sup>, and November 26<sup>th</sup> of 2019. During the July 30, 2019 monitoring visit, the pond water level logger cap broke during recovery, where it fell down the conduit and was stuck in several inches of sediment. The pond gage was not recovered until November 26, 2019 whereby it was verified that the pond gage was stuck in

several inches of sediment. No correction was needed in the water level data. Due to the sedimentation in the stilling well, the slotted PVC well casing was replaced with new casing, wrapped in filter fabric to reduce sedimentation within the stilling well, and the pond gage was restrung on November 26, 2019. Further, the pond gage was exposed to moisture, which created artificial noise in the output, which was filtered by applying a moving average. Finally, a housing screen for the pond outlet valve and a staff plate were installed on the outlet structure by Confluence Restoration on November 12, 2019.

In Year 4, visits to monitor and maintain the project site were made on April 14<sup>th</sup> and October 9<sup>th</sup> of 2020. No further issues or corrections with the surface water gages were noted this year; however, the weather station that contains the rain and temperature gages failed. The data for these gages were lost upon attempts to recover the data due to issues with the microstation electronic board. Currently, steps are being taken to replace the current weather station setup.

**Table 2. Annual precipitation totals by water year**

Water Year	Gilroy COOP (inch) <sup>[1]</sup>	Gilroy Scaled (inch) <sup>[2]</sup>	Project Rain Gage (in)	Water Year Type <sup>[3]</sup>
2010	25.60	30.32	---	Wet
2011	22.08	26.15	---	Normal
2012	11.25	13.32	---	Dry
2013	14.69	17.40	---	Normal
2014	9.16	10.85	---	Very Dry
2015	14.69	17.40	---	Normal <sup>[8]</sup>
2016	17.96	21.27	---	Normal
2017	22.24	26.34	13.52 <sup>[4]</sup>	Wet
2018	9.41	11.14	8.53 <sup>[5]</sup>	Very Dry
2019	23.41 <sup>[6]</sup>	27.72	29.67 <sup>[7]</sup>	Wet
2020	8.21	9.72	NA <sup>[9]</sup>	Very Dry
30-Minimum	8.21	9.72	8.53	
30-Maximum	34.23	40.54	29.67	
30-Average	18.98	22.48	17.24	

Notes:

[1] Gilroy COOP (043417-4) precipitation for WYs 1958 through 2019 (i.e., 62 years)

[2] Gilroy precipitation scaled to project site based on PRISM (OSC, 2012) 30-year rainfall normal using a scaling factor of 1.1842

[3] WY type (very wet, wet, normal (average), dry, very dry) designated based on reasonable exceedance probabilities (<0.10, ≥0.10, ≥0.33, ≥0.67, ≥0.90)

[4] Precipitation for WY 2017 is under reported as project rain gage was installed on 1/27/2017

[5] Project rain gage failed on 5/26/2018 and was not fixed until 11/7/2018; rain gage was recalibrated upon redeployment

[6] Rainfall data was missing for the Gilroy COOP gage for the months of November, December, March, April, and May for WY 2019. To estimate the missing data, monthly values for prior years (2008 to 2018) were correlated to San Jose COOP (047821).

- [7] Rainfall data was under reported as gage failed 3/22/2019 and not fixed until 11/26/2019
- [8] By addition of WY 2020 data, the WY type for WY 2015 changed as this WY is within 0.01 inches of being classified as Dry.
- [9] Rain gage on site fully failed and data was not recoverable.

### 2.1.1 POND MITIGATION SITE

As observed during Year 1 (cbec, 2017), the pond maintained maximum capacity from January through early May when above normal (i.e., wet WY) precipitation and seep flows were contributing to the pond (Figure 2). The pond water levels drew down at a consistent rate starting in mid-May through mid-September, which correlates to the dry season when the seep inflow decreases. By September 19<sup>th</sup>, 2017, the pond was emptied to manage for invasive species (crayfish and bullfrogs).

In Year 2, water levels in the pond reached a maximum at the end of March and steadily drew down thereafter, but at an increased rate beginning in June due to the rancher pumping from the seep trough. Pond water levels fell below the two-foot depth target early on July 12, 2018, and eventually became dry on August 26, 2018. The combination of a very dry WY and the rancher pumping from the water trough likely contributed to the pond drying out earlier than the success criteria.

In Year 3, the pond maintained maximum capacity from January through mid-April when above normal (i.e., wet WY) precipitation and seep flows were contributing to the pond (Figure 2). The pond water levels drew down at a consistent rate starting in early May through early September, which correlates to the dry season when the seep inflow decreases. On September 9, 2019 seep flow was completely diverted away from the pond to the water storage tank, which caused a slightly sharper drop in water level. Then, on October 30, 2019, the pond was emptied to manage for invasive species (crayfish and bullfrogs).

In Year 4, the pond never reached maximum capacity, but the maximum water level was observed on April 7<sup>th</sup>, 2020 (Figure 2). This peak occurred at the only time of the year when the seep flow sustained maximum estimated flows. However, this is lowest peak water level since the start of monitoring due to recording the lowest annual rainfall depth in the past 30 years. Draw down of the pond started on a similar trajectory to that of Year 2, but again, the draw down rate increased with cattle access to the water trough. The seep flow was diverted on November 3<sup>rd</sup>, 2020, but the pond completely dried out on July 26<sup>th</sup>, 2020.

Regarding hydrologic performance standards, the pond exceeded a target water depth of at least two feet (i.e., 4.8 feet) through the end of August in Year 1. In Year 2, the water depth fell below the hydrologic performance standard. The pond did not fill to capacity and did not meet the two-foot water depth target for the end of August. As shown by Figure 2, there was an increase in the draw down rate of the pond water level at the beginning of June that corresponds to the period of time that the rancher started pumping from the water trough to water cattle. In addition to this increase in draw down rate, the fact that Year 2 was a very dry WY or well below normal (average) conditions largely contributed to not meeting the two-foot water depth target at the end of August. Year 3 did meet the hydrologic performance standard (i.e., 2.49 ft). As shown by Figure 2, there was an increase in the draw down rate

of the pond water level at the end of June that corresponds to the period of time that the rancher started pumping from the water trough to water cattle. Year 4 did not meet the hydrologic performance standards because it was a very dry WY or well below normal (average) conditions. This is due to it being the lowest recorded water year rainfall total in the last 30 years.

### 2.1.2 WETLAND MITIGATION SITE

As observed during Year 1 at the wetland site (Figure 3), the lower wetland was at maximum capacity through May and water levels decreased thereafter as seep inflow and rainfall decreased in the dry season. Water levels have been below the outlet sill invert elevation and no water has been diverted from the lower wetland to the cattle trough since June 2017 for the remainder of Year 1.

