ANNUAL RESTORATION MONITORING REPORT
YEAR 5

SAN FELIPE CREEK RESTORATION PROJECT
SANTA CLARA VALLEY HABITAT AGENCY

Prepared for

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

Section 1. RESTORATION PROJECT OVERVIEW

1.1. INTRODUCTION AND SUMMARY

Nomad Ecology (Nomad) prepared this Annual Monitoring Report for the San Felipe Creek Restoration Project (project) on behalf of the Santa Clara Valley Habitat Agency (Habitat Agency). This report summarizes the annual monitoring results for Year 5 (2023) of monitoring. Site performance for Years 1, 2, 3 and 4 can be found in the San Felipe Creek Restoration Project Mitigation Monitoring Annual Report for Year 1 (Dudek 2020a), Year 2 (Dudek 2020b), Year 3 (Dudek 2021), and Year 4 (Nomad 2023).

The project consists of the restoration, establishment, and enhancement of aquatic resources along San Felipe Creek and its tributaries between the Corral and Cañada de Pala trails in the Joseph D. Grant County Park in unincorporated Santa Clara County, California (Figures 1 and 2). The restoration project generates habitat restoration credits and contributes to recovery per the requirements of the Santa Clara Valley Habitat Plan (ICF International 2012) and Regional General Permit 18 (USACE 2016). Restoration credits are also sought to satisfy requirements associated with 401 Water Quality Certifications issued by the Regional Water Quality Control Board. Restoration of San Felipe Creek will mitigate impacts from historical land uses and disturbances, enhance aquatic and upland habitats, make San Felipe Creek more resilient to climate change, and provide educational opportunities for the public.

The project plan is to restore approximately 1 mile of stream through modification of in-channel habitat and restoration of sustainable natural channel and floodplain functions. Restoration construction was completed in 2018 and included the following activities:

- Improvements to park trails and associated drainage features
- Restoration of San Felipe Creek including inset floodplain creation, re-contoured ephemeral drainage, and inset floodplain creation.
- Improvements to an incised agricultural ditch and seasonal wetlands
- Rehabilitation of incised tributaries
- Rehabilitation of Boyds Creek (a tributary to San Felipe Creek) and an associated abandoned channel
- Enhancement of seasonal wetlands and a spring wetland

Per the San Felipe Creek Restoration Project Mitigation and Monitoring Plan (MMP) (Dudek 2019), monitoring began in 2018 following the completion of construction activities and will extend for a 10-year period through October 2028. This report presents the results of the fifth year (2023) of restoration monitoring. This report provides an overview of the restoration project; performance standards; requirements, timing, and methodology of monitoring efforts; monitoring results; and recommendations.

The performance of the project site is evaluated through comparison of the monitoring data to the performance standards in the MMP. There are separate performance standards for wetland restoration areas and for stream and riparian buffer areas. There are additional wetland re-establishment success criteria, separate from the performance standards, evaluated in Year 5 and Year 10.

Based on vegetation monitoring in Year 5, the wetland rehabilitation and enhancement areas met four of seven of the interim performance standards. They met: maximum cover by weed species, absolute cover of wetland species, target species richness, and hydrology. They did not meet: container plant cover, seeded area cover, or relative cover of native species. Recommendations are included to keep the site on track to meet performance standards.

Based on vegetation monitoring in Year 5, the stream and riparian buffer met three of the six interim performance standards. They met: minimum cover of plants, maximum cover by weed species and target species richness. They did not meet: container plant cover, cuttings cover, or relative cover of native species.

Several of the vegetation performance standards were not met because the majority of surviving plants on site were part of replacement planting that occurred in fall 2020 and fall 2021, and the plants are younger and smaller than plants from the initial plantings and are not meeting Year 5 targets. Continued maintenance including irrigation, caging, mulching, and weed control will ensure these plants continue to grow and mature and provide sufficient cover to meet performance standards.

In addition, several of the performance standards, as written in the MMP, do not accurately capture restoration success on site. The Habitat Agency has proposed revised performance standards for the project that are ecologically meaningful and is in the process of working with the permitting agencies to finalize these revised standards.

Based on geomorphology and hydrology monitoring in Year 5 conducted by Balance Hydrologics, Inc. (Balance), the stream and riparian buffers are meeting all performance standards. Balance recommends adding a second course of staked debris jams during summer 2024 in the eastern incised channel (ID 02) and establishing adaptive management strategies to reduce the flow requirements and increase the frequency of activation of Boyds Creek distributary channels.

1.2. Permit Holder and Information

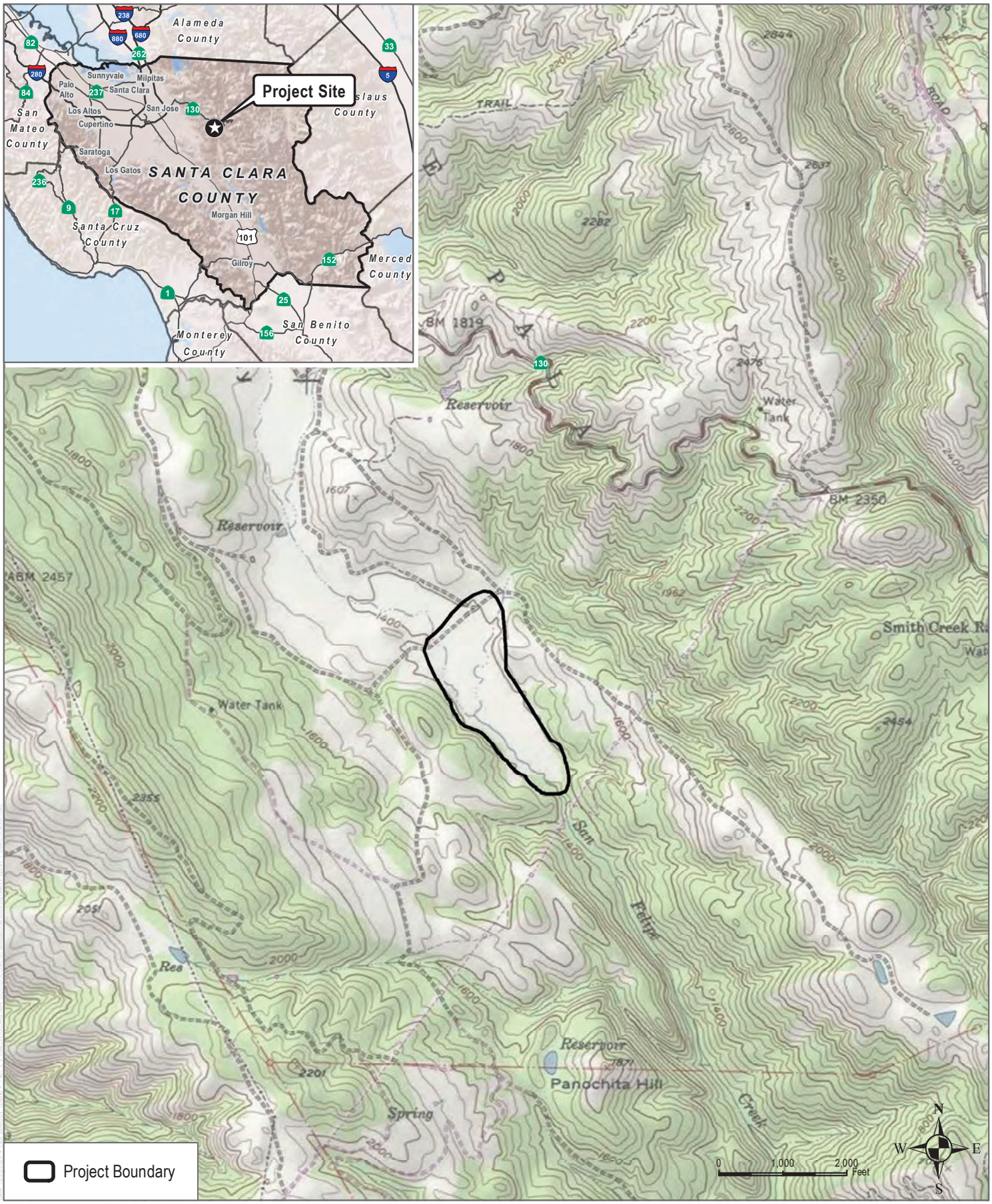
The following permits were secured for this project and are held by the Santa Clara Valley Habitat Agency. This document was prepared in accordance with the conditions provided in the following regulatory permit documents:

- U.S. Army Corps of Engineers (USACE) File Number: 2017-00322S, and RGP 18, File Number: SPN-2012-00302S
- San Francisco Bay Regional Water Quality Control Board, Water Quality Certification, CIWQS Place ID 836012
- California Department of Fish and Wildlife Lake or Streambed Alteration Agreement, Notification Number 1600-2017-0309-R3
- Santa Clara Valley Habitat Agency Reporting File Number SCVHA-2-18-01

1.3. Project Setting

The project site is in the Joseph D. Grant County Park in unincorporated Santa Clara County, California (Figure 1). The project site is approximately 7 miles east of the City of San Jose in Section 12, Township 7 South, and Range 2 East of the U.S. Geological Survey Lick Observatory 7.5-minute quadrangle. The approximate center of the project site corresponds to GPS coordinates 37.320166, -121.699706. The restoration area is within the San Francisco Bay Area subregion of the California Floristic Province (Baldwin et al. 2012) and within the Coyote Creek Watershed.

The project site is approximately 61 acres and is along approximately 1 mile of San Felipe Creek. The project site consists of undeveloped parkland bordering the San Felipe Creek corridor south of the Corral Trail and associated tributaries and uplands (Figure 2). Topography within the restoration area consists of low-gradient alluvial valley and terrace terrain, surrounded to the north, east, and south by steepening hill slopes.



SOURCE: USGS 7.5-Minute Series Lick Observatory Quadrangle

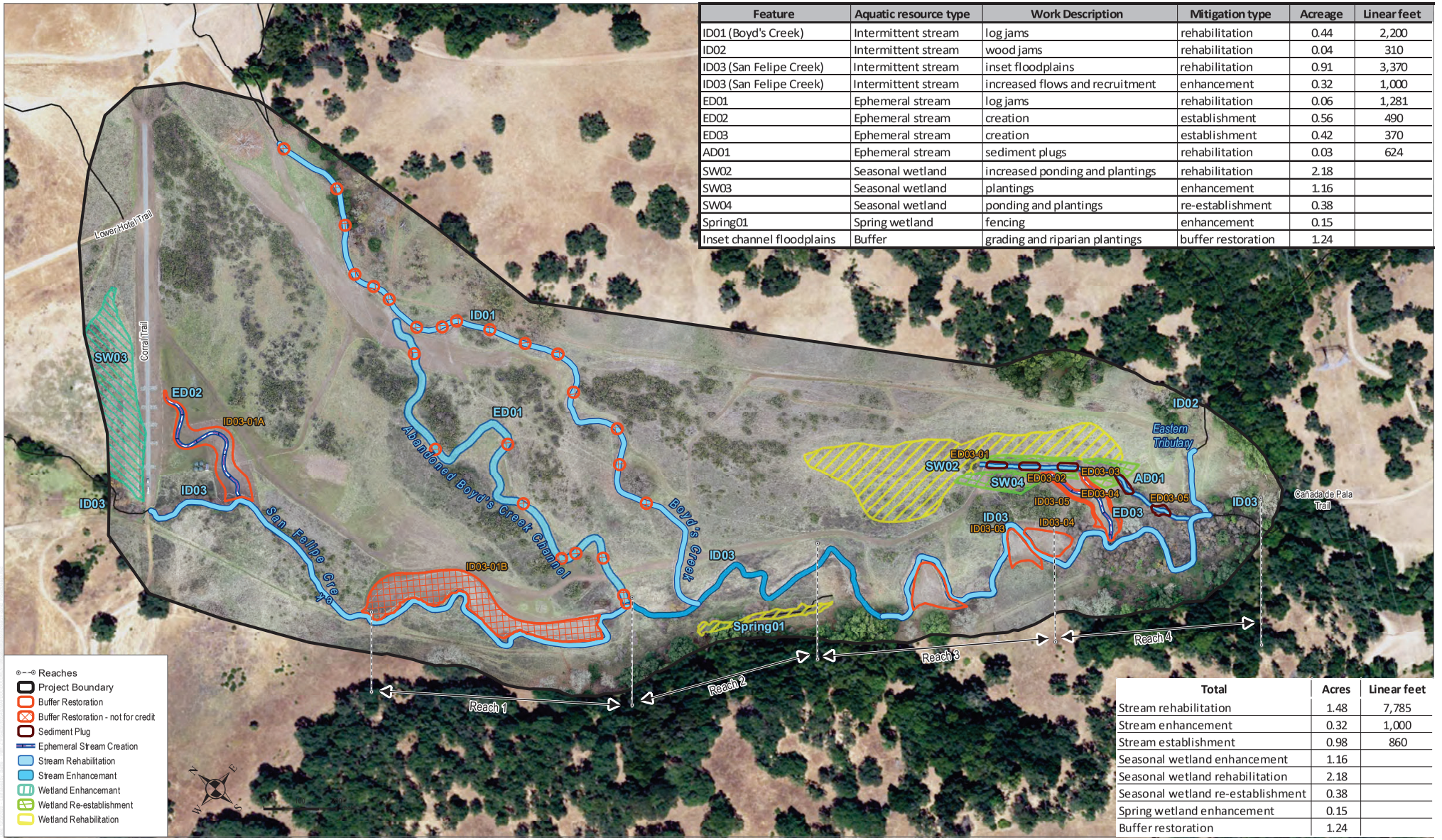
FIGURE 1

Project Location

San Felipe Creek Restoration Project

DUDEK

Feature	Aquatic resource type	Work Description	Mitigation type	Acreage	Linear feet
ID01 (Boyd's Creek)	Intermittent stream	log jams	rehabilitation	0.44	2,200
ID02	Intermittent stream	wood jams	rehabilitation	0.04	310
ID03 (San Felipe Creek)	Intermittent stream	inset floodplains	rehabilitation	0.91	3,370
ID03 (San Felipe Creek)	Intermittent stream	increased flows and recruitment	enhancement	0.32	1,000
ED01	Ephemeral stream	log jams	rehabilitation	0.06	1,281
ED02	Ephemeral stream	creation	establishment	0.56	490
ED03	Ephemeral stream	creation	establishment	0.42	370
AD01	Ephemeral stream	sediment plugs	rehabilitation	0.03	624
SW02	Seasonal wetland	increased ponding and plantings	rehabilitation	2.18	
SW03	Seasonal wetland	plantings	enhancement	1.16	
SW04	Seasonal wetland	ponding and plantings	re-establishment	0.38	
Spring01	Spring wetland	fencing	enhancement	0.15	
Inset channel floodplains	Buffer	grading and riparian plantings	buffer restoration	1.24	



Total	Acres	Linear feet
Stream rehabilitation	1.48	7,785
Stream enhancement	0.32	1,000
Stream establishment	0.98	860
Seasonal wetland enhancement	1.16	
Seasonal wetland rehabilitation	2.18	
Seasonal wetland re-establishment	0.38	
Spring wetland enhancement	0.15	
Buffer restoration	1.24	

SOURCE: Bing Maps 2020

DUDEK

FIGURE 2

Project Design

San Felipe Creek Restoration Project

1.4. Restoration Project Purpose and Project Elements

1.4.1 Project Purpose and Goals

The purpose of the project is to restore approximately 1 mile of stream by modifying in-channel habitat and restoring sustainable natural channel and floodplain functions within the reach of San Felipe Creek located between the Corral and Cañada de Pala Trails (Figure 2). Conditions prior to restoration were variable within the project reach but were generally categorized as an incised channel with a disconnected historical floodplain, limited groundwater connectivity, and areas that had converted to upland plant species (denuded of riparian vegetation). Legacy agricultural activities had influenced overland flow pathways and channel morphology. Restoration of San Felipe Creek will mitigate impacts from historical land uses and disturbances, enhance aquatic and upland habitats, make San Felipe Creek more resilient to climate change, and provide educational opportunities for the public. The restoration project was proposed to generate habitat restoration credits and contribute to recovery per the requirements of the Santa Clara Valley Habitat Plan (Habitat Plan) (ICF International 2012) and Regional General Permit 18 (USACE 2016). Restoration credits are also being sought to satisfy requirements associated with 401 Water Quality Certifications issued by the Regional Water Quality Control Board. Restoration of San Felipe Creek within the project area supports the biological goals and objectives of the Habitat Plan.

Overall, the project will result in increased aquatic resource functions and services by restoring, establishing, and enhancing wetland and non-wetland waters of the United States, including improving functions within an existing on-site ditch and incised channel, and restoring riparian woodland adjacent to San Felipe Creek. These restoration actions are expected to benefit special-status species such as California tiger salamander (*Ambystoma californiense*) and California red-legged frog (*Rana draytonii*) by providing upland habitat and refugia. The project will also increase the diversity of native wetland and riparian vegetation, as well as improve the functional capacity of existing on-site streams by increasing the potential for addition of allochthonous material (organic matter and nutrients imported into an ecosystem), providing flood protection benefits, and providing groundwater recharge.

1.4.2 Project Elements

The following project elements were implemented with the goal of establishing (i.e., creating), re-establishing, rehabilitating, and enhancing the creek and wetland areas into the desired habitat types. Per Habitat Plan definitions (ICF International 2012), all of these methods are considered under the umbrella term "restoration." Each element is described in further detail below. The anticipated mitigation type and amount for each project element is provided in Table 1.

Table 1. Aquatic Resource Mitigation Types and Amounts per MMP

Feature	Aquatic Resource Type	Work Description	Mitigation Type[1]	Acreage	Linear Feet
ID01 (Boyds Creek)	Intermittent stream	Log jams	Rehabilitation	0.44	2,200
ID02 (Incising Tributary)	Intermittent stream	Wood jams	Rehabilitation	0.04	310
ID03 (San Felipe Creek Reaches 1, 3, and 4)	Intermittent stream	Inset floodplains	Rehabilitation	0.91	3,370
ID03 (San Felipe Creek Reach 2)	Intermittent stream	Increased flows and recruitment	Enhanced	0.32	1,000

Feature	Aquatic Resource Type	Work Description	Mitigation Type[1]	Acreage	Linear Feet
ED01 (Boyds Creek Abandoned Channel)	Ephemeral stream	Log jams	Rehabilitation	0.06	1,281
ED02 (Ephemeral Drainage)	Ephemeral stream	Creation	Establishment	0.56	490
ED02 (Ephemeral Drainage)	Ephemeral stream	Creation	Establishment	0.42	370
AD01 (Agricultural Ditch)	Ephemeral stream	Sediment plugs	Rehabilitation	0.03	624
SW02 (Rehabilitated Seasonal Wetland)	Seasonal wetland	Increased ponding and plantings	Rehabilitation	2.18	N/A
SW03 (Enhanced Seasonal Wetland)	Seasonal wetland	Plantings	Enhancement	1.16	N/A
SW04 (Re-established Seasonal Wetland)	Seasonal wetland	Ponding and plantings	Re-establishment	0.38	N/A
Spring01 (Spring Wetlands)	Spring wetland	Fencing	Enhancement	0.15	N/A

Source: San Felipe Creek Restoration Project – Year 3 Annual Report (Dudek 2021)
[1] Per Habitat Plan definitions (ICF International 2012), all of these methods are considered under the umbrella term "restoration."

Improve Corral Trail and Lower Hotel Trail

Prior to restoration efforts, the Corral Trail was lower than the surrounding fields, and it captured runoff that would otherwise flow across and infiltrate into the Boyds Creek alluvial fan, resulting in erosion of the road and excess sediment delivery to San Felipe Creek, and reducing recharge across the alluvial fan. The Corral Trail was modified using filling to allow flows to pass the road to the south onto the alluvial fan. Where runoff flowed across and eroded the Hotel Trail, an Arizona Crossing (i.e., low-flow crossing) was constructed to prevent erosion, reduce fine sediment loading, improve trail access, and reduce trail maintenance.

Along the Corral Trail near the seasonal wetland to the east of San Felipe Creek, there was an existing buried rock drain that was inadequate to carry water across the trail during high-flow periods. The project built up the grade along the Corral Trail to reduce flow and erosion across the trail, in tandem with installation of additional rock drain lenses to carry water from the upstream to downstream side of the road, where it naturally flows into San Felipe Creek. The elevation of the rock lenses was designed to maintain the hydrology of the existing seasonal wetland upstream. To avoid concentration of flows, each drainage lens contains a single 4-inch-diameter high-density polyethylene pipe located at the same elevation. The pipes are redundant and are included to prolong the life of the drainage lenses and avoid erosion of the Corral Trail from overtopping and maintain existing water surface elevations and hydroperiods in the existing wetland. These pipes are intended to provide a low-flow path that can easily be maintained by parks staff.

The previously listed trail and road modifications did not have any direct impacts on waters of the United States. There are indirect, beneficial effects on downstream water quality and quantity in Boyds Creek and San Felipe Creek. Disturbed areas resulting from the trail improvements were seeded with native upland plant species. The trail itself was not seeded.

Restoration of San Felipe Creek (ID03)

The project approach acknowledges the varying states of incision from reach to reach, and accelerated the channel evolution process by excavating, expanding, and revegetating inset channel floodplains. Advancing the channel evolution process to stable form proactively removes fine sediment before it is introduced to the system by way of bank erosion and failure, while at the same time establishing more frequent floodplain inundation and encouraging more frequent aquifer recharge. The excavated floodplains will likely store fine sediment transported from upstream of the site, further reducing fine-sediment impacts.

Reach 1 (upstream portion of on-site San Felipe Creek [ID03] to confluence with Boyds Creek abandoned channel [ED01])

Inset floodplain creation (ID03-01 and ID03-01A) occurred in Reach 1 of San Felipe Creek (ID03) to advance widening processes and re-sculpt inset flood bench features. The flood bench was excavated between 1 to 3 feet above the channel bed based on storm flow observations; recurrence flow analysis; and relationships between slope, watershed areas, and channel geometry in downstream reference reaches. The restoration approach and plant palettes were tailored to the intermittent flow regime of this area. The above actions should result in creek rehabilitation within Reach 1 of San Felipe Creek. Per Habitat Plan definitions this is considered stream restoration. Additionally, these actions should result in restoration of the willow riparian forest and scrub or mixed riparian forest and woodland land cover type per the Habitat Plan.

Ephemeral Drainage (ED02)

There was a small head cut along San Felipe Creek just downstream of the Corral Trail in the vicinity of ID03-01A. The project re-contoured the feature into a broad ephemeral drainage (ED02) (creek establishment or stream restoration per Habitat Plan definitions) that maintains slow, overland flow as it approaches San Felipe Creek. The downstream portion of the ephemeral drainage creates a backwater channel when San Felipe Creek floods, slowing flow and increasing early-season infiltration.

Reach 2 (confluence with Boyds Creek abandoned channel downstream to eastern edge of spring wetland)

Reach 2 of San Felipe Creek (ID03) was generally in good condition and had good connection with the valley surface and well-developed inset floodplains, so no work occurred within this reach. Reach 2 will be enhanced by way of increased water flows and improved riparian cover over time.

Reaches 3 and 4 (downstream portion)

Additional inset floodplains (ID03-02, ID03-03, and ID03-04) were developed in this reach of San Felipe Creek (ID03). There were existing inset floodplains, but more extensive floodplain inundation and riparian diversity was intended by lowering selected inset floodplains and planting more riparian species. The restoration approach and plant palettes were tailored to the intermittent flow regime of these areas. The additional inset floodplains should result in creek rehabilitation (stream restoration per Habitat Plan definitions) within Reaches 3 and 4. Additionally, these actions should result in restoration of the willow riparian forest and scrub, or mixed riparian forest and woodland land cover type per the Habitat Plan.

Improve Incised Agricultural Ditch (AD01) and Seasonal Wetlands (SW02 and SW04)

Linear plug treatments were implemented within the incised agricultural ditch (AD01) to slow the drainage of water through the ditch. These sediment plugs serve to re-establish the water table adjacent to the ditch to support additional seasonal wetlands (SW04), arrest incision, and encourage spreading of flows across valley bottomlands. In addition to re-established seasonal wetland areas (SW04), the existing seasonal wetlands (SW02) adjacent to the agricultural ditch were rehabilitated by way of improved hydrology and planting native species. The restoration approach and plant palettes were tailored to the intermittent flow regime of these areas.

Additionally, a new ephemeral creek (ED03) and floodplain feature (ID03-05) were established to direct the channel to a new confluence with San Felipe Creek upstream of the ditch's previous confluence, consistent with valley floor topography. This feature was intended to restore the willow riparian forest and scrub, or mixed riparian forest and woodland land cover type defined in the Habitat Plan. Disturbed existing willows in the incised agricultural ditch were used to revegetate banks and plugs. Undisturbed willows were anticipated to self-propagate upslope in the ditch. Additionally, the established creek was planted with native species. The restoration approach and plant palettes were tailored to the intermittent flow regime of these areas.

Rehabilitate Incising Tributary (ID02) Using Staked Wood Jams

Installation of staked wood jams occurred to rehabilitate (restore per Habitat Plan definitions) the incised tributary (ID02) located in the southern portion of the project site. Staked wood jams retain sediment and aggrade the channel, reversing the downcutting trend. The wood jams were installed in a phased approach, which should result in an eventual 6 to 7 feet of increased channel elevation. The wood jams were planted from cuttings using red willow (*Salix laevigata*) and arroyo willow (*Salix lasiolepis*). The restoration approach and plant palettes were tailored to the intermittent flow regime of these areas.

Rehabilitate Boyds Creek (ID01) and Boyds Creek Abandoned Channel (ED01)

The project elements implemented within the Boyds Creek alluvial fan included living log jams planted with container plants to encourage distribution of flows to abandoned swales and channels across the Boyds Creek fan. Areas at the head of the alluvial fan impacted by former agricultural operations and roads were graded and lowered and overbank swales were restored to allow flood-flows to spread across the alluvial fan more frequently.

Constructed living log jams consist of large wood, with and without root wads, paired with native container plants consisting of western sycamore (*Platanus racemosa*) and valley oak (*Quercus lobata*). The restoration approach and plant palettes were tailored to the intermittent flow regime of these areas. Western sycamore plantings were only used when genetically pure container plants were procured at the time of planting; valley oaks were used as substitutions, as needed.

Enhancement of Seasonal Wetland (SW03) and Spring Wetland (Spring01)

Within the existing seasonal wetland (SW03) at the northern portion of the project site and the spring wetland (Spring01) adjacent to San Felipe Creek, enhancement (restoration per Habitat Plan definitions) occurred in the form of non-native and invasive plant species control and installation of permanent exclusion fencing to improve wetland habitat diversity and function. Non-native and invasive plants that

were removed from the wetlands include poison hemlock (*Conium maculatum**), Fuller's teasel (*Dipsacus fullonum**), and curly dock (*Rumex crispus**).

The spring wetland had been decimated by feral pigs (*Sus scrofa*), and as a result there was little vegetation within the wetland. Permanent exclusion fencing was installed to protect the project area, including the spring wetland. With the exclusion fence installed, it is anticipated that the wetland area will naturally revegetate over time since enough existing native plants within the spring can provide seed stock, as long as the non-native and invasive plant species and the pigs are controlled.

1.4.3 Initial Planting and Seeding

Initial restoration implementation included planting container plants and willow stakes (Table 2) and seeding with native seed mixes (Tables 3-5). Initial planting efforts included installation of 7,624 container plants in the wetland rehabilitation and enhancement areas, 1,871 tree and shrub container plants in the riparian buffer and stream areas, and 400 willow cuttings installed along living log jams and in the riparian enhancement areas (Dudek 2020b, 2021, 2023).

Table 2. Original Plantings Installed During Initial Restoration Implementation

Scientific Name	Common Name	Type of Planting	Quantity of Planting Installed[1]
Aesculus californica	California buckeye	tree pot4	17
Baccharis salicifolia	mulefat	deepot	110
Carex praegracilis	field sedge	liners	1,882
Frangula californica	California	deepot	65
Juncus effusus	common rush	tree bands	1,741
Juncus patens	spreading rush	tree bands	2,254
Juncus xiphioides	iris-leaved rush	tree bands	1,891
Platanus racemosa	western sycamore	tree pot4	150
Quercus douglasii	blue oak	tree pot4	5
Quercus lobata	valley oak	tree pot4	293
Ribes californicum var. *californicum*	California gooseberry	deepot	160
Rosa californica	wild rose	deepot	230
Rubus ursinus	California blackberry	deepot	130
Salix laevigata	red willow	cuttings	200
Salix lasiolepis	arroyo willow	cuttings	200
Sambucus mexicana	elderberry	deepot	86
Symphoricarpos albus var. *laevigatus*	snowberry	deepot	100
		Total	**9,514**

Source: San Felipe Creek Restoration Project As Built Plans in the Year 3 Annual Monitoring Report (Dudek 2021).

* Denotes a plant species not native to California.

Table 3. Original Seed Mix Type 1 – Wetland Riparian Mix

Scientific Name	Common Name	Application Rate (lbs. pure live seed/ac)
Achillea millefolium	yarrow	0.2
Cyperus eragrostis	umbrella plant	2.0
Elymus glaucus	blue wild rye	10.0
Elymus trachycaulus	slender wheatgrass	6.0
Festuca rubra	native red fescue	8.0
Hordeum brachyantherum subsp. *brachyantherum*	meadow barley	12.0
Lasthenia californica	goldfields	0.5
	Total	**38.7**

Source: San Felipe Creek Restoration Project As Built Plans in the Year 3 Annual Monitoring Report (Dudek 2021).

Table 4. Original Seed Mix Type 2 – Riparian Mix

Scientific Name	Common Name	Application Rate (lbs. pure live seed/ac)
Achillea millefolium	yarrow	0.2
Cyperus eragrostis	umbrella plant	2.0
Elymus glaucus	blue wild rye	10.0
Elymus trachycaulus	slender wheatgrass	6.0
Festuca rubra	native red fescue	8.0
Heliotropium curassavicum	heliotrope	1.0
Hordeum brachyantherum subsp. *brachyantherum*	meadow barley	12.0
Sisyrinchium bellum	blue-eyed grass	2.0
	Total	**41.2**

Source: San Felipe Creek Restoration Project As Built Plans in the Year 3 Annual Monitoring Report (Dudek 2021).

Table 5. Original Seed Mix Type 3 – Upland Mix

Scientific Name	Common Name	Application Rate (lbs. pure live seed/ac)
Achillea millefolium	yarrow	0.2
Bromus carinatus	California brome	6.0
Clarkia purpurea	purple clarkia	2.0
Elymus glaucus	blue wild rye	15.0
Eriogonum fasciculatum	California buckwheat	1.5
Eriophyllum confertifolium	golden yarrow	0.25
Hordeum brachyantherum subsp. *brachyantherum*	meadow barley	8.0
Phacelia californica	California phacelia	1.0
Sisyrinchium bellum	blue-eyed grass	2.0
Stipa pulchra	purple needlegrass	12.0
	Total	**47.95**

Source: San Felipe Creek Restoration Project As Built Plans in the Year 3 Annual Monitoring Report (Dudek 2021).

1.5. RESTORATION IMPLEMENTATION AND MONITORING SCHEDULE

Project construction began in late summer 2018 and continued through November 2018. Implementation of the restoration plantings began once grading of the channel areas and installation of the intended improvements were complete, as per the final as-built engineering plans. Seeding occurred on October 23 and 25, 2018. Planting of woody vegetation and plugs occurred on November 7 through November 19, 2018. Habitat Agency staff submitted the as-built engineering plans to regulatory agencies on May 13, 2019; the plans were also included within the Year 1 Annual Report (Dudek 2020a). The implementation schedule for the overall restoration program and status is presented in Table 6.

Table 6. Restoration Implementation Schedule

IMPLEMENTATION TASK	SCHEDULE	YEAR 5 STATUS
Order seed and container plants	Upon approval of the 65% Design Submittal.	Complete
Restoration site clearing and grading	After Notice to Proceed with construction and before channel/slope grading.	Complete
Restoration channel/slope grading	After site clearing and grading.	Complete
Restoration area finish grading	Upon certification of channel grading; based on final construction phasing strategy.	Complete
Initial weed treatment	After site grading.	Complete
Temporary irrigation	To be installed after initial weed treatment. Discontinued by the end of Year 3 and removed/abandoned at the end of Year 5.	Complete and Currently Maintained
Seed mix application	Following weed eradication and before container planting.	Complete
Container planting and cutting installation	Following weed eradication and container planting.	Complete. Additional planting occurred in 2020 and 2021, and 2023.
Establishment Period: Assessment of installation, seed germination, and plant establishment	Weekly during initial 120-day period following seeding and container plant installation.	Complete
Site maintenance	10 years. Monthly during Year 1; monthly during November through April, and every other month during May through October for Years 2–10; maintenance visits will also be informed by the biological monitoring and biologist's recommendations.	Year 5 Complete; Ongoing
Restoration monitoring	Qualitative monitoring quarterly during Year 1, beginning with successful completion of initial maintenance period, and bi-annual during Years 2–10. Quantitative monitoring (transects) annually in Years 2–10.	Year 5 Complete; Ongoing
Final sign-off	End of Year 10 (or earlier if agreed to by agencies based on achievement of Year 10 standards)	To be Completed Year 10

Source: San Felipe Creek Restoration Project – Year 3 Annual Report (Dudek 2021)

During the 10-year maintenance and monitoring period, the project will be assessed to document the status of the compensatory mitigation effort, measured against the project performance standards outlined in the MMP (Dudek 2019). Dudek conducted the annual restoration monitoring during the initial 3 years of the 10-year monitoring period. Habitat Restoration Sciences Inc. (HRS) conducted the first 3 years of the 10-year site maintenance. Beginning in Year 4 (2022), Nomad Ecology conducted the biological monitoring, and Confluence Restoration, Inc. (Confluence) conducted site maintenance. Balance Hydrologics, Inc. conducted the geomorphic and hydrologic monitoring for Years 1 through 5.

Annual reports for the 10-year maintenance and monitoring period will be submitted each year for compliance with the permit reporting requirements and will be submitted by December 31 to accommodate California Department of Fish and Wildlife and San Francisco Regional Water Quality Control Board requirements.

1.6. SUMMARY OF REMEDIAL ACTIONS IN PRIOR YEARS

Maintenance and monitoring activities, as well as remedial actions to improve site performance and achievement of performance standards have been ongoing since implementation of the restoration project.

1.6.1 REMEDIAL PLANTING AND SEEDING EFFORTS

Based on the results of Year 1 and Year 2 monitoring (Dudek 2020a, Dudek 2020b), plantings were not meeting performance standards for survival. Plant loss and mortality that occurred shortly after installation was attributed to high rainfall and heavy flows, with additional loss over time due to feral pig activity, irrigation malfunction, and drought (Dudek 2020b). A Remedial Plan (Dudek 2020c) was developed to correct performance deficiencies of the project, with the intent to bring the project back into conformance with performance standards. Recommendations from the Remedial Plan (Dudek 2020c) included installation of replacement plantings, which was completed in two phases. The replacement planting palettes included additional species not originally included in 2018: coyote brush (*Baccharis pilularis* subsp. *consanguinea*), California mugwort (*Artemisia douglasiana*), toyon (*Heteromeles arbutifolia*), and Fremont cottonwood (*Populus fremontii*) (Table 7 and 11). These species were recommended as replacement plants to add to the species richness and habitat complexity of the project site and were observed within the San Felipe Creek watershed in the project vicinity. The additional species were approved by the San Francisco Bay Regional Water Quality Control Board on October 21, 2020 (Dudek 2023).

