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Memorandum

Project No. 3753-08

December 22, 2023

To: **Nathan Hale, Senior Restoration Ecologist, Santa Clara Valley Habitat Agency**

From: **Kate Drake, Project Manager, Senior Restoration Ecologist**
Max Busnardo, Principal, Restoration Ecologist

Subject: **Calero County Park and Wetland Restoration Project—Year 7 (2023) Supplemental Vegetation and Hydrology Monitoring**

Introduction

The Calero County Park Pond and Wetland Restoration Project (project) was implemented by the Santa Clara Valley Habitat Agency (Habitat Agency) in partnership with the Santa Clara Parks and Recreation Department in 2016. The project is located in Calero County Park, in the eastern foothills of the Santa Cruz Mountains in the Alamitos Creek watershed (Figure 1). The purpose of the project was to restore and establish pond and wetland habitats at two locations (the pond mitigation site and wetland mitigation site; Figure 2) in order to accomplish habitat goals under the Santa Clara Valley Habitat Plan (Habitat Plan). Additional project details are available in the project's *Calero County Park Pond and Wetland Restoration Project Mitigation and Monitoring Plan* (MMP) (H. T. Harvey & Associates 2016).

The project's MMP called for mitigation monitoring to occur for 5 years following construction of the project. However, monitoring in 2021 (Year 5) found that some of the final success criteria for the project were not met (H. T. Harvey & Associates 2022). The monitoring period was then extended into Year 6 (2022) (H. T. Harvey & Associates 2023). In Year 6, the majority of the final success criteria were met. However, some criteria at the pond mitigation site were not met. Specifically, (1) no California red-legged frogs had been observed during the monitoring period, (2) wetland vegetation cover at the pond mitigation site was below 70%, and (3) the population of Mt. Hamilton thistle (*Cirsium fontinale*) was found to be in decline. In addition, four out of the six monitoring years occurred during dry water years, which limited the ability to assess whether (4) the target hydrologic regime had been met at the pond. Therefore, at the request of the regulatory agencies, additional monitoring was conducted in Year 7 (2023) in each of these four areas. Specific feedback from the U. S. Fish and Wildlife Service (USFWS) and the U. S. Army Corps of Engineers (USACE) are included in Appendix A. A summary of the project's final success criteria and the current monitoring status are presented in Table 1.

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Figure 1. Vicinity Map

Calero County Park and Wetland Restoration Project
Year 7 (2023) Supplemental Vegetation and Hydrology Monitoring Memorandum (3753-08)
December 2023

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Figure 2. Mitigation Site Locations
Calero County Park and Wetland Restoration Project
Year 7 (2023) Supplemental Vegetation and Hydrology Monitoring Memorandum (3753-08)
December 2023

Year 7 supplemental monitoring was conducted by the H. T. Harvey & Associates team, consisting of H. T. Harvey & Associates and cbec ecoengineering (cbec), in conjunction with the Habitat Agency. The purpose of this memorandum is to report on the results of Year 7 supplemental monitoring.

Monitoring Methods

Monitoring efforts in Year 7 were limited to assessing success criteria that were not met or sufficiently assessed (due to drought conditions) during the main mitigation monitoring period (Years 1 – 6). These included target hydrologic regime, California red-legged frog/California tiger salamander/Northwestern Pond Turtle surveys, Mt. Hamilton thistle abundance, and percent cover of wetland vegetation. Photodocumentation was also collected at the pond mitigation site. The methods for each of these metrics are provided below.

Target Hydrologic Regime

Hydrology in the pond was visually observed to have fully drawn down during a vegetation monitoring site visit on July 17, 2023, despite having been observed to have been at maximum capacity in June 2023 due to the very wet conditions in the winter of 2023. This indicated that the performance criterion for target hydrology was not met (Table 1). Following that site visit, ecohydrologists from cbec conducted another site visit on August 16, 2023, to further investigate the potential cause for project site underperformance during a high precipitation year. The ecohydrologists conducted an analysis of gage data from the pond and seep trough to identify any data trends and analyzed precipitation data from the pond weather station to classify the water year (WY) type. They then compared water budget model predictions to observed gage data for each monitored water year to identify what parameters were responsible for changes in drawdown rates at the pond. Additional details on cbec's methods are available in their technical memorandum (Appendix B).

California Red-Legged Frog/California Tiger Salamander/Northwestern Pond Turtle

On June 1, 2023, Matt Fogarty and Julie King, biologists from the Habitat Agency, conducted surveys for special-status wildlife species at the pond mitigation site to evaluate the performance standards for the California red-legged frog, California tiger salamander, Northwestern pond turtle, and aquatic predator abundance. The majority of the pond was inaccessible at this time because it was too deep. However, one seine pass was conducted close to shore. Because no California tiger salamander or California red-legged frog were found in the seine pass, dip netting was conducted to establish presence of California tiger salamander and was stopped when one larva was found. No follow-up surveys were conducted because the pond was dry in July.

The Habitat Agency biologists also performed a visual encounter survey for juvenile and adult herpetofauna on the same day.

Table 1. Summary of Final Performance Standards Monitoring Status

Metric	Final Performance Standard	2023 Status
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.	Met in monitoring Years 1 and 3; N/A in monitoring Years 2 and 4-6 due to dry conditions. Not met in Year 7. **Recommend continued monitoring.**
Sedimentation and Geomorphic Stability	The pond and wetland mitigation sites and springbox-seep water collection structures will demonstrate minimal sedimentation and geomorphic stability (includes cross-section surveys).	Met in all monitoring years (1-6); not monitored in Year 7.
California Red-legged Frog/California Tiger Salamander/Northwestern 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 northwestern pond turtle (criteria do not apply to wetland site).	Red-legged frog: Not met in any monitoring year. **Recommend continued monitoring.** Tiger salamander: Successful breeding observed in Years 1-3 and 5-7. Failure to observe in Year 4 was likely due to timing of monitoring. Northwestern pond turtle: Observed in all monitoring years (1-7), including juveniles observed in Years 1, 2, 4, and 5.
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).	Met in all monitoring years (1-7)
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).	Population has been showing evidence of decline from Year 4 (2020) through Year 7(2023). **Recommend continued adaptive management and monitoring.**
Wetland Vegetation Cover	70% in planting zones (separate and combined); less than 50% in open water pond habitat; at least three wetland species will be present.	Wetland vegetation cover at wetland mitigation site: met in monitoring Years 2-4 and 6; not monitored in Year 7. Wetland vegetation cover at pond mitigation site: not met in Years 1-6; met in Year 7 Wetland species count: Met in all monitoring years (1-6 at wetland mitigation site and 1-7 at pond mitigation site). Open water pond habitat cover: Met in Years 1-6; not monitored in Year 7
Invasive Plant Cover	Less than 5%	Met in Years 1-6. Met in wetland at pond mitigation site in Year 7; not monitored elsewhere in Year 7.

Metric	Final Performance Standard	2023 Status
Wetland Delineation	<u>Pond Mitigation Site:</u>	
	Restored jurisdictional wetlands ≥ 0.27 ac	Met in Year 6
	Created jurisdictional wetlands ≥ 0.01	Met in Year 6
	<u>Wetland Mitigation Site:</u>	
	Restored jurisdictional wetlands ≥ 0.10 ac	Met in Year 6
	Created jurisdictional wetlands ≥ 0.02 ac	Met in Year 6
Water for Cattle	Sufficient water to support the same grazing intensity of the Reserve lands as the existing conditions.	Water was available year-round for cattle via the spring-fed trough at the pond mitigation site in Years 1-5, although in Year 5 water was insufficient to meet the demands of the historic cattle stocking rate, in response to drought conditions in recent years. In Year 6, the cattle rancher coordinated with Santa Clara County Parks and Recreation Department to secure a municipal water source and installed four new troughs and improved one old trough to supply with municipal water.

Mt. Hamilton Thistle Abundance

H. T. Harvey & Associates senior restoration ecologist Kate Drake and Habitat Agency senior ecologist Nathan Hale conducted a survey for Mt. Hamilton thistle at the pond mitigation site on July 17, 2023 (Figure 3). 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) estimating the percent cover of Mt. Hamilton thistle within the area encompassed by the population using the quadrat sampling method (Bonham 1989); (4) qualitatively assessing the condition of Mt. Hamilton thistle individuals within the population; and (5) taking photographs to document onsite conditions. The spatial extent of the population was not mapped as in previous years because it was found that this metric is not helpful for tracking the health of the population.