In Year 2, the lower wetland water levels remained low and were responsive to two small rainfall events occurring in January and March/April. It should be noted that the lower wetland gage was reading dry for most of Year 2 (i.e., water levels below the gage). Despite the gage reading dry, moist soil conditions were still observed in portions of the lower wetland during dry season visits on 10/3/2018 and 11/7/2018. The moist conditions were in part created by flows over the upper wetland berm to the lower wetland. Even with the upper wetland water levels being consistently elevated throughout the first two years, the flows over the upper wetland berm were likely reduced in Year 2 due to the drier conditions, and coupled with well below normal precipitation, the lower wetland was significantly drier than Year 1. It should be noted that seep flow downslope of the lower wetland has been repeatedly observed (including the 10/3/2018 field visit) on the exposed hillside on approach to the Almaden-Calero Canal. It is hypothesized that the inflow to the lower wetland during these drier conditions is being conveyed subsurface. A potential opportunity to enhance the hydroregime in the lower wetland would be to move the upper wetland berm spill location from the northeast side to the northwest to spill directly onto the portion of the expanded lower wetland underlain by bentonite. This has the potential to increase residence time in the lower wetland and improve vegetation response.

Observations from Year 3 revealed that the upper wetland pond generally maintained full capacity for the entire year. On October 16, 2018, the pond was drained for predator control but quickly refilled due to seep inflow. The lower wetland gage read dry outside of the time period between January 6, 2019 to April 9, 2019. However, moist soil conditions were still observed downstream of the pond spill over toward the weir on field visits as late as November 1, 2019. Also, seep flows that surface on the hillside approach to the Almaden-Calero Canal were still being observed. As stated in the previous year's monitoring report, the lower wetland hydroregime could be enhanced by moving the spill over location of the upper pond to the northwest.

In Year 4, the upper wetland pond remained above the berm spill over elevation until June 28<sup>th</sup>, 2020, where it dropped below the berm elevation for the first time since monitoring started. However, the water level only dropped below the berm by no more than ~0.03 ft (Figure 3). The earthen outlet of the pond was still heavily saturated, which indicates water was likely still seeping into the lower wetland area

adjacent. The constructed portion of the lower wetland was again reading dry for most of the year<sup>1</sup>, with wet stints in December and April. Regardless, other areas of the lower wetland remained saturated without standing water as late as the field visit on October 9<sup>th</sup>, 2020 despite the very dry water year conditions.

## 2.2 SEDIMENTATION AND GEOMORPHIC STABILITY

In Year 1, cbec surveyed a total of 8 transects (i.e., six for the pond site and two for the wetland site) and compared these to the as-built surfaces to monitor sedimentation at both sites. The pond transects generally showed little to no change between the as-built survey and current conditions. The wetland transects generally showed elevations 0.4 ft (4.8 inches) below as-built elevations, which were likely attributed to both cow and human disturbances within the wetland site and potential settlement of soils that were minimally compacted during construction.

In Year 2, cbec did not resurvey the 8 transects per the monitoring plan schedule. Rather, general observations are provided. At the pond, after it had dried out, potential sedimentation was observed at the lowest point of the pond adjacent to the gated culvert at the base of the outlet structure. The pond bed was approximately 0.7 feet above the invert of the gate. A sample hole showed that there was approximately 0.8 feet of soil on top of the bentonite layer. Considering that the bottom of the pond was designed to have 0.5 feet of soil placed over the bentonite, there has been approximately 0.1 feet of sedimentation accompanied by potential swelling of the bentonite. Given that this was the first year that cattle were allowed at the pond, the sedimentation in the deepest portions of the pond may be due to increased suspended sediment generated by the cattle at water's edge. Sedimentation will be confirmed in the Year 3 transect surveys.

In Year 3, cbec resurveyed the 8 transects from Year 1 (Figures 4-7). An effort to maintain the same stationing was made to accurately compare from year to year. Cross sections show good agreement between Year 1 and Year 3. As observed in Year 2, the pond sight did see minor sedimentation. Sedimentation up to 1.5 ft occurred on Alignment B (Figure 4) and was localized to the pond outlet structure, likely sourced from cattle and human activity in the wet, unvegetated portions of the pond. Additionally, there was minor slumping on Alignment B – North (Figure 5) in 2017; however, the slumping has since been stabilized by the emergence of vegetation on the slope. Alignment D (Figure 6) was changed since the as-built survey. The upper wetland site was generally unchanged but did see some sedimentation in the ponded portion (~0.6 ft compared to as-built survey).

In Year 4, cbec did not resurvey the 8 transects per the monitoring plan schedule. Similar to Year 2, general observations were made in regard to the geomorphic stability of the project. Sedimentation continues to gather in lowest sections of the pond near the outlet structure. Given the approximately 0.7 ft of sedimentation that was observed in Year 2 and the maximum of 1.5 ft that was observed in Year 3, there has been little to no appreciable sedimentation in Year 4 (Figure 8). Contribution of sediment from cattle

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<sup>1</sup> Observations indicate that the water in the lower wetland tends to be held at elevations below the gage. To better understand the water regime in the lower wetland, the gage will be recessed into the soil to try to capture this data.

grazing has likely continued and maintenance of the outlet structure has also caused a small, localized pile of sediment (Figure 8). Areas that previously experienced slumping have remained unchanged. No sources or evidence of sedimentation were noted in the pond of the upper wetland. Banks on the lower basin of the upper wetland were cracking due to the clay's expansion and contraction. This is an expected characteristic of the clay but will be continued to be monitored for signs of slumping.

Overall, these results demonstrate that the pond and wetland mitigation sites continued to show minimal sedimentation from Year 1 and are geomorphically stable.

### 3 MAINTENANCE MONITORING

On a quarterly basis, cbec conducted qualitative observations and photo documentation of site conditions. In Year 1, maintenance items included repairing the slumped western slope of the pond berm north of the outlet culvert and increasing the weir elevation of the pond outlet structure to match the design; both repairs were observed to be in good condition in Year 2. Also, in Year 1, a portion of the pond bank slope slumped just north of the pond outlet structure on Alignment B – North with the decision to leave as-is; it appears to be revegetating. In Year 2, there were no significant maintenance items.

Based on observations through Year 4-4, cbec suggests the following annual maintenance and monitoring considerations:

- Annual maintenance:
  - Clean debris from logjams before coming rainy season and check that flow is not undermining the logs. Repair if necessary.
  - Clean out the spring box and uphill seep channels to optimize seep flow to the pond.
  - Clean out the pond troughs once a year in the Fall to reduce accumulated silt.
  - Reduce human impacts to pond side slopes and bentonite liner during invasive species removal while pond soils are saturated.
- Monitoring considerations:
  - Erosion of the roadway / trail upslope from the springbox caused deposition throughout the drainage all the way downslope to the springbox during WY 2019. Continuing to clean out the trail gravel from the site upstream of the springbox would be advised. Also, consider suggesting best management practices and roadway construction techniques to County Parks on the roadway / trail to minimize roadway erosion and subsequent sedimentation of road base into the wetlands leading to the springbox.
  - The constructed portion of the lower wetland was not heavily saturated along its length in Year 2. Consider redirecting the upper wetland spill-over location to the northwest corner of the upper wetland so the water has a longer flow path through the lower wetland to enhance the hydroregime and vegetation response. Given that Year 4 was a very dry condition, this consideration should be re-evaluated after Year 5 inundation and vegetation response.