Phase 1 container planting occurred in November 2020, and included 751 container plants (Table 7) installed in the riparian buffer and stream habitats where sediment accretion/deposition occurred (Dudek 2023). Select seeded areas that were eroded by feral pig activity were reseeded in December 2020; seed mixes (Tables 8-10) varied from the original seed mixes due to species availability and were approved by the Habitat Agency. An additional 100 willow cuttings were installed in January 2021 in select locations where soil moisture and hydrology would most likely be conducive to success in ID02, ID03-03, ID03-04, ED03-01, ED03-02, and ED03-03 (Dudek 2023). Phase 2 container planting occurred in October and November 2021, and included an additional 1,273 container plants (Table 11) and 50 willow cuttings (Dudek 2023).

Table 7. Phase 1 Replacement Container Plantings – 2020

Scientific Name	Common Name	Quantity Installed	Planting Area(s)
Baccharis salicifolia	mulefat	92	ID03-1A; ID03-03, -04, -05
Frangula californica	California coffeeberry	153	ID03-1A; ID03-03, -04, -05
Heteromeles arbutifolia[1]	toyon	56	ID03-1A; ID03-03, -04, -05
Juncus balticus subsp. *ater*[1]	Baltic rush	98	SW02, 03
Populus fremontii[1]	Fremont cottonwood	20	ID03-1A; ID03-03, -04, -05
Quercus lobata	valley oak	90	ID03-1A; ID03-03, -04, -05
Rubus ursinus	California blackberry	27	ID03-1A; ID03-03, -04, -05
Salix lasiolepis	arroyo willow	1	ID03-1A; ID03-03, -04, -05
Sambucus mexicana	blue elderberry	102	ID03-1A; ID03-03, -04, -05
Schoenoplectus californicus[1]	California bulrush	112	ED03-02, SW02, 03
	Total Container Plants	**751**	

Source: Record of Replanting Activities for the San Felipe Creek Restoration Project (Dudek 2023).
[1]Denotes species not included in the original plant palette.

Table 8. Phase 1 Reseed Mixes Type 1 – Wetland Mix

Scientific Name	Common Name	Source	Application Rate (lbs. pure live seed/ac)
Carex densa[1]	dense sedge	Alameda County	1.3
Hordeum brachyantherum subsp. *brachyantherum*	meadow barley	Contra Costa County	10.0
Juncus patens	common rush	Alameda County	1.0
		Total	**12.3**

Source: Record of Replanting Activities for the San Felipe Creek Restoration Project (Dudek 2023).
[1]Denotes species not included in the original wetland seed mix.

Table 9. Phase 1 Reseed Mix Type 2 – Riparian Mix

Scientific Name	Common Name	Source	Application Rate (lbs. pure live seed/ac)
Artemisia douglasiana[1]	California mugwort	Alameda County	0.25
Carex densa[1]	dense sedge	Alameda County	1.3
Castilleja exserta[1]	purple owl's clover	Alameda County	2.5
Grindelia stricta[1]	gumweed	Alameda County	2.0
Hordeum brachyantherum subsp.	meadow barley	Contra Costa	10.0
Juncus patens[1]	common rush	Alameda Couty	1.0
Diplacus aurantiacus[1]	sticky monkeyflower	Santa Clara County	0.15
		Total	**17.2**

Source: Record of Replanting Activities for the San Felipe Creek Restoration Project (Dudek 2023).
[1]Denotes species not included in the original riparian seed mix.

Table 10. Phase 1 Reseed Mix Type 3 – Upland Mix

Scientific Name	Common Name	Source	Application Rate (lbs. pure live seed/ac)
Acmispon glaber[1]	deerweed	Santa Clara County	3.0
Artemisia californica[1]	coastal sagebrush	Santa Clara County	0.5
Elymus glaucus	blue wild rye	Santa Clara County	12.0
Eriogonum fasciculatum	California buckwheat	Alameda County	1.5
Eschscholzia californica[1]	California poppy	Alameda County	1.5
Lupinus bicolor[1]	dove lupine	Santa Clara County	4.0
Diplacus aurantiacus[1]	sticky monkeyflower	Santa Clara County	0.15
Salvia millifera[1]	black sage	Santa Clara County	2.0
Stipa pulchra	purple needlegrass	Santa Clara County	12.0
		Total	**36.65**

Source: Record of Replanting Activities for the San Felipe Creek Restoration Project (Dudek 2023).
[1]Denotes species not included in the original upland seed mix.

Table 11. Phase 2 Replacement Plantings – 2021

Scientific Name	Common Name	Quantity Installed	Planting Area(s)
Aesculus californica	California buckeye	104	ID03-02, ID01, ED01
Artemisia douglasiana	California mugwort	96	ID01, ED01
Baccharis pilularis[1]	coyote brush	94	ID03-02, ID01, ED01
Baccharis salicifolia	mulefat	135	ID01, ED01
Frangula californica	California coffeeberry	95	ID03-02, ID01, ED01
Heteromeles arbutifolia[1]	toyon	143	ID03-02
Platanus racemosa	western sycamore	45	ID03-02, ID01, ED01
Populus fremontii[1]	Fremont cottonwood	75	ID03-02
Quercus agrifolia[1]	coast live oak	62	ID03-02
Quercus lobata	valley oak	140	ID03-02, ID01, ED01
Ribes californicum var. *californicum*	California gooseberry	25	ID03-02
Rosa californica	California rose	57	ID03-02
Rubus ursinus	California blackberry	55	ID03-02
Sambucus mexicana	blue elderberry	107	ID01, ED01
Symphoricarpos albus var. *laevigatus*	snowberry	40	ID03-02
	Total Container Plants	**1,273**	

Source: Record of Replanting Activities for the San Felipe Creek Restoration Project (Dudek 2023).
[1]Denotes species not included in the original plant palette.

1.6.2 Irrigation Management

The irrigation system was transitioned from sprinkler to drip irrigation throughout 2020 and 2021 to ensure replacement plants would receive enough water. In 2022 and 2023, the irrigation system was regularly inspected, and repairs and maintenance was regularly conducted to ensure functionality.

1.6.3 Remedial Restoration Activities

In addition to plantings, two log jam and debris jam structures were built. On November 4, 2020, HRS replaced a log jam in Boyds Creek that had been dislodged in an attempt to protect plantings on an outside bank. On August 26, September 20 and September 21, 2021, HRS constructed a debris jam structure to redirect flows into the pre-project channel alignment where a cutoff channel had formed at ID03-02 in 2019 (Balance Hydrologics 2023).

Section 2. SITE MAINTENANCE ACTIVITIES

2.1. ROUTINE SITE MAINTENANCE

Routine site maintenance was performed by Confluence throughout the project site during Year 5. Per the MMP (Dudek 2019), maintenance and monitoring are to continue for 10 years or until the project performance standards have been met. Maintenance activities included fence and gate inspection and repair; irrigation inspection, repair and maintenance; plant inspection and cage repair; weed control; trash and debris removal; mowing; and other related activities. Confluence monitored the site for evidence of feral pig activity, as fences and gates are designed to exclude feral pigs. All maintenance dates, activities and site notes to date for Year 5 are summarized in Table 12. A more extensive table of maintenance activities can be found in Appendix A.

Invasive species are defined in the MMP as species that threaten the diversity or abundance of native species through competition for resources, predation, parasitism, interbreeding with native populations, transmitting diseases, or causing physical or chemical changes to the invaded habitat (Dudek 2019). The California Invasive Plant Council (Cal-IPC) identifies, lists, and rates invasive species (Cal-IPC 2023). Per the MMP, species rated "moderate" or "high" by Cal-IPC are considered weeds and are monitored for comparison to the project performance standards (Dudek 2019). In Year 5, weed management activities targeted black mustard (*Brassica nigra**), hoary mustard (*Hirschfeldia incana**), yellow star-thistle (*Centaurea solstitialis**), bull thistle (*Cirsium vulgare**), stinkwort (*Dittrichia graveolens**), medusahead grass (*Elymus caput-medusae**), and pepperweed (*Lepidium latifolium**).

Table 12. Summary of Site Management Activities for Year 5

MONTH (DAYS) IN 2023	MANAGEMENT ACTIVITIES CONDUCTED DURING MONTH	SITE NOTES
January 10, 24	• Fence and flap gate inspection and repair • Assessment of irrigation • Debris and litter removal	Inspected fence line and gates. Cleared wire buildup and t-post from upper flap gate. Removed a log and debris from lower flap gate; one end of the gate is stuck partially open from soil buildup. Removed soil buildup to allow gate to close. Surveyed damage to valves and irrigation in floodplain areas. Rainy weather. Water flowing in all creeks and channels.
February 13, 14, 16	• Site inspection • Irrigation inspection • Flagged existing willows and willow planting locations	Site walk conducted in all planting areas. Inspected irrigation system; repair needed around all flow lines. No damage to any mainlines. ID03-02 and ID03-03 and -04 plantings are mostly surviving after floods/high flow. Approximately 1/3 of plantings in this area impacted by flow; ¼ heavily impacted. Recovery is expected for most impacted plants. All planted willow pole areas with at least surviving pole cutting. Most cuttings are buried with sediment, others have erosion at the base. Flagged existing willow locations and new willow planting locations. Blue elderberry and willows showing strong new growth, and willows beginning to bud. Planted about 25 willows, in clusters of 4-7 with one foot spacing, in ID03-02 and 25 willows in ID03-03 and -04. Approximately 50 total willow pole cuttings planted, harvested just upstream and downstream of installation locations. Removed storm debris and freed plants covered in sediment and sticks from flooding. Lots of bent rebar, smashed cages and buried drip tubing.

Month (Days) in 2023	Management Activities Conducted during Month	Site Notes
March 30	• Site inspection • Fence and flap gate inspection and repair • Irrigation inspection, repairs, and maintenance	Water flowing in all creeks and channels. Observed new channel flow paths at the lower floodplain. Inspected fence line and gates and made repairs as needed. Reinstalled pig wire panel at the lower flap gate and removed sediment buildup behind flap gate to allow it to fully close. Repaired sagging areas to the fence with more wire. Irrigation system and water tanks inspected and repaired as needed. Broken 1.5" mainline upstream of pump house, capped mainline. Upper pond is spilling over. Signs of new growth of medusahead grass in SW02. Willows are beginning to leaf-out. Potentially observed large pig at upper floodplain; some evidence of digging found inside of site, especially at Boyd valve.
May 4, 18, 30	• Fence inspection • Irrigation inspection, repairs, and maintenance • Weed control • Plant inspection and maintenance	Site and access roads are beginning to dry up. San Felipe Creek still flowing. Inspected fence line and gates, no breaks to note. Irrigation system inspected. Began to lay out new irrigation lines. Pressurized the system and removed air from mainlines. Lots of damage observed from both floods and rodents. Confirmed timers and valve irrigation are functioning. Flushed sediment from the lines and replaced emitters. Creek crossings installed with removeable fittings for winter. Started irrigation repairs along Boyd creek; all other planting areas have sufficient basin moisture. Goat grazing occurred on site, in a localized upland area adjacent to plantings in ID-03-01A. Hand-pulled weeds from 40% of planted basins in the upper floodplain. Weeded mustard and thistle from this zone as well. Counted 200 trees and shrubs in lower floodplain plus 65 willows, most willows in clusters. Counted 155 trees and shrubs in the upper floodplain plus 52 willows, all willows in clusters. Plantings health is variable. Many plants are starting to show signs of stress with brown leaves; soil was very dry before irritation. Plants near the pump house (ID-03-01A) are still very green and flowering. Victor from the Santa Clara County Parks said pigs are being "dispatched" 15-20 at a time.
June 1, 2, 6, 15, 16, 29, 30	• Irrigation inspection, repairs, and maintenance • Weed management • Plant inspection and maintenance • Mowed roads and access points	San Felipe Creek has stopped flowing. Irrigation system inspected and made repairs as needed. All plants received new tubing and emitters; two zones of willows need emitters. Soil moisture still high near creek bottoms. Fine-tuned irrigation repairs to the Boyd Creek area. Began irrigation repairs to ID01. Repaired damaged PVC pipe ID01 and lower floodplain. Flushed system and filters of sediment. Majority of old drip lines have clogged emitters from floods, replaced clogged emitters. Removed irrigation to basins with dead plants. Hand-pulled weeds from planted basins and outside of cages, and flagged dead plants. Mowed weeds in planting area ID03-02, Boyd Creek, ID-03-01A, leaving native grasses and forbs in place. Mowed access roads. Most plant species appear to be healthy and maturing, however high mortality among oaks observed. No herbivory present, despite extensive growth through cages. High percentage of acorn seedling survival from Year 4 seeding effort. Many stream bank plantings were lost due to erosion. Observed two gopher snakes in a valve box.

Month (Days) in 2023	Management Activities Conducted during Month	Site Notes
July 12, 14, 17, 18, 25, 26, 28, 31	• Fence inspection • Irrigation inspection repairs, and maintenance • Weed management • Plant inspection and maintenance	Inspected fence line and gates, no breaks to note. Irrigation system inspected and repaired as needed. Repaired leak at pump house. Soil moisture has dried up. Focused watering efforts on young and small plants. Clipped and hand removed all perennial pepperweed flower- and seed-heads. Mowed pepperweed and mustard populations in SW03. Hand-pulled and mowed weeds around plantings in Boyd Creek area and upper floodplain. Built cages and installed them around cottonwoods and oaks. Carefully removed cages from 22 plants that no longer need the protection due plant size and lack of browsing pressure (primarily mulefat, mugwort and coyote brush). Relocated cages to plantings as needed. Removed small cages from 20 plants and built larger cages around blue elderberry, oaks, buckeyes and coffeeberry. Most plants doing well except new willows which have turned brown. Older willows appear well established and healthy. Observed browsing on weeds and plants in upper floodplain, especially on cottonwoods. Observed natural recruits of sagebrush, coyote mint and mugwort.
August 1, 2, 4, 8, 9, 17, 18, 28	• Irrigation inspection, repairs, and maintenance • Weed management • Plant inspection and maintenance • Mowed roads and access points	Irrigation system inspected and repaired as needed. Cleaned filters of sediment buildup. Added driplines to willow clusters and weak plants in the creek bed. Removed irrigation to basins with dead plants. Weeded yellow star-thistle, mustard and stinkwort from pump house planted area and lower floodplain, ID03-05 and ID02. Native lotus growing over plantings, needs weeding. Applied herbicide (Polaris mix with PCR) to patch of pepperweed in SW03; population had resprouted after mowing. Bagged and removed seed heads and applied herbicide to pepperweed patch near San Felipe Creek flap gate, where population is mixed with natives. Applied deer repellent (Liquid Fence) spray to willows, cottonwoods, elderberry, coffeeberry, rose, blackberry and oaks. Removed cages from plants outgrowing their cages and empty basins. Recaged oaks, buckeye, coffeeberry and elderberry with larger cages (3-foot diameter). Flagged plantings in lower floodplain to have cages removed or replaced. Pond water level has receded to about half-full or less. Willows within pond banks died from being underwater too long. Mowed access road from lower floodplain to side channel zone near ponds.
September 11, 12, 26, 27	• Fence inspection and repairs • Irrigation inspection, repairs, and maintenance • Weed management • Plant inspection and maintenance	Inspected fence line and gates, no breaks to note. Irrigation system inspected and repaired as needed. Cleaned filters of sediment buildup. Mowed and raked planting areas around the mother oak. Mowed yellow star-thistle around oak basins and between ponds. Weeded in upper floodplain, ED03-01, ED03-02, ED03-03, ED03-04, and ED03-05, side channel, and ponds. Primarily mustard and yellow star-thistle with some stinkwort. Some natives weeded from the basins as well in order to uncover planted species. Applied deer repellent to exposed plants in upper and lower floodplain as well as the pump house area to willows, coffeeberry, rose and cottonwoods.

Month (Days) in 2023	Management Activities Conducted during Month	Site Notes
October 9, 16, 19	• Irrigation inspection, repairs, and maintenance • Weed management • Plant inspection and maintenance	Irrigation system inspected and repaired as needed. Repaired rodent chew-holes as necessary. Continued weeding in planted areas throughout site. Pepperweed previously mowed and treated with herbicide is 90% brown with some new growth of new plants. Removed loose/damaged cages and rebar. Dislodged cages with damaged plants observed, likely due to deer browsing. Meeting on 10/16 with Balance to discuss erosion control and fencing of ID02.
November 10, 13, 16	• Irrigation maintenance and preparation for the winter season • Weed management • Plant inspection and maintenance • Acorn and seed collection	Prepared irrigation system for winter. Removed irrigation from floodplains and Boyd Creek. Cut PVC going across creeks at upper and lower floodplain and taped ends. Pulled drip line to willow cuttings, and stapled on higher ground. Emptied water from supply line. Monitored pepperweed population that were treated with herbicide; all appeared dead. Removed Himalayan blackberry from between the floodplains. Handpulled mustards from pump house area. Removed loose/damaged cages and rebar. Created and installed cages; 12 in pump house and 9 in upper floodplain. Counted and flagged additional plants that could use caging. Collected valley oak acorns. Flagged 50 basins to plant with acorns. 7 in pump house, 25 in upper floodplain, and 18 in lower floodplain. Collected 10 buckeye seeds from near the spring on site and 40 from Quimby Road. Regraded second creek crossing. Site is dry, ponded features are dry.

2.2. Supplemental Willow Cuttings

Approximately 50 supplemental willow cuttings were installed on February 16, 2023, at locations along ID-03-2, ID-03-03 and ID03-04. Approximately 25 willows were planted at ID-03-2 in clusters of 4-7 poles with one-foot spacing. Approximately 25 willows were planted at ID-03-03 and ID03-04 in clusters of 4-7 poles with one-foot spacing.

Section 3. SUCCESS CRITERIA, PERFORMANCE STANDARDS AND MONITORING METHODS

The MMP contains success criteria for Wetland Re-establishment Areas, performance standards for Wetland Rehabilitation and Enhancement Areas, and performance standards for Non-Wetland Waters (Streams) and Riparian Buffer Areas (Dudek 2019). The ecologically based performance standards were established in the MMP to determine if the compensatory mitigation project is achieving its objectives. The MMP requires the site to be monitored and maintained for 10 years (2018 to 2028) or until performance standards have been met. Restoration features are shown in Figures 2 and 3.

3.1. WETLAND RE-ESTABLISHMENT SUCCESS CRITERIA

Per the MMP, the following functional wetlands success criteria must be met for the wetland re-establishment mitigation areas by the end of Year 5 or Year 10 of monitoring.

3.1.1 WETLANDS RE-ESTABLISHMENT AREAS MUST MEET ALL THREE WETLAND PARAMETERS

The wetlands re-establishment areas under the jurisdiction of the USACE must meet the definition of three-parameter USACE-jurisdictional wetlands by the end of the 5-year maintenance and monitoring period. A delineation of the wetland establishment areas will be required prior to resource agency sign-off from the USACE and RWQCB. If it is determined that the wetland establishment areas meet the vegetation and hydrology criteria for a USACE wetland, but are lacking hydric soils, the USACE may waive, at their discretion, the need to obtain hydric soils prior to sign-off if the site is progressing towards hydric soils and will likely become hydric in the near future.

3.1.2 WETLANDS RE-ESTABLISHMENT AREAS MUST BE SELF-SUSTAINING

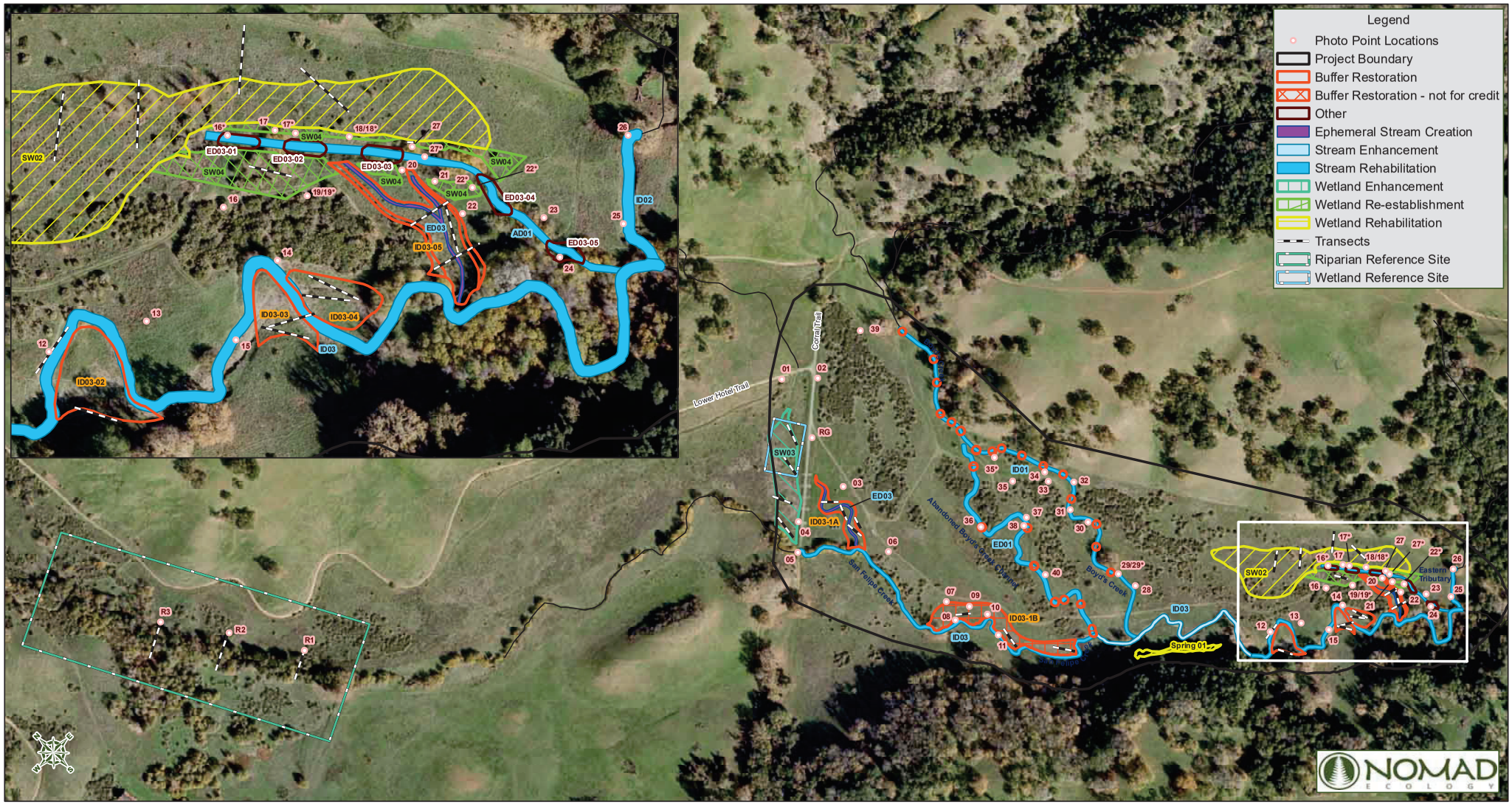
The wetlands re-establishment mitigation areas must be self-sustaining (i.e., able to survive on their own without artificial support) by the end of the 10-year maintenance and monitoring period. Determination of self-sustainability will be the presence of natural growth cycles and healthy wetlands vegetation that has not been irrigated in the preceding 2 years prior to the end of the 10-year maintenance and monitoring period.

3.1.3 WETLANDS RE-ESTABLISHMENT AREAS MUST SHOW EVIDENCE OF NATURAL RECRUITMENT

The wetlands re-establishment mitigation areas must show evidence of natural recruitment of native wetlands and/or riparian species within the mitigation area. This means naturally occurring native species colonize the site in addition to the originally planted container plants or applied seed.

3.2. WETLAND REHABILITATION AND ENHANCEMENT AREAS PERFORMANCE STANDARDS

Per the MMP, the following performance standards will be achieved for all wetlands rehabilitation and enhancement areas at the end of each year of monitoring (Table 13) (Dudek 2019). If revegetation efforts fail to meet performance standards in any one year, the habitat restoration specialist will recommend remedial actions to the Habitat Agency and maintenance contractor that will help enhance the project to a level of conformance. Several of the performance standards require comparison of the restoration site to a reference site which are shown in Figure 3.



November 2023

Figure 3
Qualitative and Quantitative Monitoring Reference
San Felipe Creek Restoration Project

1:4,800
0 200 400
Feet

Santa Clara County, California

Table 13. Wetland Rehabilitation and Enhancement Performance Standards

Performance Metric	Year of Monitoring									
	1 (2019)	2 (2020)	3 (2021)	4 (2022)	5 (2023)	6 (2024)	7 (2025)	8 (2026)	9 (2027)	10 (2028)
Container Plants (Minimum Performance)	90% plant survivorship	85% plant survivorship	25% vegetated cover	30% vegetated cover	35% vegetated cover	40% vegetated cover	45% vegetated cover	50% vegetated cover	55% vegetated cover	60% vegetated cover
Cuttings (Minimum Performance)	70% plant survivorship	65% plant survivorship	15% vegetated cover	20% vegetated cover	25% vegetated cover	30% vegetated cover	35% vegetated cover	40% vegetated cover	45% vegetated cover	50% vegetated cover
Seeded Areas (Minimum Cover of Plants)[1]	50% cover	55% cover	60% cover	65% cover	70% cover	70% cover	70% cover	70% cover	70% cover	70% cover
Maximum Cover by Weed Species[2]	15% cover	10% cover	10% cover	10% cover	10% cover	10% cover	10% cover	10% cover	10% cover	10% cover
Absolute Cover of Wetland Species (OBL, FACW, or FAC)[3]	≥50% reference[3] absolute cover of wetland species	≥75% reference[3] absolute cover of wetland species	≥75% reference[3] absolute cover of wetland species	≥75% reference[3] absolute cover of wetland species	≥75% reference[3] absolute cover of wetland species	≥75% reference[3] absolute cover of wetland species	≥75% reference[3] absolute cover of wetland species	≥75% reference[3] absolute cover of wetland species	≥75% reference[3] absolute cover of wetland species	≥75% reference[3] absolute cover of wetland species
Relative Cover of Native Species	≥50% relative cover of native species	≥75% relative cover of native species	≥75% relative cover of native species	≥75% relative cover of native species	≥75% relative cover of native species	≥75% relative cover of native species	≥75% relative cover of native species	≥75% relative cover of native species	≥75% relative cover of native species	≥75% relative cover of native species
Target Species Richness	≥75% of reference[4] site	≥75% of reference[4] site	≥75% of reference[4] site	≥75% of reference[4] site	≥75% of reference[4] site	≥75% of reference[4] site	≥75% of reference[4] site	≥75% of reference[4] site	≥75% of reference[4] site	≥75% of reference[4] site
Hydrology	≥14 days of ponding or saturated soils in an average or above-average precipitation year	≥14 days of ponding or saturated soils in an average or above-average precipitation year	≥14 days of ponding or saturated soils in an average or above-average precipitation year	≥14 days of ponding or saturated soils in an average or above-average precipitation year	≥14 days of ponding or saturated soils in an average or above-average precipitation year	≥14 days of ponding or saturated soils in an average or above-average precipitation year	≥14 days of ponding or saturated soils in an average or above-average precipitation year	≥14 days of ponding or saturated soils in an average or above-average precipitation year	≥14 days of ponding or saturated soils in an average or above-average precipitation year	≥14 days of ponding or saturated soils in an average or above-average precipitation year

Source: San Felipe Creek Restoration Project – Mitigation and Monitoring Plan (Dudek 2019)
Year 5 is shaded gray as these are the applicable performance standards for this annual report.
[1] Although the MMP says "Minimum Cover of Native Plants", this performance standard has been interpreted to be Minimum Cover of all Plants starting in Year 1 (Dudek 2020a).
[2] Weeds shall be non-native plant species rated moderate to high according to the California Invasive Plant Council excluding common non-native grass species that have naturalized throughout California (Cal-IPC).
[3] Prior project reports mistakenly defined wetland species as consisting of OBL and FACW species. This report and all subsequent reports define wetland species by the indicators OBL, FACW, and FAC, in accordance with the USACE wetland delineation methodology.

[4] The seasonal wetland reference site is in the northeastern portion of SW03 and is shown in Figure 3.

3.3. Non-Wetland Waters (Streams) and Riparian Buffer Areas Performance Standards

Per the MMP, the following performance standards will be achieved for Non-Wetland Waters (Streams) and Riparian Buffer Areas at the end of each year of monitoring (Table 14) (Dudek 2019). If revegetation efforts fail to meet performance standards in any one year, the habitat restoration specialist will recommend remedial actions to the Habitat Agency and maintenance contractor that will help enhance the project to a level of conformance. Several of the performance standards require comparison of the restoration site to a reference site which are shown in Figure 3.

Table 14. Non-Wetland Waters (Streams) and Riparian Buffer Areas Performance Standards

Performance Metric	Year									
	1 (2019)	2 (2020)	3 (2021)	4 (2022)	5 (2023)	6 (2024)	7 (2025)	8 (2026)	9 (2027)	10 (2028)
Container Plants (Minimum Performance)	90% plant survivorship	85% plant survivorship	25% vegetated cover	30% vegetated cover	35% vegetated cover	40% vegetated cover	45% vegetated cover	50% vegetated cover	55% vegetated cover	60% vegetated cover
Cuttings (Minimum performance)	70% plant survivorship	65% plant survivorship	15% vegetated cover	20% vegetated cover	25% vegetated cover	30% vegetated cover	35% vegetated cover	40% vegetated cover	45% vegetated cover	50% vegetated cover
Seeded Areas (Minimum cover of all plants)[1]	50% cover	55% cover	60% cover	65% cover	70% cover	70% cover	70% cover	70% cover	70% cover	70% cover
Maximum Cover by Weed Species[2]	20% cover	15% cover	10% cover	10% cover	10% cover	10% cover	10% cover	10% cover	10% cover	10% cover
Relative Cover of Native Species	≥50% relative cover of native species	≥75% relative cover of native species	≥75% relative cover of native species	≥75% relative cover of native species	≥75% relative cover of native species	≥75% relative cover of native species	≥75% relative cover of native species	≥75% relative cover of native species	≥75% relative cover of native species	≥75% relative cover of native species
Target Species Richness	≥75% of reference site[3]	≥75% of reference site[3]	≥75% of reference site[3]	≥75% of reference site[3]	≥75% of reference site[3]	≥75% of reference site[3]	≥75% of reference site[3]	≥75% of reference site[3]	≥75% of reference site[3]	≥75% of reference site[3]
Hydrology – Inset Floodplains on San Felipe Creek	Inset Floodplain inundation if peak flows exceed a 2-year event	Inset Floodplain inundation if peak flows exceed a 2-year event	Inset Floodplain inundation if peak flows exceed a 2-year event	Inset Floodplain inundation if peak flows exceed a 2-year event	Inset Floodplain inundation if peak flows exceed a 2-year event	Inset Floodplain inundation if peak flows exceed a 2-year event	Inset Floodplain inundation if peak flows exceed a 2-year event	Inset Floodplain inundation if peak flows exceed a 2-year event	Inset Floodplain inundation if peak flows exceed a 2-year event	Inset Floodplain inundation if peak flows exceed a 2-year event
Hydrology – Boyds Creek Alluvial Fan – Living Log Jams	Flow in 2 or more channels during the winter season	Flow in 2 or more channels during the winter season	Flow in 2 or more channels during the winter season	Flow in 2 or more channels during the winter season	Flow in 2 or more channels during the winter season	Flow in 2 or more channels during the winter season	Flow in 2 or more channels during the winter season	Flow in 2 or more channels during the winter season	Flow in 2 or more channels during the winter season	Flow in 2 or more channels during the winter season

Channel Form	< 1 foot of channel bed elevation loss	< 1 foot of channel bed elevation loss, averaged over reach and absent of significant knickpoint	< 1 foot of channel bed elevation loss, averaged over reach and absent of significant knickpoint	<1 foot of channel bed elevation loss, averaged over reach and absent of significant knickpoint	<1 foot of channel bed elevation loss, averaged over reach and absent of significant knickpoint	< 1 foot of channel bed elevation loss, averaged over reach and absent of significant knickpoint	< 1 foot of channel bed elevation loss, averaged over reach and absent of significant knickpoint	< 1 foot of channel bed elevation loss, averaged over reach and absent of significant knickpoint	< 1 foot of channel bed elevation loss, averaged over reach and absent of significant knickpoint	<1 foot of channel bed elevation loss, averaged over reach and absent of significant knickpoint
Corral Trail Drainage Lenses	During- and post-storm: If Corral Trail is/was overtopped, positive flow off of road maintained with no significant erosion of road or fill prism. Dry season: pipes are not plugged.	During- and post-storm: If Corral Trail is/was overtopped, positive flow off of road maintained with no significant erosion of road or fill prism. Dry season: pipes are not plugged	During- and post-storm: If Corral Trail is/was overtopped, positive flow off of road maintained with no significant erosion of road or fill prism. Dry season: pipes are not plugged	During- and post-storm: If Corral Trail is/was overtopped, positive flow off of road maintained with no significant erosion of road or fill prism. Dry season: pipes are not plugged	During- and post-storm: If Corral Trail is/was overtopped, positive flow off of road maintained with no significant erosion of road or fill prism. Dry season: pipes are not plugged	During- and post-storm: If Corral Trail is/was overtopped, positive flow off of road maintained with no significant erosion of road or fill prism. Dry season: pipes are not plugged	During- and post-storm: If Corral Trail is/was overtopped, positive flow off of road maintained with no significant erosion of road or fill prism. Dry season: pipes are not plugged	During- and post-storm: If Corral Trail is/was overtopped, positive flow off of road maintained with no significant erosion of road or fill prism. Dry season: pipes are not plugged	During- and post-storm: If Corral Trail is/was overtopped, positive flow off of road maintained with no significant erosion of road or fill prism. Dry season: pipes are not plugged	During- and post- storm: If Corral Trail is/was overtopped, positive flow off of road maintained with no significant erosion of road or fill prism. Dry season: pipes are not plugged
Lower Hotel Trail Arizona Crossing	Articulated mat is stable and no significant knickpoints have formed	Articulated mat is stable and no significant knickpoints have formed	Articulated mat is stable and no significant knickpoints have formed	Articulated mat is stable and no significant knickpoints have formed	Articulated mat is stable and no significant knickpoints have formed	Articulated mat is stable and no significant knickpoints have formed	Articulated mat is stable and no significant knickpoints have formed	Articulated mat is stable and no significant knickpoints have formed	Articulated mat is stable and no significant knickpoints have formed	Articulated mat is stable and no significant knickpoints have formed
Staked Wood Jams	Staked material is intact and in such a condition to capture sediment and organic material transported by creek.	Staked material is intact and in such a condition to capture sediment and organic material transported by creek.	Staked material is intact and in such a condition to capture sediment and organic material transported by creek.	Staked material is intact and in such a condition to capture sediment and organic material transported by creek.	Staked material is intact and in such a condition to capture sediment and organic material transported by creek.	Staked material is intact and in such a condition to capture sediment and organic material transported by creek.	Staked material is intact and in such a condition to capture sediment and organic material transported by creek.	Staked material is intact and in such a condition to capture sediment and organic material transported by creek.	Staked material is intact and in such a condition to capture sediment and organic material transported by creek.	Staked material is intact and in such a condition to capture sediment and organic material transported by creek.

Source: San Felipe Creek Restoration Project – Mitigation and Monitoring Plan (Dudek 2019)
Year 5 is shaded gray as these are the applicable performance standards for this annual report.
[1] Although the MMP says "Minimum Cover of Native Plants", this performance standard has been interpreted to be Minimum Cover of all Plants starting in Year 1 (Dudek 2020a).
[2] Weeds shall be non-native plant species rated moderate to high according to the California Invasive Plant Council excluding common naturalized grass species (Cal-IPC).
[3] Reference sites include established willow riparian habitat upstream and within the same reach of the project site and were identified in Year 1 of monitoring and are shown on Figure 3.