Wetland Vegetation Percent Cover

Kate Drake and Nathan Hale conducted wetland vegetation monitoring at the pond mitigation sites on July 17, 2023. Percent cover of planted and naturally recruited vegetation was determined by species using the quadrat sampling method (Bonham 1989). Each quadrat was placed using a generalized random tessellation stratified survey design so that quadrat locations were randomly and evenly distributed across the area delineated as wetlands in 2021/2022 (Figure 3) (H. T. Harvey & Associates 2022). This approach to the selection of randomized quadrat locations was chosen instead of the transect method of selecting random quadrat locations used in monitoring years 1 through 5 because it was better able to represent conditions at the mitigation site as delineated in 2021/2022. By contrast, the transects were established based on site conditions shortly after project construction in 2016. 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 C). Cover was estimated by species to the nearest whole percent. 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 obligate (OBL), facultative wetland (FACW), or facultative (FAC) based on the National Wetland Plant List v3.5 Species Detail Tool (USACE 2023), regardless of whether they were native or nonnative. The average percent cover of wetland vegetation was then compared to the final success criterion.

Photodocumentation

Photodocumentation of the pond mitigation site was conducted during vegetation monitoring on July 17, 2023, 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 from the locations established in the Year 1 monitoring report (H. T. Harvey & Associates 2017b). Photographs are provided in Appendix D and the locations of the photodocumentation points are shown on Figure 3.

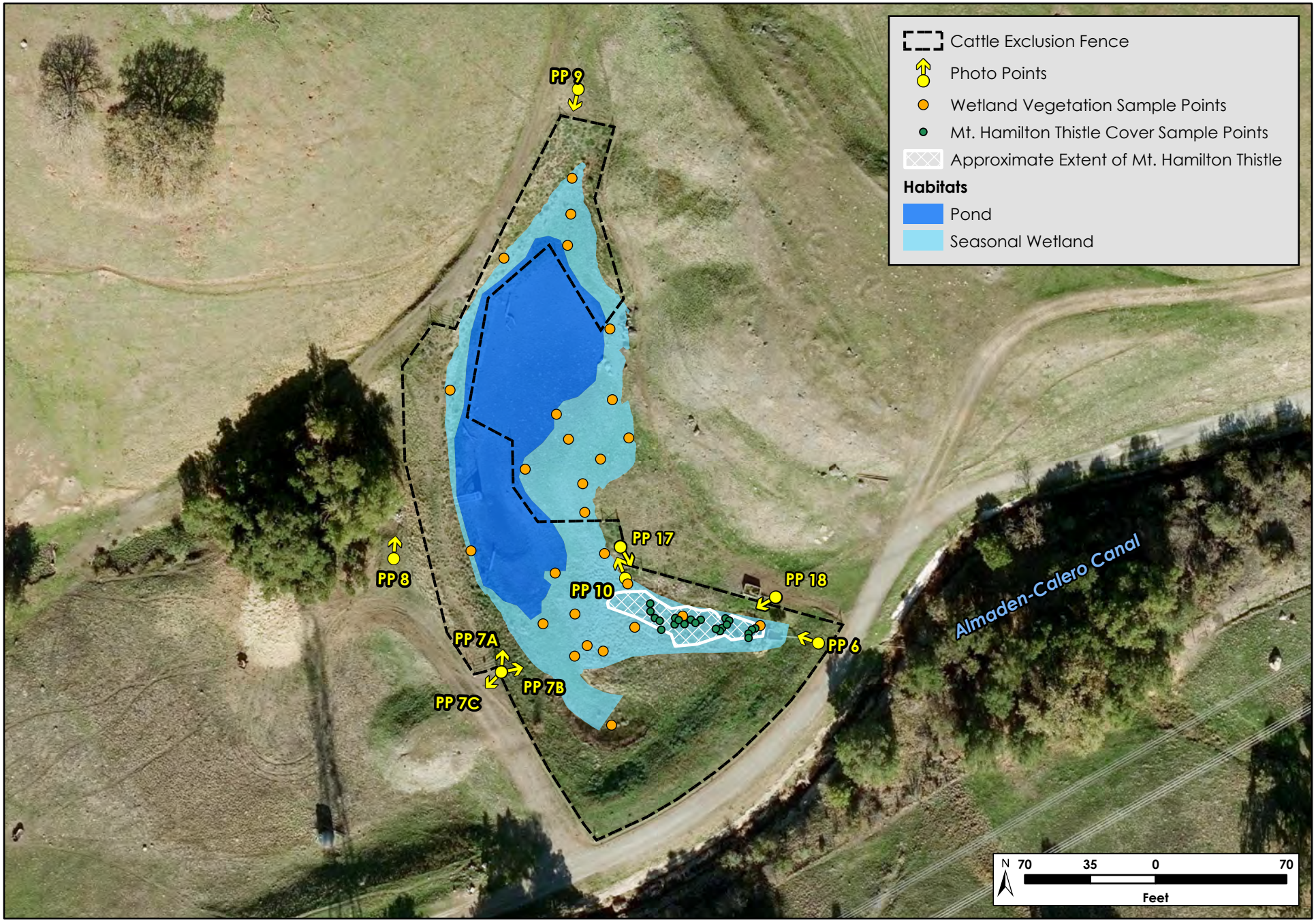

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Figure 3. Pond Mitigation Site
Calero County Park and Wetland Restoration Project
Year 7 (2023) Supplemental Vegetation and Hydrology Monitoring Memorandum (3753-08)
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Results

The results of Year 7 supplemental monitoring are presented below.

Target Hydrologic Regime

The success criterion for target hydrologic regime of at least 2 feet of water through August 31 was not met, despite the very wet conditions in 2023. Further analysis conducted by cbec indicated that pond water level drawdown rates have increased every year since the start of the monitoring period (Appendix B). In addition, Habitat Agency staff identified a significant blockage at the intake of the seep spring box that feeds the troughs and pond which was causing water to overtop the seep spring box and flow into the Almaden-Calero canal for an extended period, which was deduced based on the level of organic matter that was blocking the intake pipe and the dry conditions observed in the troughs. cbec's water budget model analysis of the pond shows that seep flow input and percolation losses are the most important variables contributing to the pond's Spring/Summer hydrologic regime. Observed differences in the pond's modeled water levels and the observed data for the first five years of the project (WY 2017-2021) are in large part explained by changes in estimates of seep flow due to climate extremes and blockages in the seep spring box not allowing for sustained inflow to the pond. However, this discrepancy was not completely explained by decreases in seep inflows to the pond. Therefore, cbec hypothesizes that there has been an increase in water volume losses likely due to percolation losses through the bottom of the pond. The suspected percolation losses in the two most recent WYs are even higher despite WY 2023 being the wettest of the past 30 years. The pond lost water faster in these two WYs compared to the previous four WYs by nearly double the rate. Potential contributions to the temporal acceleration of pond water level drawdown rates include, but are not limited to: 1) compromised bentonite layer in the pond bottom, 2) seepage via cracks through or under the bentonite layer, 3) piping through the pond embankment, 4) ground squirrel burrowing activity lower down on the embankment (though there are no observations to date), 5) seepage around the outlet structure, and/or 6) leaks in the outlet structure gate or mounting plate.

See Appendix B for more details on cbec's analysis and results and recommendations.

California Red-Legged Frog/California Tiger Salamander/Northwestern Pond Turtle

The following species were observed during the surveys on June 1, 2023:

- 14 California newt (*Taricha torosa*) larvae
- 101 Sierran treefrog (*Pseudacris sierra*) larvae
- 3 American bullfrog (*Lithobates catesbeianus*) larvae (dispatched)
- 1 California tiger salamander (*Ambystoma californiense*) larva
- 1 American bullfrog adult

- 3 Northwestern pond turtle (*Actinemys marmorata*) adults

Detailed survey results of special status species are provided below:

California Red-Legged Frog—No California red-legged frogs or egg masses were observed in the pond or wetland mitigation sites during Year 7 monitoring. There have been no documented observations of the California red-legged frog at the pond or wetland mitigation sites in Years 1–7. Therefore, the performance criterion of successful breeding of California red-legged frog in at least one monitoring year was not met. 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 2016a). The Habitat Agency will continue annual monitoring for California red-legged frog after the end of the short-term monitoring period, as part of the project's Long Term Monitoring Plan (LTMP).

California Tiger Salamander—One California tiger salamander larva was observed at the pond mitigation site in Year 7. California tiger salamander larvae were also observed in Years 1–3 and Year 5, but not in Year 4. Therefore, the performance criterion of continued successful breeding of the California tiger salamander was met. A lack of observed breeding in Year 4 may have been caused by either the very dry year inhibiting breeding or the timing of surveys. In Year 4, the second larval survey was delayed until late in the year due to 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. Therefore, the lack of larval California tiger salamander larvae in Year 4 does not conclusively indicate a lack of their presence in Year 4.