- Ground squirrel burrowing activities should continue to be monitored along the pond berm, especially in drier WYs when pond water levels are lower, to confirm that the berm integrity is not being compromised.
- Monitor integrity of log-jams as their decay becomes more apparent and replace as needed. Currently, the outer layers of the logs (bark) are starting to split (Figure 9).
- The gage that continuously measures water levels at the outlet structure in the lower wetland mitigation site was dry during much of Year 2 and Year 3. It is presently installed on the outlet structure with its measurement point just above the sill of the outlet structure. The gage should be relocated to the side of the outlet structure and recessed into the soil to better capture the entire water level drawdown.
- Replace faulty rain gage with telemetry capable gage. This will allow real time troubleshooting of gage issues and minimize any potential for lost data.

## REFERENCES

cbec. 2017. Calero Mitigation Site Monitoring: Year 1 Monitoring Report.

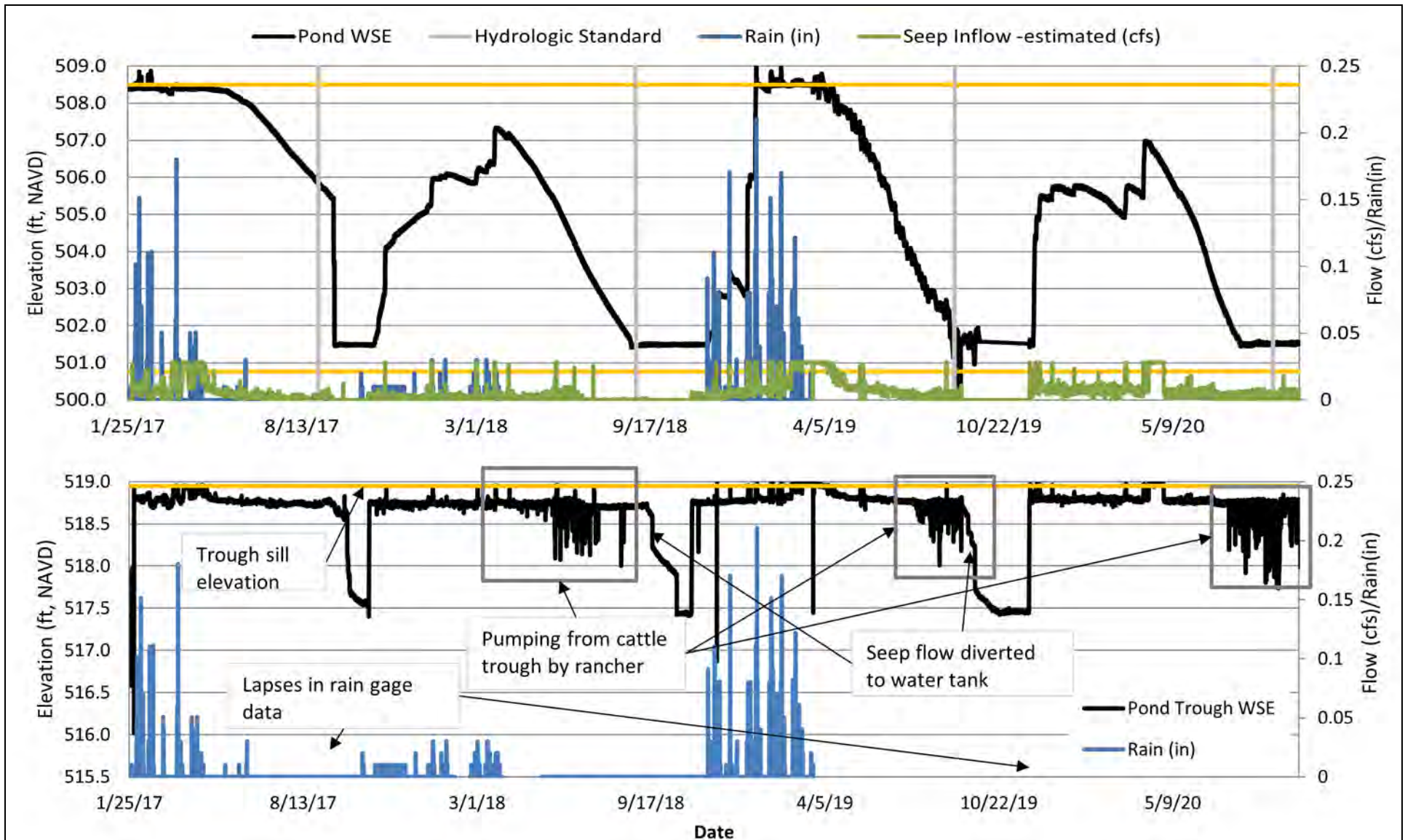
[OCS] Oregon Climate Services at Oregon State University. 2012. Average Monthly or Annual Precipitation 1981-2010.

**FIGURES**



Notes:





Notes: Seep inflows are estimated using rating curve established by measuring trough water levels and outflows. When the trough was full the highest recorded seep inflow was 0.028 cfs. In reality, seep inflows can be greater than 0.028 cfs when the trough capacity is exceeded.