3.4. MONITORING SCHEDULE AND SITE VISITS

3.4.1 ANNUAL MONITORING SCHEDULE

Monitoring methods consist of a combination of quantitative and qualitative data collection to assess restoration progress in relation to the performance standards described in the MMP (Dudek 2019). Quantitative monitoring occurs in the late spring/early summer during Years 2 through 10. Qualitative monitoring occurs quarterly during Year 1, beginning with successful completion of the initial 120-day maintenance period, and bi-annually during Years 2 through 10. Monitoring methods and timing, as well as associated performance metrics are summarized in Table 15.

Table 15. Mitigation Monitoring Methods and Timing

MONITORING TASK	MONITORING YEAR		PERFORMANCE METRIC
	YEARS 1 AND 2	YEARS 3 THROUGH 10	
WETLANDS RE-ESTABLISHMENT, REHABILITATION, AND ENHANCEMENT MONITORING			
Quantitative Monitoring: Vegetation – Belt Transects	April-June, beginning in Year 2	Annually, April-June	Container Plants Survivorship or Vegetated Cover Cuttings Survivorship or Vegetated Cover Seeded Areas Cover of Native Plants Maximum Cover by Weed Species Absolute Cover of Wetland Species Relative Cover of Native Species Target Species Richness Wetland Delineation in Year 5 for Wetland Re-establishment Area
Hydrologic Monitoring	October 1- September 30	October 1 – September 30	Hydrology including Hydroperiod and Groundwater Levels
Qualitative Monitoring	Quarterly, beginning with successful completion of 120-day maintenance period; bi-annually Year 2	Bi-annually	Invasive Weeds Wildlife Observations Plant Health and Vigor Maintenance Needs
STREAM AND RIPARIAN BUFFER MONITORING			
Quantitative Monitoring: Vegetation – Point Intersect Transects	April – June, beginning in Year 2	Annually, April – June	Container Plants Survivorship or Vegetated Cover Cuttings Survivorship or Vegetated Cover Seeded Areas Cover of Native Plants Maximum Cover by Weed Species Relative Cover of Native Species Target Species Richness
Qualitative Monitoring	Quarterly, beginning with successful completion of 120-day maintenance period; bi-annually Year 2	Bi-annually	Plant survival and vigor Wildlife usage Maintenance Needs
Hydrologic Monitoring	N/A	N/A	Hydrology Channel Form Drainage Lenses Arizona Crossing Staked Wood Jams

3.4.2 MONITORING SITE VISITS IN 2023

The site was monitored on eleven dates during the Year 5 monitoring year (Table 16). Balance staff visited the project site on January 10, 2023, January 25, 2023, March 24, 2023, and July 12, 2023, and

after the end of the water year on October 3, 2023, to make visual observations of the constructed project elements. Nomad Ecology principal restoration ecologist Erin McDermott and botanist Leanne Feely conducted monitoring visits on March 27, May 10 and 11, June15, and August 9, 2023. Habitat Agency staff made regular site visits throughout the year which are not included in Table 16. A site visit was conducted by the project team including Habitat Agency staff, Nomad Ecology, and Confluence on October 19, 2023. All monitoring visits required by the MMP for Year 5 were conducted.

Table 16. 2023 Monitoring Site Visits

Monitoring Element	Jan 10, 2023	Jan 25, 2023	March 24, 2023	March 27, 2023	May 10, 2023	May 11, 2023	June 15, 2023	July 12, 2023	Aug. 9, 2023	Oct. 3, 2023	Oct. 19, 2022
Quantitative Monitoring: Wetland Vegetation – Belt Transects	-	-	-	-	X	-	-	-	-	-	-
Quantitative Monitoring: Stream and Riparian Buffer Vegetation – Point Intersect Transects	-	-	-	-	X	X	-	-	-	-	-
Wetland Delineation	-	-	-	X	-	-	-	-	-	-	-
Hydrologic Monitoring	X	X	X	-	-	-	-	X	-	X	-
Qualitative Monitoring	-	-	-	X	X	X	X	-	X	-	-
Invasive Plant Assessment	-	-	-	-	X	X	X	-	X	-	-
Photo Point Photo Monitoring	-	-	-	-	-	-	X	-	-	-	-
Overall Site Assessment	-	-	-	X	X	X	X	-	X	-	X

3.5. Monitoring Methods

3.5.1 Quantitative Monitoring

Wetland Delineation

A formal assessment of jurisdictional wetland in the wetland re-establishment area (SW04) was conducted at Year 5 to confirm wetland acreage. The vegetation, soils, and hydrology of the site were examined following the guidelines outlined in the Routine Determination Method in the Corps of Engineers 1987 Wetlands Delineation Manual (Environmental Laboratory 1987) and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0) (Regional Supplement USACE 2010).

Based on this protocol, topography and field characteristics including evidence of inundated or saturated soil conditions resulting from permanent or periodic inundation by ground water or surface water, the prevalence of hydrophytic vegetation (e.g., plant species typically adapted for life in saturated soil conditions), and the presence of hydric soils, were evaluated to determine the limits of potentially jurisdictional waters of the U.S. within the study area. Data were collected at a total of two data point locations, using the Wetland Determination Data Form – Arid West Region (Appendix B).

If the desired wetland acreage is not achieved in Year 5 or if climatic conditions were atypical in that year (i.e., below average rainfall year), a wetland delineation will be repeated at the site in subsequent years to accurately determine the wetland acreage supported by the site. Alternatively, the actual wetland acreage created as determined by the delineation will be credited against the wetland restoration requirements set forth in the MMP.

Wetland Vegetation – Belt Transects

Vegetation sampling was conducted on May 10 and 11, 2023, by Nomad Ecology principal restoration ecologist Erin McDermott and botanist Leanne Feely. For wetland habitat rehabilitation, enhancement, and creation areas, the belt transect method of vegetation sampling was used to determine compliance and achievement of the revegetation performance standards. Permanent belt transects measuring 30 to 50 meters long were established in the wetland revegetation areas at representative locations during Year 2 by Dudek at the time of the first sampling event (Dudek 2020b). During 2022 monitoring, belt transects were placed in the same locations, however some belt transects were shortened so that the entire belt transect was included within the feature being sampled as determined based on field conditions, and all belt transects were the same length (26 meters). In 2023, monitoring transects were consistent with 2022. Along each transect, 1-meter by 1-meter quadrats were placed at 10-meter intervals. Data collected at each plot along the belt transects included absolute cover of each plant species present as well as the cover of all vegetation, bare soil, and water using the California Native Plant Society (CNPS) method for estimating cover values. This method uses a "bird's eye view" looking from above, and only living plants are included in the vegetation cover estimate (CNPS 2022). Monitoring transects locations are shown in Figure 3.

The vegetation data were analyzed to determine vegetative cover of container plants, vegetative cover of cuttings, cover of seeded areas, cover of weed species, absolute cover of wetland species, relative cover of native species, and target species richness.

Total cover contributed by invasive weed species was calculated for each created seasonal wetland. Invasive weeds were defined as California Invasive Plant Council (Cal-IPC) ranked Moderate or High (Cal-IPC 2019). As is standard practice in habitat restoration monitoring, several non-native annual grasses that have a Moderate Cal-IPC rank and are ubiquitously naturalized throughout California were not included as invasive weeds, as these species are ubiquitous throughout annual grasslands and they contribute substantial cover in the grassland communities on site. These species include foxtail fescue (*Festuca myuros**), hare barley (*Hordeum murinum* subsp. *leporinum**), Italian ryegrass (*Festuca perennis**), Mediterranean barley (*Hordeum marinum* subsp. *gussoneanum**), ripgut brome (*Bromus diandrus**), red brome (*Bromus rubens**), slender oats (*Avena barbata**), and wild oats (*Avena fatua**).

The National Wetland Plant List version 3.5 was used to determine wetland indicator status for each species (USACE 2020). The predicted frequency of occurrence in wetlands represented by each wetland indicator status category is presented in Table 17. Several previous project reports incorrectly defined wetland species as consisting of OBL and FACW species. This report and all subsequent reports define wetland species by the indicators OBL, FACW, and FAC, in accordance with the USACE's wetland delineation methodology.

Table 17. Categories of Wetland Plant Indicators

Indicator Categories	Codes	Comments
Obligate	OBL	Almost always is a hydrophyte, rarely in uplands
Facultative Wetland	FACW	Usually is a hydrophyte but occasionally found in uplands
Facultative	FAC	Commonly occurs as either a hydrophyte or non-hydrophyte

Indicator Categories	Codes	Comments
Facultative Upland	FACU	Occasionally is a hydrophyte but usually occurs in uplands
Upland	UPL	Occurs in wetlands in another region, but occurs almost always (estimated probability 99%) under natural conditions in non-wetlands in the regions specified.
Not Listed	NL	Plant species does not have a listed wetland indicator status.

Source: Environmental Laboratory 1987

Stream and Riparian Buffer Vegetation – Point Intersect Transects

Vegetation sampling was conducted on May 10 and 11, 2022, by Nomad Ecology principal vegetation ecologist Erin McDermott and botanist Leanne Feely. Data for stream and riparian restoration areas were collected using the line intercept transect method of vegetation sampling to document achievement of the performance standards on the project site. In Year 2, permanent vegetation transect sampling stations were established by Dudek within the project site to measure year-to-year changes in plant cover and species composition (Dudek 2020b). In Year 4, transects were adjusted to center on restoration features and to be a consistent length of 20 meters. In Year 5, a single transect was added in the ephemeral drainage habitat where additional plantings were installed. Data collection points were distributed evenly along the transect (every 25 cm) so the number of points along each transect were sufficient to provide adequate resolution of cover values. Monitoring transects and points are shown in Figure 3. At each sampling point, the species was recorded, and if no vegetation was present then bare ground was recorded. Cover values were calculated by dividing the number of hits by the total number of sampling points and multiplying by 100.

The vegetation data were analyzed to determine vegetative cover of container plants, vegetative cover of cuttings, cover of seeded areas, cover of weed species, relative cover of native species, total cover contributed by invasive weed species, and target species richness.

3.5.2 Hydrologic Monitoring

All hydrologic monitoring methods are taken from the 2023 Geomorphic and Hydrology Monitoring Report for San Felipe Creek Restoration Project prepared by Balance Hydrologics (Balance Hydrologics 2023; Appendix C), which summarizes the annual geomorphic and hydrologic monitoring results for Water Year[1] 2023 (WY2023).

Rainfall

To provide context for the hydrologic and geomorphic data collected at the project site, rainfall data from the University of California Berkeley Blue Oak Ranch Reserve (UCBO) rain gage[2,] located 4.5 miles northwest of the site at approximately 1800 feet MSL elevation is presented. Average annual rainfall at

[1] A Water Year (WY) is defined as that period from October 1st of a preceding year through September 30th of the following year and is named according to the following year. For example, WY2023 occurred from October 1, 2022, through September 30, 2023.

[2] Long-term data are available through the Western Regional Climate Center (https://wrcc.dri.edu/weather/ucbo.html), and 10-minute interval preliminary data are used here with permission from University of California at Berkeley (http://sensor.berkeley.edu/index_ucnrs.html).

the UCBO station is approximately the same as at the Project site (Santa Clara County Drainage Manual, Schaaf and Wheeler, 2007).

Water Levels and Streamflow Monitoring

A network of gauges to monitor stream, wetland, and groundwater-level was established following completion of restoration work and prior to significant winter rainfall in December 2018 by Balance. Further details of this effort are available in the Geomorphic and Hydrologic Monitoring Report (Balance Hydrologics 2023; Appendix C). The following list describes the gaging methods for each type of gage:

Stage (Water Level) and Estimated Streamflow

To monitor water levels and estimate streamflow in San Felipe and Boyds Creek, Balance installed continuous-recording water level sensors which collect and record 15-minute stage measurements within the designed wetland features and nearby channels and wetlands. Balance staff visited the site multiple times during the rainy season and during the dry season to calibrate, repair, and download water level recorders. Water level data were used to create 15-minute stage hydrographs at stream stage and streamflow stations.

Balance established three stage and streamflow gages, two on San Felipe Creek (SFUS and SFDS) and one on Boyds Creek (BCUS)[3]. Periodic staff plate readings were used to calibrate the 15-minute depth data recorded by the logger and convert the raw water level record to a stage record, according to the local datum. To develop an estimated record of streamflow, periodic streamflow measurements were taken during Year 1 monitoring in accordance with practices outlined in the U.S. Geological Survey Techniques of Water Resources Investigations[4]. The manual streamflow measurements were used to establish Manning's roughness coefficients at streamflow gage sites. A rating curve was then developed to convert stage to streamflow using the Manning's calculator in USACE Hydraulic Engineering Center River Analysis System (HEC-RAS) 5.0. The stage-discharge rating was then calibrated using additional manual flow measurements. For the purpose of evaluating the performance standards, the estimated streamflow record is considered to be sufficient. Additional measurements are required to develop a more accurate streamflow record and will be taken opportunistically. Because this gage has required re-location multiple times, including during 2023, when it became disconnected from flow, no rating curve has been developed.

Groundwater Monitoring

To monitor groundwater levels near constructed floodplain features, channels, and wetlands, Balance installed continuous-recording water level sensors in 4 of the 5 piezometers which were used during the pre-project evaluation. Water level data were calibrated against periodic manual depth-to-water readings to develop 1-hour depth-to-groundwater (below the ground surface) records. The ground surface and top of each piezometer were also surveyed and used to convert the depth-to-water records to groundwater elevation records.

[3] Note that Boyds Creek Downstream (BCDS) is a stage-only gage.
[4] https://pubs.usgs.gov/twri/index090905.html

Surface Ponding in Wetlands

To monitor inundation duration within wetland areas, Balance installed continuous-recording water level sensors in stilling wells along with staff plates. Water level data were calibrated to periodic manual stage readings to develop hourly wetland stage records.

Peak Stage near Floodplains

To record peak stage and document whether floodplains were inundated, Balance installed six additional water level recorders at select locations across the project site (BCA1, BCA2, BCA3, BCA4, BCDS, SFDF). Data from these supplemental stations are archived along with manual stage and high-water mark readings; data from BCA1 through BCA4 is not presented this year because flow into those distributary channels was directly observed (see Section 4.5.2).

QUALITATIVE MONITORING

Nomad principal vegetation ecologist Erin McDermott and botanist Leanne Feely visited the project site on March 27, May 10 and 11, June 15, August 9, and October 19, 2023, to qualitatively assess conditions throughout the site. Per the MMP, qualitative monitoring includes overall assessment of container plant and seedling establishment and survival (vigor); assessment of wildlife usage of the restoration site through incidental observation of presence, nests, scat, and other sign; assessment of container plant health, including reviewing for pests and disease; assessment of weeds and exotic non-native species and recommendations for control; and an assessment of soil moisture and plant stress. Routine site maintenance visits conducted by Confluence included general site assessments on plant establishment and health, and weed assessments within the planting effort.

Balance qualitatively assessed geomorphic conditions on site during site visits in the wet and dry season to observe streamflow conditions and areas of surface ponding, document evidence of runoff patterns, and inspect the stability of constructed features (Balance 2023; Appendix C). When practical and safe, a small unmanned aerial vehicle (UAV, or drone) was used to collect oblique aerial photos and repeat vertical aerial photographs (Balance 2023; Appendix C).

3.5.3 TOPOGRAPHIC MONITORING

Per the MMP, post-storm topographic surveys should occur after years in which the 2-year recurrence streamflow is met or exceeded. Estimated peak streamflow was used at SFUS and compared to the calculated peak flow recurrence estimates according to regional regression relationships developed by Gotvald et al. (2012), (Balance Hydrologics 2023; Appendix C – Table 3). Because estimated peak flows exceeded a 2-year recurrence threshold in WY2023, topographic data were collected during Year 5 monitoring. Channel evolution monitoring metrics are intended to identify whether channel bed and banks, large wood, and floodplain benches evolved and if aggradation or scour took place over the year.

Geomorphic change surveys were conducted using two methods: First, Balance performed topographic surveys using a Total Station to collect data at selected locations on July 12, 2023. Second, a UAV was flown over the project area to collect detailed overlapping aerial photography. These flights were ground point controlled based on the NAD83 California zone 3 (US ft) datum (EPSG:2227). Using Agisoft™ software and photogrammetry methods, orthoimages and digital elevation models (DEM) were produced from each flight. To check the quality of the generated DEM, Balance compared manually collected survey elevations to corresponding DEM elevations (Balance Hydrologics 2023; Appendix C).

The as-built (Year 0) flight occurred on December 21, 2018, and the Year 5 flight occurred on October 3, 2023. The Year 5 DEM was subtracted from the Year 0 DEM to create a DEM-of-difference (DOD) which produced a spatially explicit map of change (aggradation and degradation) that occurred over 5-year period, which allows for a detailed understanding of change and potentially early detection of issues that may threaten the function of the Project. This method does not allow monitoring under tree canopy or

dense vegetation, however at those areas are limited to a few short reaches which were supplemented with direct field and photo observations.

3.5.4 PHOTO POINT MONITORING

All photo points were visited and photos taken on June 15, 2022 by Nomad Ecology botanist Leanne Feely. Forty permanent photo-documentation stations were established by Dudek during Year 1 monitoring to record the progress of the revegetation program and the status of plant establishment over the 10-year period, and eight additional photo points were established in Year 3. GPS coordinates and the direction of view were recorded for each photo point location. Photo documentation methods included replicating the permanent photos of the restoration features for each photo documentation site visit. A subset of photos taken during the photo point monitoring are included in Appendix D.

Section 4. MONITORING RESULTS

This section provides the results of the Year 5 monitoring in relation to the performance standards outlined in the MMP (Dudek 2019).

4.1. ANNUAL RAINFALL

Annual precipitation in the vicinity of the Project site was 40.1 inches during WY2023, as recorded at the UCBO station (Balance Hydrologics 2023; Appendix C – Figure 3), which is above the long-term average of 24 inches, as reported in the Santa Clara County drainage manual. The UCBO station has been operating since 2011, and the average annual rainfall at UCBO over the 12-year period of record is 23.9 inches.

Annual precipitation during WY2023 was characterized by numerous wet periods starting in early November and continuing into early May. It was particularly rainy starting December 26, 2022, through the middle of January 2023. February was relatively dry, but approximately 10.5 inches of rainfall occurred during a wet period between February 23, 2023, and the end of March. Overall rainfall totals and temporal distribution were similar to the last very wet year, WY2017, which occurred prior to implementation of the Project (Balance Hydrologics 2023; Appendix C).

The largest WY2023 events were multi-day storms that occurred in December 2022, January 2023, and March 2023 (Balance Hydrologics 2023; Appendix C). On December 10 and 11, 2022, 3.2 inches of rain was recorded. Between December 26 and 31, 2022, 7.62 inches of rain was recorded. Over a longer period stretching from December 26, 2022, to January 16, 2023, 16.0 inches of rain was recorded. Peak 24-hour rainfall was 3.34 inches, recorded between 12:00 AM December 31, 2022, and 12:00 AM January 1, 2023. The December 31 rainfall event occurred after about 13.9 inches of seasonal rainfall, and soils at the site were likely well-saturated, leading to significant peak flows through the site (Balance Hydrologics 2023; Appendix C).

4.2. WETLAND RE-ESTABLISHMENT PERFORMANCE

The wetland re-establishment areas were surveyed for areas that would meet the definition of three-parameter USACE-jurisdictional wetlands. During qualitative monitoring efforts, wetland re-establishment areas were also assessed to determine if they show evidence of natural recruitment of native wetland species and are self-sustaining.

4.2.1 WETLANDS RE-ESTABLISHMENT AREAS MUST MEET ALL THREE WETLAND PARAMETERS (WETLAND DELINEATION)

The MMP required that a wetland delineation be conducted in Year 5 to document acreages of wetland habitats present in the wetland re-establishment areas. Four areas that would meet the definition of three-parameter USACE-jurisdictional wetlands were observed within the wetland re-establishment areas, and total 0.11 acre (Figure 4). Table 18 shows the acreage of re-established wetlands mapped during Year 5 monitoring, and the wetland re-establishment project goals.

Hydrophytic Vegetation

Within the wetland re-establishment areas, seasonal wetlands were present adjacent to the wetland rehabilitation area and the ponded ephemeral drainage features. Dominant wetland species within the wetland re-establishment areas included hyssop loosestrife (*Lythrum hyssopifolia**, OBL), spreading rush (*Juncus patens*, FACW), Italian ryegrass* (FAC), creeping wildrye (*Elymus triticoides*, FAC), curly

dock* (FAC), dense sedge (*Carex densa*, OBL) and toad rush (*Juncus bufonius* subsp. *bufonius;* FACW). Other dominant species included coyote brush (NL), hoary mustard* (NL), medusahead grass* (NL), soft chess ((*Bromus hordeaceous**, NL), and coast tarweed (*Madia sativa*, NL).

Hydric Soil

Hydric soil indicators were difficult to observe in the wetland re-establishment areas. Soils on site are very dark grayish brown (10YR 3/2), which obscures redox features. In addition, the wetland re-establishment areas are fairly young (five years old) therefore visible hydric soil indicators may not have developed yet, particularly in seasonal wetlands that are saturated for only a portion of the growing season. Hydric soil indicators that were observed in wetland re-establishment areas include redox depressions, and redox dark surface. Redox features were faint and hard to see.

Wetland Hydrology

Wetland hydrology indicators observed in the wetland re-establishment areas included saturation and surface water, water marks, and surface soil cracks.

Table 18. Summary of Wetland Re-Establishment On Site

Seasonal Wetland Re-Establishment Area	Project Goal	Acreage 5-Years Post-Project (2023)[2]
SW04	0.38	0.11
Total	**0.38**	**0.11**

4.2.2 Wetlands Re-Establishment Areas Must Be Self-Sustaining

The wetlands re-establishment mitigation areas must be self-sustaining (i.e., able to survive on their own without artificial support) by the end of the 10-year maintenance and monitoring period. Wetland re-establishment areas are on track to be self-sustaining with several planted and seeded wetland species growing in and showing evidence of natural growth cycles. Wetland areas were not irrigated in 2022 or 2023 and no irrigation is planned for the future. Planted and seeded species observed include spreading rush and dense sedge.

4.2.3 Wetlands Re-Establishment Areas Must Show Evidence of Natural Recruitment

Wetland re-establishment areas show evidence of natural recruitment of native wetland species and/or riparian species. Planted, seeded, and naturally occurring native species are colonizing the wetland years. By year 10, wetland re-establishment areas will likely include many new native wetland recruits. Naturally recruited native species observed include creeping wildrye and toad rush.

November 2023

Legend

- Project Boundary
- Mitigation Type per MMP
  - Wetland Enhancement
  - Wetland Re-establishment
  - Wetland Rehabilitation
- Wetland Determination Data Point Locations (3a, 3b)
- Wetland Re-establishment Areas - Year 5 Field Delineated

1:3,600
0 150 300
Feet

Figure 4
Results of Year 5 Wetland Delineation of Wetland Re-establishment Areas
San Felipe Creek Restoration Project

Santa Clara County, California

4.3. Wetland Rehabilitation and Enhancement Area Performance

The results of vegetation monitoring of the wetland rehabilitation and enhancement areas, and how they compare to the performance standards, are discussed in the following sections. Performance standards for wetlands based on hydrology are discussed in Section 4.5.

Based on vegetation monitoring in Year 5, the wetland rehabilitation and enhancement areas met four of seven of the interim performance standards. They met: maximum cover by weed species, absolute cover of wetland species (OBL, FACW, and FAC), target species richness performance standards, and hydrology. They did not meet: container plant cover, seeded area cover, or relative cover of native species performance standards.

The performance standards and monitoring results for vegetation and hydrology in the wetland rehabilitation and enhancement areas are outlined in Table 19 and discussed further below.

Table 19. Wetland Rehabilitation and Enhancement Area Performance – Year 5

Performance Metric	Year 5 (2023) Target	Wetland Feature Monitoring Results		Overall Site Performance (Average)
		SW02	SW03	
Container Plants (Minimum Performance)	35% vegetated cover	10% Not Met	4% Not Met	7% Not Met
Cuttings (Minimum performance)[1]	25% vegetated cover	N/A	N/A	N/A
Seeded Areas (Minimum % of Plants)	70% cover	38% Not Met	29% Not Met	33% Not Met
Maximum Cover by Weed Species	10% cover	1% **Met**	1% **Met**	1% **Met**
Absolute Cover of Wetland Species (OBL, FACW, or FAC)[2]	≥75% reference absolute cover of wetland species Reference site had 36% wetland species cover; restoration areas require a minimum of 27% wetland species cover (which is 75% of 36%).	30% **Met**	26% **Met**[3]	28% **Met**
Relative Cover of Native Species	≥75% relative cover of native species	37% Not Met	81% **Met**	59% Not Met For comparison, reference wetland had 60% relative native cover.
Target Species Richness	≥75% of reference site Reference site has 12 native species present; restoration areas require a minimum of 9 native species to meet the minimum performance standard.	15 species **Met**	7 species Not Met	19 species **Met**
Hydrology	≥14 days of ponding or saturated soils in an average or above-average precipitation year	**Met**	**Met**	**Met**

Source: San Felipe Creek Restoration Year 3 Monitoring Report (Dudek 2021).
[1] No cuttings were installed within wetland rehabilitation and enhancement areas (SW02 and SW03).
[2] Prior project reports mistakenly defined wetland species as consisting of OBL and FACW species, and they measured and reported wetland species' cover

accordingly. This report and all subsequent reports define wetland species by the indicators OBL, FACW, and FAC, in accordance with USACE's wetland delineation methodology.
[3]A difference of 1% is within the margin of sampling error.

4.3.1 Container Plants (Minimum Performance)

Percent cover was recorded for all species along the belt transects. For any species that were planted, the cover was assumed to be from a planted individual. Initial planting included field sedge (*Carex praegracilis*), common rush (*Juncus effusus*), spreading rush, and iris-leaved rush (*Juncus xiphioides*), and replanting efforts included Baltic rush (*Juncus balticus* ssp. *ater*) and California bulrush (*Schoenoplectus californicus*). Planted species observed in SW02 and SW03 included field sedge, common rush, spreading rush, Baltic rush, and iris-leaved rush. Planted container plants had a cover of 10% in SW02 and 4% in SW03, with an average of 7% which is less than the 35% Year 5 target. While the performance standard is not met, the overall goal of the wetland restoration is to develop native and wetland species cover, and the wetland is on track to meet these goals as detailed below.

We recommend revising this performance metric in future years as accounting of just the planted species is not a useful indicator of seasonal wetland performance. The goal of the project is to develop native and wetland species cover, and naturally recruited species that are subsequently managed for provide highly suitable contributions to habitat values. The Habitat Agency has proposed revised performance standards for the project that are ecologically meaningful and is in the process of working with the permitting agencies to finalize these revised standards.

4.3.2 Cuttings (Minimum Performance)

No cuttings were installed in the wetland rehabilitation or enhancement areas. This performance standard is not applicable.

4.3.3 Seeded Areas (Minimum Cover of Plants)

SW02 had an average absolute vegetation cover of 38%. SW03 had an average absolute vegetative cover of 29%. Overall site vegetative cover was 33%, which does not meet the Year 5 performance target of 70% cover of plants.

Native species that were regularly encountered in SW02 and SW03 include Spanish clover (*Acmispon americanus* var. *americanus*), winter cress (*Barbarea orthoceras*), meadow barley (*Hordeum brachyantherum* subsp. *brachyantherum*), toad rush, common rush, Baltic rush, spreading rush, iris-leaved rush, creeping wildrye, dense sedge, willow dock (*Rumex salicifolius*) and snow white meadowfoam (*Limnanthes douglasii* subsp. *nivea*). All native species observed along sampling transects are listed in the discussion of species richness in Section 4.3.7.

Due to high rainfall received in 2023, during monitoring, SW02 and SW03 had areas with low cover of vegetation and evidence of ponded water. Vegetation monitoring was conducted in May 2023 to be consistent with prior years and capture spring blooming species, however because of the high precipitation received the prior winter and cool temperatures received in spring of 2023, many plant species were still small and actively growing. It was observed during site visits conducted later in the summer that vegetation continued to grow and these areas had high cover. In subsequent monitoring years annual monitoring activities may be conducted later to allow seasonal wetland vegetation to reach maximum growth and cover.

4.3.4 Maximum Cover by Invasive Weed Species

Invasive weed species had absolute cover of 1% in SW02 and SW03 with an average of 1% cover, which meets the performance standard of 10% or less. Invasive weed species observed in the wetland rehabilitation and enhancement areas include black mustard*, bull thistle*, Italian thistle (*Carduus*

pycnocephalus subsp. *pycnocephalus**), yellow star-thistle*, poison hemlock*, Fuller's teasel*, medusahead grass*, hoary mustard*, perennial pepperweed*, and pennyroyal*. In order to keep invasive weed cover below the 10% threshold and continue to meet performance standards, continued weed control is recommended. Further details about invasive weeds found on site are in Section 4.6 Qualitative Monitoring.

4.3.5 Absolute Cover of Wetland Species (OBL, FACW or FAC)

The performance standard for absolute cover of wetland species (OBL, FACW, or FAC) is based on comparison to the reference site, and restored wetlands must have 75% or more compared to the reference site. Based on quantitative data collected in Year 5, the reference site had 36% wetland species cover, therefore the restoration areas require a minimum of 27% wetland species cover (75% of 36% cover) to meet the minimum performance standard.

The absolute cover of wetland species was 30% in SW02, which meets the performance standard, and 26% in SW03, which does not meet the performance standard but is very close and is only 1% off which is in the margin of sampling error. The average is 28%, which meets the performance standard. Wetland species observed in the wetland rehabilitation and enhancement areas include winter cress (FACW), dense sedge (OBL), field sedge (FACW), creeping spikerush (*Eleocharis macrostachya*, OBL), tall annual willow-herb (*Epilobium brachycarpum*, FAC), fringed willow-herb (*Epilobium ciliatum* subsp. *ciliatum*, FACW), meadow barley (FACW), toad rush (FACW), common rush (FACW), western rush (FACW), spreading rush (FACW), iris-leaved rush (OBL), snow white meadowfoam (OBL), willow dock (FACW), red willow (FACW), little quaking grass (*Briza minor**, FAC), hyssop loosestrife* (OBL), pennyroyal*(OBL), creeping wildrye (FAC), long leaf plantain (FACW), rabbitsfoot grass (FACW), curly dock* (FAC), Italian rye grass* (FAC), and Mediterranean barley* (FAC).

4.3.6 Relative Cover of Native Species

SW02 had 37% relative cover of native species and SW03 had 81% relative cover of native species, for an average of 59% relative cover which does not meet the performance standard of greater or equal to 75% relative cover of native species. This data show that SW02 is dominated by non-native species, SW03 is dominated by native species (primarily creeping wildrye), and that on average over a half of the restored seasonal wetland cover is composed of native plants.

For comparison purposes, the reference site had 60% relative native species cover, which is roughly equal to the average relative native cover. Native species observed in the enhanced and rehabilitated seasonal wetlands and reference site during quantitative monitoring are shown in Table 20.

A relative cover of 75% native species is very high for seasonal wetlands in the region and will likely not be attained, and should be compared to reference sites for context. The Habitat Agency has proposed revised performance standards for the project that are ecologically meaningful. and staff are in the process of working with the permitting agencies to finalize these revised standards.

4.3.7 Target Species Richness

The performance standard for species richness is based on comparison to the reference site, and restored wetlands must have 75% native species or more compared to the reference site. Based on quantitative data gathered in Year 5, the reference site has 12 native species present, therefore the restoration areas require a minimum of 9 native species (75% of 12 species) to meet the minimum performance standard. SW02 had 15 native species captured in sampling quadrats which meets the performance standard and SW03 had 7 species captured in sampling quadrats, which does not meet the performance standard. Combined the restoration areas had 19 different native species present, which surpasses the performance standard of 9 species required. Native species recorded in both the reference site and restoration areas during vegetation monitoring are listed in Table 20.

Table 20. Native Species Recorded in Wetland Reference and Restoration Sites During Year 5 Vegetation Monitoring

Scientific Name[1]	Common Name	Present in Restoration Site	Present in Reference Site
Acmispon americanus var. *americanus*	Spanish clover	X	X
Barbarea orthoceras	winter cress	X	-
Carex densa[2]	dense sedge	X	-
Carex praegracilis[2]	field sedge	X	-
Carex tumulicula	foothill sedge	X	-
Eleocharis macrostachya	creeping spikerush	X	X
Elymus triticoides	creeping wildrye	X	X
Epilobium brachycarpum	tall annual willow-herb	-	X
Epilobium ciliatum subsp. *ciliatum*	fringed willow-herb	X	-
Hemizonia congesta subsp. *luzulifolia*	hayfield tarweed	-	X
Hordeum brachyantherum subsp. *brachyantherum*[2]	meadow barley	X	X
Juncus bufonius subsp. *bufonius*	toad rush	X	X
Juncus effusus[2]	common rush	X	-
Juncus balticus subsp. *ater*[2]	Baltic rush	X	-
Juncus occidentalis	western rush	X	-
Juncus patens[2]	speading rush	X	X
Juncus xiphioides[2]	iris-leaved rush	X	-
Limnanthes douglasii subsp. *nivea*	snow white meadowfoam	X	X
Lupinus bicolor[2]	dove lupine	-	X
Madia sativa	coast tarweed	X	-
Rumex salicifolius	willow dock	X	-
Salix laevigata[2]	red willow	X	-
Trifolium dichotomum	branched Indian clover	-	X
Trifolium fucatum	sour clover	-	X
	Total Species	**19 species total**	**12 species total**

[1] These species were recorded during monitoring site visits and annual vegetation monitoring. Comprehensive botanical surveys were not conducted. Other native species may be present in the restoration area.
[2] Species that were included in the container planting or seed mixes from all planting efforts.

4.3.8 Hydrology

The standard states that hydrology will consist of a minimum of 14 days of ponding or saturated soils in an average or above-average precipitation year. Rainfall totals for WY2023 was approximately 168 percent of average from the UCBO rain gage, following three drier-than-average water years. The abundant rainfall supported on-site wetlands and resulted in the wetland sufficiency criteria being met during WY2023. Based on observations during site visits, all of the agricultural ditch wetlands held water

for more than 14 days. Water levels in ED03-02 within the agricultural ditch persisted for at least 8 months (Balance Hydrologics 2023; Appendix C – Figure 10).

During the March 24, 2023 site visit, Balance observed approximately 2 inches of ponded water in the vicinity of Piezometer 16-3 which is directly adjacent and upslope from wetland SW02 (Balance Hydrologics 2023). Correlating this to the Piezometer 16-3 water level record, it can be inferred that ponding/soil saturation within six inches of the ground surface occurred within SW02 from at least the beginning of March through the end of the first week of April (Balance Hydrologics 2023). Balance concludes that it is also highly likely (based on observations under similar conditions from previous years) that ponding/soil saturation within six inches of the ground surface for the entire wet season between January 1, 2023, and the first week of April 2023. Surface ponding in in the seasonal wetland at SW03, (the Corral Trail Seasonal Wetland station, CTSW) lasted for approximately 93 days (Balance Hydrologics 2023; Appendix C – Figure 11).

A more detailed discussion of the site's hydrology performance can be found in the Geomorphic and Hydrologic Monitoring Report (Balance 2023; Appendix C).

4.4. Non-Wetland Waters (Stream) and Riparian Buffer Performance - Vegetation

The results of vegetation monitoring of the stream and riparian buffer, and how they compare to the performance standards, are discussed in the following sections. Performance standards for streams based on hydrology are discussed in Section 4.5.

Based on vegetation monitoring in Year 5, the stream and riparian buffer met three of the six interim performance standards. They met: minimum cover of plants, maximum cover by weed species and target species richness performance standards. They did not meet: container plant cover, cuttings cover, or relative cover of native species performance standards.

A summary of riparian buffer performance during Year 5 is presented in Table 21. Performance standards are discussed in detail below.