Northwestern Pond Turtle—Northwestern pond turtles were observed basking at the pond mitigation during monitoring. Therefore, the pond mitigation site continued to provide suitable northwestern pond turtle habitat, and the performance criterion of continued occurrence of Northwestern pond turtle was met.

Mt. Hamilton Thistle Abundance

A summary of the results of Mt. Hamilton thistle abundance monitoring in Years 1-7 is presented in Table 2. The population abundance shows a declining trend beginning in Year 4 and continuing through Year 7, although the number of flowering individuals has remained approximately consistent. Percent cover in Year 7 was very low relative to prior monitoring years, although this was likely attributable to the time of year in which monitoring was conducted (July, vs. May-June in Years 1-6). Second-year plants were in various stages of senescence, indicating some cover had already been lost. Health and vigor of individuals in the population was good. Most flowering individuals had begun to drop their seed at the time of monitoring. Photodocumentation of the Mt. Hamilton thistle population is included in Section D.

As noted in the Year 6 annual report, thatch and herbaceous vegetation was cleared from around the base of flowering individuals on June 10, 2022 prior to seed set, at the recommendation of Janell Hillman (H. T. Harvey & Associates 2022). This action was chosen to increase likelihood of successful reproduction (via increasing seed-soil contact), since seeds of this species are typically deposited directly under or nearby the flowering

individuals, due to the drooping growth habit and relatively heavy seeds. In addition, although in prior monitoring years we had speculated that very dry conditions had contributed to the declining population size of this wetland species (Table 2), which is supported by the spring-fed seep, the 2022/2023 winter was a very wet year. However, the population continued to decline in 2023. We hypothesize that the reason for the decline of the population is the increased density of native vegetation in the vicinity of the population of the Mt. Hamilton thistle due to cattle exclusion fencing limiting both browse and ground disturbance from cattle and native wildlife (e.g. deer).

The Habitat Agency is in the process of implementing the following steps to protect and reinvigorate the Mt. Hamilton thistle population:

- Coordinating with two AIR-Accredited (i.e., Accreditation to Improve Restoration and Native Plant Nursery Stock Cleanliness) nurseries to contract grow seedlings from seed collected on-site, to be installed in the late winter or early spring of 2023/2024
- Trimming and clearing of competing native herbaceous vegetation in the Mt. Hamilton thistle population area, to mimic the effects of cattle grazing and reduce competition with the Mt. Hamilton thistle
- Continuing to protect the seep flow to the channel through maintenance of the springbox that collects spring inflow and conveys it to the wetland that supports the population of Mt. Hamilton thistle via steel pipe. In addition, taking additional actions to reduce the frequency at which maintenance is needed. Specifically:
    - Investigating improvements to the springbox to reduce the potential for clogs
    - Fencing off the hillside upstream of the springbox from cattle grazing and applying seed to the area, to reduce erosion on the hillslope and therefore the potential for clogs
- Planning for controlled grazing within the seep area once the Mt. Hamilton thistle population numbers are bolstered (see first bullet).

The Habitat Agency will continue to monitor the Mt. Hamilton thistle population until a clear positive trajectory is established. In the long term, grazing may be reintroduced to the area to reduce competition with Mt. Hamilton thistle by other herbaceous species. However, this measure will not be taken until the population is shown to be well-established and stable, due to the potential for damage to remaining individuals from grazing or trampling.

Wetland Vegetation Percent Cover

The average percent cover of wetland vegetation was 72.4% at the pond mitigation site, which exceeds the final success criterion of 70%. This is an increase over previous monitoring years, likely in response to the high precipitation in the winter of 2022/2023, in contrast to the historically dry conditions in the prior three

Table 2. Mt. Hamilton Thistle Abundance at Calero County Park, 2017-2023

Monitoring Year	Count	Survey Dates	Count of Flowering Individuals	Percent Cover	Water Year Type
1	111	May 16th, July 14th, and August 8th, 2017	No data	19.5	Wet
2	123	May 14th, 2018	23	24.3	Very Dry
3	125	June 3rd, 2019	9	32.7	Wet
4	96	May 13th, 2020	29	37.0	Very Dry
5	69	May 20th, 2021	42	23.5	Very Dry
6	58	March 5th and May 19th, 2022	22	19.4	Dry
7	32	July 17, 2023	21	3.3	Very Wet

monitoring years. The wetland also exhibited high plant species richness, with 18 wetland species having been observed during quadrat sampling (Table 3).

Upland species cover was low and the area was dominated by cover of wetland species. Creeping spike rush (*Eleocharis macrostachya*, OBL) provided the most cover (40.8%), followed by bog rush (*Juncus effusus*, FACW) and two toothed sedge (*Carex serratodens*, FACW), which provided 13.9% and 5.6% cover, respectively. Complete vegetation monitoring results, including species accumulation curves, are provided in Appendix C.

The results of our monitoring data combined with field observations indicate that wetland vegetation cover at the pond is closely linked to the hydrologic conditions at the pond, which are very sensitive to intra- and interannual variations in rainfall. However, as shown in Year 7 monitoring, during a sufficiently wet year the final performance criterion for wetland vegetation cover was met (Table 3).

Table 3. Wetland Vegetation Percent Cover and Number of Wetland Species at Pond Mitigation Site

Year	Water Year Type	Wetland Vegetation Cover	Wetland Vegetation Cover Performance Standard	Number of Wetland Species[1]	Wetland Species Number Performance Standard
1	Wet	34.9%	15%	18	3
2	Very Dry	60.9%	25%	19	3
3	Wet	45.2%	40%	21	3
4	Very Dry	60.2%	60%	24	3
5	Very Dry	39.8%	70%	21	3
6	Dry	44.6%	70%	18	3
7	Very Wet	72.4%	70%	16	3

[1] Wetland indicator status based on the *National Wetland Plant List v3.5 Species Detail Tool* (USACE 2023).

Photodocumentation

Photodocumentation is presented in Appendix D.

Recommendations

The H. T. Harvey & Associates team has the following recommendations for the Calero pond mitigation site:

- Continued monitoring of the hydrology at the pond is highly recommended, to gain a further understanding of the potential causes for the increasing rate of pond losses. Continued monitoring should include:
    - Continued gage data monitoring and subsequent water budget analysis to compare yearly data trends.
    - More frequent monitoring visits, especially immediately after rain events during WY 2024 to observe conditions in real-time, especially early in the season as the pond is filling but also after the pond has filled and drawing down for the season.
    - Supplemental flow monitoring in the creek below the pond to understand flow rates and volumes, especially early in the season as the pond is filling but also after the pond has filled and is drawing down for the season.
    - More frequent maintenance of the seep trough to ensure minimal sedimentation resulting in blockage cutting off inflow to the pond from the spring box.
    - Inspection of the pond outlet structure gate seals and grout for possible leaks.
- Continued monitoring of the Mt. Hamilton thistle population. We recommend more frequent visits in the spring to assess the presence or absence of seedlings and track their survival rate. We also recommend that measures planned for implementation to enhance the population, as described above, be closely tracked to determine effectiveness.
- Continued investigations for California red-legged frog, consistent with the Habitat Plan and the LTMP for the project site.
- We recommend that monitoring for the following MMP metrics cease, and transition to the LTMP monitoring phase: wetland vegetation at the pond mitigation site; California tiger salamander surveys; Northwestern pond turtle surveys. We request concurrence from the regulatory agencies that MMP monitoring of these metrics can cease.

References

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H. T. Harvey & Associates. 2017b. Calero County Park Pond and Wetland Restoration Project Year 1 Monitoring Report. Prepared for the Santa Clara Valley Habitat Agency. December 22.

H. T. Harvey & Associates. 2022. Calero County Park Pond and Wetland Restoration Project Year 5 Monitoring Report. Prepared for the Santa Clara Valley Habitat Agency. January 3.

H. T. Harvey & Associates. 2023. Calero County Park Pond and Wetland Restoration Project Year 6 Monitoring Report. Prepared for the Santa Clara Valley Habitat Agency. January 13.

Kershaw, K. A. 1973. Quantitative and Dynamic Plant Ecology. Second edition. American Elsevier Publishing Company, Inc. New York, New York.

[USACE] U.S. Army Corps of Engineers. 2023. 2020 National Wetland Plant List v3.5. <https://cwbi-app.sec.usace.army.mil/nwpl_static/v34/species/species.html?DET=001100>. Accessed December 13.