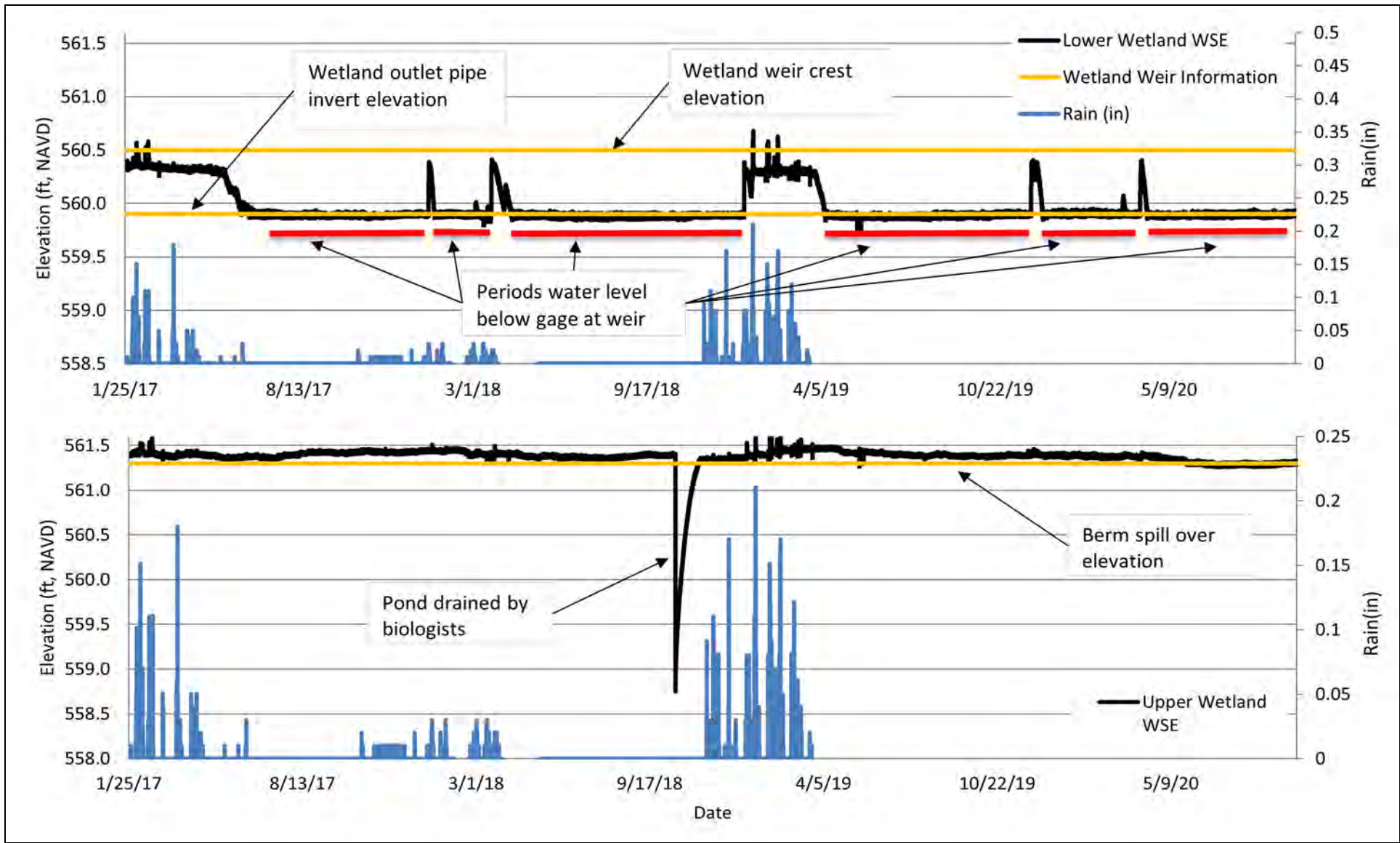
Calero Mitigation Site Monitoring

**Pond water levels**

Project No. 15-1030-4

Created By: GD

**Figure 2**



Notes:  
 7/17/2017 and 10/4/2018– Estimated dates when level logger cable was changed, water levels adjusted to account for elevation change of logger.

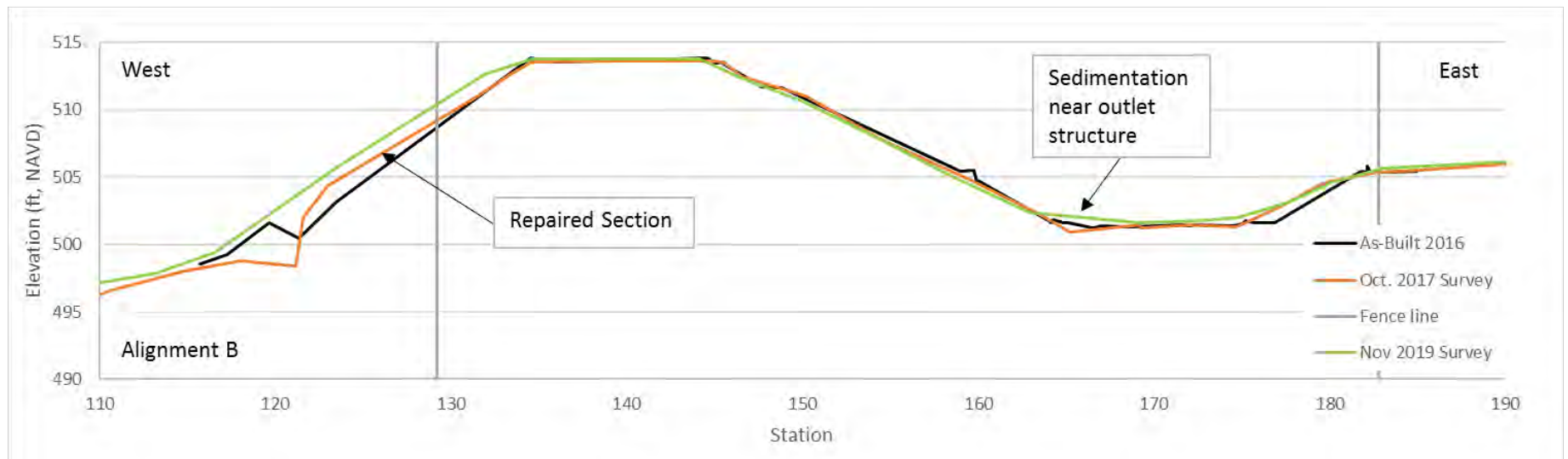
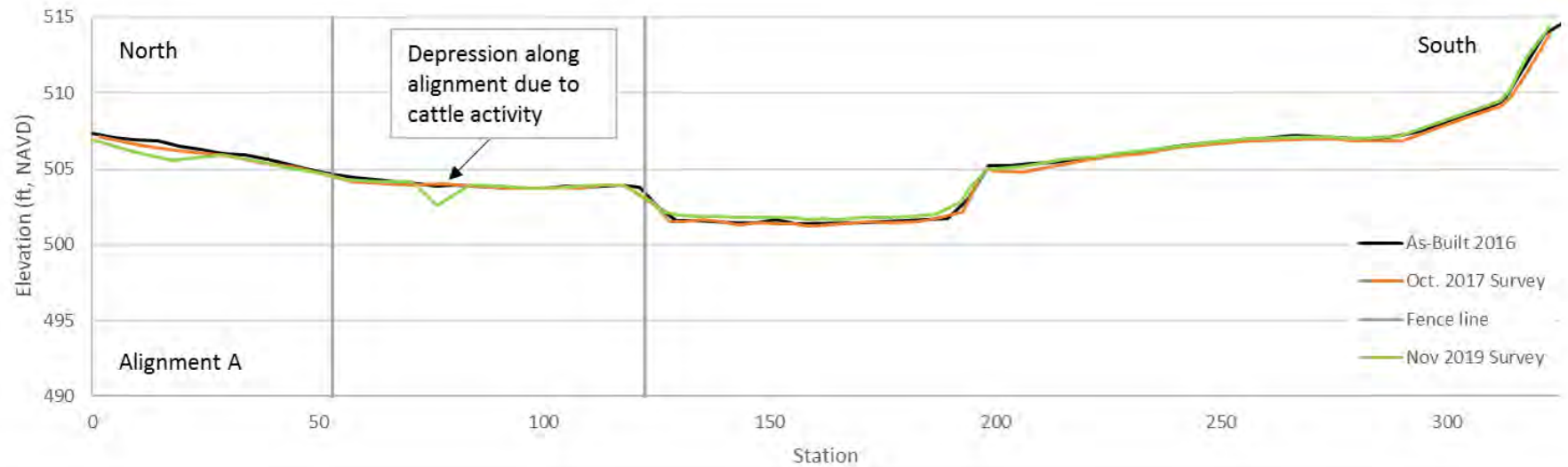


Calero Mitigation Site Monitoring  
**Wetland water levels**

Project No. 15-1030-4

Created By: GD

**Figure 3**



Notes: As-built elevations (black line) derived from as-built surface. Berm slump fixed after Year 1 at stations 115-123. Maximum sedimentation occurs on Alignment B at station 165.