Table 21. Non-Wetland Waters (Stream) and Riparian Buffer Performance – Year 5 Vegetation

Performance Metric	Year 4 (2022) Target	Stream and Riparian Buffer Feature[1]							Overall Site Performance
		ID03-01A	ID03-01B	ID03-02	ID03-03	ID03-04	ID03-05	ED-03-03[1]	
Container Plants (Minimum Performance)	35% vegetated cover	15% Not Met	N/A No planting occurred	25% Not Met	24% Not Met	29% Not Met	25% Not Met	N/A No planting occurred	20% Not Met
Cuttings (Minimum performance)	25% vegetated cover	0% Not Met	0% Not Met	4% Not Met	6% Not Met	6% Not Met	9% Not Met	81% **Met**	15% Not Met
Seeded Areas (Minimum % cover of plants)	70% cover	88% **Met**	81% **Met**	52% Not Met	68% Not Met	78% **Met**	82% **Met**	88% **Met**	77% **Met**
Maximum Cover by Weed Species	10% cover	1% **Met**	0% **Met**	3% **Met**	1% **Met**	4% **Met**	0% **Met**	13% Not Met	3% **Met**

Performance Metric	Year 4 (2022) Target	Stream and Riparian Buffer Feature[1]							Overall Site Performance
		ID03-01A	ID03-01B	ID03-02	ID03-03	ID03-04	ID03-05	ED-03-03[1]	
Relative Cover of Native Species	≥75% relative cover of native species	65% Not Met	59% Not Met	70% Not Met	76% **Met**	81% **Met**	71% **Met**	72% **Met**	70% Not Met
Target Species Richness	≥75% of reference site Reference site had 8 native species present; restoration areas require a minimum of 6 species	17 species **Met**	8 species **Met**	13 species Not Met	16 species **Met**	16 species **Met**	21 species **Met**	1 species Not Met	**Met** 35 species among all the restoration areas

Source: San Felipe Creek Restoration Year 3 Monitoring Report (Dudek 2021).
[1] ED01 did not have sampling transects established in it when transects were set up by Dudek. The transect in ED03-03 was not sampled in 2022 because the ephemeral drainage is very narrow and the transect extends into adjacent habitats and does not represent the stream channel. A suitable transect was established in ED-03 In Year 5 2023 to capture these areas.

4.4.1 Container Plants (Minimum Performance)

Container plant performance in the riparian buffer was assessed during vegetation monitoring data collection along transects and estimated visually. Container plant cover in the riparian buffer areas ranged from 15% to 29% and averaged 20% based on transect data. Container plants did not meet the performance standard of 35% vegetated cover.

The majority of the container plants on site are replacement plants that were planted in 2020 and 2021 as a remedial action to address low plant survival. Therefore, the planted containers on site are still relatively young and small and are not providing sufficient cover to meet performance standards. In addition, willow cuttings are intermixed with the container plantings which results in lower cover of container plantings than total native plantings overall. The site is densely planted with container plantings are expected to experience an increase in cover with continued maintenance. Additional container plantings are not recommended due to the density of plantings in the planted areas. The riparian buffer and stream habitat is on track toward meeting the final goal of this performance standard.

We recommend that this performance standard be modified to capture all container plantings, willow cuttings, and naturally recruited riparian species. The Habitat Agency has proposed revised performance standards for the project that are ecologically meaningful, and staff are in the process of working with the permitting agencies to finalize these revised standards.

4.4.2 Cuttings (Minimum Performance)

Performance of willow cuttings in the riparian buffer was assessed during vegetation monitoring and site visits. Willow cutting cover in the riparian buffer areas ranged from 0% to 81% and averaged 15% based on transect data. Willow cover does not meet the performance standard of 25%.

Many of the willows on site are replacement plants that were planted in 2020 and 2021 as a remedial action to address low survival. Therefore, the willow stakes on site are still relatively young and small and are not providing sufficient cover to meet Year 5 performance standards. Where planted willows are successful, they are growing and becoming well established. Willow cover will continue to move toward the performance target in future years. Additional willows may be recommended to stabilize potential erosion areas, and increase willow cover along the drainages.

We recommend that this performance standard be modified to capture all container plantings, willow cuttings, and naturally recruited species. The Habitat Agency has proposed revised performance standards for the project that are ecologically meaningful, and staff are in the process of working with the permitting agencies to finalize these revised standards.

4.4.3 Seeded Areas (Minimum Cover of Plants)

Vegetative cover in riparian buffer enhancement and restoration areas ranged from 52% to 88%, with an average vegetative cover of 77%, which meets the minimum requirement of 70%. A majority of the riparian buffer features, including ID03-01A, ID03-01B, ID03-04, and ID03-05 met the minimum cover, however the other features did not. Vegetation cover is anticipated to continue to grow and increase in cover toward future performance goals.

Native species that were regularly encountered along riparian transects include yarrow (*Achillea millefolium*), Spanish clover, California mugwort, coyote brush, mulefat (*Baccharis salicifolia*), winter cress, blue wildrye (*Elymus glaucus* subsp. *glaucus*), tall annual willow-herb, California poppy (*Eschscholzia californica*), California coffeeberry (*Frangula californica* subsp. *californica*), meadow barley, toad rush, snow white meadowfoam, dove lupine (*Lupinus bicolor*), coast tarweed, California brome (*Bromus sitchensis* var. *carinatus*), Fremont cottonwood, California gooseberry (*Ribes californicum* var. *californicum*), California blackberry (*Rubus ursinus*), willow dock, arroyo willow, blue elderberry (*Sambucus mexicana*), snowberry (*Symphoricarpos albus* var. *laevigatus*) and blue-eyed grass (*Sisyrinchium bellum*).

4.4.4 Maximum Cover by Weed Species

Invasive weed species were present in the stream and riparian buffer restoration areas with an overall average cover of 3%, ranging between 0% and 13% cover, which meets the performance standard of less than 10% cover. Non-native invasive weed species observed in the stream and riparian buffer restoration areas include black mustard*, yellow star-thistle*, poison hemlock*, medusahead grass*, hoary mustard*, and perennial pepperweed*. Although cover of weed species was below the performance standard, these species will continue to be monitored and managed to ensure the site stays on track to continue to meet performance standards. Further details about invasive weeds found on site are in Section 4.6 Qualitative Monitoring.

4.4.5 Relative Cover of Native Species

Relative cover of native species within the stream and riparian buffer rehabilitation and enhancement areas ranged from 59% to 81%, with an average of 70%, which does not meet the performance standard of at least 75%. Two of the riparian buffer features, including ID-03-03 and ID-03-04, met the minimum cover, however a majority of the features did not. Native vegetation cover is anticipated to continue to grow and increase in cover toward the performance goal. Native planted species are still relatively young and small in size. Native species observed during vegetation monitoring are listed in Table 22.

4.4.6 Target Species Richness

Based on quantitative data gathered in Year 5, the reference site had 8 native species present; therefore, the restoration areas require a minimum of 6 native species present to meet the performance standard. There were 35 native species among all the riparian restoration areas, which meets the performance standard. Of note, the riparian reference site consists of mature riparian cover with a shaded understory and limited species richness. Native species recorded in both the reference site and restoration areas during vegetation monitoring are listed in Table 22.

Table 22. Native Species Recorded in Riparian Buffer Reference and Restoration Sites During Year 5 Vegetation Monitoring

Scientific Name[1]	Common Name[1]	Restoration Site	Reference Site
Achillea millefolium[2]	yarrow	X	-
Acmispon americanus var. *americuanus*	Spanish clover	X	-
Aesculus californica[2]	California buckeye	X	-
Amsinckia menziesii	small flowered fiddleneck	X	-
Artemisia douglasii[2]	mugwort	X	-
Baccharis pilularis subsp. *consanguinea*[2]	coyote brush	X	-
Baccharis salicifolia[2]	mule fat	X	-
Barbarea orthoceras	winter cress	X	-
Bromus sitchensis var. *carinatus*[2]	California brome[2]	X	-
Calandrinia menziesii	red maids	X	-
Elymus glaucus subsp. *glaucus*[2]	blue wildrye[2]	X	-
Elymus triticoides	creeping wildrye	-	X
Eplobium brachycarpum	willow herb	X	-
Equisetum arvense	common horsetail	-	X
Eschscholzia californica[2]	California poppy	X	-
Festuca microstachys	Eastwood fescue	X	-
Frangula californica[2]	coffeeberry	X	-
Galium aparine	common bedstraw	X	X
Hordeum brachyantherum subsp. *brachyantherum*[2]	meadow barley[2]	X	-
Juncus bufonius var. *bufonius*	common toad rush	X	-
Juncus patens[2]	spreading rush	X	-
Limnanthes douglasii subsp. *nivea*	snow white meadowfoam	X	-
Lupinus bicolor[2]	dove lupine	X	-
Lupinus microcarpus var. *microcarpus*	chick lupine	X	-
Madia sativa	coast tarweed	X	-
Madia gracilis	slender tarweed	X	-
Populus fremontii[2] subsp. *fremontii*	Fremont cottonwood	X	-
Quercus agrifolia[2] var *agrifolia*	coast live oak	X	X
Quercus lobata[2]	valley oak	X	-
Ribes californicum[2] var. *californicum*	California gooseberry	X	-
Rosa californica[2]	California wild rose	X	-
Rubus ursinus[2]	California blackberry	X	-

Scientific Name[1]	Common Name[1]	Restoration Site	Reference Site
Rumex salicifolius	willow dock	X	-
Salix laevigata[2]	red willow	-	X
Salix lasiolepis[2]	arroyo willow	X	X
Sambucus mexicana[2]	blue elderberry	X	-
Sisyrinchium bellum[2]	blue eyed grass[2]	X	-
Symphoricarpos albus var. *laevigatus*[2]	snowberry	X	-
Toxicodendron diversilobum	poison oak	-	X
Umbellularia californica	California bay	-	X
		35 species total	**8 species total**

[1]These species were recorded during monitoring site visits and annual vegetation monitoring. Comprehensive botanical surveys were not conducted. Other native species may be present in the restoration area.
[2]Species that were included in the container planting, stake planting, and/or seed mixes from all planting efforts.

4.5. Non-Wetland Waters (Stream) and Riparian Buffer Performance - Hydrology and Geomorphology

Based on hydrology and geomorphology monitoring in Year 5 conducted by Balance, the stream and riparian buffers are performing as intended, and meeting all performance standards (Balance Hydrologics 2023; Appendix C). A summary of stream performance for each hydrology metric during Year 5 is presented in Table 23. WY2023 was well above the average annual precipitation, with numerous wet periods starting in early November and continuing into early May. Detailed hydrologic data can be found in the Geomorphic and Hydrologic Monitoring Report (Balance Hydrologics 2023; Appendix C) and information below is taken from this report.

Table 23. Stream Feature Performance – Year 5

Performance Metric	Year 5 (2023) Target	Stream Feature								Overall Site Performance
		ID01	ID02	ID03 (reaches 1,3 and 4)	ID03 (reach 2)	ED01	ED02	ED03	AD01	
Hydrology – Inset Floodplains on San Felipe Creek	Inset Floodplain inundation if peak flows exceed a 2-year event.	N/A	N/A	**Met**	**Met**	N/A	N/A	N/A	N/A	**Met**
Hydrology – Boyds Creek Alluvial Fan – Living Log Jams	Flow in 2 or more channels during the winter season	**Met**	N/A	N/A	N/A	**Met**	N/A	N/A	N/A	**Met**
Channel Form	There will be less than 1 foot of channel bed elevation loss averaged over reach and absent of a significant knickpoint.	**Met**	**Met**	**Met**	**Met**	**Met**	**Met**	**Met**	**Met**	**Met**

Performance Metric	Year 5 (2023) Target	Stream Feature								Overall Site Performance
		ID01	ID02	ID03 (reaches 1,3 and 4)	ID03 (reach 2)	ED01	ED02	ED03	AD01	
Corral Trail Drainage Lenses	During and post-storm, if the Corral Trail was overtopped, positive flow off road will be maintained with no significant erosion of road or fill prism. Pipes will not be plugged in the dry season.	**Met**	**Met**	**Met**	**Met**	**Met**	**Met**	**Met**	**Met**	**Met**
Lower Hotel Trail Arizona Crossing	Articulated mat is stable and no significant knickpoints	**Met**	**Met**	**Met**	**Met**	**Met**	**Met**	**Met**	**Met**	**Met**
Staked Wood Jams	Staked material is intact and in such a condition to capture sediment and organic material transported by creek.	**Met**	**Met**	**Met**	**Met**	**Met**	**Met**	**Met**	**Met**	**Met**

4.5.1 Hydrology – Inset Floodplains on San Felipe Creek

The 2-year streamflow event magnitude was exceeded during WY2023; direct and indirect evidence of inundation on inset floodplains during WY2023 was observed. Water levels at SFUS appear to have inundated the ID03-01 floodplain numerous times during January 2023 and again in March 2023, suggesting that the ID03-01 floodplain may have been partially or completely inundated during multiple storm events (Balance Hydrologics 2023; Appendix C – Figure 5). Similarly, it appears that water levels at SFDS inundated the ID03-02 floodplain during multiple events during January 2023 (Balance Hydrologics 2023; Appendix C – Figure 6). Streamflow actively inundated portions of the floodplain features at ID03-01a, ID03-02, ID03-03 and ID03-04 on January 10, 2023, and freshly deposited sediment and organic debris across ID03-02, ID03-03 and ID03-04, from which Balance infers inundation (Balance Hydrologics 2023; Appendix C – Figure 14).

4.5.2 Hydrology – Boyds Creek Alluvial Fan – Living Log Jams

The performance standard states that flows from Boyds Creek should occupy at least two of the existing or created channels (located at area ED01-01) across the Boyds Creek alluvial fan during the monitoring year. WY2023 was a very wet year and all of the Boyds Creek distributary channels (BCDS, BCA1, BCA2, BCA3 and BCA4) received streamflow from Boyds Creek during WY2023. Streamflow in all of the distributary channels was observed on January 10, 2023 (Balance Hydrologics 2023; Appendix C – Figure 15). This success criterion was met during WY2023. Recorded water level data from gages in the distributary channels are not presented, as streamflow into the distributary channels were observed during site visits.

It should be noted that at least two additional log pieces that were originally installed as living log jams were dislocated during WY2023. Field observations suggest logs from Living Log Jam G have moved (Balance Hydrologics 2023; Appendix C – Appendix C); this is in addition to logs that have been dislodged from Living Log Jams A, J-1 and J-2 in previous monitoring years. It appears that the dislocated logs were moved downstream during high-flow events but remain on Boyds Creek. Based on

surveys conducted during Year 5, it appears that the streamflow required to activate distributary channels BCA1 through BCA4 has increased since installation from the design target of 0.75 feet to 0.8 to 1.9 feet.

We recommend developing adaptive management measures to reduce this channel bed elevation difference and encouraging more frequent inundation of the Boyds Creek distributary channels at lower flows.

4.5.3 CHANNEL FORM

Because 2-year flows were exceeded, and field observations suggested geomorphic change had occurred, Balance collected supplemental topographic data during Year 5 monitoring to evaluate this success criterion during WY2023.

Boyds Creek Alluvial Fan (ED01-01)

In WY2023, two logs from two separate living log jams moved downstream. Logs placed as part of the living log jams were intentionally not anchored so that active channel dynamics and migration could occur. Therefore, movement of logs was anticipated.

In many cases, Balance observed localized scour and deposition within 1 to 10 feet of the placed logs, with bed aggradation upstream, and scouring of pools downstream of logs (Balance Hydrologics 2023; Appendix C – Figure F1in Appendix F). All of the living log jams installed on the abandoned branch of Boyds Creek (BCA4), are stable and remain largely buried. It appears that scour has occurred at the historic knickpoint on BCA4 between Year 0 and Year 5, but incision has not migrated upstream to intercept the buried grade control log. Though localized scour and deposition greater than one foot occurred locally, no net degradation or lowering of the streambed was observed across the reach. This is consistent with the expected response described in the MMP; the living log jams are functioning as intended.

The DEM of difference does show natural geomorphic processes taking place; on the lower reaches of Boyds Creek, for example (Balance Hydrologics 2023; Appendix C – Figure 13c), erosion can be seen on the outside of the channel bend and deposition on the inside of the channel bend.

Based on a collaborative review at the end of WY2020, the Project Team decided to replace one log in an effort to protect three oak plantings (Balance Hydrologics 2023; Appendix C – Figure 16). This adaptive management measure was executed on November 4, 2020, and is presented in the adaptive management as-built memorandum (Donaldson et al., 2021b). Though some minor erosion has occurred around the log, the log has not moved since being installed, and planted oaks continue to grow. The team will continue to monitor placed logs and make adaptive management recommendations if floodplain inundation or bed elevation performance standards are not met, or if vegetative survivorship performance standards are threatened.

Graded Swale (ID03-01a)

This swale allows overland stormflows from the Corral Trail drainage lenses and the Boyds Creek alluvial fan to return to San Felipe Creek without causing excess erosion. Hydrologic conditions were sufficiently wet to generate runoff through the ID01-01a swale; no erosion was noted at the graded swale (Balance Hydrologics 2023; Appendix C – Figure 13a), and the feature appears to be functioning as intended.

San Felipe Creek Graded Floodplain ID03-01

Very little erosion or deposition was noted on or adjacent to the graded floodplain feature (Balance Hydrologics 2023; Appendix C – Figure 13a). A small amount of bank erosion occurred between Year 0 and Year 5 on the channel bank where return flows formed a small channel approximately 10 feet long

and one foot wide. The erosion was noted in the Year 1 monitoring report and does not appear to compromise the function of the floodplain. The DEM of difference shows erosion within San Felipe Creek near the middle of the graded floodplain feature (Balance Hydrologics 2023; Appendix C – Figure 13a); the erosion is limited to a short reach and does not present a concern in terms of reducing floodplain inundation frequency or duration at this time. Appendix C – Figure 13a (Balance Hydrologics 2023) also shows some apparent increase in elevation along the graded floodplain feature. The increase in measured floodplain elevation is likely due to grasses becoming well-established on the floodplain, but it is possible a portion of the elevation increase is attributable to deposition of sediment and debris on the floodplain. The channel and floodplain morphology are within the expected range of outcomes and the channel through this reach is meeting the success criteria.

"Reference Reach"

During the design phase, the design team referred to the reach between the Boyds Creek-San Felipe Creek confluence downstream to ID-03-02 (Balance Hydrologics 2023; Appendix C – Figure 13c) as the reference reach because the reach displayed geomorphic indicators of a dynamic channel-floodplain system with a floodplain that was regularly inundated. Balance noted that the DEM of difference indicates ongoing channel dynamism occurred between Year 0 and Year 5. Many areas where greater than one foot of erosion or deposition has taken place can be noted from the DEM of difference; in the middle of the "reference reach" the channel has migrated north (hot colors) and deposited a new channel bar (cool colors) (Balance Hydrologics 2023; Appendix C – Figure 13c). This reach is similar to the geomorphic change that has occurred along the ID03-02, ID03-03 and ID03-04 reaches.

San Felipe Creek Graded Floodplains (ID03-02, ID03-03, and ID03-04)

At graded floodplains along San Felipe Creek (ID03-02, ID03-03, and ID03-04), the designed floodplain was reconfigured by high flows during WY2019, which inundated and flowed across the created floodplain features with enough velocity to form new channels. At these locations, however, much of the former channel experienced deposition, thereby balancing the sediment production from this area, with minimal net change in channel bed elevation. Other portions of the abandoned channel features formed backwater pools/channels at low flows.

Year 1 topographic data (Donaldson et al., 2021a) indicated that some areas of the ID03-02 floodplain along San Felipe Creek experienced over 1 foot of incision where the new cutoff channel formed through the created floodplain during the first year after construction. The new channel thalweg elevation was within one foot of the former channel elevation, suggesting limited or no vertical instability. Thus, it is interpreted that the success criteria were met at this location.

In order to reduce the potential for downcutting along the created (and steeper) new primary channel, adaptive management activities were initiated during WY2021 and consisted of installing a bioengineered debris jam during WY2021 in the inlet of the new channel to encourage increase sinuosity, reduce channel slope, and encourage streamflow to spread across the created floodplain area. This work was completed on August 26, 2021, and is shown in Balance Hydrologics' 2023 report (Appendix C – Figure 17) and the adaptive management as-built memorandum (Donaldson et al., 2021b). Following high flows of WY2023, the new channel thalweg has migrated, with sediment deposition filling the inside of the channel bend, scour and migration occurring along the outside of the channel bend, and periodic inundation of the original channel (now a secondary high-flow channel). These observations suggest that the new channel is laterally dynamic, with limited vertical instability, and this metric for success continues to be met at Floodplain ID03-02.

Based on the channel cross section Year 0 – Year 5 comparison at ID03-02, the floodplain feature has been largely aggradational since construction (Balance Hydrologics 2023; Appendix C – Figure F2 in Appendix F).

Similar to ID03-02, the constructed floodplains at ID03-03 and ID03-04 were inundated and modified by WY2023 high flows, but channel avulsion did not occur at these locations. Rather, a set of shallow channels and backwater features developed (Balance Hydrologics 2023; Appendix C – Figure F3 in Appendix F). Balance noted that the ID03-03 and ID03-04 constructed floodplain areas have been primarily aggradational between Year 0 and Year 5, with the exception of cutbank erosion on the right bank near ID03-03, which has eroded (Balance Hydrologics 2023; Appendix C – Figure 13d and Figure F3 in Appendix F). The observed dynamism of the channel is within the expected outcomes for the design and the site is functioning as expected, with less than 1 foot of vertical elevation change over the reach and active channel dynamics within the inset and widened floodplain corridors. Success Criterion 4 is being met at ID03-03 and ID03-04.

Created Channel ID03-05

During WY2019**,** Balance observed 1 to 3 feet of erosion at the confluence of ID03-05 and San Felipe Creek, which appears to have resulted from the focusing of scour on the left bank of San Felipe Creek during high flows at the outside of the bend, exacerbated by the downstream site boundary exclusion fence which crosses San Felipe Creek at this location. The fence was improved following WY2019. During the high flows of WY2023, minor additional erosion was noted at the bank along the fence. The downstream-most buried log step structure along ID03-05 experienced some erosion along the downstream side of the step due to streamflow in San Felipe Creek, not streamflow emanating from the agricultural ditch wetland. The erosion appears to have only uncovered the top-most log, and the majority of the structure remains buried, stable, and intact. Thus, the channel morphology is within the expected range of outcomes and is meeting this success criteria at this location.

4.5.4 Corral Trail Drainage Lenses

During end-of-year site visit observations, no deleterious erosion or deposition was observed in or around the drainage lenses and Corral Trail (Balance Hydrologics 2023; Appendix C – Figure 18). The PVC pipes in the drainage were not clogged and water was observed flowing through multiple pipes during the winter. There was no evidence (e.g., high-water marks) that the Corral Trail overtopped during WY2023. The performance standard is being met.

4.5.5 Lower Hotel Trail Arizona Crossing

As discussed in the Geomorphic and Hydrologic Monitoring Report (Balance Hydrologics 2023; Appendix C), the articulated mat Arizona Crossing constructed on the Lower Hotel Trail is performing as designed and no deleterious erosion or deposition was noted (Balance Hydrologics 2023; Appendix C – Figure 18). The performance standard is being met.

4.5.6 Staked Wood Jams

Staked debris jams were installed in the Incised Tributary (ID02-01), including four standard staked debris jams and two hand-built staked debris jams utilizing slash and cobbles. Based on direct observations and the DEM of difference (Balance Hydrologics 2023; Appendix C - Figure 13d), the staked debris jams appeared to both retain and release sediment between Year 0 and Year 5. In the same timeframe the channel appears to have widened (Balance Hydrologics 2023; Appendix C - Figure 13d). These processes are to be expected. During WY2023, following winter high flows, all but one of the staked debris jams are functioning as intended, serving to capture episodic sediment delivered during high flows and meter sediment out during intermediate flows (Balance Hydrologics 2023; Appendix C - Figure 19). Erosion occurred at the downstream-most staked debris jam (Debris Jam 6, Balance Hydrologics 2023; Appendix C - Figure 19) during WY2023. Debris wracked on a fence installed above the jam (not part of the project design), which caused sediments to redirect follows toward the banks. Streamflow eroded the banks adjacent to the staked debris jam on both the right and left sides and create scour holes

just downstream of the staked debris jam. The scour hole on the right bank was substantially larger than the scour hole on the left bank, and Balance estimated that approximately 3-4 cubic yards of soil had been washed away. This finding was shared with the SCVHA, which completed adaptive management measures on November 6, 2023, to rectify the problem. The adaptive management will be documented in the Year 6 (WY2024) report.

Previously, Balance recommended adding a second course of staked debris jams, as outlined in the MMP. At this point, all jams are considered to be "full", having trapped sediment and debris as designed, with vegetation becoming more mature along and within the channel. Additional aggradation could be promoted with additional structures and would benefit the system with continued progress toward a long-term goal of reversing incision in this channel. Planning is currently underway to design and install the additional staked debris jams.

4.6. QUALITATIVE MONITORING

On March 27, May 10 and 11, June 15, and August 9, 2023, Nomad principal vegetation ecologist Erin McDermott, and botanists Leanne Feely and Clare Loughran visited the project site to qualitatively assess site-wide conditions. Qualitative monitoring included surveys for invasive weeds, wildlife observations, and visual assessment of vegetation during each site. Habitat Agency staff also made wildlife observations including through the use of motion sensor wildlife cameras and permitted dip netting of the created ponds of the site.

4.6.1 INVASIVE WEEDS

Per the MMP (Dudek 2019), plants were considered non-native invasive weeds if they are Cal-IPC ranked as Moderate to High threat level, or if they were included on the CDFA list of invasive species. Naturalized non-native annual grasses with the Cal-IPC rank of Moderate (such as wild oats*, ripgut brome*, Italian ryegrass*, and hare barley*) were not mapped or controlled since they are ubiquitous throughout the site and not subject to the criterion.

On June 15, 2023, Nomad principal vegetation ecologist Erin McDermott mapped invasive weeds on site, and on August 9, 2023, Nomad botanists Leanne Feely and Clare Loughran mapped later season invasive weeds throughout the site. Twelve invasive weed species were observed in the Restoration Area (Table 24), including black mustard*, Italian thistle*, yellow star-thistle*, bull thistle*, poison hemlock*, stinkwort*, Fuller's teasel*, medusahead grass*, hoary mustard*, perennial pepperweed*, pennyroyal*, and harding grass*. These weed species varied in distribution from widespread to limited to just a few or more populations. Confluence conducted weed management and control during maintenance visit including hand removal, which are described in detail in Section 2.

Table 24. Invasive Weed Species Recorded in the Restoration Area

COMMON NAME *SPECIES NAME*	CAL-IPC RATING[1]	DISTRIBUTION IN RESTORATION AREA	TREATMENT IN 2023	RECOMMENDED TREATMENT FOR 2024
black mustard *Brassica nigra*	Moderate	Scattered throughout the site.	Hand pulled and mowed in planted areas. Goat grazing within a localized area adjacent to plantings.	Hand pull around plantings. Localized goat grazing.

Common Name *Species Name*	CAL-IPC Rating[1]	Distribution in Restoration Area	Treatment in 2023	Recommended Treatment for 2024
Italian thistle *Carduus pycnocephalus* subsp. *pycnocephalus*	Moderate	Isolated patches throughout the site.	Hand pulled and mowed in planted areas. Goat grazing within a localized area adjacent to plantings.	Hand pull around plantings. Localized goat grazing.
Yellow star-thistle *Centaurea solstitialis*	High	Scattered throughout the site.	Hand pulled and mowed in planted areas. Goat grazing within a localized area adjacent to plantings.	Hand pull around plantings. Mow large stands. Localized goat grazing.
Bull thistle *Cirsium vulgare*	Moderate	Isolated patches throughout the site.	Hand pulled and mowed in planted areas. Goat grazing within a localized area adjacent to plantings.	Hand pull around plantings. Localized goat grazing.
Poison hemlock *Conium maculatum*	Moderate	Scattered throughout the site.	None.	Hand pull as feasible or mow to prevent seeding.
Stinkwort *Dittrichia graveolens*	Moderate	Individuals scattered along San Felipe Creek and Boyds Creek	Mapped and hand pulled throughout	Hand pull individuals.
Fuller's Teasel *Dipsacus fullonum*	Moderate	Scattered within SW03 and San Felipe Creek	None.	Hand pull around plantings.
Medusahead grass *Elymus caput-medusae*	High	Scattered throughout the site.	Targeted goat grazing occurred within a localized area adjacent to plantings.	Hand pull around plantings. Targeted and timed goat grazing within a localized area adjacent to plantings. Timed mowing in SW02 and SW03.
Hoary mustard *Hirschfeldia incana*	Moderate	Scattered throughout the site.	Hand pulled and mowed in planted areas. Goat grazing within a localized area adjacent to plantings.	Hand pull around plantings. Localized goat grazing.
perennial pepperweed *Lepidium latifolium*	High	Isolated patches within SW03.	Mowed and Herbicide	Hand pull and mow in SW03. Herbicide treatment in select areas as feasible.

Common Name *Species Name*	CAL-IPC Rating[1]	Distribution in Restoration Area	Treatment in 2023	Recommended Treatment for 2024
pennyroyal *Mentha pulegium*	Moderate	Isolated patches within SW03.	None.	Hand pull around plantings.
Harding grass *Phalaris aquatica*	Moderate	Scattered patches with few individuals. throughout the site.	None.	Excavate before flowering.

[1]California Invasive Plant Council rating as listed in the California Invasive Plant Inventory Database (Cal-IPC 2023).
[2]California Department of Food and Agriculture noxious weeds are included on the CDFA California Noxious Weeds List (CDFA 2023).

4.6.2 Wildlife Observations

Trail cameras were deployed throughout the year to detect wildlife, including feral pigs that may gain access to the site through breeches in the perimeter fence or through vehicle gates unintentionally left open by other Park user groups. Native mammals documented accessing the restoration area included bobcat (*Lynx rufus*), mountain lion (*Puma concolor*), coyote (*Canis latrans*), gray fox (*Urocyon cinereoargenteus*), mule deer (*Odocoileus hemionus*), striped skunk (*Mephitis mephitis*), black-tailed jack rabbit (*Lepus californicus*), and brush rabbit (*Sylvilagus bachmani*).

Qualified biologists Matthew Fogarty and Julie King conducted a daytime visual encounter survey (VES) of the restoration ponds and San Felipe Creek corridor on April 19, 2023. The ponds were also dip-netted to detect the presence of larval amphibians and reptiles. No special status species were observed during the VES and dipnet surveys. Sierran treefrog (*Pseudacris sierra*) and Western toad (*Anaxyrus boreas boreas*) larvae were abundant. An active California scrub jay (*Aphelocoma californica*) nest was found in willow riparian scrub between the San Felipe Creek channel and the restoration ponds (no formal nest survey was conducted throughout the restoration areas of the site). A subsequent survey for larval amphibians and reptiles was conducted on July 3, 2023. Small numbers of Sierran tree frog and Western toad larvae were observed, suggesting that most of the larvae observed during the April 19 effort had metamorphosed. Biologist Julie King observed one juvenile Southwestern pond turtle in restoration pond 4 between ED03-03 and ED03-04.

4.6.3 Feral Pig Control

A Santa Clara County Parks-sponsored pig control project and remedial actions implemented by Wildlife Detections in Year 4 reduced the prevalence of feral pigs within the site. Santa Clara County Parks and the United States Department of Agriculture (USDA) have been trapping feral pigs throughout Grant Park. This year to date, 69 feral pigs have been dispatched.

One large old boar (>300 lbs) was consistently observed inside the restoration area January through May 2023 and is believed to be the same individual consistently observed during the reporting Year 4. Feral pigs had been absent from the site from May 23 through mid-November 2023, until the Corral Trail cattle gate on the West side of the property was left open, presumably after a prescribed burn performed by CalFire. This suggests that the remedial fence improvement actions have been effective in preventing pig entry to the site, so long as gates remained closed. To remedy this problem going forward, the Habitat Agency contracted Southwest fence to install an additional fence line on the South side of the corral trail. The new fence line acts as a second line of defense and will prevent feral pigs from entering the core of the site when Corral Trail gates are inadvertently left open (e.g., by trail users or CalFire during control burns).

Wildlife Detections LLC continued Phase 2 remedial actions identified in the Year 3 report by securing an additional 790 linear feet of barbed wire atop the woven wire mesh perimeter fence and added a

minimum of three 12-guage vertical wire ties between every t-post along those sections to further hold up the wire mesh to resist feral pig ability to climb over the fence.

4.6.4 Plant Health and Vigor

Plant health was regularly monitored in Year 5 by Confluence during their routine maintenance visits, detailed in section 2. Nomad Ecology staff surveyed the plantings during site visits. Overall, the plantings appeared vigorous and healthy. Cages were well maintained, and many plantings had larger cages installed to allow for continued growth. Irrigation was running consistently, with Confluence regularly checking the irrigation system and addressing any issues.

4.7. Photo Point Monitoring

Photos were taken at each of the 48 permanent photo point locations on June 15, 2023. An informative subset from the photo-documentation views is presented in Appendix D. Year 1 and current year (Year 5) photos are shown for contrast. Intervening years' photos and photo points 1, 7, 11, 13, 19, 22*, 23, 28, 33, 35, 35*, 37, 39, and 40 can be furnished upon request and are found in prior year's monitoring reports. These photo points were removed for file size reduction and due to the limited information and/or redundant nature of the photos compared to those included in Appendix D.

Section 5. SUMMARY AND RECOMMENDATIONS

5.1. SUMMARY

Per the MMP, if revegetation efforts fail to meet performance standards in any year, remedial actions shall be recommended to bring the project to a level of conformance (Dudek 2019). The results of monitoring and recommendations are summarized in Table 25. Details of the recommendations are discussed below.

Table 25. Summary of Year 5 Results and Recommendations

Performance Standard	Wetland Re-Establishment			Wetland Rehabilitation and Enhancement			Stream and Riparian Buffer Enhancement		
	Year 5 Performance Standard	Year 5 Monitoring results	Recommendations	Year 5 Performance Standard	Year 5 Monitoring results	Recommendations	Year 5 Performance Standard	Year 5 Monitoring results	Recommendations
Wetland Delineation	Meet the definition of three-parameter USACE jurisdictional wetlands	Delineated wetland acreage on site within the wetland re-establishment areas is 0.11 acre, which is less than the project goal of 0.38 acre.	None	N/A	N/A	N/A	N/A	N/A	N/A
Wetland re-establishment areas must be self-sustaining by Year 10	N/A	On track	None	N/A	N/A	N/A	N/A	N/A	N/A
Wetland re-establishment areas must show evidence of natural recruitment by Year 10	N/A	On track	None	N/A	N/A	N/A	N/A	N/A	N/A

Performance Standard	Wetland Re-Establishment			Wetland Rehabilitation and Enhancement			Stream and Riparian Buffer Enhancement		
	Year 5 Performance Standard	Year 5 Monitoring results	Recommendations	Year 5 Performance Standard	Year 5 Monitoring results	Recommendations	Year 5 Performance Standard	Year 5 Monitoring results	Recommendations
Container Plants (minimum performance)	N/A	N/A	N/A	35% vegetated cover	7% Vegetative Cover Did not meet Performance Standard	Recommend revising this performance standard in future years as it is not a useful indicator of seasonal wetland performance. The Habitat Agency has proposed revised performance standards for the project that are ecologically meaningful and is in the process of working with the permitting agencies to finalize these revised standards.	35% vegetated cover	20% Vegetative Cover Did not meet Performance Standard	Recommend revising this performance standard to capture container plantings, willow cuttings, and natural recruits. The Habitat Agency has proposed revised performance standards for the project that are ecologically meaningful and is in the process of working with the permitting agencies to finalize these revised standards.
Cuttings (minimum performance)	N/A	N/A	N/A	25% vegetated cover	N/A	N/A	25% vegetated cover	15% Vegetative Cover Did not meet Performance Standard	Recommend revising this performance standard to capture container plantings, willow cuttings, and natural recruits. The Habitat Agency has proposed revised performance standards for the project that are ecologically meaningful and is in the process of working with the permitting agencies to finalize these revised standards.