Appendix A. Correspondence from Regulatory Agencies regarding Year 6 Monitoring Results

From: Terry, Joseph D
To: Firestone, Sarah M CIV USARMY CESPN (USA); Kate Drake; Blinn, Brenda@Wildlife; Garrison, Kristin@Wildlife
Cc: Nathan Hale; Julie King
Subject: Re: [EXTERNAL] RE: Calero Pond and Wetland Restoration Project Year 6 monitoring report
Date: Thursday, June 29, 2023 8:09:47 AM
Attachments: image001.jpg

Monitoring should occur this year to ensure that the pond supports suitable California red-legged frog breeding habitat during a wet year (depth of inundation of at least 2 feet through August 31) since only 2 of the monitoring years were during normal or wet years. Additional California red-legged frog surveys should be conducted during the appropriate time of year to make up for the omission of one nighttime survey in 2022 (along with the lack of meeting the success criteria for observation of California red-legged frog breeding). Annual California red-legged frog surveys should continue until successful breeding of California red-legged frogs is observed at the pond mitigation site. It appears that the Santa Clara Valley Habitat Agency will continue annual California red-legged frog surveys at the pond restoration site under the LTMP.

The decline of Mt. Hamilton thistle since the restoration project began is a concern that needs to continue to be addressed and monitored until the success criteria have been met---the restoration project was supposed to benefit the Mt. Hamilton thistle not result in its decline. Monitoring Mt. Hamilton thistle this year during a wet year (unless it is too late in the season) and subsequent years should help determine whether the decline was caused by drought versus other factors. Monitoring should be conducted to see if the clearing of thatch and herbaceous vegetation in 2022 near the base of flowering Mt. Hamilton thistles resulted in an increase in recruitment in those areas. Additional thatch and invasive plant removal near the base of flowering Mt. Hamilton thistles should continue if shown to benefit recruitment. Experimenting with flash grazing and monitoring the results may need to be considered if recommended by Janell Hillman.

Thanks,

Joseph Terry (he/him)
Senior Fish and Wildlife Biologist
Coast Bay Division
U.S. Fish and Wildlife Service
Sacramento Fish and Wildlife Office
2800 Cottage Way, Suite W-2605
Sacramento, CA 95825

Work cell phone (916)943-6721
email address: joseph_terry@fws.gov

From: Firestone, Sarah M CIV USARMY CESPN (USA) <Sarah.M.Firestone@usace.army.mil>
Sent: Friday, June 23, 2023 12:04 PM
To: Kate Drake <kdrake@harveyecology.com>; Blinn, Brenda@Wildlife <brenda.blinn@wildlife.ca.gov>; Garrison, Kristin@Wildlife <Kristin.Garrison@wildlife.ca.gov>; Terry, Joseph D <Joseph_Terry@fws.gov>
Cc: Nathan Hale <nathan.hale@scv-habitatagency.org>; Julie King <julie.king@scv-habitatagency.org>
Subject: [EXTERNAL] RE: Calero Pond and Wetland Restoration Project Year 6 monitoring report

Good afternoon, Kate,

Based on the Year 6 report, it looks like mitigation site has not achieved the performance criteria for California red-legged frog, Mount Hamilton thistle, and percent cover of wetland vegetation. Could you provide a little more justification for approving the mitigation as complete given its failure to meet the performance criteria?

Also, I will need to conduct a JD site visit prior to determining that the medication is complete. I am available the following dates for a JD site visit:
Friday, 12-Jan-24
Thursday, 18-Jan-24
Friday, 19-Jan-24
Tuesday, 23-Jan-24
Friday, 26-Jan-24

Sincerely,

Sarah

**I will be on annual leave June 14-June 20 and June 29-July 7. I will also be in the field all day June 22 and in meetings all day June 21. During this time, there will likely be a delay in responding to your emails and phone calls. If you need immediate assistance during this time, please contact my supervisor, Katerina Galacatos.

From: Kate Drake <kdrake@harveyecology.com>
Sent: Friday, January 13, 2023 16:48

To: Brenda Blinn <Brenda.Blinn@wildlife.ca.gov>; Garrison, Kristin@Wildlife <Kristin.Garrison@wildlife.ca.gov>; Joseph Terry <joseph_terry@fws.gov>; Firestone, Sarah M CIV USARMY CESPN (USA) <Sarah.M.Firestone@usace.army.mil>
Cc: Nathan Hale <nathan.hale@scv-habitatagency.org>; Julie King <julie.king@scv-habitatagency.org>
Subject: [URL Verdict: Neutral][Non-DoD Source] Calero Pond and Wetland Restoration Project Year 6 monitoring report

Hello all,

Please find the Calero County Park Pond and Wetland Restoration Project – Year 6 (2022) annual monitoring report available for download at the SharePoint link below:

https://harveyecology.sharefile.com/d-s097f9fafd6954c8d987fbb3927f0301c

Please note that Year 6 was the final year of monitoring for this project, and we are requesting concurrence that annual monitoring at this site is considered complete. The project will then transition to the long-term monitoring phase under the site's LTMP.

This report has been submitted to the Regional Water Quality Control Board under separate cover.

Please let us know if you have any questions or comments.

Thank you,
Kate

Kate Drake
Senior Ecologist 2
Restoration Ecology
kdrake@harveyecology.com
408-458-3271, c: 631-882-1880
Cell phone preferred

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Appendix B. Supplemental Hydrologic Analysis

TECHNICAL MEMORANDUM

Date:	December 12, 2023
To:	Kate Drake (H. T. Harvey)
From:	Anna Hamilton, Chris Campbell, Sam Diaz
Project:	Calero Mitigation Site Monitoring
Subject:	Supplemental Hydrologic Analysis

1 INTRODUCTION

To support H. T. Harvey 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 since 2017. cbec continuously measured pond and wetland water levels, direct rainfall, and seep inflows to pond to monitor the hydrologic regime at the pond and wetland mitigation sites. For each monitoring year, 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 in years with 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 observational sedimentation and geomorphic stability monitoring (i.e., no repeat topographic cross section surveys). Following Year 6 monitoring (Water Year 2022), the project was to transition to its long-term monitoring phase. However, additional data collection was requested by the regulatory agencies. During a field visit in June 2023 to perform this data collection, it was observed that that the pond had not met its hydrologic success criterion in 2023, even though the expectation was that it would, given the wet winter. cbec has been given the task of conducting further analysis to better understand the current hydrology of the site. As such, cbec prepared additional hydrologic analysis to understand why the pond may not be meeting its performance criteria.

1.1 STUDY OBJECTIVES

To understand why the pond has not met its hydrologic success criterion to support suitable habitat for the California red-legged frog and California tiger salamander breeding during a very wet year (2023), additional monitoring and data analysis by cbec was conducted, including:

Task 1.1 – cbec staff conducted a site visit to further investigate the potential cause for project site underperformance during a high precipitation year. Gage data for further analysis was also collected from the pond and seep trough at this time.
Task 1.2 – cbec conducted an analysis of gage data from the pond and seep trough to identify any data trends. Additionally, analysis of precipitation data from the pond weather station was conducted to classify the water year (WY) type and prepare it for the water budget analysis.
Task 1.3 – cbec compared water budget model predictions to observed gage data for each monitored water year to help identify what parameters may be responsible for changes in drawdown rates at the pond.
Task 1.4 – cbec has produced the current technical memorandum summarizing findings from analysis of site inspection, gage analysis, and water budget analysis. Recommendations are also provided based on the analysis.

2 DATA ANALYSIS

2.1 SITE VISIT

A site visit was made on August 16, 2023, to download gage data and inspect the site for probable causes of the unexpected drawdown in pond water levels that occurred earlier this summer.

A clog at the seep spring box was removed on August 2, 2023, prior to the August 16th site visit, which improved seep flow into the pond trough but did not produce any standing water in the pond by the August 16th monitoring date (Note: puddling was observed in the bottom of the pond in mid-November 2023 by Habitat Agency staff). There was some dampness noted at the very bottom of the pond which had previously been dry (according to HT Harvey). Immediately downstream of the pond at creek grade, the bed of the creek was also damp with some puddling of water present (Figure 1). With a newly restored seep inflow, this would suggest that seep inflows to the pond were potentially flowing below the pond.

Upon further inspection of the seep spring box, a cow carcass was found upstream of the log weirs. The cow carcass has since been removed from the seep flow line and a fence was built surrounding the upstream seep areas to keep cattle out during the wet season in the future with the goals of enhancing the upstream wetland seeps, reducing sedimentation, and reducing blockage formation at the intake pipe (N. Hale, personal communication, December 19, 2023).

2.2 GAGE DATA

The gage data were collected during the August site visit, then processed and compared to previous years. The drawdown rate has become steeper each year (Figure 2), indicating a noticeable change in the performance of the pond since the start of the project.