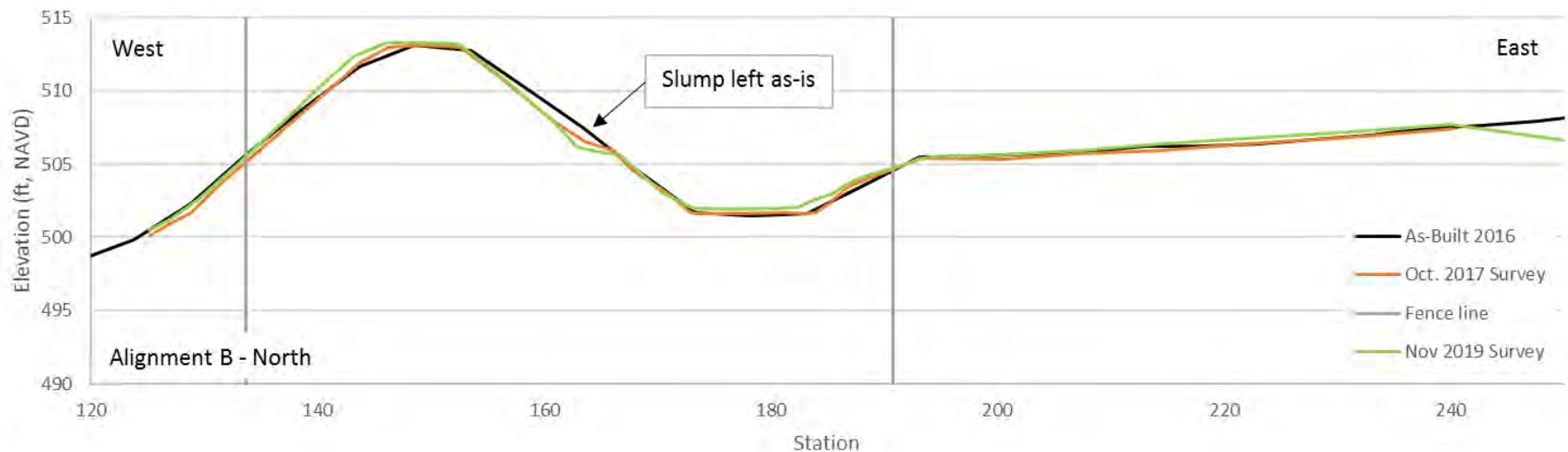
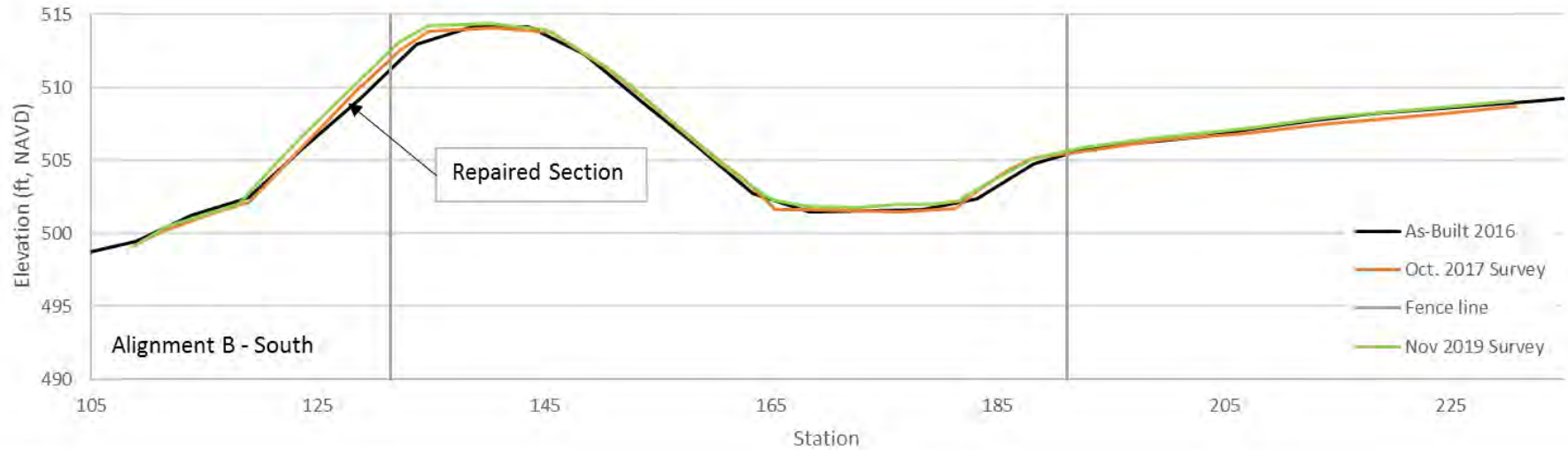


Calero Mitigation Site Monitoring  
**Alignment A and B**

Project No. 15-1030-4

Created By: GD

**Figure 4**



Notes: As-built elevations (black line) derived from as-built surface. Minor bank slump on Alignment B – North at station 165.