Performance Standard	Wetland Re-Establishment			Wetland Rehabilitation and Enhancement			Stream and Riparian Buffer Enhancement		
	Year 5 Performance Standard	Year 5 Monitoring Results	Recommendations	Year 5 Performance Standard	Year 5 Monitoring Results	Recommendations	Year 5 Performance Standard	Year 5 Monitoring Results	Recommendations
Seeded Areas (minimum percent of cover of plants)	N/A	N/A	N/A	70% cover	33% cover Did not meet Performance Standard	Monitor later in the season when seasonal wetland species have achieved full growth and cover.	70% cover	81% Vegetative Cover **Met Performance Standard**	None
Maximum Cover by Weed Species	N/A	N/A	N/A	10% cover	1% cover **Met Performance Standard**	None	10% cover	3% cover **Met Performance Standard**	None
Absolute Cover of Wetland Species (OBL, FACW and FAC)[1]	N/A	N/A	N/A	≥75% reference absolute cover of wetland species Minimum 27% required to reach 75% of reference wetland cover.	28% cover **Met Performance Standard**	None	N/A	N/A	N/A

Performance Standard	Wetland Re-Establishment			Wetland Rehabilitation and Enhancement			Stream and Riparian Buffer Enhancement		
	Year 5 Performance Standard	Year 5 Monitoring Results	Recommendations	Year 5 Performance Standard	Year 5 Monitoring Results	Recommendations	Year 5 Performance Standard	Year 5 Monitoring Results	Recommendations
Relative Cover of Native Species	N/A	N/A	N/A	≥75% relative cover of native species	59% cover Did not meet Performance Standard	A relative cover of 75% native species is very high for seasonal wetlands in the region and will likely not be attained until Year 10 . Recommend revising this performance standard in future years as it is not a useful indicator of seasonal wetland performance. The Habitat Agency has proposed revised performance standards for the project that are ecologically meaningful and is in the process of working with the permitting agencies to finalize these revised standards.	≥75% relative cover of native species	74% cover Did not meet Performance Standard	Continue to maintain container plantings and native species to facilitate growth and increase cover. Plants will continue to grow and increase in cover.
Target Species Richness	N/A	N/A	N/A	≥75% of reference site Minimum of 9 native species to reach 75% of reference wetland.	19 species **Met Performance Standard**	None	≥75% of reference site Minimum of 8 native species to reach 75% of reference riparian habitat.	35 species **Met Performance Standard**	None

Performance Standard	Wetland Re-Establishment			Wetland Rehabilitation and Enhancement			Stream and Riparian Buffer Enhancement		
	Year 5 Performance Standard	Year 5 Monitoring Results	Recommendations	Year 5 Performance Standard	Year 5 Monitoring Results	Recommendations	Year 5 Performance Standard	Year 5 Monitoring Results	Recommendations
Hydrology	N/A	N/A	N/A	≥14 days of ponding or saturated soils in an average or above-average precipitation year	**Met Performance Standard**	None	N/A	N/A	N/A
Hydrology – Inset Floodplains on San Felipe	N/A	N/A	N/A	N/A	N/A	N/A	Inset Floodplain inundation if peak flows	**Met Performance Standard**	None
Hydrology – Boyds Creek Alluvial Fan – Living Log Jams	N/A	N/A	N/A	N/A	N/A	N/A	Flow in 2 or more channels during the winter season	**Met Performance Standard**	Balance recommends developing adaptive management techniques to reduce the channel bed elevation difference and encouraging frequent inundation of the Boyds Creek distributary channels at lower flows.
Channel Form	N/A	N/A	N/A	N/A	N/A	N/A	There will be less than 1 foot of channel bed elevation loss averaged over reach and absent of a significant knickpoint.	**Met Performance Standard**	None

Performance Standard	Wetland Re-Establishment			Wetland Rehabilitation and Enhancement			Stream and Riparian Buffer Enhancement		
	Year 5 Performance Standard	Year 5 Monitoring Results	Recommendations	Year 5 Performance Standard	Year 5 Monitoring Results	Recommendations	Year 5 Performance Standard	Year 5 Monitoring Results	Recommendations
Corral Trail Drainage Lenses	N/A	N/A	N/A	N/A	N/A	N/A	During and post-storm, if the Corral Trail was overtopped, positive flow off road will be maintained with no significant erosion of road or fill prism. Pipes will not be plugged in the dry season	**Met Performance Standard**	None
Lower Hotel Trail Arizona Crossing	N/A	N/A	N/A	N/A	N/A	N/A	Articulated mat is stable and no significant knickpoints have formed	**Met Performance Standard**	None
Staked Wood Jams	N/A	N/A	N/A	N/A	N/A	N/A	Staked material is intact and in such a condition to capture sediment and organic material transported by creek.	**Met Performance Standard**	Staked wood jams are considered "full". Place additional staked debris jams in summer 2024.

[1] Prior project reports mistakenly defined wetland species as consisting of OBL and FACW species, and they measured and reported wetland species' cover accordingly. This report and all subsequent reports define wetland species by the indicators OBL, FACW, and FAC, in accordance with USACE's wetland delineation methodology.

5.2. RECOMMENDATIONS

5.2.1 ADDITIONAL PLANTINGS AND CAGING TO INCREASE NATIVE COVER

We recommend additional plantings to increase native cover on site. Acorn planting and additional willow planting is planned for December 2023 or January 2024. Plantings will occur primarily at ID-03-2, ID-03-03 and ID03-04.

Many plantings on site are inside caging to protect them from herbivory; however, the size of the original cages is restricting canopy growth of some of the plantings. Confluence will continue replacing a portion of the cages with larger cages to allow plantings more space to grow outward and increase in cover.

5.2.2 INVASIVE WEED CONTROL

Invasive weeds should continue to be controlled on site. This will keep the site on track to meet the goals of the project as well as help maintain and increase native cover and decrease invasive cover to meet these performance standards. Control recommendations are included in Table 24. Highest priority areas for control of invasive weeds are directly around plantings and within planting areas, and in SW02, SW03, and Spring01. Species that are limited in distribution on site are also high priority for control since they can be controlled before they become well established. Any herbicide application should be under the direction of a Certified Pest Control Advisor. All herbicide labels and regulations should be followed. All weed control activities will avoid impacts to plantings.

Targeted goat grazing is recommended to occur for the second year in target areas to control invasive weeds include medusahead, mustard, and yellow starthistle. Goat grazing should occur in late spring, after medusahead stems begin to elongate and before the seed milk stage, which is just prior to exposure of the inflorescence (DiTomaso et al. 2008), as outlined above. The most effective results occur when grazing is high density for a short duration (DiTomaso et al. 2008).

5.2.3 FERAL PIG CONTROL

The following actions will continue to reduce feral pig impacts to the site:

- Support feral pig trapping and removal efforts throughout the region, including the ongoing collaboration between County Parks and USDA.
- Continue opportunistic perimeter fence inspection and repair to prevent pig entry into the site.
- Continue camera trapping to monitor areas where pigs have been most prevalent on site in the past, particularly the seasonal wetland.

5.2.4 REVISED PERFORMANCE STANDARDS

The Habitat Agency is currently working with the permitting agencies to revise the MMP and some of the performance standards and targets to more accurately measure project success. Performance Standards to be revised include parameters for measuring absolute and relative cover of native species and minimum vegetation cover in both wetland rehabilitation and enhancement areas and riparian buffers.

Prior project reports incorrectly defined wetland species as consisting of only OBL and FACW species, and they measured and reported wetland species' cover accordingly. The 2022 report and all subsequent reports define wetland species by the indicators OBL, FACW, and FAC, in accordance with USACE's wetland delineation methodology.

5.2.5 Add Second Course of Staked Debris Jams

As outlined in the MMP as part of the ongoing stewardship of the Project site, installation of a second course of staked debris jams was planned, once the first course had stabilized with aggraded with sediment to the point of being full. At this point, all jams are considered to be full, having trapped sediment and debris, with vegetation becoming more mature along and within the channel. Additional aggradation could be promoted with additional structures and would benefit the system with continued progress toward a long-term goal of reversing incision in this channel. Planning is underway and installation of the second course is anticipated to occur during the summer of 2024. Continued aggradation will benefit the channel by reversing the incision that has taken place in this tributary while simultaneously increasing connectivity of the channel flows with the elevated groundwater table and generally slowing flows through the channel.

5.2.6 Boyds Creek Distributary Adaptive Management Strategies

At this time, Balance recommends developing adaptive management strategies to reduce the flow requirements and increase the frequency of activation and inundation of Boyds Creek distributary channels at lower flows. Balance is preparing additional strategies for addressing this recommendation for the Habitat Agency.

Section 6. REFERENCES

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APPENDIX A CONFLUENCE MAINTENANCE LOG

San Felipe Creek Maintenance Log

Gate Code: 4210

County lock (green stripe), 8240

Date	Staff	Hours on-site (travel)	Field Conditions	Task Descriptions and Location	Mileage	Materials Furnished	Plant Mortality	Weeds controlled	Fenceline Patrol	Irrigation Inspection	Water Tank Level
1/10/2023	GS, PP 6.5 (1.5) each	13 (3)	Wet, raining	Hiked into site from parking lot. Considered the RTV but couldn't locate air compressor. A large oak limb blocked the access road about a 1/3 of the way to site. Inspected flap gate above the pump house. Gate was open from the heavy flow but not approachable due to the high water level. Difficult to see if debris was lodged from a distance but took photos. The boyd flap gate was relatively clean, pulled out a ball of wire. Water flowing strong in all creeks and channels. The pump house zone has a stream running through it with areas that are submerged. Some decent damage to valves and irrigation in flood planes and a bit less in the other zones. Removed a log and debris from the southern flap gate. One end if the gate is stuck partially open from the soil building up below. Walked a majority of the perimeter and didn't find fallen trees or limbs damaging the fence.	85						
1/24/2023	Gs	6.5 (1.5)	Sunny, muddy	RTV battery was dead and had no jumper cables in the F250. The tree limb has been cleared from the access road so I was able to drive in. Road still pretty slushy here and there, best to use RTV if possible. Water is still flowing in the creeks and channels. Did not drive far into the site after the last gate. Muddy stretch before the pump house did not look ideal. Cleared a t-stake that was caught in the top flap gate, otherwise no debris or issues. Hiked down to the southern flap gate and spent most of my time there digging out soil that had built up under the gate, keeping it open. Took pictures of the gates and the site.	85						
2/13/2023	KL	2		Meeting discussing flood events and actions. Review and plan							
2/14/2023	KL	4 (3)	Sunny, cold	Site walk in all planting areas. Irrigation repair need around all flow lines, especially in the SF floodplain zones. 3" Yellowmine mainline irrigation pipe pushed around in a few places but, no damage to any mainlines noted except lower flood where valve assembly broke off; easily repairable. *Upper and Lower floodplain plantings, ID03-02 and ID03-03&4, are hanging in there after floods/high flow. Approximately 1/3 of the plants in these areas have been impacted by flow; 1/4 heavily impacted. Lots of plants still dormant so hard to get a living count; finding buckeye seeds and sycamore branches. Expect most of the lightly impacted plants to recover and some of the heavily impacted to recover. Sambucus showing strong new green growth and willows beginning to bud; no leaves on buckeyes yet. ALL irrigated willow areas, in these two floodplain zones, still have at least one surviving pole cutting; 3/4 of the willow pole cuttings are mostly buried with sediment and the others have experienced erosion around the base. *Flagged existing willow locations and new willow locations with small pink flags. 25-30 new willow locations flagged in each of the two floodplain zones. SW02 still very boggy today and the Upper pond, ED03-01, water surface is at top of bank. Pump house still has a muddy area just before the large willows in creek. *Flag color from last year reminder. •White: empty basin •Blue: empty basin with capped irrigation •Red: acorn seeded basin •Orange: drip end cap •Lime green: drip tube to ridged pvc connection	85						
2/16/2023	KL, GS, PP, KN, Helen 6.5 (1.5) each	32.5 (7.5)	Frozen morning turned nice	ID03-02 + ID03-03 & 04: Planted about 25 willows, in clusters of 4-7 one foot spacing, in each of the two floodplain zones. Approximately 50 total willow pole cuttings planted today, harvested just upstream and downstream of installation locations. Removed storm debris and freed plants covered in sediment and sticks from flooding. Lots of bent rebar, smashed cages and buried drip tubing. Broken pieces of pvc and extra cage materials were moved to higher ground. Access roads are still muddy in places but, drying out	170	RTV					

San Felipe Creek Maintenance Log

Gate Code: 4210

County lock (green stripe), 8240

Date	Staff	Hours on-site (travel)	Field Conditions	Task Descriptions and Location	Mileage	Materials Furnished	Plant Mortality	Weeds controlled	Fenceline Patrol	Irrigation Inspection	Water Tank Level
3/30/2023	KL 6.5 (1.5) GS, PP 5.5 (1.5) each	17.5 (4.5)	Partly cloudy cool	Drove RTV into site; parked trucks at the RTV storage container. All drainages are flowing and there is a big puddle on the road to the pump house. Found broken 1.5" mainline upstream of pump house. Mainline was going to unused valves in SW03; glue capped the 1.5" mainline before these valves to fix and updated parks about the repair. Uncovered buried pipes at the Boyd creek valve. Drip 90 at valve and 3/4 to 1/2 pvc needs repair at downstream end. Fixed 3" yellow mine mainline creek crossing at mother oak by replacing t stakes that washed out from higher flows; mainline had shifted but is intact. No new erosion or deposition at the two floodplain planting areas but the creek is still very full with lots of different flow paths at the lower floodplain. Reinstalled hog wire panel at lower SF flap gate, found wire and t stakes buried just down stream of flap gate. Also dug out behind flap gate so it will fully close. Fence walk: no major breaks found, fixed some saggy areas by adding more wire. Upper pond is spilling over leaving a big puddle at old 12 valve cluster. Signs of new growth on Medusa head in SW02 but still small/vegetative stage. Thought we might have got a glimpse of larger pig at Upper floodplain. Some evidence of digging found inside of site especially at Boyd valve. New willows starting to leave out	170	RTV			Yes	Yes	100%
5/4/2023	KL, KB, HC 6.5 (1.5) each	19.5 (4.5)	Partly cloudy cool	Dirt roads and the site in general are drying up. Site roads are getting high with vegetation, will need mowing when it starts to dry up. Inspected flap gates, all good. *Basin moisture is still high throughout all zones. Water has been turned back on to tanks. Goat grazing happening just outside of second to last gate. Edwin, goat guy, said goats will be around pump house this Saturday Sunday Monday. Counted 200 trees and shrubs in lower floodplain plus 65 willows, most willows in clusters. Counted 155 trees and shrubs in the upper floodplain plus 52 willows, all willows in clusters. Made materials list for irrigation repair and started laying out new lines. Lower floodplain needs 500 feet of new drip tubing. Weeded 40% of basins in the upper floodplain and performed a weeding pass on mustard and thistle in this zone as well	85	RTV		Mustard, star thistle			100%
5/18/2023	KL	5 (3)	Sunny warm	Pressurized the system and removed air from the mainlines; all good. Lots of brown water came out of the flush ports; two hose bibs and the 2" flush port at pump house valve assembly. Started repairing Boyd creek irrigation since this irrigation zone and mother oak irrigation zone are in the drier parts of the site. Repaired multiple pvc and drip irrigation breaks in Boyd Creek plus cleaned filter which was totally clogged. This includes flood damage and rodents chewing drip line. All other planting areas have sufficient plant basin moisture at this time. Visited each valve box to confirm timer and valve irrigation function. Need new timer at pump house. *Goat grazing was very successful and came right up to the edge of the pump house planting area. Site and access roads now completely dry, except for a little flow In SF creek; pond water levels have begun to reseed. *Turned system off upon departure	85					Started flood and general repairs	100%
5/30/2023	KL, HE 6.5 (1.5) each	13 (3)	Sunny warm	Purchased irrigation repair supplies on the way to the site. Continued irrigation repairs in the Boyd creek planting area ID01. Tons of dragged drip lines, broken drip fittings and emitters/spaghetti tubing fittings. Some drip lines totally gone. System is now working good and the majority of the living plants have 2 functioning 2gph emitters. Lots of sediment got in the lines from flooding so, flushed lines at end caps and replaced clogged emitters. Creek crossings now have removable fittings for winterizing. Many plants are starting to show signs of stress with brown leaves; soil was very dry before irrigation. *Power to System is off and ball valves just before and after pump are off. Pump house plants and native flora are still very green and flowering, soil is dry. *Victor with parks said the pigs are being "dispatched" 15-20 at a time	85	RTV. Ewing: $527.75					
06/01/2023	HE, KB, F	19.5 (4.5)	Overcast to sunny	Mowed planting area ID03-02 due to an excessive amount of weeds. Replaced drip tubing to flagged plants; existing tubing damaged substantially due to flooding from past winter. Found soil moistures to be high in creek bottoms, becoming low moving away from creek. Most plant species appear to be healthy and maturing, however high mortality among oaks was observed. No herbivory present, despite excessive growth through cages. All plants received new tubing and emitters, however two zones of willows still need emitters. Recommend finishing drip irrigation to said willows, and road mowing upon next visit. *Creek has stopped flowing	85						

San Felipe Creek Maintenance Log

Gate Code: 4210

County lock (green stripe), 8240

Date	Staff	Hours on-site (travel)	Field Conditions	Task Descriptions and Location	Mileage	Materials Furnished	Plant Mortaility	Weeds controlled	Fenceline Patrol	Irrigation Inspection	Water Tank Level
6/2/2023	KL	5 (3)	Sunny warm	Ran drip for two hours in Boyd creek, ID01. Working good, lots of fine tuning. There is a high percentage of surviving acorn seedlings, red flags, from last years seeding effort in this zone. Lost many of the stream bank plantings due to erosion. *Walked Mother oak zone, ED01, and fixed major irrigation breaks; found two gopher snakes in the valve box. There were a few pvc breaks and multiple creek crossings that needed attention. Less surviving plants here compared to Boyd, as noted last year, but most surviving plants are more established. Will monitor this zone in the near future for irrigation needs; soil and grasses are dry. Work will be focused on zones with younger plants next visit; floodplains and pump house. *Irrigation system is off at pump house, water and power, but mainline is pressurized and ready to go. *Need more mainline drip tubing	85					ID01 & ED01	100%
6/6/2023	KL, GS 6.5 (1.5) each	13 (3)	Cloudy/rain in the morning	Supply run for more drip tubing, fittings and emitters. Cloudy/rainy this morning so pump would not pressurize at first, low power. Ran the remaining drip mainline in Upper Floodplain and rebuilt all of the damaged pvc pipe. Cleaned filter a few times, kept clogging, and ran system for 1.5 hours. The majority of the old drip lines in the upper western area have clogged emitters from flood sediment getting in lines, need replacement. New drip running strong. *Ran mother oak drip for one hour. *Reconnected valve that was completely broken off in Lower Floodplain. Plants look really green in the Lower Floodplain but with get drip going to at least the plants on the upper banks soon. RTV not starting again	85	Ewing: $228.06				ID03-02	
6/15/2023	KL, HE, KB, FA, CL 6.5 (1.5) each	32.5 (7.5)	Sunny warm	Mowed pump house zone selectively, leaving native grasses and yarrow since not totally brown yet. Big rattle snake found in planting area at the pump house; was luckily avoided during mowing. Fixed pump house drip, found 8 spots were drip was totally chewed in half and fixed two large chew holes. Fixed 10 emitters that were totally chewed off. Started weeding basins and flagging dead plants with with white flags. Ran drip at pump house for 1+ hour. *Ran Boyd and mother oak drip for 2 hours, these two zones can run simultaneously. *Started repairing PVC in lower floodplain, lots of native lotus on the eastern bank. Met with Erin and Leanne, from Nomad, to discuss weeding approach. Medusa head is of biggest concern because it is now found in more areas across site, unfortunately it is now too developed for mowing	170					ID03-01A	
6/16/2023	KL, KB, FA, CL 6.5 (1.5) each	26 (6)	Sunny warm	Overcast upon arrival so pump was very slow to start. Didn't get sunny until 930, then we started to get full power/flow. Continued mowing around the pump house zone and weeded basins on the western side of the planting area. Watered for another hour+ so, this planting area received a solid watering between yesterday and today. Started finding some more clogged/low flowing emitters as we got a more detailed look at each basin, replaced with new emitters as we went. Check remaining basins, primarily east of the PVC mainline during next watering event. *Finished drip and replaced clogged emitters in the upper floodplain. The older drip and pvc had a lot of sediment in it, most of these basins on the eastern bench needed emitter replacement. Ran this zone for 2 hours+. Filter clogged multiple times, still a lot of sediment pushing through the mainline. *Started fixing irrigation in the lower floodplain. Flushed pvc of sediment and connected to drip on the far upper side. Drip on close upper side, next to valve, ready for connecting. This zone still needs a lot of work, weeding and irrigation, but plants are more established here and moisture is present a 3-6 inches below the surface in creek bed planting area. Noticed a cracked fittings just downstream of the filter, needs replacement. **Run pump house and upper floodplain zones in 2 weeks; Boyd and mother oak could get water at that time also but, less priority/more established. Boyd/mother oak ready for weeding/mowing also. *Continue working in lower floodplain to get irrigation to upper most plants. Keep and eye on new willow cuttings in the lower floodplain also. Lots of weeding and mowing in the lower floodplain to be done as well. Continue mowing all access roads. *Water and power is off at the pump house	170						

San Felipe Creek Maintenance Log

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Date	Staff	Hours on-site (travel)	Field Conditions	Task Descriptions and Location	Mileage	Materials Furnished	Plant Mortality	Weeds controlled	Fenceline Patrol	Irrigation Inspection	Water Tank Level
6/29/2023	GS, KB, CL, AJ (8 each)	26(6)	Sunny hot	Started up pump and ran pump house zone for 2 hours. Walked irrigation lines and found no issues. Replaced clogged emitters and began capping dead basins. Valve filter was not too dirty. Mowed 4' buffers around plants in Boyd. Ran upper flood plane irrigation for 2 hours, no leaks or issues. Good flow to plants on upper shelf. Began hand weeding basins and outside of cages in lower flood plane. Weeds are dense here. Plugged in irrigation going to closer upper shelf	85	Ewing $28.32					
6/30/2023	GS, HE, KB, FA, CL (8 each)	32.5 (7.5)	Sunny hot	Tank float had been stuck on, nudged it into place. Ran Boyd irrigation and walked line repairing breaks. Occasionally capped dead plants and replaced clogged emitters (could use a few bags of emitters out here). Continued mowing Boyd and access roads. Hand weeded larger thistle and mustard in upper floodplain then mowed between plants and surrounding bank. Ran irrigation in lower floodplain, only to the banks on either side of the plain for 1 hour. Hand weeded larger yst and began mowing in the middle section	85	192	labor hours				
7/12	KL	2		Emails, planning, irrigation and mowing supply purchases		•Ewing: $149.53* •Gardenland: $129.80*					
7/14/2023	KL (1) GS, HE, CL, AJ, FA 6.5 (1.5) each	33.5 (7.5)	Hot and sunny	Put battery back in rtv and it started up with no problem. Cut 5 10' lengths of fence wire to make 3' diameter cages and installed on cottonwoods in pump house zone. Leak has worsened in pump house. Ran pump house zone for 2 hours. Cracked solenoid to bypass timer, middle toggle button not working. New timer in pump house, can switch out Monday. Took pictures of fittings needing to be replaced. Mowed around planting clusters in another Oak zone starting at Boyd. Mowed path between clusters. Topped nearly all of the pepper weed flowers and bagged, still need to mow down.	85	RTV					
7/17/2023	KL, GS 6 (2) each	12 (4)	Hot and sunny	Purchased repair materials and fixed the leak in pump house plumbing. Had to jiggle tank float this morning because it hadn't turned off completely. Ran drip in Upper Floodplain, most plants doing really well except the new willows which have started to turn brown really quick. Filter was continuously leaking after many attempts to rectify ended up being a stretched o ring creating the problem; replaced o ring; all good. Added more emitters to the willows in the upper floodplain and ran drip for another hour plus; extra water. Continued weeding in this zone and noticed a lot of browsing on weeds and plants, especially the cottonwoods; hopefully bigger cages soon. Site moisture has dried up incredibly fast and we are seeing the same trend on new willows in lower floodplain as well, will water these tomorrow. Side channel and ponds planting areas, southern end of site, continue to look strong without supplemental irrigation	85	RTV •Ewing: $40.11*					
7/18/2023	KL	6.5 (1.5)	Hot and sunny	Ran drip in Boyd/Mother Oak, ID01 & ED01, for 2 hours, all good. Ran drip to both banks and hand watered the smaller/weak creek bed plants in the Lower Floodplain, ID03 & ID04. Cleaned filters prior to running zones. *Lower Floodplain: Noticed sage brush, Coyote mint and lots of mugwort recruits. Continued hand weeding zone; minimize the the number of forfeit piles. This zone still need lots of work; weeding and irrigation repair. Hand weeding preferred, because of all of the recruits, but can mow west slope. Majority of these plants still growing really strong except for some small roses and the new willows. Older willows look established/no need for irrigation at this time	85						
7/25/2023	KL	5.5 (2.5)	Hot and sunny	Watered Upper Floodplain for 2 hours; new willows are stable. Watered this whole zone today because most plants are still small here; very healthy though. *Fixed cracked fitting at Lower Floodplain valve and laid out hose for hand watering in the creek bed, focus on new willows. Continued weeding and cage removal/relocation in Lower Floodplain. Irrigation Fix in pump house blew off, was weary, at beginning of lower Floodplain irrigation event so, spent the rest of the day replumbing pump house with newly purchased repair fittings. Caught the break right away so not much water was lost, tanks 100% full and done filling upon departure	85						100%

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Date	Staff	Hours on-site (travel)	Field Conditions	Task Descriptions and Location	Mileage	Materials Furnished	Plant Mortality	Weeds controlled	Fenceline Patrol	Irrigation Inspection	Water Tank Level
7/26/2023	KL, CL, AG, SM, FA 6.5 (1.5) each	32.5 (7.5)	Hot and sunny	Hand watered Lower Floodplain creek bed focusing on new willows. The surviving new willows pole cuttings are stable. Hand weeded this zone and mowed the west bank, turnaround around area and access road from the big dip to lower floodplain turnaround. Walked entire fence line, all good. *Watered Pump House planting area for 2+ hours, looking really good. Replaced malfunctioning timer at Pump House valve box. Mule fat and willow growing strong in ID02 without supplemental irrigation. Turned power off at pump house but, water is still open since leaks have been repaired. No automated irrigation events scheduled at this time, been watering while onsite weeding. Will continue weeding and start recaging efforts by reusing materials already onsite; combining multiple old small cages into one larger cage	170	RTV		Star thistle, mustard, tobacco	Yes		
7/28/2023	MB, KB, CL, AG 6.5 (1.5) each	26 (6)	Hot and sunny	Finished bagging and removing pepper weed seed heads from SW3. Mowed pepperweed after removing seed heads and mowed the thick mustard patch in the same area. Hand weeded pump house planting area and the star thistle patch just east of pump house. Built and installed 13 cages, using fence wire from storage container, on 10 oaks and 3 cottonwoods; 3 rebars each.	85	RTV					
7/31/2023	KL, KB, CL, SM, FA 6.5 (1.5)	32.5 (7.5)	Hot and sunny	Removed cages from 22 plants that don't need cages due to plant size and lack of browsing pressure, mainly mule fat and a couple mugwort and a couple coyote brush. Some of these small cages were badly intertwined with the plants so, had to carefully cut old wire away from plant. Removed old small cages from 20 more plants and built new bigger cages on sambucus, oaks, buckeyes and coffee berry. Old small wire was reused to build bigger cages by connecting 3 old pieces of wire into one bigger piece; takes a lot of time. Used multiple rebar to help stabilize floppy wire. (26 hours, onsite, spent on caging) *Pump house has a small leak in plumbing, was able to minimize leak down to a drip by patching it. *Watered Mother Oak/Boyd for 2+ hours; repaired one chew hole in drip mainline in furthest upstream planting area in ED01/Mother Oak zone	170	RTV	765	185 hours			
8/1/2023	MB, KB, SM, FA 6.5 (1.5)	26 (6)	Warm, sunny	Removed roughly 60 cages, 30 from mule fat and 30 from empty basins, and recaged 26 oaks, coffeeberries and sambucus. Finished recaging left side of pvc, and started on the right side today. Used all wire harvested today to make new cages. Weeded star thistle around pump house (22 hours onsite spent caging today)	85	RTV					
8/2/2023	KL, HE, CL, KB, FA 6.5 (1.5) each	32.5 (7.5)	Overcast morning	Watered *Upper floodplain for 2 hours, new willows recovering and all plants looking strong. *Lower floodplain: Hose Watered the new willows and a few weak plants in creek bed. New willows are stable. *Both of these filters were caked with sediment; cleaned prior to running zones. Gave the banks, in the lower floodplain, a little water also but, pretty much only the new willows will need regular water here. Picked up flags used this spring to count plants in this zone and reflagged. Lots of cages to be removed, green flags. 20 plants need bigger cages, pink flags. Add drip to 6 willow clusters and a few weak plants in creek bed, yellow flags. Rake up mowed weeds on west bank and place in forfeit pile at top of hill. *Pump House caging: caged 26 plants using materials that were already on plants and from empty basins in the pump house zone. Cages were extended from 1 to 3+ feet diameter focusing on oaks, buckeye, coffee berry and sambucus. Plenty of rebar but, wire gets used up fast. (24 hours onsite caging today)	170	RTV					
8/4/2023	KL (4) HE, AG, FA (8 each)	23.5(4.5)	Sunny	Purchased 200 feet of four foot tall welded wire. Lower Floodplain: Removed 25 cages from plants outgrowing their cages (3 hours). Added drip to the new willows and a few small/weak plants in the creek bed. Raked up mowed weeds on the West Bank. Float valves was barely stuck on, jiggled it slightly to stop overflowing tanks. Pump house holding pressure and leak is minimal.	170	RTV •Home Depot: $292.49*					
8/8/2023	KL, HE, SM, KB, FA 6.5 (1.5) each	32.5 (7.5)	Warm	*Lower Floodplain: Watered new willows only via new drip line installed last visit; this on the same valve but can turn off other areas using drip ball valves. Removed 25 more cages from big plants that have outgrown small cage. Upsized 15 trees to 3' diameter cages using new wire and reused rebar. Continued weeding this zone, looking good. *Mowed access road from lower floodplain to side channel zone near ponds. *Watered all plants in Upper floodplain, ran drip for 2 hours. New wire and some fencing wire is staged in upper floodplain to make about 10 more large cages for this zone. Couldn't get RTV to start	170						

San Felipe Creek Maintenance Log

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County lock (green stripe), 8240

Date	Staff	Hours on-site (travel)	Field Conditions	Task Descriptions and Location	Mileage	Materials Furnished	Plant Mortality	Weeds controlled	Fenceline Patrol	Irrigation Inspection	Water Tank Level
8/9/2023	KL (1) GS, SM, FA 6.5 (1.5) each	20.5 (4.5)	Warm	*Side channel (ID03-05) and ID02: Weeded large stands of star thistle and mustard in these planting areas. Lots of tar weed present and native lotus in side channel zone. Some irrigated willows in ponds that we barely kept alive in the drought are now dead from being under water too long. Ponds have now receded to about half full or a little less. More detailing here, lots of native lotus covering small plants, and probably turn irrigation on in side channel next time. *Watered pump house zone for 2 hours	85						
8/17/2023	KL, KB 6.5 (1.5) each	13 (3)	Warm	Cleaned filters and water upper and lower floodplain plus Boyd/mother oak zones (ID01/ED01) for 2 hours each. Pulled dittrichia in lower floodplain and removed old drip. Inspected pond, side channel and ID02 planting areas, no need for irrigation at this time. Side channel needs more detailed weeding around plants, mainly native lotus (Spanish) ~2 feet tall overtaking mitigation plants. Planting zones around the Mother oak tree could use mowing. (RTV still not starting, electrical issue, noticed corrosion in a connection point on positive end.)	85						
8/18/23	KB 6.5 (1.5) SM 6 (1.5)	12.5 (3)	Warm	11 cages made for upper flood plains 9 plants recaged total. Deer sprayed cotton wood and oaks in upper flood plains. Pulled 2 ditrichia in upper flood plains 7 new cages for pump house, sprayed oaks and san buccas and some cotton woods with deer spray. No leak at pump house.	85						
8/28/2023	KL 6.5 (1.5) DS 7.5 (1.5)	14(3)	Hot	Sprayed herbicide on larger mono crop of pepper weed mapped by nomad. It was resprouting after mowing but regrowth was weak. Bagged and removed seed heads from other pepper weed patch near SF creek flap gate, close to the mapped patch***herbicide notes: 2 gal of Polaris mix PCR used (8oz total). DS extra 1 hr off site mob/demob herbicide gear**. This secondary spot is more mixed with natives; sprayed herbicide here also. *Sprayed repellent, liquid fence, on small willows and uncaged coffee berry, rose, blackberry and sambucus in both floodplain zones and at pump house. *Watered pump house zone for 2+ hours. Found 4 seeded acorn basins, from last winter, growing strong; red flag. Lifted the 3 foot reused cages in pump house to focus browse protection towards the tops of larger caged plants. Bagged and removed one GREEN Medusa head in pump house zone! *Cage the remaining 2 cottonwoods in Upper floodplain and started hand weeding in southwest corner; slow going lots of small star thistle. Found native Hoita growing here. *Automatic irrigation ran successfully yesterday in both floodplain zones; moisture found in basins, new willows are putting on growth. Pulled 10 more dittrichia, total, from these two zones	170	misc PPE $10 •Liquid fence: $49.38*	1020	213.5 Hours in August			
9/11/2023	KL 4 (1.5) MB, HE, FA 6.5 (1.5) each	23.5 (6)	Warm	Cleaned all filters. Ran Boyd plus Mother oak irrigation zones for 2 hours each at the same time delivering ~8 gallons per plant. Fixed a cracked PVC near the mother oak tree. Noticed a new acorn seedling, 1' tall, at pump house newly killed by gopher/vole. Acorns are still developing, small and green. Mowed and raked planting areas around the mother oak. Removed dittrichia when encountered, mostly in stream beds and flow lines. Hand weeded in Boyd and mother oak	170						
9/12/2023	MB, CL, AJ, FA 6.5 (1.5) each	26 (6)	Warm	Completed weeded in upper floodplain. Mainly star thistle well as mustard and some dittrichia. Sprayed deer repellant on exposed plants in upper and lower floodplain as well as pump house. Willows, coffeeberries and cottonwoods. Watered pump house for 2 hours. Conducted site perimeter walk, no breaks.	85				Yes		
9/26/2023	KL, GS, KB 6.5 (1.5) each	19.5 (4.5)	Overcast morning	Weeded basins and high invasive plants from ED03-04 & 05, Side Channel. This area has a lot of tarweed, 3 different types, and native lotus so goal was to expose planted plants that were covered. Thistles and invasives were added to the forfeit pile. Also weeded around the planted oaks in ED03-01, 02 & 03, Ponds. Plants in both of these zones, Ponds and Side channel, are still looking good with no irritation all dry season. *Witnessed scheduled irrigation event in the upper and lower floodplain zones, all good. *Sprayed repellent on uncaged plants in both floodplain zones and at the pump house. Focused spraying on willow, coffee berry, rose and cottonwood. Second failed attempt to start RTV	85						100%
9/27/2023	MB, AJ, KB 6.5 (1.5) each	19.5 (4.5)	Sunny	Mowed star thistle around oak basins between ponds. Pulled star thistle, mustard and ditrichia and cleaned the basins in lower flood plains and mother oak. Pull star thistle and mustard around pump house.	85						