2.3 WATER YEAR CLASSIFICATION

Local precipitation data were compiled to classify the WY type. As in previous monitoring reports (cbec, 2022), data from the nearby Gilroy gage was collected and scaled to the project site for comparison. Year 7 (WY 2023) was classified as Very Wet. Total rainfall at the project rain gage was 40.54 inches, the highest amount of rainfall since the start of the project, and in the last 30 years.

Table 1: Annual Precipitation Totals by Water Year

Water Year	Gilroy COOP (inch)[1]	Gilroy Scaled (inch)[2]	Project Rain Gage (in)	Water Year Type[3]
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[8]
2016	17.96	21.27	---	Normal
2017	22.24	26.34	13.52[4]	Wet
2018	9.41	11.14	8.53[5]	Very Dry
2019	23.41[6]	27.72	29.67[7]	Wet
2020	8.21	9.72	NA[9]	Very Dry
2021	6.44[10]	7.63	7.77	Very Dry
2022	12.81	15.17	15.28	Dry
2023	42.53	50.36	40.54	Very Wet
30-Minimum	6.44	7.63	7.77	
30-Maximum	42.53	50.36	40.54	
30-Average	19.31	19.76	21.20	

Notes:
[1] Gilroy COOP (043417-4) precipitation for WYs 1958 through 2021 (i.e., 64 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 project rain 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 was reclassified as this WY is within 0.01 inches of being classified as Dry.

[9] Project rain gage fully failed and data was not recoverable.
[10] Gilroy recorded an erroneous precipitation depth for the month of September. The value was confirmed erroneous by nearby gages and removed from the analysis.

3 WATER BUDGET MODEL

A water budget model originally developed and calibrated to support the design for the pond, which is described in detail in the Mitigation and Monitoring Plan (H.T. Harvey & Associates and cbec, 2016), was updated to investigate the potential parameters affecting the hydrologic performance of the pond. Inputs to the water model include direct rainfall, input from the upslope watershed, and spring box inflow. Losses include percolation through the pond bottom, evapotranspiration, cattle consumption, and excess water conveyed through the outlet culvert. The model was updated to reflect the as-built geometry of the pond.

Daily water budget calculations were prepared using rainfall data from the project site, and evapotranspiration data for CIMIS Station 211 (Gilroy) from 1/27/2017 through 9/30/2023. To account for increased evapotranspiration from open water and seasonal wetlands, the evapotranspiration data were multiplied by a microclimate factor of 1.1 for seasonal wetlands. Runoff was computed using the TR-55 Curve Number (CN) runoff method (USDA, 1986). A CN value of 85 for a rangeland in fair condition with an initial abstraction (I_a) value of 0.3 inches was assumed and subsequent to the assumption that the first two inches of rainfall at the start of the water year was absorbed by the dry upslope soils. Cattle consumption was assumed to be 800 gal/day from May until the first rains of the following water year. This assumption was made for all water years. Outflow from the pond occurs only when the storage capacity of the pond exceeded the spill elevation of the outlet structure (i.e., 508.5 ft) or was manually drawn down in late summer. These are all the same values used in the original modeling effort (cbec, 2016), and while other values were evaluated, they did not have a significant impact on pond drawdown rates.

Seep flow and percolation were the primary water budget calibration parameters for the model that affected pond drawdown rates. Field measurements taken during the project monitoring period were compared against the original rating curve to inform revisions to seep flow data in the model. Seep flow and percolation losses were calibrated to the first year of the project, and then the same values were evaluated on subsequent project years. Noticeable differences in the WY's led to a separate calibration of wet and dry years. Seep flow and percolation values were determined by the number of storm occurrences for that water year which is further detailed below. Calibration results are further discussed in the following sections.

4 RESULTS

4.1 GAGE DATA

Gage data were compiled and processed to determine any trends in the data. Pond water level recessions were compared for each year. Figure 2 shows that there has been a progressive increase in the pond drawdown rate since the start of post-construction monitoring in 2017, indicating a fundamental change in the hydrologic performance of the pond. The results from the water budget analysis are further discussed below.

4.2 MODEL RESULTS

Seep flow and percolation rates were found to be the most important parameters in calibration of predicted drawdown rates. Additionally, the seasonal changes in both seep flow and percolation rate due to precipitation were crucial for modeling the correct timing of pond water level increases and recessions.

4.2.1 SEEP FLOW CALIBRATION AND VALIDATION

The previous seep flow rating curve established prior to project construction was compared against field measurements taken during the performance monitoring period. Primarily low flow measurements were taken, leaving a gap in data for higher flows. Table 2 summarizes the field observations. Figure 3 compares the previously established rating curve to post-construction monitoring field measurements. Outlier data may be due to a sediment blockage or excess cattle consumption as this is difficult to verify. Dry and wet years were compared to one another to determine differences in seep flow averages. Seep flow measurements were generally larger for wetter years (mean = 7384.17 gpd) and smaller for drier (mean = 1357.27 gpd) years. Previous modeling efforts assumed spring box inflow to be 704 gpd following the first 2 storms of the water year and 2371 gpd starting with the third storm of the water year through the end of April, and 0 gpd from the beginning of May until the first rains of the following water year. These values were found to be too low during the low flow period (May 1st until the first storm event) and therefore were updated in the model to reflect observed averages for wet (2017, 2019, and 2023) and dry years (2018, 2020-2022) respectively.

Seep flow calibration was based on validating predicted flow with field observation averages. Daily seep flow is assumed to be the same for the first two storm events and increase for the third and fourth storms into the dry season for all years. A summary of seep flows used in the model can be found in Table 3.

Table 2. Average seep inflow observations

Date	WSE (ft)	Depth(ft)	Time (s)	Volume (ml)	Flow rate (gpd)
4/13/2017	518.93	0.37	3.00	1703.44	12990.97
10/4/2017	NA[1]	NA[1]	4.50	369.67	1874.32
3/20/2018	518.70	0.6	7.64	500.00	1486.53
5/14/2018	518.75	0.55	5.13	320.00	1421.90
10/3/2018	NA[1]	NA[1]	22.63	500.00	517.05
3/22/2019	NA[1]	NA[1]	12.73	13248.90	23784.47
7/30/2019	518.78	0.52	7.17	473.18	1486.53
4/14/2020	519.00	0.3	4.53	473.18	2391.37
10/9/2020	518.17	1.13	12.43	500.00	904.84
3/15/2021	518.90	0.4	7.80	500.00	1486.53
5/11/2021	518.75	0.55	11.99	561.00	1098.74
9/30/2021	518.95	0.35	15.66	473.18	710.95
3/23/2022	518.78	0.52	4.28	473.18	2520.64
7/14/2022	518.74	0.56	14.86	500.00	775.58
9/16/2022	518.78	0.52	14.24	500.00	775.58
5/4/2023	518.74	0.56	0.86	500.00	13249.50
8/16/2023	518.69	0.61	6.30	500.00	1809.69

[1] Indicates missing data not used in seep flow averages

Table 3: Water budget model seep flow values

Storm Value	2017/2023 Seep (ac-ft/day)	2022 Seep (ac-ft/day)	2018-2021 Seep (ac-ft/day)	Original Assumptions (ac-ft/day)	Description
1	0.012	0.002	0.006	0.0019	First storm[1]
2	0.012	0.002	0.006	0.0019	Second storm
3	0.025	0.01	0.01	0.0072	Third storm
4	0.025	0.01	0.01	0.0072	Fourth storm
0	0.025	0.01	0.01	0	Dry Season[2]

[1]Rain event classified as 0.25 in/day or greater

[2]Dry season is from May 1st- October 1st . An exception has been made for 2017 where the rainy season extends to June due to rain occurring throughout the month of May.

4.2.2 PERCOLATION CALIBRATION

Percolation is a key calibration parameter that depends on ongoing precipitation as well as soil moisture conditions, and other factors. A bentonite layer was installed on the pond bottom to reduce percolation rates, but performance of this layer and associated percolation losses are largely uncertain. The original

model used a percolation value of 0.25 in/day after the first storm event of the WY, 0.15 in/day after the second and third storms, and 0.3 in/day after the fourth storm. Percolation values were calibrated for each individual WY and were generally larger than the original model assumptions.

The values used for model calibration are outlined in Table 4:

Table 4: Water budget model percolation loss values

Storm Value	2017 Percolation (in/day)	2018 – 2021 Percolation (in/day)	2022/2023 Percolation (in/day)	Original Assumption (in/day)	Description
1	0.5	0.3	0.5	0.25	First storm[1]
2	0.5	0.5	0.5	0.15	Second storm
3	0.5	0.5	0.5	0.15	Third storm
4	0.1	0.4	0.75	0.3	Fourth storm
[1]Rain event classified as 0.25 in/day or greater					

All groups were assumed to have the same percolation rates between the second and third storm event (0.5 in/day), with different percolation rates after the first and third storm events.