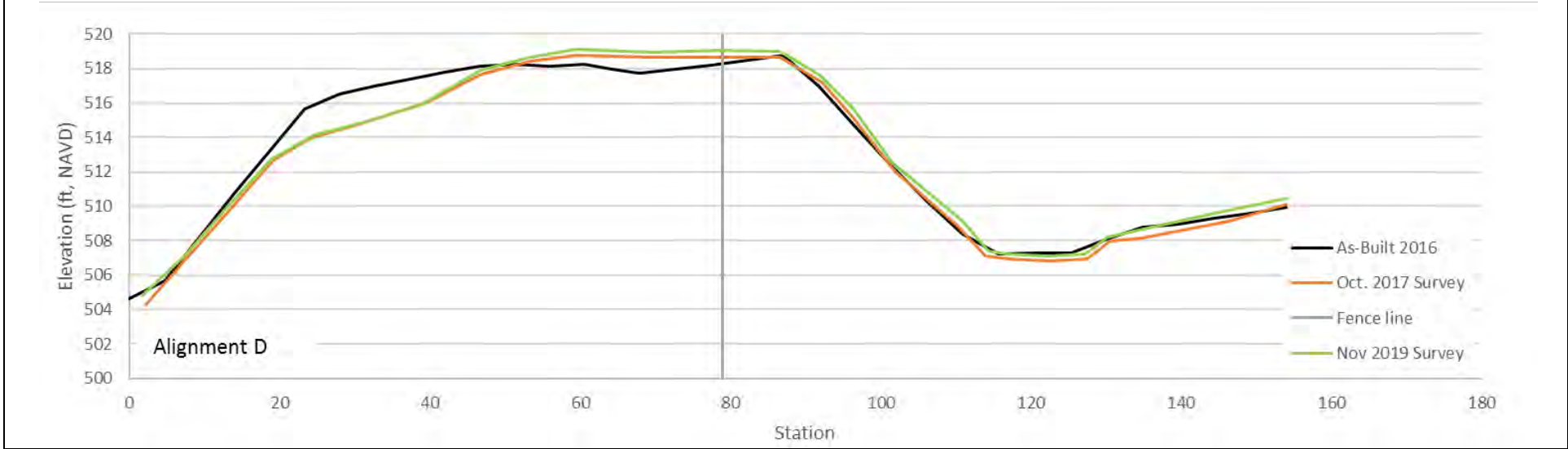
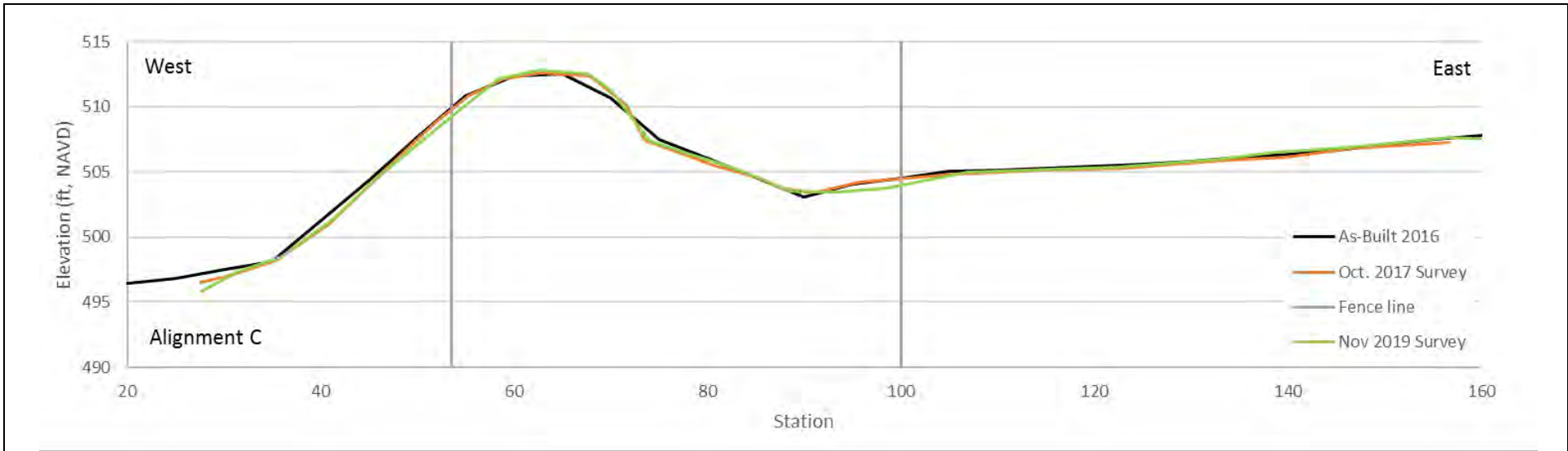


Calero Mitigation Site Monitoring  
**Alignment B North and South**

Project No. 15-1030-4

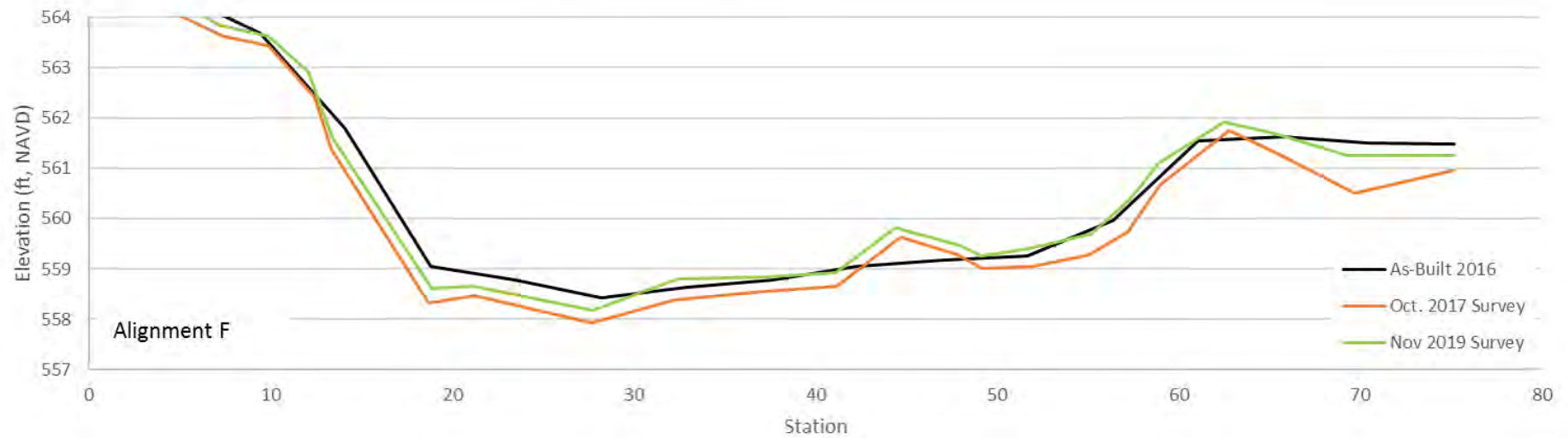
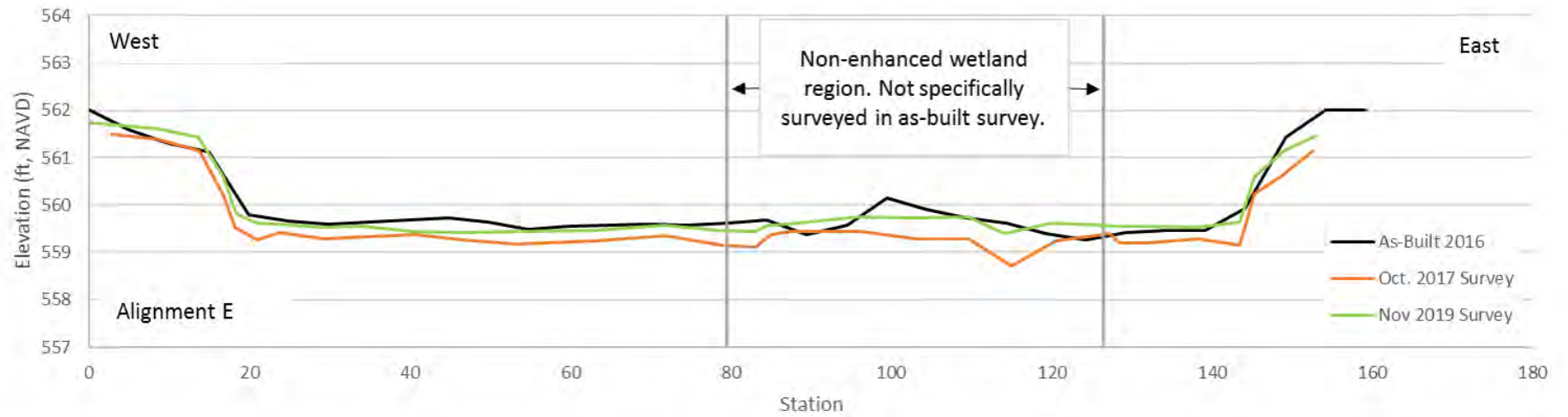
Created By: GD