San Felipe Creek Maintenance Log

Gate Code: 4210

County lock (green stripe), 8240

Date	Staff	Hours on-site (travel)	Field Conditions	Task Descriptions and Location	Mileage	Materials Furnished	Plant Mortality	Weeds controlled	Fenceline Patrol	Irrigation Inspection	Water Tank Level
10/9/2023	KL (8)	5.5 (2.5)	Cloudy	Watered Pump House for 2 hours; looking good, some mustard to be weeded here. Watered *Boyd and *Mother Oak for 2 hours each. Capped 5 chewed spaghetti tubing and one large chew hole in mainline tubing. Removed some old unused drip tubing from lower Boyd creek. Cloudy today so watered these zones one at a time since pump was putting out less flow. Removed 15 loose/mangled cages and 30 rebars; stock piled at pump house. Found 3 dislodged cages with plants damaged by probable deer rub, recaged. Lots of deer sighted on road in and on the outside of the site fence today. Pulled 10 dittrichia through these two creek beds. *Pepper weed previously treated with herbicide is 90% brown with some new green spouts; green sprouts appear to be new plants popping up. *Sprayed repellent in both floodplain planting areas and pump house. Acorns are still green and sparse, not separating from cap very easily. *PVC, old drip and metal to be removed from both floodplain planting areas; material is sorted, piled and ready to go	85						100%
10/16/23	RY,KL	1.5		Meeting with balance to discuss erosion control and fencing of ID 02.							
10/19/2023	RY 4 (3), KL 5 (3)	9 (6)	Hot	Meeting takeaways: replanting with acorns and buckeye seed willow cutting in zones with new containers plants. Assess number of cages required for next year. Prepare a 3 year maintenance proposal by the end of November.	170						
11/10/23	GS, MB, HE, FA, CL, AG 6.5 each (1.5 each)	39 (9)	Cool	Checked on herbicided pepper weed above pump house and took pictures. A few deformed greenish leaves but everything appears dead. Removed cages, rebar and irrigation from floodplains and Boyd creek. 18 Ford able to pass second dip now that it's regraded. Cut pvc going across creek at upper floodplain and taped ends. Also pulled up willow drip line and stapled on higher ground. Consolidated small refuse pile in side channel onto larger pile. Ponds are dry.	170	•Dump run: $36.25*					
11/13/23	MB, AG, CL 6.5 each (1.5 each) GS (2)	21.5 (4.5)	Cool	Cut and taped pvc from creek in lower floodplain. Removed himalayans from between floodplains . Hand pulled mustard from pump house area. Made 12 cages for pump house area. Still 200 ft of wire. Collected valley oak acorns (half of a sandwich bag full) still lots of weeding at pump house and throughout site. Dump run (GS)	85						
11/16/2023	KL, GS, FA 6 each (2 each)	18 (6)	Cloudy	Flagged 50 acorn basins with *blank/no writing orange flags: 7 in pump house, 25 in upper floodplain and 18 in lower floodplain. Collected buckeyes from near the spring on site (10) and on quimby road (40) plus flagged the area of coffee berry recruits with a blue flag. *Parks turned off water to tanks today so we can install a ball valve just before tanks in the 1.5" supply line. Started emptying water from supply line and tanks into the pump house zone, via drip. Added new cages with purchased rebar and wire Julie left on site. Unfortunately new wire is only 3 feet tall but, we installed it one foot off the ground to protect the upper portions of plants from deer browse; 4 foot tall wire is sufficient, 5 foot tall even better. Added 12 cages in Pump House and 9 cages in Upper Floodplain; some wire and rebar still left. New cages are 3 feet wide and have 4 rebar each, 2 new rebar plus 2 reused rebar. *Counted and flagged more plants, by planting zone and species, that could use a cage; marked with yellow flags. Site is still relatively dry, just few tiny puddles on the road in	170	•Rebar: $315.50*					
11/21/2023	KL	1		Emails, purchase supplies for acorn planting, receipts		•50 • 5 gallon Gopher baskets: $315.56*					
11/28/2023	KL, GS, HE, CL, AG, FA, KB 6.5 (1.5) each	45.5 (10.5)	Warm, dry	Planted the 50 previously flagged, orange, acorns basins, 2 acorns per basin, in 5 gallon gopher baskets. Continued draining the tanks but did not add a ball valve upstream of the tanks yet; tanks are still half full. Also planted 17 buckeye nuts, 1 per basin, at upper floodplain and 15 buckeye nuts, 1 per basin, at lower floodplain and flagged with white flags. Added repurposed small browse cage to Acorns and buckeye basins. Added three new 3 foot diameter cages to cottonwoods in the upper floodplain; still a little bit of fencing wire left to add a few cages to the lower floodplain. Site and access roads are dry	255	667.31	100.0965				Water feed from parks is off. Tanks are 50% full
						155					
						36					

APPENDIX B WETLAND DETERMINATION DATA FORMS

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Arid West Region
See ERDC/EL TR-08-28; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 11/30/2024
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: San Felipe Creek Restoration Project | City/County: San Jose / Santa Clara | Sampling Date: 3/27/2023
Applicant/Owner: Santa Clara County Parks | State: Ca | Sampling Point: 3a
Investigator(s): Leanne Feely, Erin McDermott | Section, Township, Range: Section 12, Township 7 South, Range 2 East
Landform (hillside, terrace, etc.): valley bottom | Local relief (concave, convex, none): convex | Slope (%): 0
Subregion (LRR): LRR C | Lat: 37.31736235 | Long: -121.69678881 | Datum: WG84
Soil Map Unit Name: Garretson gravelly loam, 0 to 5 percent slopes | NWI classification: none
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No ____
Hydric Soil Present? Yes X No ____
Wetland Hydrology Present? Yes X No ____

Is the Sampled Area within a Wetland? **Yes** X **No** ____

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: N/A)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	=Total Cover		
Sapling/Shrub Stratum (Plot size: 5'x5')			
1. *Baccharis pilularis*	3	No	UPL
2.			
3.			
4.			
5.			
	3 =Total Cover		
Herb Stratum (Plot size: 5 x 5')			
1. *Juncus patens*	2	Yes	FACW
2. *Carex densa*	1	Yes	OBL
3. *Elymus glaucus*	1	Yes	FACU
4. *Madia sativa*	1	Yes	UPL
5. *Lythrum hyssopifolium*	1	Yes	OBL
6. *Rumex crispus*	2	Yes	FAC
7. *Festuca perennis*	1	Yes	FAC
8.			
	9 =Total Cover		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	=Total Cover		

% Bare Ground in Herb Stratum 90 % Cover of Biotic Crust ____

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)
Total Number of Dominant Species Across All Strata: 7 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 71.4% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ____	x 1 = ____
FACW species ____	x 2 = ____
FAC species ____	x 3 = ____
FACU species ____	x 4 = ____
UPL species ____	x 5 = ____
Column Totals: ____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:
X Dominance Test is >50%
____ Prevalence Index is ≤3.0[1]
____ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
____ Problematic Hydrophytic Vegetation[1] (Explain)
[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** X **No** ____

Remarks:
Low total cover of vegetation. Bare ground areas is mostly made up of ponded water and saturated soils.

SOIL

Sampling Point: 3a

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-14	10YR 3/2	98	10YR 7/8	2	C	M	Loamy/Clayey	Prominent redox concentrations

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR C)**
- ___ 1 cm Muck (A9) **(LRR D)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR C)**
- ___ 2 cm Muck (A10) **(LRR B)**
- ___ Iron-Manganese Masses (F12) **(LRR D)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ___

Depth (inches): ___

Hydric Soil Present? **Yes** X **No** ___

Remarks:
Concentrations primarilly along root channels.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- X Water Marks (B1) **(Nonriverine)**
- ___ Sediment Deposits (B2) **(Nonriverine)**
- ___ Drift Deposits (B3) **(Nonriverine)**
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Water Marks (B1) **(Riverine)**
- ___ Sediment Deposits (B2) **(Riverine)**
- ___ Drift Deposits (B3) **(Riverine)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes	X	No ___	Depth (inches):	2
Water Table Present?	Yes	X	No ___	Depth (inches):	0
Saturation Present? (includes capillary fringe)	Yes	X	No ___	Depth (inches):	0

Wetland Hydrology Present? **Yes** X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
This feature and surrounding areas was saturated to ponded. Sample point is adjacent to a ponded feature, where water is overflowing.

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Arid West Region
See ERDC/EL TR-08-28; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 11/30/2024
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: San Felipe Creek Restoration Project | City/County: San Jose / Santa Clara | Sampling Date: 3/27/2023
Applicant/Owner: Santa Clara County Parks | State: Ca | Sampling Point: 3b
Investigator(s): Leanne Feely, Erin McDermott | Section, Township, Range: Section 12, Township 7 South, Range 2 East
Landform (hillside, terrace, etc.): valley bottom | Local relief (concave, convex, none): convex | Slope (%): 1
Subregion (LRR): LRR C | Lat: 37.3173368524 | Long: -121.696854362 | Datum: WGS 84
Soil Map Unit Name: Garretson gravelly loam, 0 to 5 percent slopes | NWI classification: none
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ____ No X
Hydric Soil Present? Yes ____ No X
Wetland Hydrology Present? Yes X No ____

Is the Sampled Area within a Wetland? **Yes** ____ **No** X

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: N/A)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	____ =Total Cover		
Sapling/Shrub Stratum (Plot size: N/A)			
1. *Baccharis pilularis*			
2.			
3.			
4.			
5.			
	____ =Total Cover		
Herb Stratum (Plot size: 5x5)			
1. *Festuca perennis*	5	No	FAC
2. *Hirschfeldia incana*	15	Yes	UPL
3. *Acmispon americanus*	20	Yes	UPL
4. *Bromus hordeaceus*	10	No	FACU
5. *Avena barbata*	2	No	UPL
6. *Hordeum brachyantherum*	3	No	FACW
7. *Carduus pycnocephalus*	5	No	UPL
8.			
	60 =Total Cover		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	____ =Total Cover		

% Bare Ground in Herb Stratum 40 % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	3	x 2 =	6
FAC species	5	x 3 =	15
FACU species	10	x 4 =	40
UPL species	42	x 5 =	210
Column Totals:	60 (A)		271 (B)

Prevalence Index = B/A = 4.52

Hydrophytic Vegetation Indicators:

____ Dominance Test is >50%
____ Prevalence Index is ≤3.0[1]
____ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** ____ **No** X

Remarks:
Upland vegetation along roadsides / upland edge of wetland areas.

SOIL

Sampling Point: 3b

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-14	10YR 3/2	99	10YR 7/8	1	C	M	Loamy/Clayey	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR C)**
- ___ 1 cm Muck (A9) **(LRR D)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR C)**
- ___ 2 cm Muck (A10) **(LRR B)**
- ___ Iron-Manganese Masses (F12) **(LRR D)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ___ **No** X

Remarks:
Concentrations present along root channels, but at low percentage. Soils pebbly.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1) **(Nonriverine)**
- ___ Sediment Deposits (B2) **(Nonriverine)**
- ___ Drift Deposits (B3) **(Nonriverine)**
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Water Marks (B1) **(Riverine)**
- ___ Sediment Deposits (B2) **(Riverine)**
- ___ Drift Deposits (B3) **(Riverine)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes X	No ___	Depth (inches): 2		
Water Table Present?	Yes X	No ___	Depth (inches): 0		
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches): 0	**Wetland Hydrology Present?**	**Yes** X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Saturated soils present, but recent storms bring saturation throughout the site.

APPENDIX C YEAR 5 GEOMORPHIC AND HYDROLOGIC MONITORING REPORT

YEAR 5 GEOMORPHIC AND HYDROLOGIC MONITORING, SAN FELIPE CREEK RESTORATION PROJECT, JOSEPH D. GRANT PARK, SANTA CLARA COUNTY, CALIFORNIA

Report prepared for:

Erin McDermott, Nomad Ecology, LLC.

Prepared by:

Eric Donaldson, P.G.
Emma Goodwin
Dave Shaw, P.G.

Balance Hydrologics, Inc.

December 13, 2023

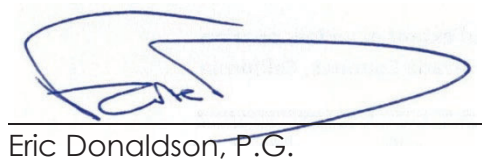
A report prepared for:

Erin McDermott
Nomad Ecology, LLC
822 Main Street
Martinez, California 94553
emcdermott@nomadecology.com

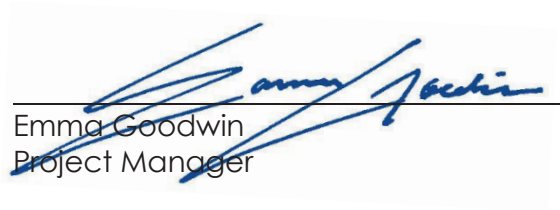
Year 5 Geomorphic and Hydrologic Monitoring, San Felipe Creek Restoration Project, Joseph D. Grant Park, Santa Clara County, California

 Project Assignment: 222108

by



Eric Donaldson, P.G.



Emma Goodwin
Project Manager

Reviewed by: David Shaw, P.G., Principal-in-charge

Balance Hydrologics

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office@balancehydro.com

December 13, 2023

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPENDICES

EXECUTIVE SUMMARY

This report summarizes the annual geomorphic and hydrologic monitoring results for Year 5 monitoring (Water Year[1] 2023, WY2023) of the San Felipe Creek Restoration Project (project), located along San Felipe and Boyds Creeks in Joseph D. Grant Park, Santa Clara County. The project provides advanced mitigation credit for the Santa Clara Valley Habitat Agency (SCVHA) as part of the Santa Clara Valley Habitat Conservation Plan (HCP) in-lieu fee program.

The project was completed in November 2018. Geomorphic and hydrologic monitoring began in October 2018, shortly after earthwork and structures were completed. This work is being conducted by Balance Hydrologics, Inc. (Balance) staff geomorphologists and hydrologists. This report presents a brief description of the project, the hydro-geomorphic performance standards set forth in the project Mitigation and Monitoring Plan (MMP, Monarres and others 2018), monitoring methods, monitoring results, and recommendations.

WY2023 was a wet year, with above-average annual precipitation. Due to the high frequency and intensity of storm events, the valley-fill aquifer at the project area experienced complete recharge. Shallow groundwater data suggest that the valley-fill aquifer became saturated and remained saturated for the longest period of time since construction. Streamflow in San Felipe Creek and Boyds Creek occurred over long periods during WY2023. Peak flows occurred in January 2023 and exceeded the 2-year event, and thus, we collected and interpreted post-storm topographic data via drone.

In 2020, the design and monitoring Team (Team) agreed upon strategic adaptive management actions for select areas. These actions were completed by SCVHA and HRS in coordination with the Balance and Dudek project design and monitoring team. Balance was primarily involved in two adaptive management actions: 1) on November 4, 2020, HRS replaced a log on Boyds Creek that had been dislodged in an attempt to protect plantings on an outside bank, and 2) on August 26, September 20 and September 21, 2021, HRS constructed a debris jam structure at wetland feature ID03-02 to redirect streamflow into the pre-project channel alignment where a cutoff channel had formed at ID03-02 in 2019. During WY2023, a new low-flow channel formed across

[1] A Water Year (WY) is defined as that period from October 1st of a preceding year through September 30th of the following year and is named according to the following year. For example, WY2023 occurred from October 1, 2022, through September 30, 2023.

the floodplain feature at ID03-02. Despite this change, these two areas of adaptive management appear to be performing within an acceptable range of conditions.

During the Year 5 site visits we observed erosion around both sides of the downstream-most staked debris jam 6. This was repaired on November 6, 2023. The second course of staked debris jams is in the planning phases, and we recommend those to be installed during summer 2024, as outlined in the MMP as part of the ongoing stewardship of the Project site.

At this time, we recommend developing adaptive management strategies to reduce the flow requirements and increase the frequency of activation of Boyds Creek distributary channels.

The monitoring team will continue to monitor the site and evaluate conditions in the context of the performance standards laid out in the MMP.

1. SITE DESCRIPTION AND MONITORING CRITERIA

The San Felipe Creek Restoration Project (Project) site is located along San Felipe Creek in Halls Valley at an elevation of approximately 1300 feet (NAVD88), within Joseph D. Grant Park County Park (**Figure 1**) in the headwaters of Coyote Creek. San Felipe Creek drains Halls Valley and has a watershed area of approximately 3.1 square miles at the upstream project boundary. Boyds Creek is tributary to San Felipe, flows into Halls Valley within the Project site from the flanks of Mount Hamilton to the east, and has a watershed area of approximately 2.6 square miles. The purpose of the Project was to restore approximately 1 mile of stream channel by restoring hydrologic function, modifying in-channel habitat, and restoring dynamic channel and floodplain functions along San Felipe and Boyds Creeks between the Corral Trail and Cañada de Pala Trail.

Legacy agricultural activities influenced overland flow pathways and channel morphology. The site conditions, impairments and restoration actions are described in the project conceptual design and feasibility study report (Donaldson and others, 2017). The impairment map assembled for that report is attached as **Appendix A**. The Project was intended to mitigate impacts from historical land uses and disturbances, enhance aquatic and upland habitats, and make San Felipe Creek and Boyds Creek more resilient to climate change. Restoration activities consisted of the following:

- re-establishment of dispersed flow paths across eroded portions the Corral Trail and across the Boyds Creek alluvial fan,
- re-connection of distributary channels on the Boyds Creek alluvial fan and placement of instream wood to disperse flows and establish dynamic flow paths,
- excavation of inset floodplains on San Felipe Creek,
- partial filling of an eroded Agricultural Ditch to create ponded areas and slow subsurface drainage of adjacent desiccated wetland areas, and
- placement of wood debris structures to reverse incision on an unnamed tributary to San Felipe Creek, the "Incised Eastern Tributary".

The San Felipe Creek Restoration Project MMP (Monarres and others, 2018) establishes hydrologic and geomorphic performance standards and monitoring requirements for the project. Relevant hydrologic and geomorphic performance standards and associated monitoring approaches are catalogued in **Table 1**. Monitoring station locations are shown in **Figure 2**.

2. MONITORING METHODS

The MMP requires at least 10 years of hydrologic and geomorphic monitoring to establish project success and establish the restoration and enhancement credits. Creek stage (water level) and streamflow, wetland inundation duration, and qualitative geomorphic monitoring will occur every year. Repeat topographic surveys are planned for years in which a 2-year flow or greater has occurred. No fewer than three topographic surveys are required over the course of the 10-year monitoring period, and one topographic survey will be conducted during Year-10 monitoring.

2.1 Hydrologic Monitoring

2.1.1 Rainfall

To provide context for the hydrologic and geomorphic data collected at the project site, we present rainfall data from the University of California Berkeley Blue Oak Ranch Reserve (UCBO) rain gage[2], located 4.5 miles northwest of the site at approximately 1800 feet MSL elevation. Average annual rainfall at the UCBO station is approximately the same as at the Project site (Santa Clara County Drainage Manual, Schaaf and Wheeler, 2007).

2.1.2 Water Levels and Streamflow Monitoring

We established a stream, wetland, and groundwater-level monitoring network following completion of restoration work and prior to significant winter rainfall in December 2018. The following list describes the gaging methods for each type of gage:

Stage (water level) and estimated streamflow: To monitor water levels and estimate streamflow in San Felipe and Boyds Creek, we installed continuous-recording water level sensors which collect and record 15-minute stage measurements within the designed wetland features and nearby channels and wetlands. Balance staff visited the site multiple times during the rainy season and during the dry season to calibrate, repair, and download water level recorders. Water level data were used to create 15-minute stage hydrographs at stream stage and streamflow stations.

[2] Long-term data are available through the Western Regional Climate Center (https://wrcc.dri.edu/weather/ucbo.html), and 10-minute interval preliminary data are used here with permission from University of California at Berkeley (http://sensor.berkeley.edu/index_ucnrs.html).

We established three stage and streamflow gages, two on San Felipe Creek (SFUS and SFDS) and one on Boyds Creek (BCUS)[3]. Periodic staff plate readings are used to calibrate the 15-minute depth data recorded by the logger and convert the raw water level record to a stage record, according to the local datum. To develop an estimated record of streamflow, periodic streamflow measurements were taken during Year 1 monitoring in accordance with practices outlined in the U.S. Geological Survey Techniques of Water Resources Investigations[4]. The manual streamflow measurements were used to establish Manning's roughness coefficients at streamflow gage sites. A rating curve was then developed to convert stage to streamflow using the Manning's calculator in United States Corps of Engineers Hydraulic Engineering Center River Analysis System (HEC-RAS) 5.0. The stage-discharge rating was then calibrated using additional manual flow measurements. For the purposes of evaluating the performance standards outlined above and in **Table 1**, the estimated streamflow record is considered to be sufficient. Additional measurements are required to develop a more accurate streamflow record and will be taken opportunistically. Because this gage has required re-location multiple times, including during 2023 when it became disconnected from flow, no rating curve has been developed.

Groundwater monitoring: To monitor groundwater levels near constructed floodplain features, channels, and wetlands, we installed continuous-recording water level sensors in 4 of the 5 piezometers which were used during the pre-project evaluation. Water level data were calibrated against periodic manual depth-to-water readings to develop 1-hour depth-to-groundwater (below the ground surface) records. The ground surface and top of each piezometer were also surveyed and used to convert the depth-to-water records to groundwater elevation records.

Surface ponding in wetlands: To monitor inundation duration within wetland areas, we installed continuous-recording water level sensors in stilling wells along with staff plates. Water level data were calibrated to periodic manual stage readings to develop hourly wetland stage records.

[3] Note that Boyds Creek Downstream (BCDS) is a stage-only gage.

[4] https://pubs.usgs.gov/twri/index090905.html

Peak stage near floodplains: To record peak stage and document whether floodplains were inundated, we installed six additional water level recorders at select locations across the project site (BCA1, BCA2, BCA3, BCA4, BCDS, SFDF). Data from these supplemental stations are archived along with manual stage and high-water mark readings; we are not presenting data from BCA1 through BCA4 this year because we have direct observations of flow into those distributary channels (see **Section 3.2.3).**

2.1.3 Monitoring Locations

A complete list of hydrologic monitoring stations and location descriptions are included in **Table 2** and station locations are shown in **Figure 2**. We present relevant site observations in station observer logs. The station observer log for surface water stations is presented in **Appendix D** and the station observer log for groundwater stations is presented in **Appendix E**.

For the purposes of this monitoring program, 3 types of features are considered:

- Excavated or constructed restoration elements on ephemeral drainages (ED) and intermittent drainages (ID). Excavated features are named according to their identifying symbols in the project plans and the project MMP: ID03-01, ID03-01A, ID03-02, etc. In some cases, informal nomenclature is also used for ease of communication. At the restored Agricultural Ditch (ED03), a series of five ponds separated by sediment plugs were constructed.

- Names for pre-existing enhanced and restored seasonal wetlands that are within or near the project area are the same as those initially given to them in the MMP, prior to project construction: SW02, SW03, and SW04.

- The Corral Trail and drainage lenses.

2.2 Geomorphic Monitoring

2.2.1 Qualitative Observations

Balance staff visited the site during the wet and dry season to observe streamflow conditions and areas of surface ponding, document evidence of runoff patterns, and inspect the stability of constructed features. Hydrologic observations were catalogued in field observer logs. When practical and safe, a small unmanned aerial vehicle

(UAV, or drone) was used to collect oblique aerial photos and repeat vertical aerial photographs.

2.2.2 Topographic Surveys

Channel evolution monitoring metrics are intended to identify whether channel bed and banks, large wood, and floodplain benches evolved and if aggradation or scour took place over the year. As stated above, the MMP dictates that surveys occur after years in which the 2-year recurrence streamflow is met or exceeded. We use estimated peak streamflow at SFUS and compare this to calculated peak flow recurrence estimates according to regional regression relationships developed by Gotvald and others (2012), as summarized in **Table 3**. Because estimated peak flows exceeded a 2-year recurrence threshold in WY2023, topographic data were collected during Year 5 monitoring.

Geomorphic change surveys were conducted using two methods: First, Balance performed topographic surveys using a Total Station to collect data at selected locations on July 12, 2023. Second, a UAV was flown over the project area to collect detailed overlapping aerial photography. These flights were ground point controlled based on the NAD83 California zone 3 (US ft) datum (EPSG:2227). Using Agisoft™ software and photogrammetry methods, orthoimages and digital elevation models (DEM) were produced from each flight. To check the quality of the generated DEM, we compared manually collected survey elevations to corresponding DEM elevations.

The as-built (Year-0) flight occurred on December 21, 2018, and the Year-5 flight occurred on October 3, 2023. The Year-5 DEM was subtracted from the Year-0 DEM to create a DEM-of-difference (DOD) which produced a spatially explicit map of change (aggradation and degradation) that occurred over 5-year period, which allows for a detailed understanding of change and potentially early detection of issues that may threaten the function of the Project. This method does not allow us to monitor under tree canopy or dense vegetation, however at those areas are limited to a few short reaches which we have supplemented with direct field and photo observations.

3. MONITORING RESULTS

3.1 Overview of Annual Conditions

3.1.1 Rainfall

Annual precipitation in the vicinity of the Project site was 40.1 inches during WY2023, as recorded at the UCBO station (**Figure 3**), more than the long-term average of 24 inches, as reported in the Santa Clara County drainage manual. The UCBO station has been operating since 2011, and the average annual rainfall at UCBO over the 12-year period of record is 23.9 inches.

Annual precipitation during WY2023 was characterized by numerous wet periods starting in early November and continuing into early May. It was particularly rainy starting December 26, 2022, through the middle of January 2023. February was relatively dry, but approximately 10.5 inches of rainfall occurred during a wet period between February 23, 2023, and the end of March. Overall rainfall totals and temporal distribution were similar to the last very wet year, WY2017, which occurred prior to implementation of the Project.

The largest WY2023 events were multi-day storms that occurred in December 2022, January 2023, and March 2023. On December 10 and 11, 2022, 3.2 inches of rain was recorded. Between December 26 and 31, 2022, 7.62 inches of rain was recorded. Over a longer period stretching from December 26, 2022, to January 16, 2023, 16.0 inches of rain was recorded. Peak 24-hour rainfall was 3.34 inches, recorded between 12:00 AM December 31, 2022, and 12:00 AM January 1, 2023. The December 31 rainfall event occurred after about 13.9 inches of seasonal rainfall, and soils at the site were likely well-saturated, leading to significant peak flows through the site.

3.1.2 Site Hydrologic Response

3.1.2.1 Streamflow Gaging

Stage and estimated streamflow records for the Boyds Creek upstream station (BCUS) and the San Felipe upstream (SFUS) and downstream (SFDS) stations are presented in **Figure 4** through **Figure 6**.

Streamflow at the Boyds Creek upstream station (BCUS) occurred briefly in response to rainfall on December 13, 2022, after about 9.6 inches of cumulative seasonal rainfall at the Blue Oak Preserve. Streamflow at BCUS again responded for a longer period of time between December 27, 2022, and January 28, 2023. During February streamflow was

intermittent. It is unclear exactly how long surface flows persisted; water level and flow data suggest there was water at or near the surface for most of January, but there is uncertainty with the streamflow record since natural sediment and debris transport processes affect the stage-discharge rating curve. The late-February through March wet period caused an additional series of high flow events on Boyds Creek, however, stage and streamflow peaks during this period were lower than in January.

Seasonal streamflow commenced along San Felipe Creek after about 13 inches of seasonal rainfall, with no measured response to the Dec 13 rain event. Streamflow at the San Felipe Creek upstream station (SFUS) occurred in response to rainfall on December 30, 2022, and continued uninterrupted through May 7, 2023. Unlike Boyds Creek, streamflow in San Felipe Creek receded but persisted during the February 2023 drier period, before responding to the late-February through March wet period.

At the San Felipe Creek downstream station (SFDS), streamflow occurred in response to rainfall on December 27, 2022, and appears to have continued for at least three weeks. Because the channel migrated away from the SFDS gage during this period, and floodplain sediment deposited around the gage, the gage was no longer in the channel thalweg and could not detect low flows.

The annual peak flow on San Felipe Creek was recorded on January 16, 2023, at the upstream station (SFUS) and is estimated to have been 93 cfs. The annual peak flow on Boyds Creek is estimated to have been approximately 163 cfs, and was recorded on December 31, 2022, concurrent with the peak stage at San Felipe Creek, downstream of the confluence (SFDS) (**Figure 4** and **Figure 5**). Calibration data at SFDS are not sufficient to generate streamflow estimates from the record of stage.

Water levels (stage) at San Felipe Creek at the "downstream floodplain" (SFDF), adjacent to created floodplains ID03-03 and ID03-04, are shown in **Figure 7**. The stage data show multiple instances during which the floodplains were inundated over the course of the WY2023 rainy season, which makes sense given that the estimated annual peak flows are between a 2- and 5-year flow on San Felipe Creek and between a 5- and 10-year flow on Boyds Creek (**Table 3**; Gotvald and others, 2012).

3.1.2.2 Groundwater and Surface Water Interactions

Groundwater and surface water levels were measured in the central portion of the project site in the vicinity of San Felipe Creek (**Figures 8a** and **8b**) and Boyds Creek

(**Figure 9a and 9b**). Water level data from Piezometer 16-2 suggest that groundwater levels in the alluvial aquifer underlying the site began rising[5] in response to rainfall and streamflow within San Felipe Creek on December 27, 2022, after approximately 12 inches of cumulative seasonal rainfall. Filling of the gaging pool in San Felipe Creek occurred approximately 10 hours prior to the measured response in Piezometer 16-2. The water level in Piezometer 19-1 began rising on December 28, 2022, approximately 8 hours after a response was detected in Piezometer 16-2.

Boyds Creek alluvial fan

Water level in Piezometer 16-5 began rising on December 28, 2022, shortly after streamflow was detected in Boyds Creek and BCUS and BCDS. Storm peaks generally matched closely between BCDC and Piezometer 16-5. Between storm peaks during January 2023, it appears that Boyds Creek near BCDS is likely "gaining" because the alluvial fan is saturated. During the March 2023 wet period, which was less intense than during January 2023, water levels at BCDS were lower than water levels in Piezometer 16-5 suggesting that the reach was "gaining" during storm and inter-storm periods.

San Felipe Creek, upstream of the confluence with Boyds Creek

Similar to previous years, groundwater and surface water gages (SFUS, Piezometer 16-2 and 19-1) in the vicinity of San Felipe Creek upstream of the confluence with Boyds Creek tends to demonstrate "losing stream" (i.e. groundwater recharge) characteristics initially with the onset of streamflow, which transitions within a few days to a partially "gaining stream" (groundwater discharge to the creek) during and just after periods of regular rainfall, with groundwater discharge dominated by slightly higher groundwater on the west (right) side of the channel at Piezometer 16-2. The early season" losing stream" relationship is indicated by hydraulic gradients between the San Felipe Creek channel (SFUS) and Piezometers 19-1 and 16-2, where water surface elevations in the stream and right (west) bank are slightly higher than that in the valley on the left side of the stream.

Water levels at SFUS and in Piezometer 19-1 were very similar beginning after the steady rains of late December 2022, when the stream appeared to be largely equilibrated with a nearly saturated valley-fill aquifer during peak flow events, then gaining from the adjacent aquifer during inter-storm baseflow recession periods. After the last week of January, hydraulic gradients indicated groundwater flow toward San Felipe Creek to

[5] Piezometers range from 6 to 7 feet depth below ground surface, thus water level changes which occur deeper than 6 to 7 feet are not detected.

be sustained from the west (i.e. from the right bank), with losing stream conditions to the east (left bank) This pattern continued through the middle of February, after which point water levels in San Felipe Creek appear to be higher than water levels in both Piezometer 16-2 and 19-1, indicating the losing stream condition.

This pattern repeats during the second wet period which commenced on February 24, 2023, after about 29 inches of rainfall. The second wet period ended on March 30, 2023, after about 38 inches of seasonal rainfall. Similar to the mid-winter dry period, San Felipe Creek appears to have continued "gaining" flow from the adjacent aquifers for about three weeks after saturating rains.

Lower San Felipe Creek

Groundwater and surface water gages (Piezometer 16-3 and ADWW, respectively) in the vicinity of the restored Agricultural Ditch (ED03) are presented in **Figure 10**. Similar to most prior years[6], groundwater conditions adjacent to the restored Agricultural Ditch appeared to respond after substantial seasonal rainfall (approximately 17 inches during WY2023) and several days after the heavy rains that began on December 26, 2022. Based on the water level data collected at ADWW, it appears that the restored Agricultural Ditch filled completely and spilled into the ID03-05 drainage channel for an extended period of time between January 1, 2023, and April 12, 2023. Ponding at ADWW extended through the summer and at least until September 11, 2023. **Figure 10**).

At Piezometer 16-3, which measures groundwater levels in the vicinity of seasonal wetland SW-02 (just east of ADWW), the groundwater response is nearly the same time and rate as ADWW; we see a response in water levels in Piezometer 16-3 on January 1, 2023, only 8 hours after ADWW. Though less pronounced than in previous, drier years, likely as a result of the large amount of rain that fell during the wet-up period, the slightly delayed response in Piezometer 16-3, and comparatively lower water levels in the agricultural ditch wetland, suggest that upgradient contributions from adjacent hillslopes, and possibly the Boyds Creek alluvial fan contribute to filling the underlying aquifer in the area of SW02 during wet periods. In addition, it appears that the created wetland ponds "hold back" water within the shallow sub-surface at the SW-2 wetland area. We infer that the wetland was likely fully saturated during periods when Piezometer 16-3 water levels were at or near the ground surface. Water levels in

[6]During the previous monitoring year, WY2021, Piezometer 16-3 appeared to respond earlier in the wet season. It is likely that the rapid response to initial wet season rainfall during WY2021 was a result of more intense site irrigation prior to the onset of winter rains.

Piezometer 16-3 were within 1 foot of the ground surface between January 1, 2023, and May 11, 2023, before slowly receding through the summer.

Surface ponding in the seasonal wetland at SW03, (the Corral Trail Seasonal Wetland station, CTSW) was detected between December 30, 2022, and February 18, 2023, and again between February 24 and April 11, 2023 (**Figure 11**). Similar to previous years, ponding only occurred after 14 inches of seasonal rainfall, suggesting that longer duration ponding in the wetland likely occurs only after substantial seasonal rainfall has recharged the underlying alluvial aquifer. Surface ponding in this wetland lasted for approximately 93 days.

3.1.3 Geomorphic Monitoring Results

Balance staff visited the project site on January 10, 2023, January 25, 2023, March 24, 2023, and July 12, 2023, and after the end of the water year on October 3, 2023, to make visual observations of the constructed project elements. Aerial photographs were taken on October 3, 2023, and were stitched together to create an orthorectified mosaic aerial photograph of the entire site (**Appendix B**). Aerial orthomosaic photos for Years 1 through 3 can be seen in the Year 3 monitoring report (Donaldson and others, 2021a). For comparison, as-built drawings can also be seen in Donaldson and others (2021a).

Topographic survey data from Year 0 and Year 5 is shown in **Appendix F** for the following locations:

- A longitudinal comparison along Boyds Creek through ED01-01, including the heads of each distributary channel BCA1-BCA4.
- Cross-section at ID03-02
- Cross-section at ID03-03/ID03-04

Figures 12 and **Figure 13a - Figure 13d** present the DEM of difference and photographs of key areas of interest. It should be noted that differences in vegetation growth between aerial surveys performed in December 2018 and October 2023 show an increase in elevation of over one foot in meadow areas and coyote brush scrub which is not associated with sediment deposition. The areas in blue highlight that much of the site has experienced vegetation growth not associated with deposition.