4.2.3 MODEL CALIBRATION AND VALIDATION SUMMARY

The final water budget model results are shown by Figure 4.

The first project year (WY 2017) was a wet year that followed two normal precipitation years (2015 and 2016). During the monitoring period, there were no other consecutive instances of normal/wet/very wet years. 2017 was therefore calibrated with a unique set of percolation values and included a manual drawdown of the pond on 09/19/2017 for invasive species control. Lower seep and percolation values were used for the next four WYs (2018-2021). The seep inflow was diverted from the pond on 9/12/2018 and the pond drained on 10/16/2018, both of which have been adjusted for in the model. It was diverted again on 9/9/2019 until 11/25/2019. Despite WY 2019 being a wet year, the same percolation rates were successfully used in the water budget model calibration as in the dry years before (2018), and after (2020-2021). Seep flows were also completely diverted away from the pond from 9/9/2019, until 11/25/2019, and the pond was emptied to manage for invasive species on October 30, 2019. Additionally, there was an increased drawdown rate due to pumping from the rancher at the end of WY 2019. This caused a slightly sharper decrease in pond water levels during this time compared to WY 2017. WY 2020 and 2021 were both very dry years, leading to lower water levels and quicker drawdown rates than previous years. The model over-predicted water levels at the start of WY 2021 (between 12/10/2020 and 01/26/2021) due to an over-prediction in seep values in the model. When seep was set to 0 gpd, the model matches the observed values, indicating a potential blockage of the seep pipe during this time. Seep flows were diverted between 11/3/2020 and 12/9/2020, and the pond was drained on 06/11/2021. The seep was also cleared on 11/3/2020, and then again on 02/09/2021.

Despite having different precipitation classifications and seep flow rates, WY 2022 and 2023 were calibrated using the same percolation values at nearly two times the rate used for the previous four years. Water levels were over-predicted at the start of both WYs. Over-estimation of seep inflow was not likely the cause of this over-estimation as lowering seep values in the model for these periods was not enough to lower pond water levels. The seep spring box was cleared on September 22, 2021, October 29, 2021, January 27, 2022, August 4, 2022, and again on October 13, 2022. Water levels were over-predicted due to large rain events (>1.5 in/day) occurring on 10/24/2022 and on 11/08/2023 where the model indicated water storage in the pond. Additionally, a higher percolation value was needed following the fourth storm event to match the drawdown rate of the pond for both WYs.

5 CONCLUSIONS / RECOMMENDATIONS

Pond water level drawdown rates have increased every year since the start of the monitoring period. WY 2023 experienced the quickest drawdown rate despite being a very wet year with more rain than any previous monitoring year. The water budget model analysis of the pond shows that seep flow input and percolation losses are the most important variables contributing to the pond's Spring/Summer hydrologic regime. Observed differences in the pond's water levels and the observed data for the first five years of the project (WY 2017-2021) are in large part explained by changes in estimates of seep flow due to climate extremes, blockages in the seep spring box not allowing for sustained inflow to the pond, but also a significant increase in losses which are assumed to be percolation losses through the bottom of the pond. The percolation losses in the two most recent WYs are even worse despite WY 2023 being the wettest year on record. Early rains and runoff in WYs 2022 and 2023 were not retained in the pond per the water budget model, resulting in lower initial observed pond water levels. Additionally, the pond lost water faster in these two WYs compared to the previous four WYs by nearly double the rate. Potential contributions to the quickening of pond water level drawdown rates include, but are not limited to: 1) compromised bentonite layer in the pond bottom, 2) seepage via cracks or under the bentonite layer, 3) piping through the pond embankment, 4) ground squirrel burrowing activity lower down on the embankment (though there are no observations to date), 5) seepage around the outlet structure, and/or 6) leaks in the outlet structure gate or mounting plate.

To gain a better understanding for why the pond losses are increasing with each passing year, future monitoring of the project site is highly recommended, to include:

- Continued gage data monitoring and subsequent water budget analysis to compare yearly data trends.
- More frequent monitoring visits, especially immediately after rain events during WY 2024 to observe conditions in real-time, especially early in the season as the pond is filling but also after the pond has filled and is drawing down for the season.
- Supplemental flow monitoring in the creek below the pond to understand flow rates and volumes, especially early in the season as the pond is filling but also after the pond has filled and is drawing down for the season.

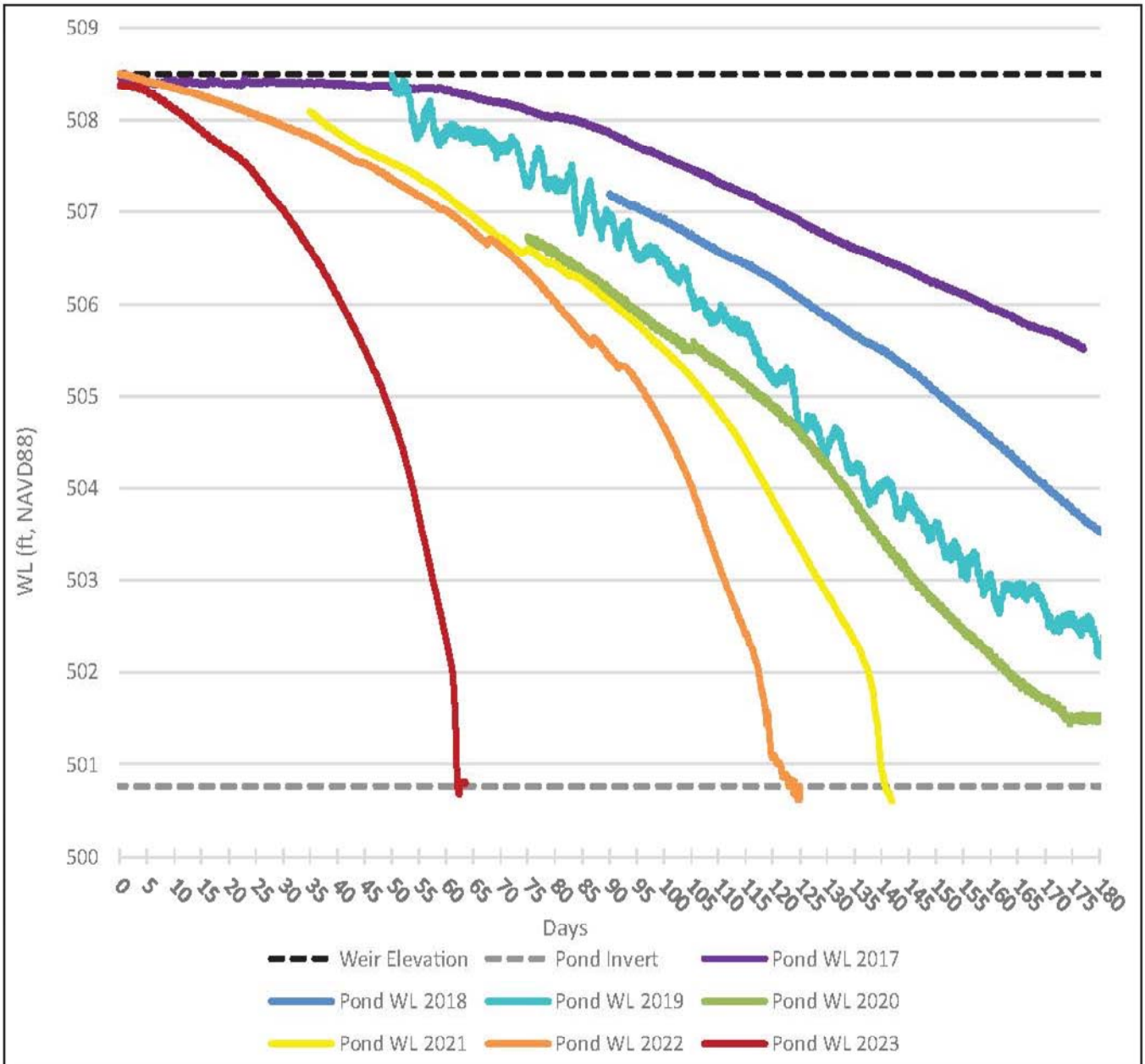
- More frequent maintenance of the seep intake pipe to ensure minimal sedimentation resulting in blockage cutting off inflow to the pond from the spring box.
- Inspect the pond outlet structure gate seals and grout for possible leaks.

6 REFERENCES

cbec 2022. Calero Mitigation Site Monitoring: Year 6 Monitoring Report.

H.T. Harvey & Associates and cbec 2016. Calero County Park Pond and Wetland Restoration Project Mitigation and Monitoring Plan. Project #3753-01.