**Figure 5**



Notes: As-built elevations (black line) derived from as-built surface. Change on Alignment D stations 20-45.





Notes: As-built elevations (black line) derived from as-built surface. Sedimentation in upper pond on Alignment F at station 45.

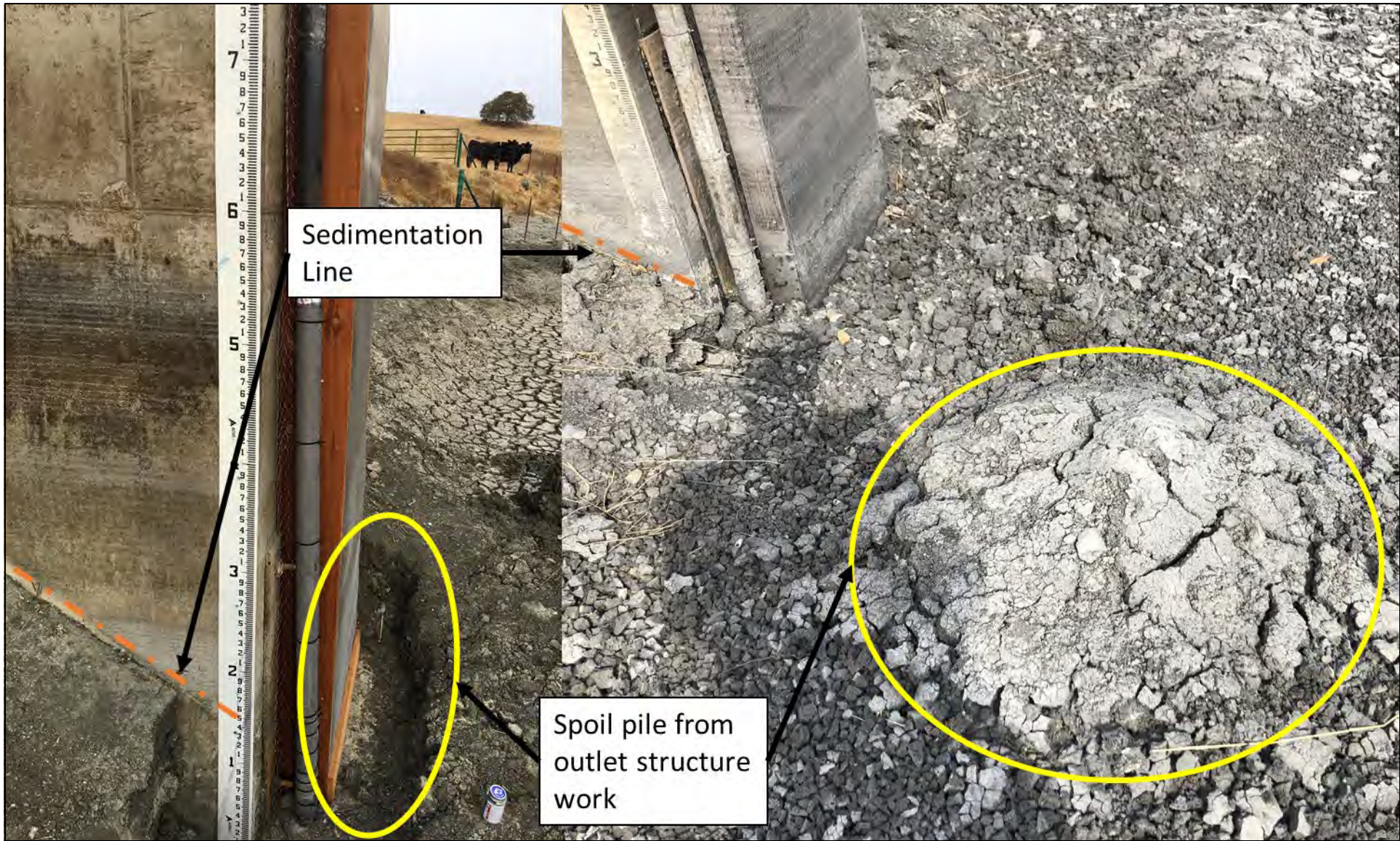


Calero Mitigation Site Monitoring  
**Alignment E and F**

Project No. 15-1030-4

Created By: GD

**Figure 7**



Notes: Photos taken on 11/26/2019 (left) during pond gage re-install and 10/09/2020 (right) during a field monitoring visit.




*Calero Mitigation Site Monitoring*  
**Pond maintenance and sedimentation**

Project No. 15-1030-4

Created By: GD

**Figure 8**



Notes:		<i>Calero Mitigation Site Monitoring</i>	
<b>Logjam decay</b>		Project No. 15-1030-4	Created By: GD
			<b>Figure 9</b>

**APPENDIX A**

## GAGE DOWNLOADS AND MONITORING OBSERVATIONS

Date:	4/14/20
Monitor:	Gavin Downey
Project:	15-1030-4 - Calero Ponds Monitoring
Subject:	

### TASK 2 - LONG-TERM MONITORING

#### TARGET HYDROLOGIC REGIME

cbec's hydrologist will monitor the hydroperiod at the pond and wetland mitigation sites. Instrumentation will be downloaded on a quarterly basis to coincide with habitat inspections: (1) monitoring at the pond site will include continuous measurements of water levels at the outlet structure, direct rainfall, and outflow from the pond springbox in Year 1; and (2) monitoring at the wetland site will include continuous measurements of water levels in the upper and lower pools.