3.2 Performance Standards

3.2.1 Performance Standard 1: More Than 14 Days of Inundation/Saturation at Seasonal Wetlands in an Average or Above-average Precipitation Year

The MMP defines wetland success as 14 days of inundation/saturation in normal to wet years. WY2023 rainfall was approximately 168 percent of average, following three drier-than-average water years. The abundant rainfall supported on-site wetlands and resulted in the wetland sufficiency criteria being met during WY2023.

Water levels in ED03-02 within the agricultural ditch persisted for at least 8 months (**Figure 10**). Based on observations during site visits, all of the agricultural ditch wetlands held water for more than 14 days.

During the March 24, 2023, site visit, staff observed approximately 2 inches of ponded water in the vicinity of Piezometer 16-3 which is directly adjacent and upslope from wetland SW02. Correlating this to the Piezometer 16-3 water level record, we infer that ponding/soil saturation within six inches of the ground surface occurred within SW02 from at least the beginning of March through the end of the first week of April. It is also highly likely (based on observations under similar conditions from previous years) that ponding/soil saturation within six inches of the ground surface for the entire wet season between January 1, 2023, and the first week of April 2023.

Surface ponding in the seasonal wetland at SW03, (the Corral Trail Seasonal Wetland station, CTSW) lasted for approximately 93 days (**Figure 11**).

On-site wetland areas appear to have met the hydrologic criteria for seasonal wetlands during WY2023.

3.2.2 Performance Standard 2: Inset Floodplains Inundated By 2-Year Event

The 2-year streamflow event magnitude was exceeded during WY2023, and we made direct and indirect observations of inundation on inset floodplains during WY2023. In **Figure 5** it appears that water levels at SFUS inundated the ID03-01floodplain numerous times during January 2023 and again in March 2023, suggesting that the ID03-01 floodplain may have been partially or completely inundated during multiple storm events. Similarly, **Figure 6** shows water levels at SFDS inundated the ID03-02 floodplain during multiple events during January 2023. Photographs presented in **Figure 14** show that streamflow actively inundated portions of the floodplain features at ID03-01a, ID03-02, ID03-03 and ID03-04 on January 10, 2023. **Figure 14** also shows freshly

deposited sediment and organic debris across ID03-02, ID03-03 and ID03-04, from which we infer inundation.

3.2.3 Performance Standard 3: Streamflow in Two or More Boyds Creek Channels During Winter Season

Performance Standard 3 (**Table 1**) states that streamflow from Boyds Creek should occupy at least two of the existing or created channels (located at area ED01-01) across the Boyds Creek alluvial fan during the monitoring year. WY2023 was a very wet year and all of the Boyds Creek distributary channels (BCDS, BCA1, BCA2, BCA3 and BCA4) received streamflow from Boyds Creek during WY2023. **Figure 15** shows streamflow in all of the distributary channels as observed on January 10, 2023. Success Criterion 3 was met during WY2023. Recorded water level data from gages in the distributary channels are not presented here because we made direct observations of streamflow into the distributary channels.

It should be noted that at least two 2 additional log pieces that were originally installed as living log jams were dislocated during WY2023. Field observations suggest logs from Living Log Jam G have moved (Refer to map of living log jams in **Appendix C**); this is in addition to logs that have been dislodged from living log jams A, J-1 and J-2 in previous monitoring years. It appears that the dislocated logs were moved downstream during high-flow events but remain on Boyds Creek. Based on surveys conducted during Year 5, it appears that the streamflow required to activate distributary channels BCA1 through BCA4 has increased since installation from the design target of 0.75 feet to 0.8 to 1.9 feet. We recommend developing adaptive management measures to reduce this channel bed elevation difference and encouraging more frequent inundation of the Boyds Creek distributary channels at lower flows.

3.2.4 Performance Standard 4: Less Than One Foot of Elevation Loss in Stream Channels, Averaged Over the reach[7] and Absence of a Significant Knick Point

Because 2-year flows were exceeded, and field observations suggested geomorphic change had occurred, we collected supplemental topographic data during 2023 to evaluate Success Criterion 4 during WY2023.

[7] Reaches are shown in the project impairment map (**Appendix A**). For Boyds Creek, we take reach to be defined as the length of Boyds Creek within the project boundary.

3.2.4.1 ED01-01 – Boyds Creek Alluvial Fan

In WY2023, two logs from two separate living log jams moved downstream. Logs placed as part of the living log jams were intentionally not anchored so that active channel dynamics and migration could occur. Therefore, movement of logs was anticipated. In many cases, we observed localized scour and deposition within 1 to 10 feet of the placed logs, with bed aggradation upstream, and scouring of pools downstream of logs (**Figure F1, Appendix F**). All of the living log jams installed on the abandoned branch of Boyds Creek (BCA4), are stable and remain largely buried. It appears that scour has occurred at the historic knickpoint on BCA4 between Year 0 and Year 5, but incision has not migrated upstream to intercept the buried grade control log. Though localized scour and deposition greater than one foot occurred locally, no net degradation or lowering of the streambed was observed across the reach. This is consistent with the expected response described in the MMP; the living log jams are functioning as intended.

The DEM of difference does show natural geomorphic processes taking place; on the lower reaches of Boyds Creek, for example (**Figure 13c**), we see erosion on the outside of the channel bend and deposition on the inside of the channel bend.

Based on a collaborative review at the end of WY2020, the Project Team decided to replace one log in an effort to protect three oak plantings (**Figure 16**). This adaptive management measure was executed on November 4, 2020, and is presented in the adaptive management as-built memorandum (Donaldson and others, 2021b). Though some minor erosion has occurred around the log, the log has not moved since being installed, and planted oaks continue to grow. We will continue to monitor placed logs and make adaptive management recommendations if floodplain inundation or bed elevation performance standards are not met, or if vegetative survivorship performance standards are threatened.

3.2.4.2 Graded Swale (ID03-01a)

This swale allows overland stormflows from the Corral Trail drainage lenses and the Boyds Creek alluvial fan to return to San Felipe Creek without causing excess erosion. Hydrologic conditions were sufficiently wet to generate runoff through the ID01-01a swale; no erosion was noted at the graded swale (**Figure 13a**), and the feature appears to be functioning as intended.

3.2.4.3 San Felipe Creek Graded Floodplain ID03-01

Very little erosion or deposition was noted on or adjacent to the graded floodplain feature (**Figure 13a**). A small amount of bank erosion occurred between Year 0 and Year 5 on the channel bank where return flows formed a small channel approximately 10 feet long and one foot wide. The erosion was noted in the Year 1 monitoring report and does not appear to compromise the function of the floodplain. **Figure 13a** shows erosion within San Felipe Creek near the middle of the graded floodplain feature; the erosion is limited to a short reach and does not present a concern in terms of reducing floodplain inundation frequency or duration at this time. **Figure 13a** shows some apparent increase in elevation along the graded floodplain feature. The increase in measured floodplain elevation is likely due to grasses becoming well-established on the floodplain, but it is possible a portion of the elevation increase is attributable to deposition of sediment and debris on the floodplain. The channel and floodplain morphology are within the expected range of outcomes and the channel through this reach is meeting Success Criterion 4.

3.2.4.4 "Reference Reach"

During the design phase, the design team referred to the reach between the Boyds Creek-San Felipe Creek confluence downstream to ID-03-02 (**Figure 13c**) as the reference reach because the reach displayed geomorphic indicators of a dynamic channel-floodplain system with a floodplain that was regularly inundated. We note that the DEM of difference indicates ongoing channel dynamism occurred between Year 0 and Year 5. We note many areas where greater than one foot of erosion or deposition has taken place; we note in **Figure 13c** that in the middle of the "reference reach" the channel has migrated north (hot colors) and deposited a new channel bar (cool colors). This reach is similar to the geomorphic change that has occurred along the ID03-02, ID03-03 and ID03-04 reaches.

3.2.4.5 San Felipe Creek Graded Floodplains ID03-02, ID03-03, and ID03-04

At these locations, the designed floodplain was reconfigured by high flows during WY2019, which inundated and flowed across the created floodplain features with enough velocity to form new channels. At these locations, however, much of the former channel experienced deposition, thereby balancing the sediment production from this area, with minimal net change in channel bed elevation. Other portions of the abandoned channel features formed backwater pools/channels at low flows.

Year 1 topographic data (Donaldson and others, 2020) indicated that some areas of the ID03-02 floodplain along San Felipe Creek experienced over 1 foot of incision where the new cutoff channel formed through the created floodplain during the first year after construction. The new channel thalweg elevation was within 1 foot of the former channel elevation, suggesting limited or no vertical instability. Thus, we interpreted that Success Criterion 4 was being met at this location.

In order to reduce the potential for downcutting along the created (and steeper) new primary channel, adaptive management activities were initiated during WY2021 and consisted of installing a bioengineered debris jam during WY2021 in the inlet of the new channel to encourage increase sinuosity, reduce channel slope, and encourage streamflow to spread across the created floodplain area. This work was completed on August 26, 2021, and is shown in **Figure 17** and the adaptive management as-built memorandum (Donaldson and others, 2021b). Following high flows of WY2023, the new channel thalweg has migrated, with sediment deposition filling the inside of the channel bend, scour and migration occurring along the outside of the channel bend, and periodic inundation of the original (now a secondary high-flow) channel. These observations suggest that the new channel is laterally dynamic, with limited vertical instability, and Success Criterion 4 continues to be met at Floodplain ID03-02.

Based on **Figure F2, Appendix F** we see that the floodplain feature has been largely aggradational since construction.

Similar to ID03-02, the constructed floodplains at ID03-03 and ID03-04 were inundated and modified by WY2023 high flows, but channel avulsion did not occur at these locations. Rather, a set of shallow channels and backwater features developed (**Figure F3, Appendix F).** We note that the ID03-03 and ID03-04 constructed floodplain areas have been primarily aggradational between Year 0 and Year 5, with the exception of cutbank erosion on the right bank near ID03-03, which has eroded (**Figure F3, Appendix F and Figure 13d**). The observed dynamism of the channel is within the expected outcomes for the design and the site is functioning as expected, with less than 1 foot of vertical elevation change over the reach and active channel dynamics within the inset and widened floodplain corridors. Success Criterion 4 is being met at ID03-03 and ID03-04.

3.2.4.6 Created Channel ID03-05

During WY2019, we observed 1 to 3 feet of erosion at the confluence of ID03-05 and San Felipe Creek, which appears to have resulted from the focusing of scour on the left bank of San Felipe Creek during high flows at the outside of the bend, exacerbated by the downstream site boundary exclusion fence which crosses San Felipe Creek at this location. The fence was improved following WY2019. During the high flows of WY2023, minor additional erosion was noted at the bank along the fence. The downstream-most buried log step structure along ID03-05 experienced some erosion along the downstream side of the step due to streamflow in San Felipe Creek, not streamflow emanating from the agricultural ditch wetland. The erosion appears to have only uncovered the top-most log, and the majority of the structure remains buried, stable, and intact. Thus, the channel morphology is within the expected range of outcomes and is meeting Success Criterion 4 at this location.

3.2.5 Performance Standards 5 and 6: Corral Trail and Lower Hotel Arizona Crossing Stability (R-01)

During end-of-year site visit observations, no deleterious erosion or deposition was observed in or around the drainage lenses and Corral Trail (**Figure 18**). The PVC pipes in the drainage were not clogged and water was observed flowing through multiple pipes during the winter. There was no evidence (e.g., high-water marks) that the Corral Trail overtopped during WY2023. The articulated mat Arizona Crossing constructed on the Lower Hotel Trail is performing as designed and no deleterious erosion or deposition was noted (**Figure 18**). Performance standards 5 and 6 are being met.

3.2.6 Performance Standard 7: Staked Debris Jams at ID02-01 Intact and Capturing Sediment

Staked debris jams were installed in the Incised Tributary (ID02-01), including four standard staked debris jams and two hand-built staked debris jams utilizing slash and cobbles. Based on direct observations and **Figure 13d** the staked debris jams appeared to both retain and release sediment between Year 0 and Year 5. In the same timeframe the channel appears to have widened (**Figure 13d**). These processes are to be expected. During WY2023, following winter high flows we observed that all but one of the staked debris jams are functioning as intended, serving to capture episodic sediment delivered during high flows and meter sediment out during intermediate flows (**Figure 19**). Erosion occurred at the downstream-most staked debris jam (Debris Jam 6, **Figure 19**) during WY2023. Debris wracked on the fence, which caused streamflow to erode the banks adjacent to the staked debris jam on both the right and left sides and

create scour holes just downstream of the staked debris jam. When observed shortly after the end of the wet season, the scour hole on the right bank was substantially larger than the scour hole on the left bank, and we estimate approximately 3-4 cubic yards of soil was washed away. This finding was shared with the SCVHA, which completed adaptive management measures on November 6, 2023. The adaptive management will be documented in the Year-6 (WY 2024) report.

Previously, we recommended adding a second course of staked debris jams, as outlined in the MMP. At this point, all jams are considered to be "full", having trapped sediment and debris, with vegetation becoming more mature along and within the channel. Additional aggradation could be promoted with additional structures and would benefit the system with continued progress toward a long-term goal of reversing incision in this channel. Planning is currently underway to design and install the additional staked debris jams.

4. CONCLUSIONS AND MANAGEMENT RECOMMENDATIONS

From a hydrologic and geomorphic perspective, the San Felipe Creek Restoration Project is performing as intended. In WY2022 the Project is meeting all the hydrologic and geomorphic performance standards described in the MMP.

Based on Year 1 through Year 5 observations, we note the following:

- Streamflow from Boyds Creek and San Felipe Creek appear to have been the primary sources of groundwater recharge to the alluvial aquifer at the confluence of the Boyds Creek alluvial fan and San Felipe Creek. Shallow groundwater entering the alluvial aquifer from the west side of the valley also appears to contribute to recharge.

- Year 1 through 5 monitoring data suggested the restoration project increases the rate of groundwater recharge and the volume of storage. Pre-project data collected during WY2017 suggests about 15 inches of rainfall was required for aquifer saturation. During WY2023, a year with very similar rainfall timing and magnitude as WY2017, the aquifer appeared to be nearly full after significantly less cumulative seasonal rainfall. For example, during WY2023 in the vicinity of Piezometer 16-2, saturation appears to have occurred after approximately 10 inches of rainfall.

- Water persisted in the vicinity of Piezometer 16-3 for a similar length of time in 2017 and 2023, suggesting that ponding within the ED03 ponds is supporting wetland characteristics directly adjacent to the ponds, but not likely substantially increasing the duration of saturated soils in portions of SW02 that are more distal from ED03. This is supported by observations of coyote brush die-off (coyote brush was expanding in the area of ED03 prior to project implementation) directly adjacent to ED03 following implementation which we attribute to a more persistently high water table.

- Estimated annual peak flows were likely between a 2- and 10-year recurrence interval, and we observed that all hydrologic performance standards were met.

- The Corral Trail and Lower Hotel Trail Arizona crossing are performing as intended, dispersing flows across the alluvial fan, with no road erosion or flow capture.

- Flows circumvented the downstream-most staked debris jam 6 located in ID02-01 during WY2023. Repairs were performed on November 6, 2023, and will be summarized in next year's monitoring report.

- As outlined in the MMP as part of the ongoing stewardship of the Project site, installation of a second course of staked debris jams was planned, once the first course had stabilized with aggraded with sediment. Planning is underway and we anticipate the second course will be installed during the summer of 2024. Continued aggradation will benefit the channel by reversing the incision that has taken place in this tributary.

- At this time, we recommend developing adaptive management strategies to reduce the flow requirements and increase the frequency of activation of Boyds Creek distributary channels.

This monitoring program is scheduled to continue through Year 10, and monitoring will continue with respect to the performance standards, with additional attention on the processes affecting the above areas of interest.

5. LIMITATIONS

Data and conclusions presented in this report are based on available observations and measurements. If other additional data should become available, or if we find that observations, measurements, or calculations were in error, we reserve the right to correct and update the data based on new information. Many sources of uncertainty can influence the data, such as transient physical changes to the monitoring location. Balance Hydrologics has prepared this report for the client's exclusive use on this project. Use of this data by others and for other purposes without the written consent of Balance Hydrologics, Inc. is not permitted and could lead to significant error and/or environmental damage.

6. REFERENCES

Donaldson, E., Hardy, J., Shaw D., 2021a. Year 3 Geomorphic and Hydrologic Monitoring, San Felipe Restoration Project, Joseph D. Grant Park, Santa Clara County, California. 19 p. + tables, figures, and appendices.

Donaldson, E., Shaw D., Hardy, J., 2021b. San Felipe Restoration Project 2020-2021 adaptive management as-built memo: Balance Hydrologics consulting report prepared for Dudek, 2 p. + attachments.

Donaldson, E., Shaw, D., and Senter, A., 2017. Conceptual Design and Feasibility Study, San Felipe Creek, Santa Clara County, California. Prepared by Balance Hydrologics, Inc., Dudek, Inc., and Habitat Restoration Sciences, Inc for the Santa Clara Valley Habitat Agency. 72 p. + plates and appendices.

England, J.F., Jr., Cohn, T.A., Faber, B.A., Stedinger, J.R., Thomas, W.O., Jr., Veilleux, A.G., Kiang, J.E., and Mason, R.R., Jr., 2018. Guidelines for determining flood flow frequency--Bulletin 17C: U.S. Geological Survey Techniques and Methods, book 4, chap. B5, 148. https://doi.org/10.3133/tm4B5.

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Monarres, L., Burris, L., Zanzi, J., and Wickens, D., 2018, San Felipe Creek Restoration Project Mitigation and Monitoring Plan. Prepared for the Santa Clara Valley Habitat Agency. June 2018 version. 94 p. + figures and appendices.

Schaaf and Wheeler, 2007. Santa Clara County Drainage Manual. Prepared for Santa Clara County, 66 p. + appendices.

TABLES

Table 1. San Felipe Creek Restoration Project Performance Standards and Associated Monitoring Approaches, Santa Clara County, California

Crit. #	MMP Section	Area	Performance Standards	Monitoring Approach
			Hydrologic Performance Standards	
1	12.2 (Table 15)	Wetland rehabilitation and enhancement areas	14 days of ponding of saturated soils in an average or above-average rainfall year	Surface water and shallow groundwater gaging in and adjacent to wetland features
2	12.3 (Table 16)	Inset floodplains on San Felipe Creek	Inset floodplain inundation if peak flows exceed a 2-year event	Surface water gaging and post-storm observations of high-water marks
3	12.3 (Table 16)	Boyds Creek alluvial fan	Flow in 2 or more channels during each winter season	Water level and estimated flow gages in break-out channels, and post-storm observations of high-water marks
			Geomorphic Performance Standards	
4	12.3 (Table 16)	Boyds and San Felipe Creeks	Less than 1 foot of channel bed elevation loss	End-of-water year topographic surveys following years when the 2-year flow is exceeded. No fewer than 3 topographic surveys will occur over the 10-year monitoring surveys
5	12.3 (Table 16)	Corral Trail drainage lenses	During- and post-storm: If Corral Trail is/was overtopped, positive flow off of road maintained with no significant erosion of road or fill prism. Dry season: pipes are not plugged	Visual inspection during and after wet-season
6	12.3 (Table 16)	Lower Hotel Trail Arizona crossing	Articulated mat is stable and no significant knickpoints have formed	Visual inspection during and after wet-season
7	12.3 (Table 16)	Staked debris jams	Staked material is intact and in such a condition to capture sediment and organic material transported by creek	Visual inspection during and after wet-season

Table 2. Hydrologic Monitoring Stations and Descriptions, San Felipe Creek Restoration Project, Santa Clara County, California

Station Name	Gage type	Station Description
Seasonal wetland water level gages and piezometers		
Piezometer 16-2	Piezometer	Formerly Piezometer A, west of San Felipe Creek near station SFUS (adjacent to project area ID03-01)
Piezometer 19-1	Piezometer	East of San Felipe Creek near station SFUS (adjacent to project area ID03-01)
Piezometer 16-5	Piezometer	Formerly Piezometer C, north of Boyds Creek near station BCDS
Piezometer 16-3	Piezometer	Formerly Piezometer E, east side of SW04 (Agricultural Ditch Wetland) (adjacent to project area ED03)
ADWW	Seasonal wetland water level	In ED03-02 (relocated during WY2021)
CTSW	Seasonal wetland water level	Southeast side of SW03, Corral Trail seasonal wetland (north of Corral Trail)
Stream water level and flow gages		
BCUS	Water level and estimated flow	Boyds Creek upstream of project site
SFUS	Water level and estimated flow	San Felipe near upstream end of site (adjacent to project area ID03-01)
SFDS	Water level and estimated flow	San Felipe Creek upstream of project area ID03-02, SFDS was moved upstream on 3/18/19 after the original location was cutoff from flow
BCDS	Water level	Boyds Creek near the confluence with San Felipe Creek
BCA1	Water level	Boyds Creek distributary channels (in project area ED01-01)
BCA2	Water level	Boyds Creek distributary channels (in project area ED01-01)
BCA3	Water level	Boyds Creek distributary channels (in project area ED01-01)
BCA4	Water level	Boyds Creek distributary channels (in project area ED01-01)
ADDC	Water level	Water level gage in SW04 (Agricultural Ditch Wetland) drainage channel (in project area ID03-05)
Rainfall		
U.C. Berkeley Blue Oak Rainfall gage (Data courtesy of U.C. Berkeley)		

Table 3. Estimated peak flow recurrence on San Felipe and Boyds Creek, San Felipe Creek Restoration Project, Santa Clara County, California

USGS Regional Regression Equations, Discharge Estimates

USGS Regional Regression equations for
Central Coast (Region 4) and North Coast (Region 1) of California
(Gotvald et al., 2012)

	(SFUS) San Felipe upstream of Boyds Creek	*(BCUS) Boyds Creek*	*(ED03) Incising Agricultural Channel*	*(ID02-01) Incising Southern Tributary*	*San Felipe- downstream Project boundary*
A = Drainage Area (mi^2)	3.1	2.6	0.07	0.08	5.8
P = Mean Annual Precipitation (in/yr)	24	24	24	24	24
	cfs	*cfs*	*cfs*	*cfs*	*cfs*
Central Coast (Region 4)					
$Q_2 = 0.00459A^{0.856}P^{2.58}$	44	37	2	2	75
$Q_5 = 0.0984A^{0.852}P^{1.97}$	135	114	5	6	231
$Q_{10} = 0.460A^{0.846}P^{1.66}$	234	199	9	11	398
$Q_{25} = 2.13A^{0.842}P^{1.34}$	391	332	16	18	662
$Q_{50} = 5.32A^{0.840}P^{1.15}$	532	452	21	25	901
$Q_{100} = 11.0A^{0.84}P^{0.994}$	670	569	27	31	1,135
North Coast (Region 1)					
$Q_2 = 1.82A^{0.904}P^{0.983}$	115	97	4	4	203
$Q_5 = 8.11A^{0.887}P^{0.772}$	257	217	9	10	449
$Q_{10} = 14.8A^{0.88}P^{0.696}$	366	308	13	15	636
$Q_{25} = 26.0A^{0.874}P^{0.628}$	512	432	18	21	884
$Q_{50} = 36.3A^{0.870}P^{0.589}$	632	533	23	26	1,090
$Q_{100} = 48.5A^{0.866}P^{0.556}$	756	639	27	32	1,302
Q_2 average	**80**	**67**	**3**	**3**	**139**

FIGURES

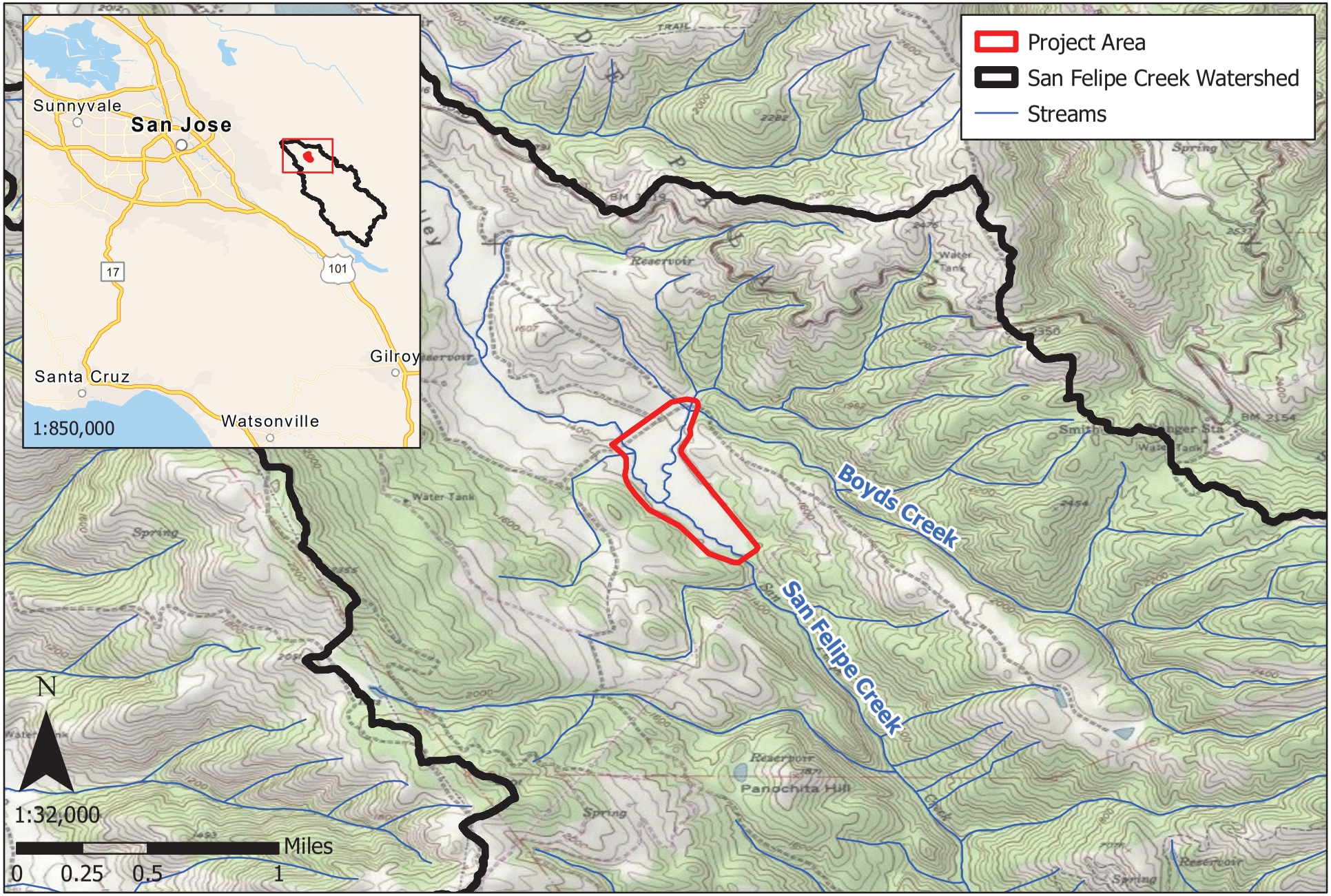

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Figure 1. Location Map, San Felipe Creek Restoration Project, Joseph D. Grant County Park, Santa Clara County, California

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Source: ESRI 2021, Balance Hydrologics 2021

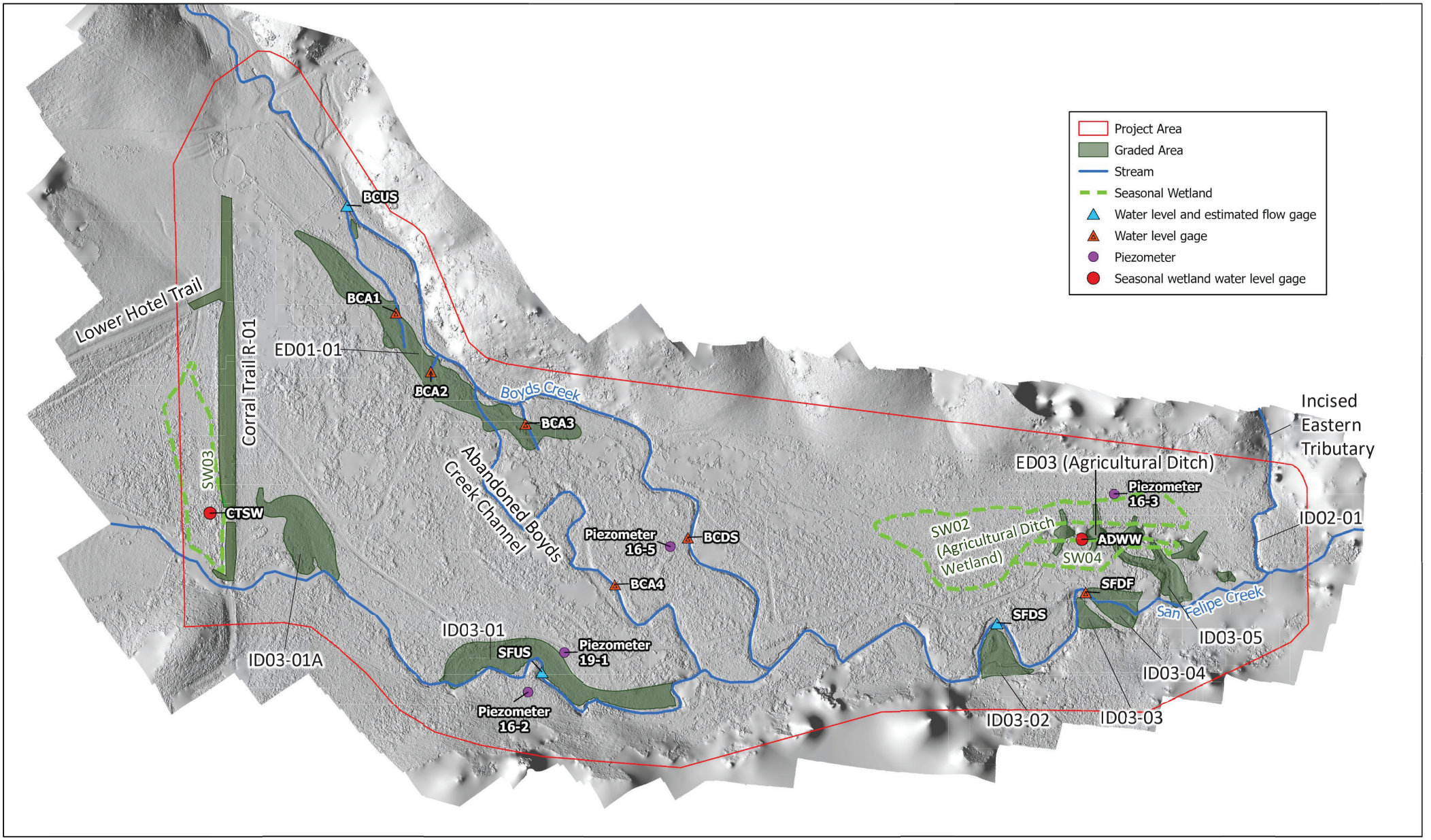

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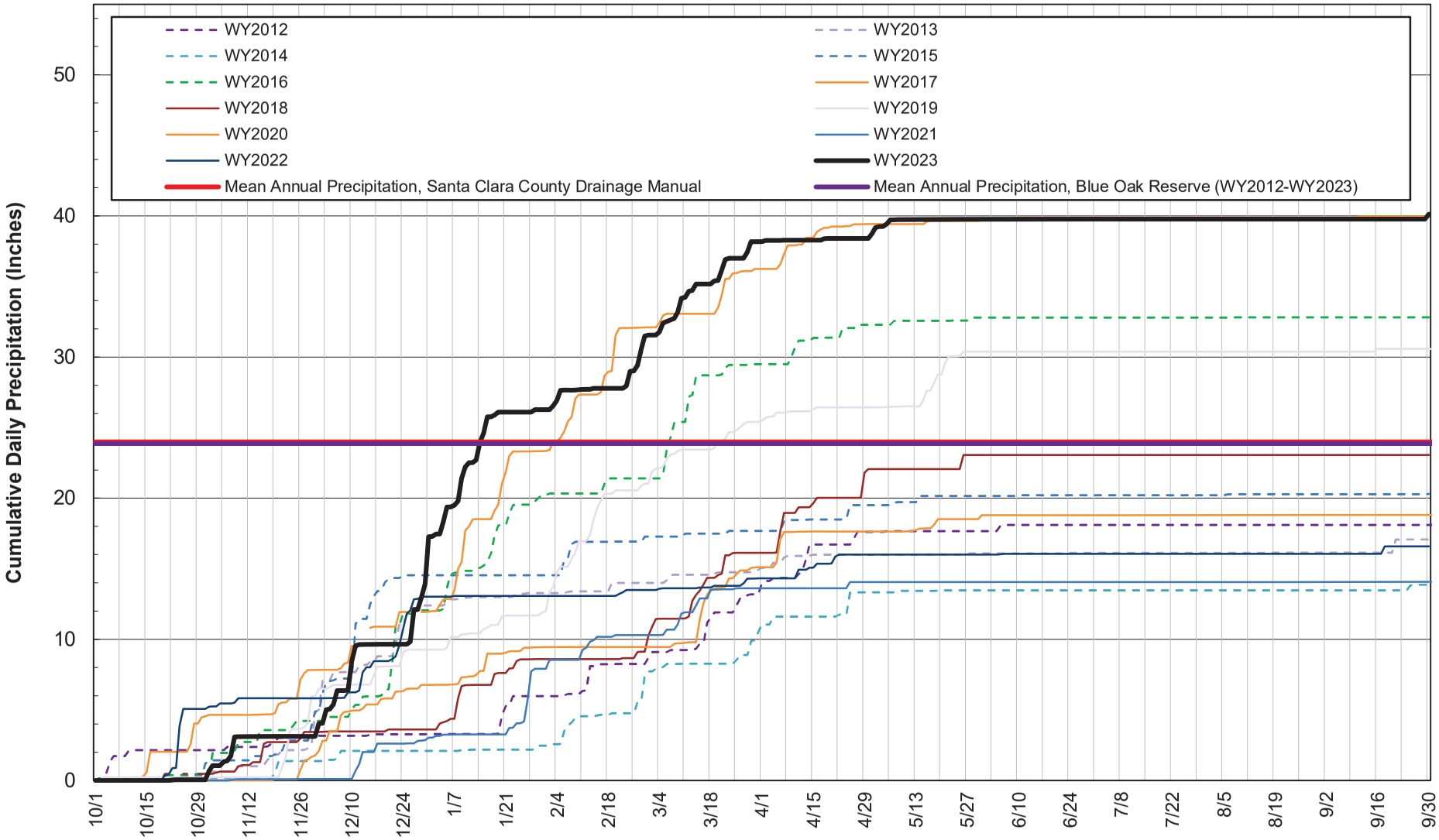
Figure 2. Monitoring station locations, San Felipe Creek Restoration Project, Joseph D. Grant Park, Santa Clara County, California