Notes: Taken 08/16/2023	cbec	*Calero Mitigation Site Supplemental Analysis* **Pond Outlet Dampness**		
		Project No. 15-1030-5	Created By: AH	**Figure 1**



WY	Date WSE dropped below weir elevation	Obs. dry date	Precipitation class
2017	3/21/2017	9/19/2017	Wet
2018	04/07/2018 (highest WL 507.19)	8/26/2018	Very Dry
2019	4/12/2019	8/30/2019	Wet
2020	4/17/2020 (highest WL 506.73 ft)	7/26/2020	Very Dry
2021	01/20/2021 (highest WL 508.09 ft)	5/15/2021	Very Dry
2022	1/19/2022	5/25/2022	Very Dry
2023	4/12/2023	7/10/2023	Very Wet

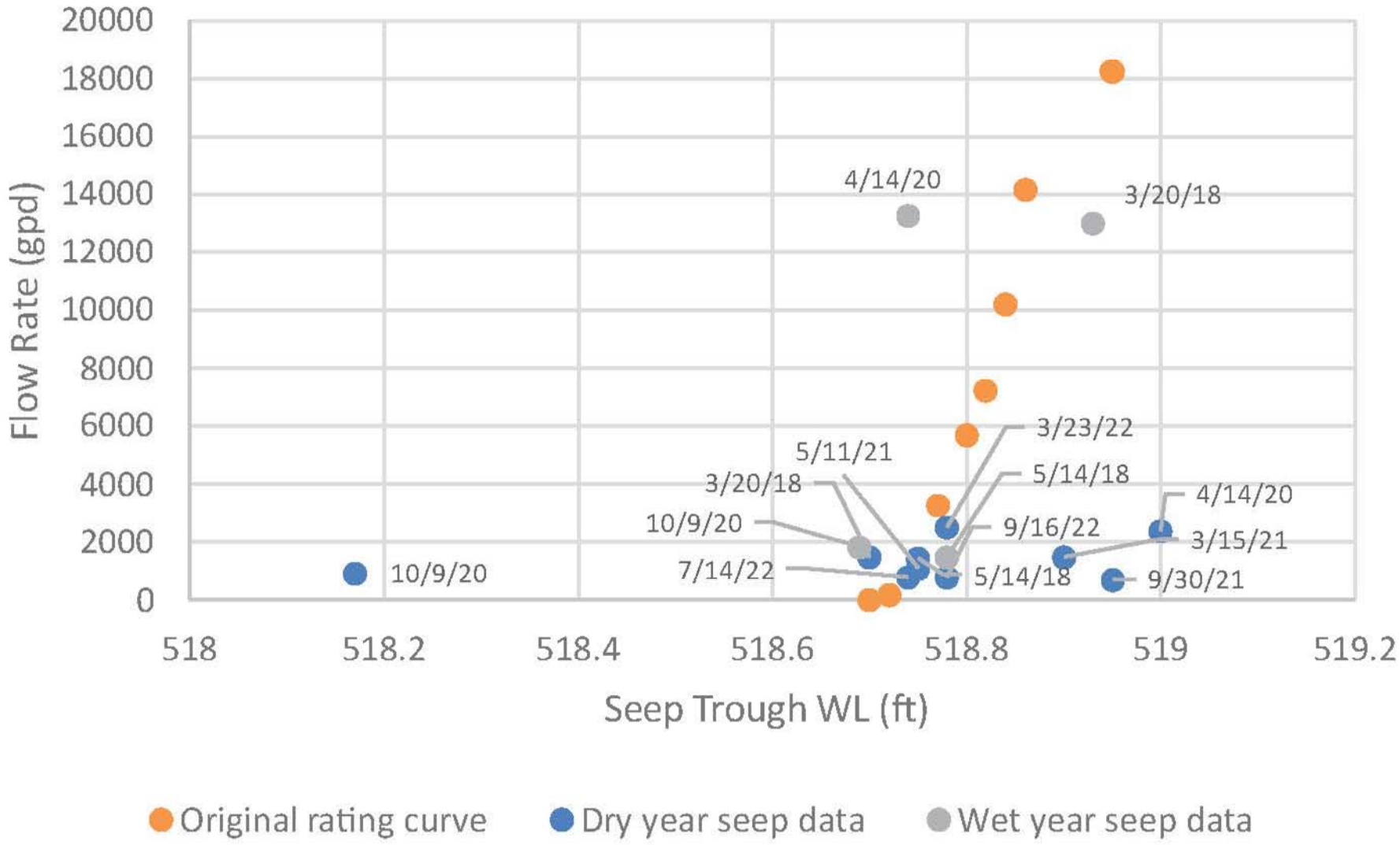
Notes:

cbec

Calero Mitigation Site Supplemental Analysis

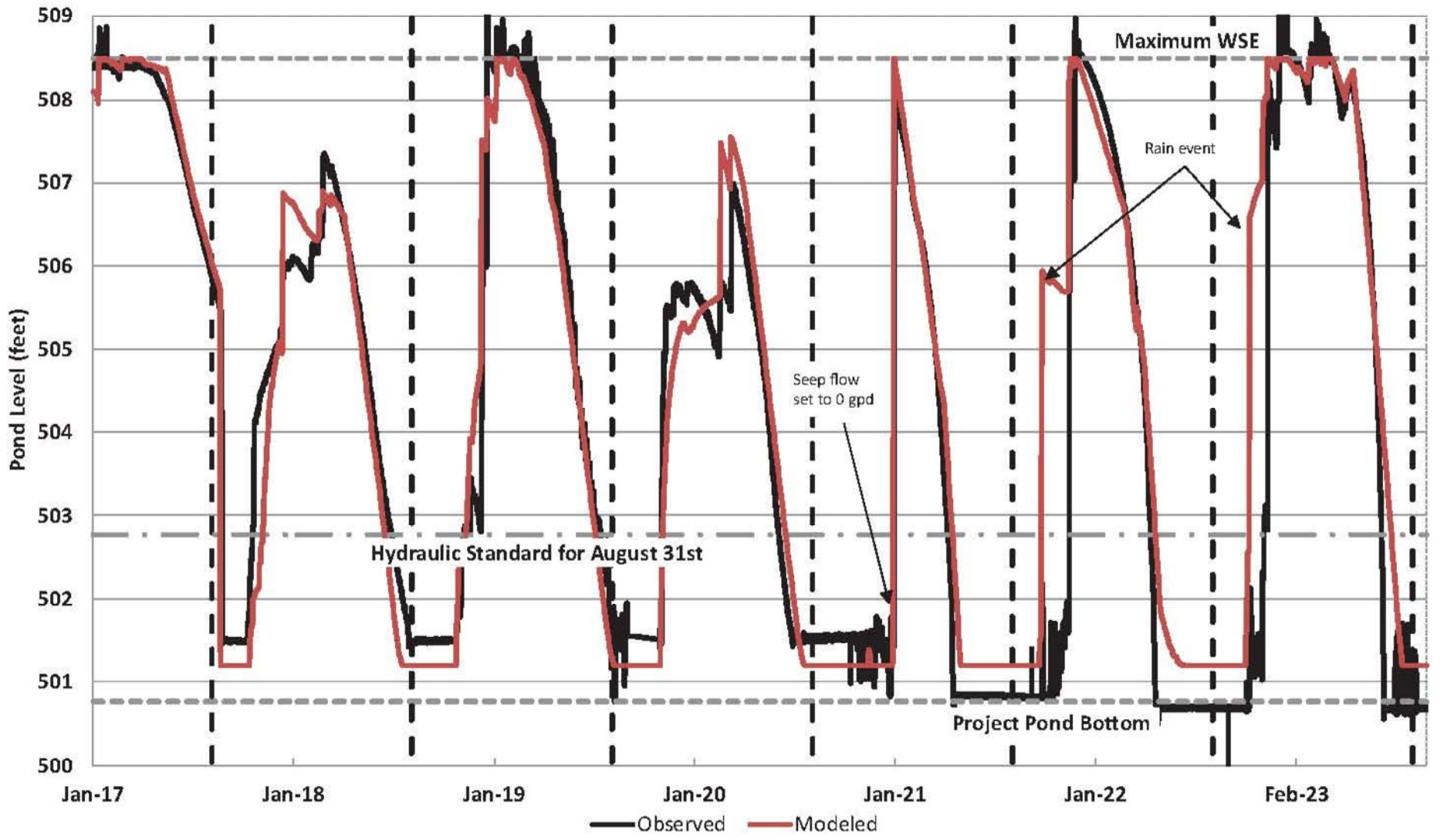
Pond Water Level Drawdown Rate Comparison