#### GAGE DOWNLOADS

9:58am

GAGE	WL (FT)	WL TIME	DOWNLOAD TIME	RELAUNCH TIME	NOTES
C1	10.00am ↙ 2.19	2.19	<del>9:41am</del>	10:15am	
C2	5.63ft	10:47am	10:43am	11:00am	Staff: 6.36
C3	1.28	9:52am	9:49am	10:00am	water just below sensor. <sup>WL</sup>
C4	0.30	10:35am	10:33am	10:45am	water spilling over trough
Baro	NA	NA	10:50am	11:00am	

1602 = 473.176 mL

**SEEP FLOW MEASUREMENT**

TIME	WL (FT)	TIME (SEC)	VOLUME (GAL) mL	V-TOTAL (GAL) $\frac{mL}{s}$	NOTES
10:29am	0.30 FT	4.53s	1602	104.5	Pipe halfway impeded by sediment
10:30am	↓	4.51s	1602	104.9	
10:30am	↓	4.51s	1602	104.9	
Average Flow:			$104.8 \frac{mL}{s} \rightarrow 0.0277 \text{ gal/s}$		

**RAIN GAGE**

No adapter (stolen out of SC office) + Data lost

GAGE	DOWNLOAD TIME	RELAUNCH TIME	NOTES
Rain			
Temp/RH			

**SEDIMENTATION AND GEOMORPHIC STABILITY**

cbec's hydrologist will conduct sedimentation monitoring of the pond and wetland mitigation sites. Elevation information will be collected once per year with an RTK GPS by wading or canoe for comparison to the Notification Memorandum cross sections.

XS SURVEY	NOTES

**GENERAL QUARTERLY OBSERVATIONS**

<ul style="list-style-type: none"> <li>• Pond full (wetland)</li> <li>• wetland ~ 5ft water</li> <li>• saw ducks</li> </ul>	<ul style="list-style-type: none"> <li>• saw algae</li> <li>• <del>the sign</del> off frogs</li> <li>• one</li> </ul>	<ul style="list-style-type: none"> <li>• low trough full</li> <li>• weir in good shape</li> <li>• water at lip of weir hole</li> </ul>
<ul style="list-style-type: none"> <li>• 3-6 turtles</li> <li>• Banks all looked good but veggie</li> </ul>	<ul style="list-style-type: none"> <li>• lots of sed in sup channel</li> <li>• troughs over spilling</li> </ul>	

### TASK 3 - MAINTENANCE MONITORING

Infrastructure (biannually officially, however informal observations will be made during the quarterly habitat inspections): (1) Pond and wetland outlet structures; (2) Seep inflow collection and delivery system; and (3) Cattle water infrastructure and delivery system

#### OBSERVATIONS

STRUCUTRE	OBSERVATIONS/NOTES
Pond outlet structure	working okay
Pond seep pipe and springbox	seep box sed blocked half pipe " pipe okay • channel sedimentation
Pond troughs	overflowing
Pond water delivery system/tank	Not in use
Wetland trough	Full and functional
Wetland weir	Draining properly

#### MAINTENANCE ITEMS

STRUCUTRE	MAINTENANCE ITEMS
Pond outlet structure	NA Staff plate looked good.
Pond seep pipe and springbox	clean sed out
Pond troughs	
Pond water delivery system/tank	NA
Wetland troughs	NA
Wetland weir	Seems stable
Fenceline	NA
Misc.	• Path looked less eroded Upside hill

## GAGE DOWNLOADS AND MONITORING OBSERVATIONS

Date:	10/19/20
Monitor:	Kevin Powers
Project:	15-1030-4 - Calero Ponds Monitoring
Subject:	

### TASK 2 - LONG-TERM MONITORING

#### TARGET HYDROLOGIC REGIME

cbec's hydrologist will monitor the hydroperiod at the pond and wetland mitigation sites. Instrumentation will be downloaded on a quarterly basis to coincide with habitat inspections: (1) monitoring at the pond site will include continuous measurements of water levels at the outlet structure, direct rainfall, and outflow from the pond springbox in Year 1; and (2) monitoring at the wetland site will include continuous measurements of water levels in the upper and lower pools.

#### GAGE DOWNLOADS

GAGE	WL (FT)	WL TIME	DOWNLOAD TIME	RELAUNCH TIME	NOTES
C1	2.34	10:10	10:08	10:15	N/A / sensor not pinging.
C2	11.67	11:18	11:14	11:30	Dry / less sed on gage.
C3	1.32	10:02	10:00	<del>11:00</del> 11:00 am	10:15 am lunch / dry
C4	1.13	11:04	11:03	11:15	
Baro	—	—	11:20	11:30	

**SEEP FLOW MEASUREMENT**

TIME	WL (FT)	TIME (SEC)	VOLUME (GAL) mL	V-TOTAL (GAL) $\frac{1}{5}$	NOTES
10:59	1.13	12.43	500 mL	40.2	
11:00	↓	11.86	↓	42.2	
11:01	↓	12.30	↓	40.7	
Average Flow:			$41.0 \frac{mL}{s}$	$\rightarrow 0.0108 \frac{gal}{s}$	

**RAIN GAGE - No Adapter.**

GAGE	DOWNLOAD TIME	RELAUNCH TIME	NOTES
Rain			
Temp/RH			

**SEDIMENTATION AND GEOMORPHIC STABILITY**

cbec's hydrologist will conduct sedimentation monitoring of the pond and wetland mitigation sites. Elevation information will be collected once per year with an RTK GPS by wading or canoe for comparison to the Notification Memorandum cross sections.

XS SURVEY	NOTES

**GENERAL QUARTERLY OBSERVATIONS**

- wetland dry on N end • lots of wetland • slight slumping in but inundated near outlet frogs dry section of lower wetland (d
- decent sedimentation at outlet
- log jams getting old & decaying, still catching sed. | weeds growing in pond.
- Spring still flowing to troughs.
- Net on the reduced sed on gage.

### TASK 3 - MAINTENANCE MONITORING

Infrastructure (biannually officially, however informal observations will be made during the quarterly habitat inspections): (1) Pond and wetland outlet structures; (2) Seep inflow collection and delivery system; and (3) Cattle water infrastructure and delivery system

#### OBSERVATIONS

STRUCUTRE	OBSERVATIONS/NOTES
Pond outlet structure	• decent amount of sedimentation • looks okay though
Pond seep pipe and springbox	Springbox needs cleaning but good shape
Pond troughs	Good shape / Flowing / algae + sed though
Pond water delivery system/tank	Not in use but looks good
Wetland trough	Still in good condition / dry
Wetland weir	Still in good shape but sitting <del>high</del> dry

#### MAINTENANCE ITEMS

STRUCUTRE	MAINTENANCE ITEMS
Pond outlet structure	—
Pond seep pipe and springbox	Needs cleaned
Pond troughs	clean out sed maybe
Pond water delivery system/tank	—
Wetland troughs	N/A
Wetland weir	—
Fenceline	—
Misc.	Dirt trail might transport more sand down slope