Project No. 15-1030-5 | Created By: AH | **Figure 2**



Notes:	cbec	*Calero Mitigation Site Supplemental Analysis* **Seep Flow Rating Curve Analysis**		
		Project No. 15-1030-5	Created By: AH	**Figure 3**

Fig3_seep_data
12/11/2023



Notes:

Calero Mitigation Site Supplemental Analysis

Water Budget Model vs Observed Data

Project No. 15-1030-5	Created By: AH	**Figure 4**

Fig4_WBM_vs_Obs_AH
12/11/2023

Appendix C. Results of Wetland Vegetation Monitoring at the Pond Mitigation Site

Plant Species Observed in the Wetland at the Pond Mitigation Site

Scientific Name	Common Name	Native Status	Wetland Indicator Status[1]	Average Percent Cover
Acmispon americanus	Spanish Clover	Native	UPL	0.1
Asclepias fascicularis	Narrow leaf milkweed	Native	FAC	< 0.1
Brassica nigra	Black mustard	Nonnative	UPL	< 0.1
Bromus hordeaceus	Soft brome	Nonnative	FACU	< 0.1
Carduus pycnocephalus	Italian thistle	Nonnative	UPL	< 0.1
Carex serratodens	Two-tooth sedge	Native	FACW	5.6
Cirsium fontinale var. campylon	Mt. Hamilton thistle	Native	OBL	0.1
Croton setiger	Turkey-mullein	Native	UPL	0.4
Cynodon dactylon	Bermuda grass	Nonnative	FACU	0.3
Cyperus eragrostis	Tall cyperus	Native	FACW	0.2
Eleocharis macrostachya	Creeping spike rush	Native	OBL	40.8
Epilobium ciliatum	Fringed willowherb	Native	FACW	0.3
Erythranthe guttata	Seep monkey flower	Native	OBL	2.7
Festuca perennis	Italian rye grass	Nonnative	FAC	1.5
Heliotropium curassivicum	Alkali heliotrope	Native	FACU	1.2
Hemizonia congesta	Hayfield tarweed	Native	UPL	1.6
Hordeum murinum	Foxtail barley	Nonnative	FACU	0.1
Juncus effusus	Bog rush	Native	FACW	13.9
Juncus xiphioides	Iris leaved rush	Native	OBL	< 0.1
Lythrum hyssopifolia	Hyssop loosestrife	Nonnative	OBL	1.1
Paspalum dilatatum	Dallis grass	Nonnative	FAC	0.1
Phalaris aquatica	Harding grass	Nonnative	FACU	1.3
Polypogon monspeliensis	Rabbitsfoot grass	Nonnative	FACW	4.5
Rumex crispus	Curly dock	Nonnative	FAC	1.1
Sisyrinchium bellum	Western blue-eyed grass	Native	FACW	0.4
Sparganium eurycarpum	Bur reed	Native	OBL	0.1

[1] Wetland indicator status based on the *National Wetland Plant List v3.5 Species Detail Tool* (USACE 2023). UPL = Upland; FACU = Facultative Upland; FAC = Facultative; FACW = Facultative Wetland; OBL = Obligate Wetland

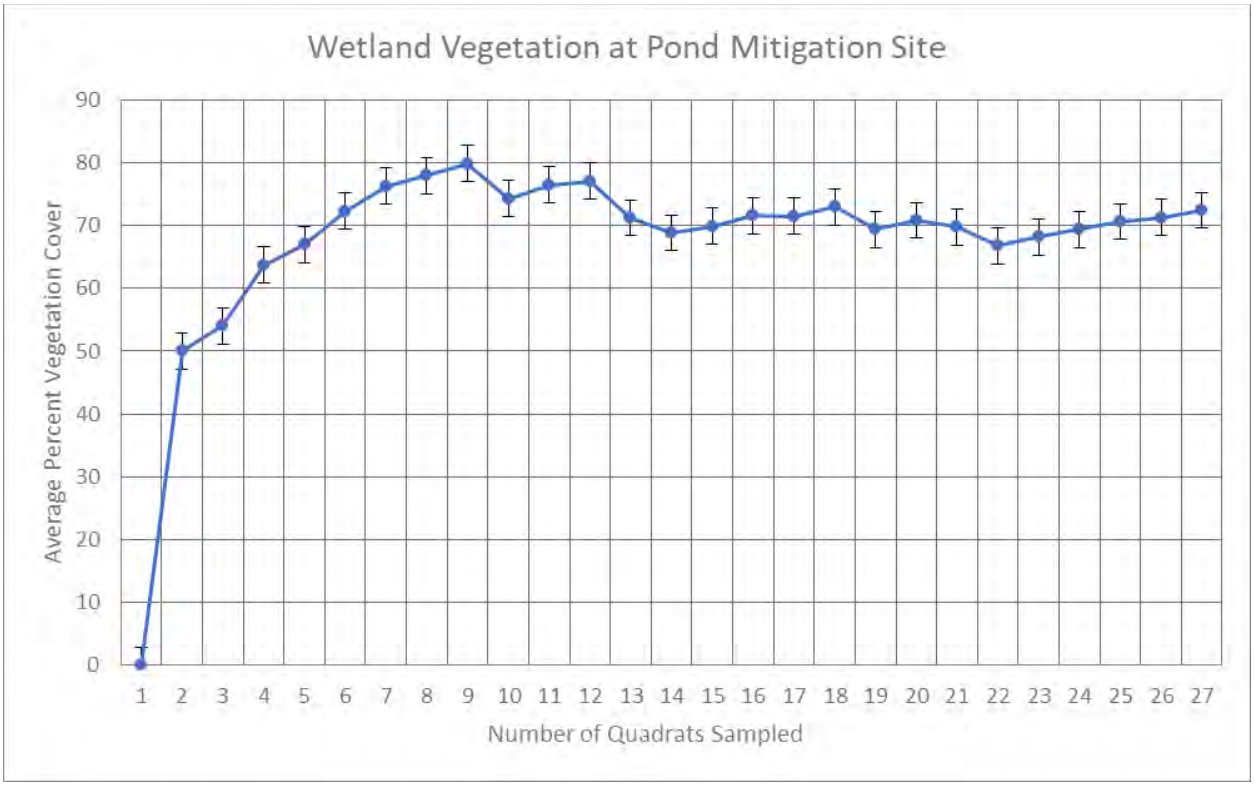


Figure C-1. Species Accumulation Curve for the Pond Mitigation Site in Year 7

Appendix D. Results of Wetland Vegetation Monitoring at the Pond Mitigation Site

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

Photo 2. Year 7 Conditions at Photo Point 6 during Mt. Hamilton Thistle Abundance Monitoring at the Pond Mitigation Site (July 17, 2023)

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

Photo 4. Year 7 Conditions at Photo Point 7a during Vegetation Monitoring at the Pond Mitigation Site (July 17, 2023)

Photo 5. Year 1 Conditions at Photo Point 7b during Vegetation Monitoring, Showing the Wetland Establishment Area at the Pond Mitigation Site (August 8, 2017)

Photo 6. Year 7 Conditions at Photo Point 7b during Vegetation Monitoring, Showing the Wetland Establishment Area at the Pond Mitigation Site (July 17, 2023)

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

Photo 8. Year 7 Conditions at Photo Point 7c during Vegetation Monitoring at the Pond Mitigation Site (July 17, 2023)

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

Photo 10. Year 7 Conditions at Photo Point 8 during Vegetation Monitoring at the Pond Mitigation Site (July 17, 2023)

Photo 11. Year 1 Conditions at Photo Point 9 during Vegetation Monitoring at the Pond Mitigation Site (August 8, 2017)

Photo 12. Year 7 Conditions at Photo Point 9 during Vegetation Monitoring at the Pond Mitigation Site (July 17, 2023)

Photo 131. Year 1 Conditions at Photo Point 10 during Vegetation Monitoring at the Pond Mitigation Site (August 8, 2017)

Photo 14. Year 7 Conditions at Photo Point 10 during Vegetation Monitoring at the Pond Mitigation Site (July 17, 2023)

Photo 15. Year 1 Conditions at Photo Point 17 during Mt. Hamilton Thistle Abundance Monitoring at the Pond Mitigation Site (August 8, 2017)

Photo 16. Year 7 Conditions at Photo Point 17 during Mt. Hamilton Thistle Abundance Monitoring at the Pond Mitigation Site (July 17, 2023)

Photo 17. Year 1 Conditions at Photo Point 18 during Mt. Hamilton Thistle Abundance Monitoring at the Pond Mitigation Site (August 8, 2017)

Photo 18. Year 7 Conditions at Photo Point 18 during Mt. Hamilton Thistle Abundance Monitoring at the Pond Mitigation Site (July 17, 2023)