Data Source: Blue Oak Reserve Rain Gage, data are preliminary

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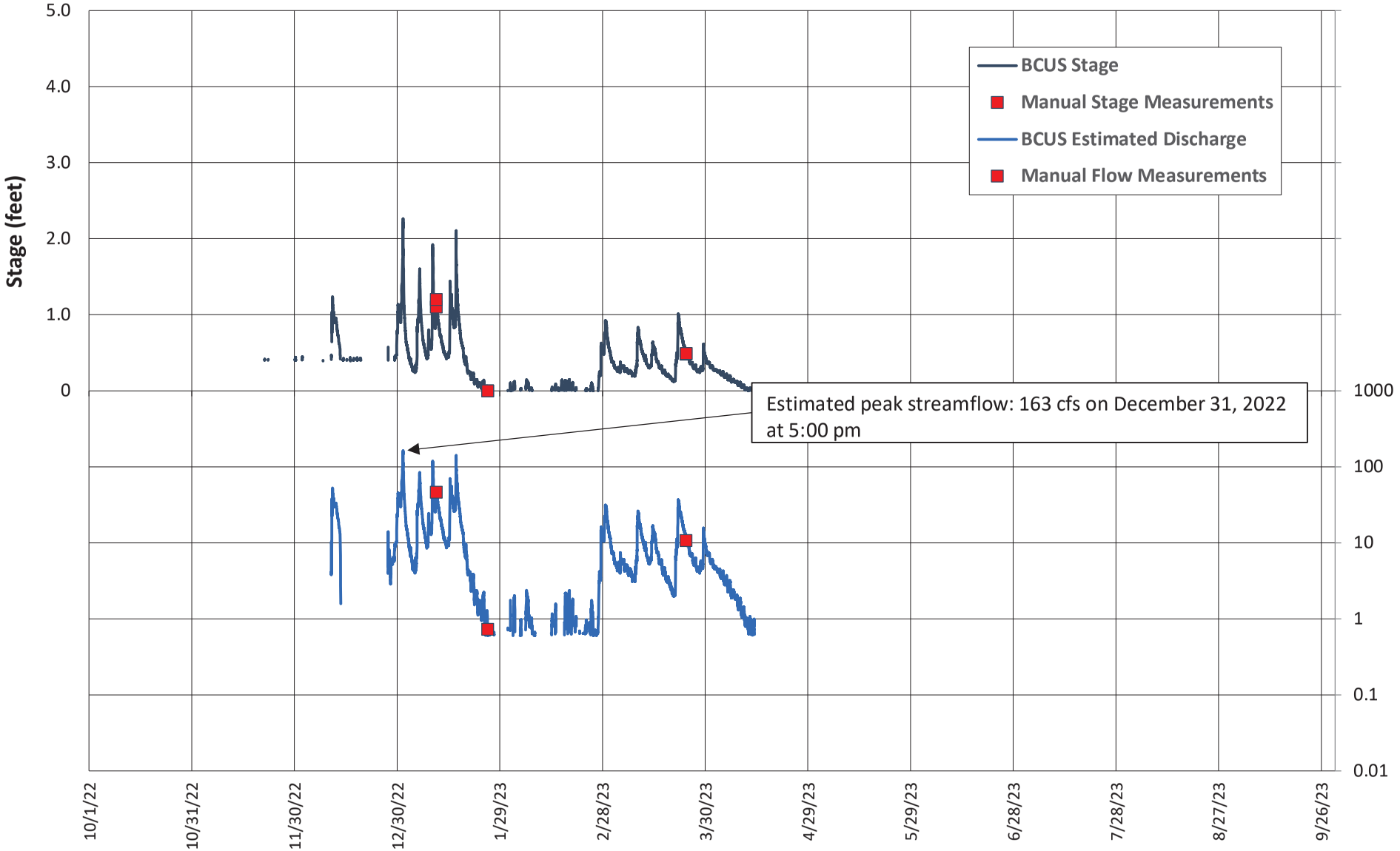
222108 WY23 Rainfall Figure Blue Oak

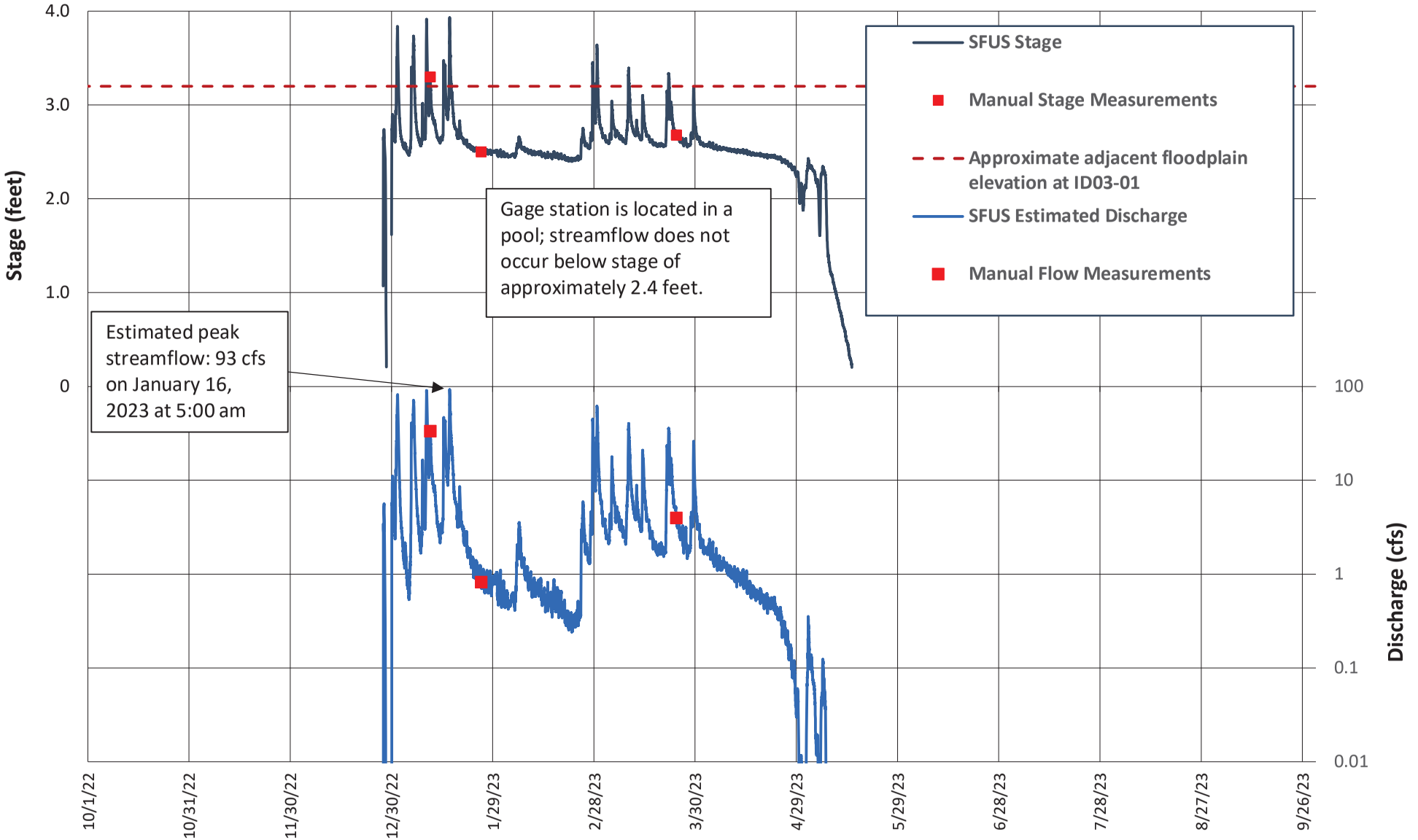
Figure 3. Cumulative daily precipitation, Blue Oak Reserve (UCBO), San Jose, California, water years 2012 - 2023. Total annual rainfall in WY2023 was well above the long-term mean annual precipitation (approximately 24 inches per Santa Clara County Drainage Manual), and the 12-year average at the Blue Oak Reserve (23.9 inches). Since construction (WY2019-WY2023), mean annual preciptation has been 24 inches, similar with the long-term mean annual precipation.



Balance Hydrologics

WY23 All Figures.xlsx

Figure 4. Stage and estimated streamflow at the Boyds Creek upstream station (BCUS), water year 2023, San Felipe Creek Restoration Project, Santa Clara County, California. The streamflow record is estimated based on limited calibration measurements.



Balance Hydrologics

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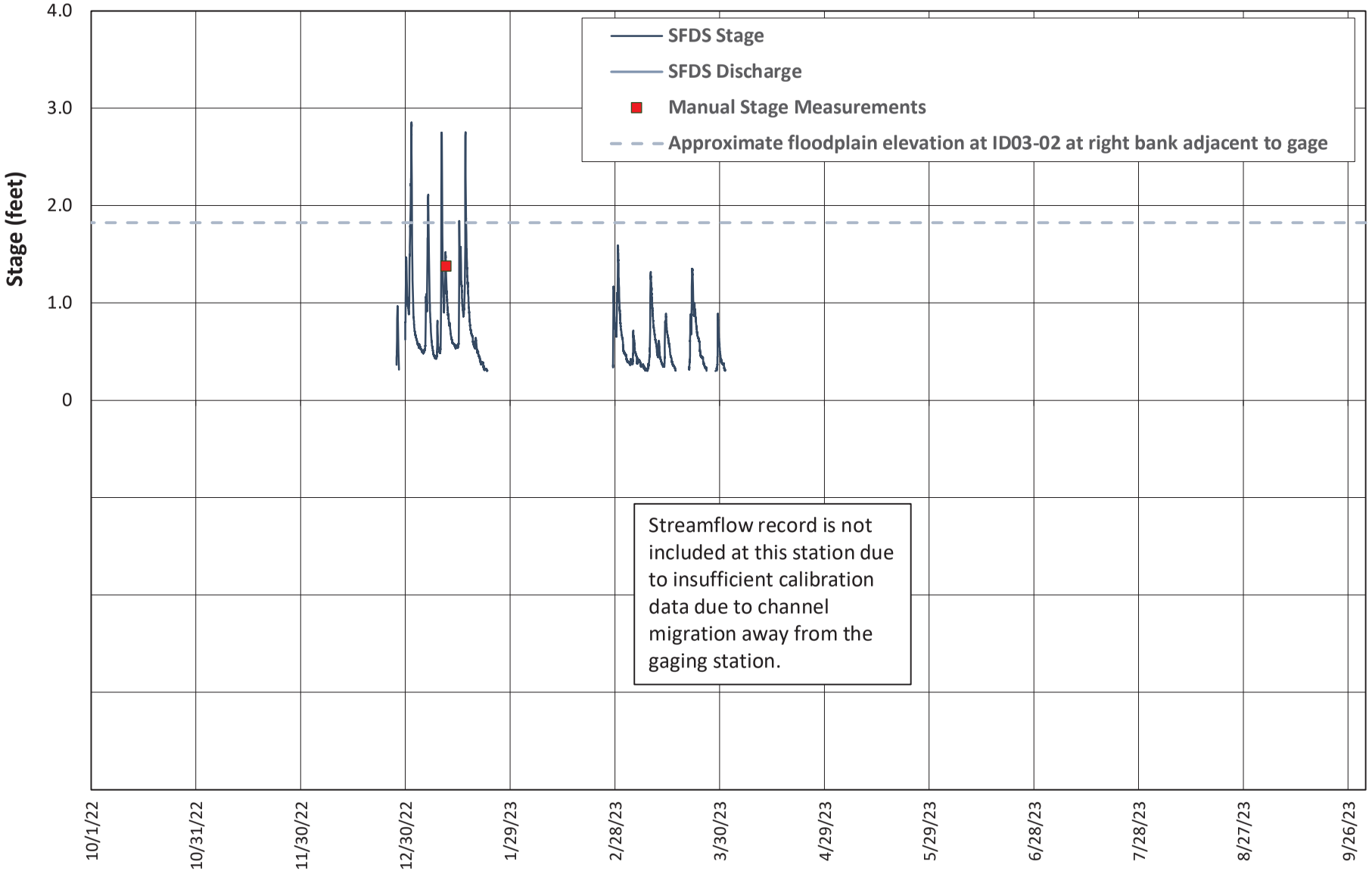
Figure 5. Stage and estimated streamflow at the San Felipe Creek upstream station (SFUS), adjacent to floodplain area ID03-01, water year 2023, San Felipe Creek Restoration Project, Santa Clara County, California. The streamflow record is estimated based on limited calibration measurements.



Balance Hydrologics

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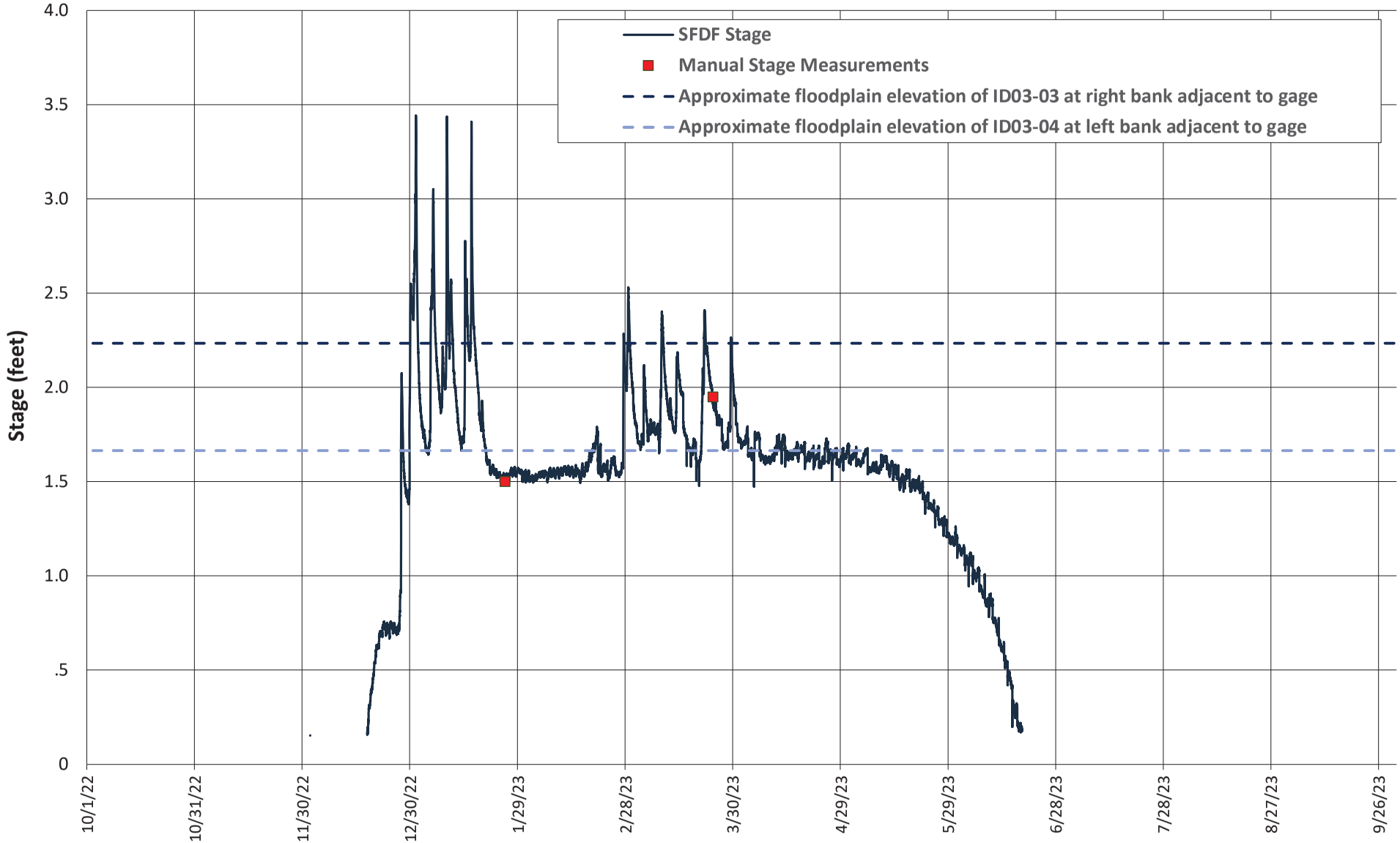
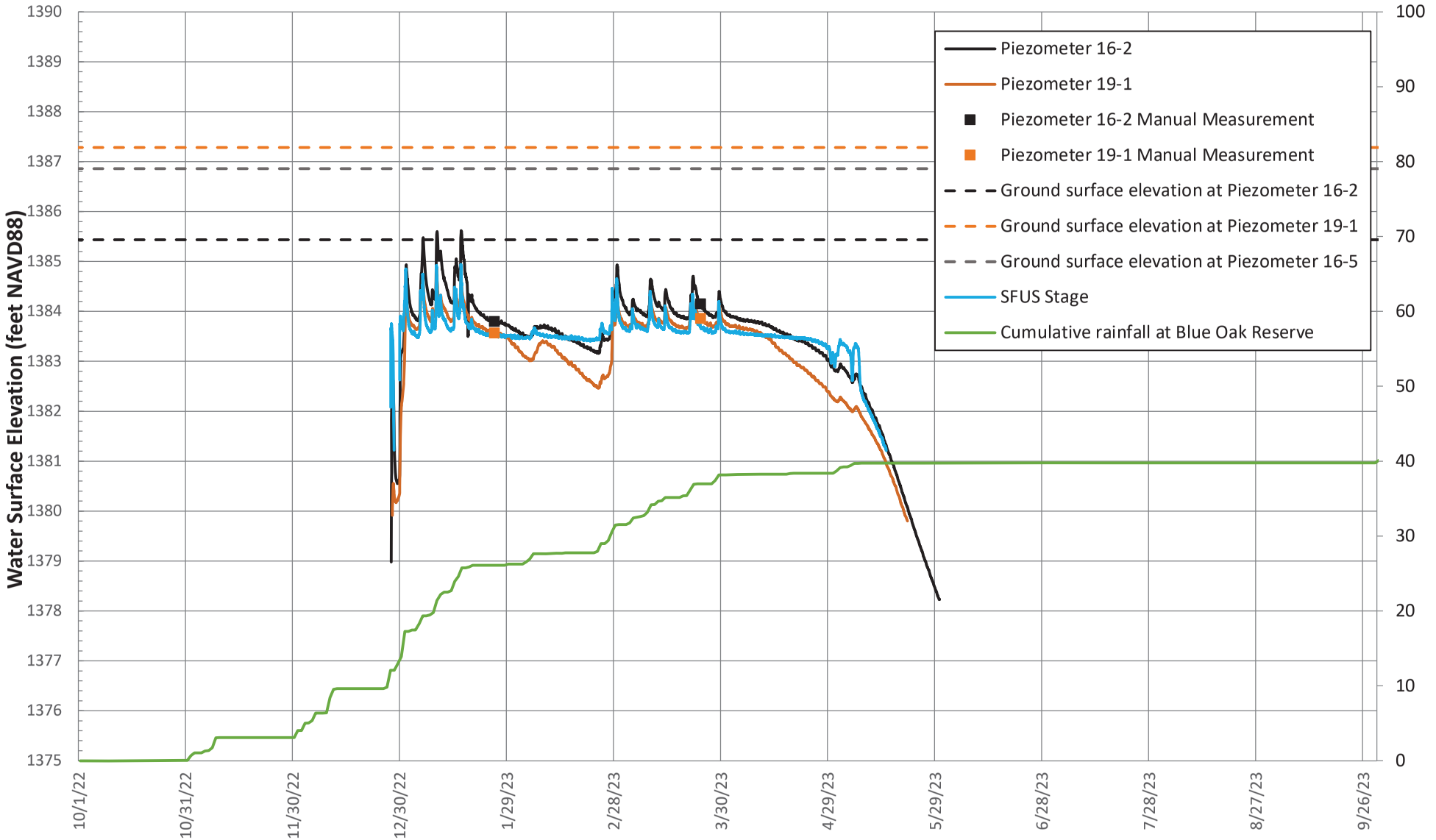
Figure 6. Stage at the San Felipe Creek downstream station (SFDS), water year 2023, San Felipe Creek Restoration Project, Santa Clara County, California. On December 10, 2021, SFDS was relocated to the northeast apex of the channel bend at ID03-02. During January, 2023 storms, the channel migrated away from the gage location. The gage was moved to a new location in October, 2023.



Balance Hydrologics

WY23 All Figures.xlsx

Figure 7. Stage at the San Felipe Creek downstream floodplains station (SFDF), water year 2023, San Felipe Creek Restoration Project, Santa Clara County, California. On December 10, 2021, SFDF was installed between ID03-03 and ID03-04 to evaluate timing and duration of floodplain inundation at ID03-03 and ID03-04.



Balance Hydrologics

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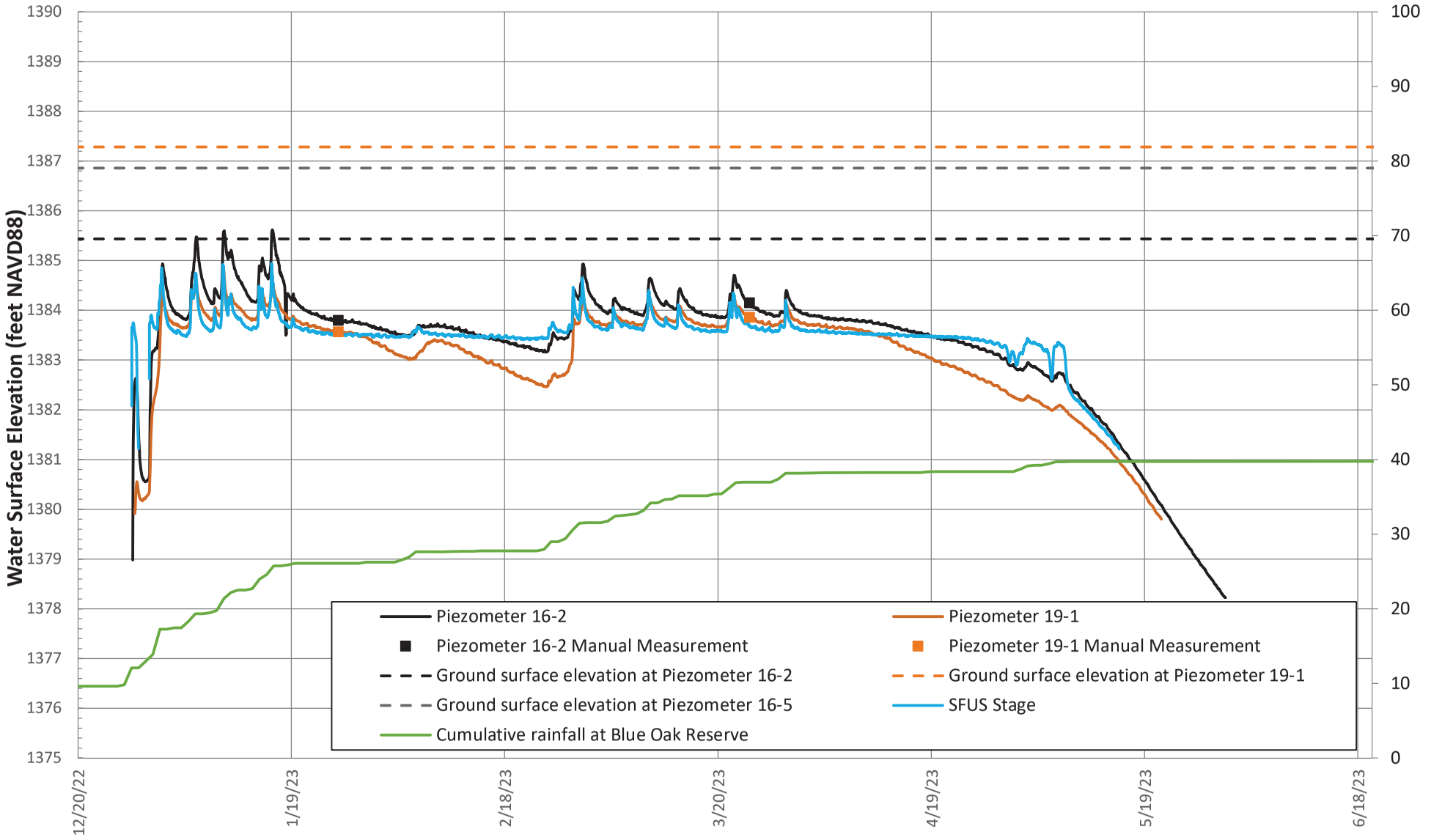
Figure 8a. **Shallow groundwater levels at Piezometers 16-2 and 19-1, and surface water level in San Felipe Creek (SFUS) for WY2023. San Felipe Creek Restoration Project, Santa Clara County, California.**



Balance Hydrologics

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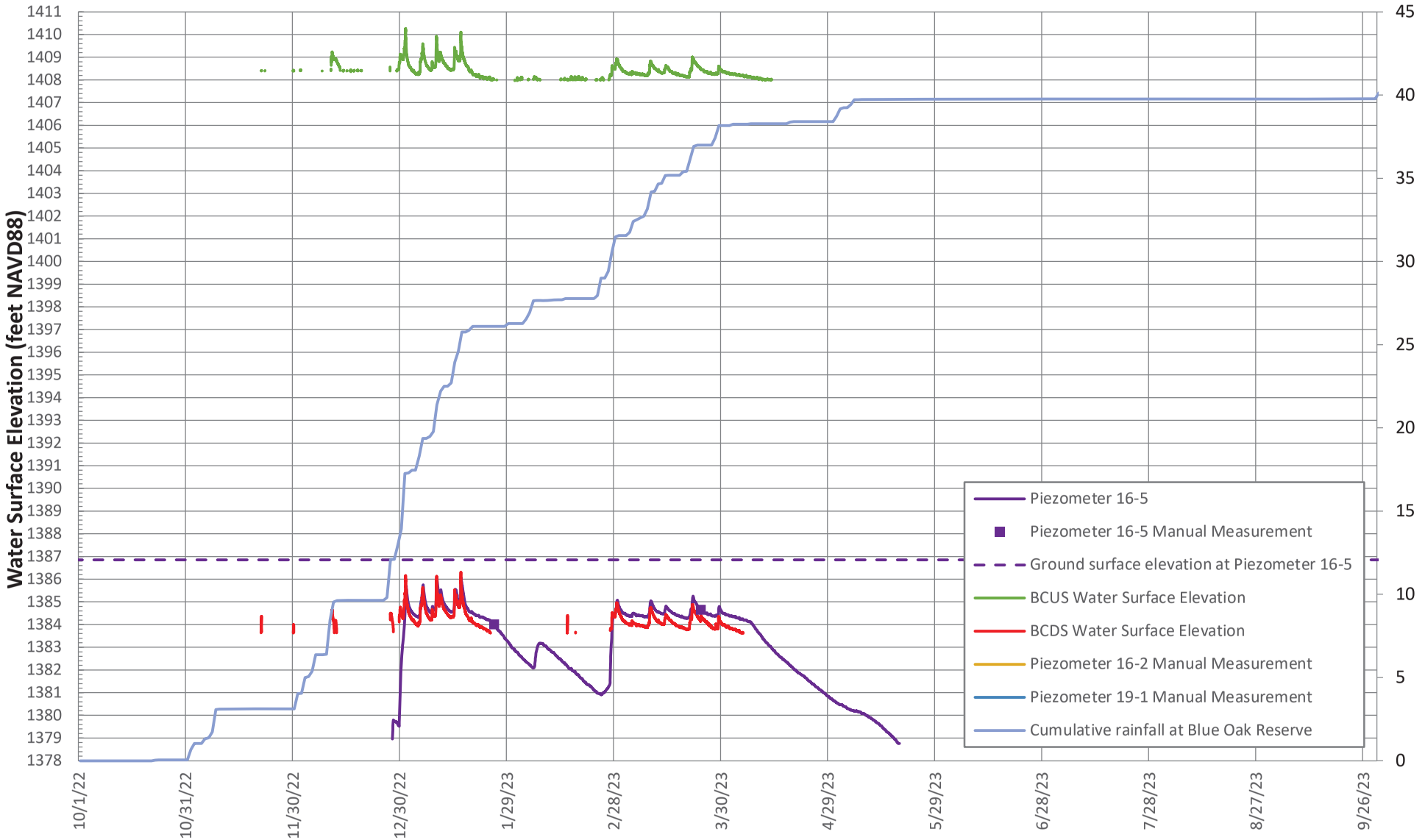
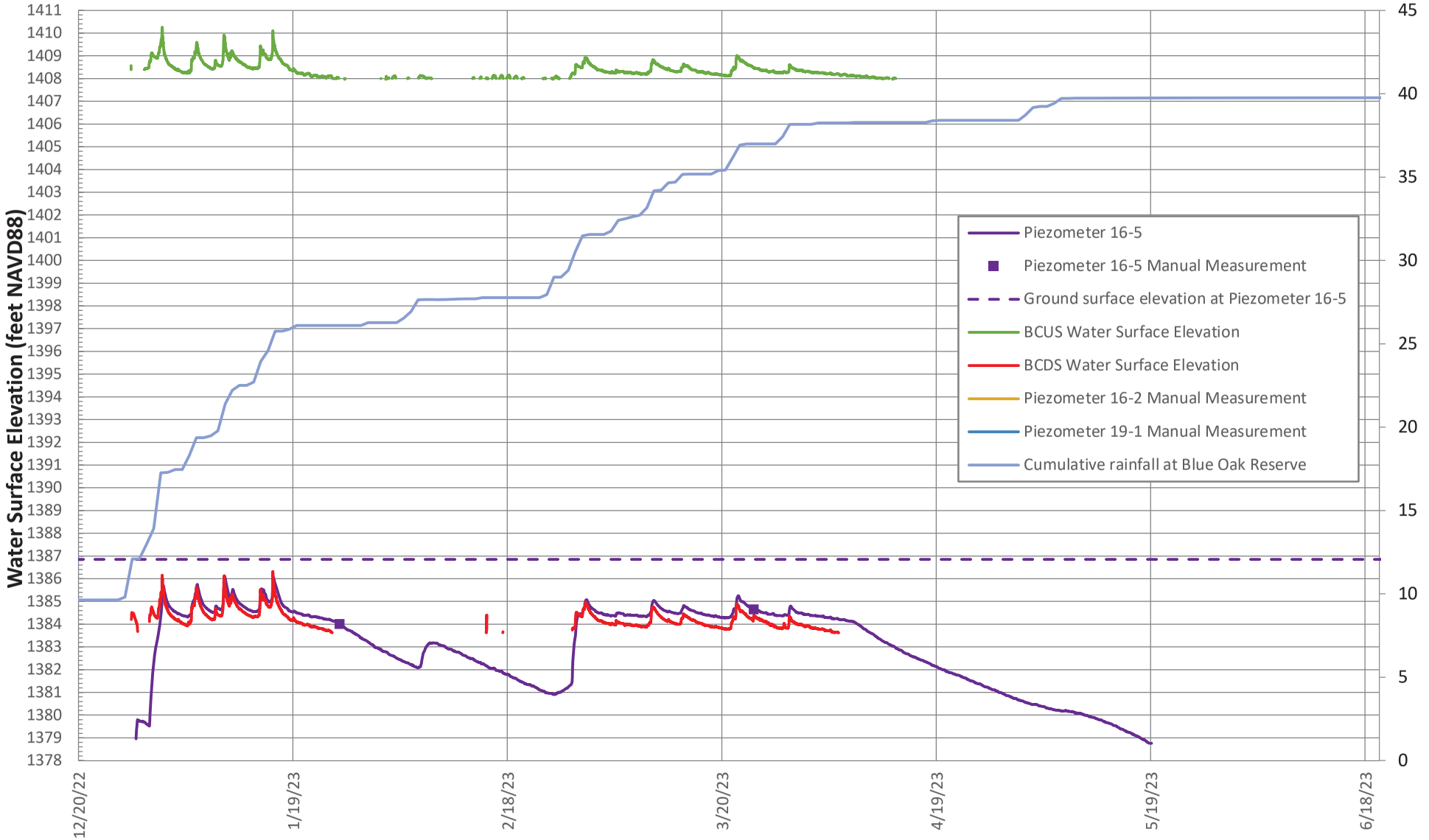
Figure 8b. Shallow groundwater levels at Piezometers 16-2 and 19-1, and surface water level in San Felipe Creek (SFUS) for WY2023. San Felipe Creek Restoration Project, Santa Clara County, California.



Balance Hydrologics

WY23 All Figures.xlsx

Figure 9a. **Shallow groundwater levels at Piezometer 16-5 and surface water stage in Boyds Creek upstream station (BCUS) and Boyds Creek downstream (BCDS), WY2023. San Felipe Creek Restoration Project, Santa Clara County, California.**



Balance Hydrologics

WY23 All Figures.xlsx

Figure 9b. **Shallow groundwater levels at Piezometer 16-5 and surface water stage in Boyds Creek upstream station (BCUS) and Boyds Creek downstream (BCDS), WY2023. San Felipe Creek Restoration Project, Santa Clara County, California.**

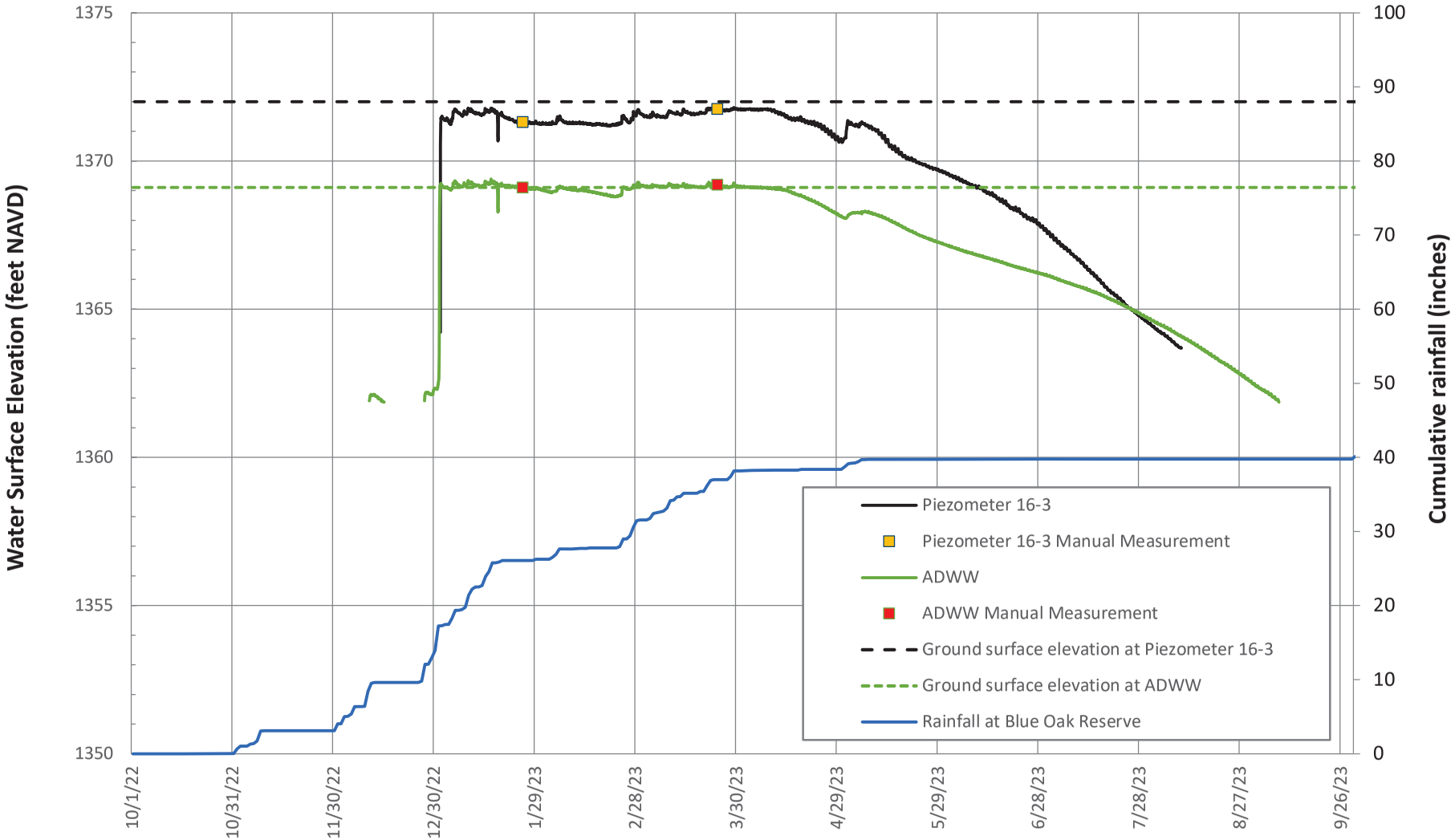


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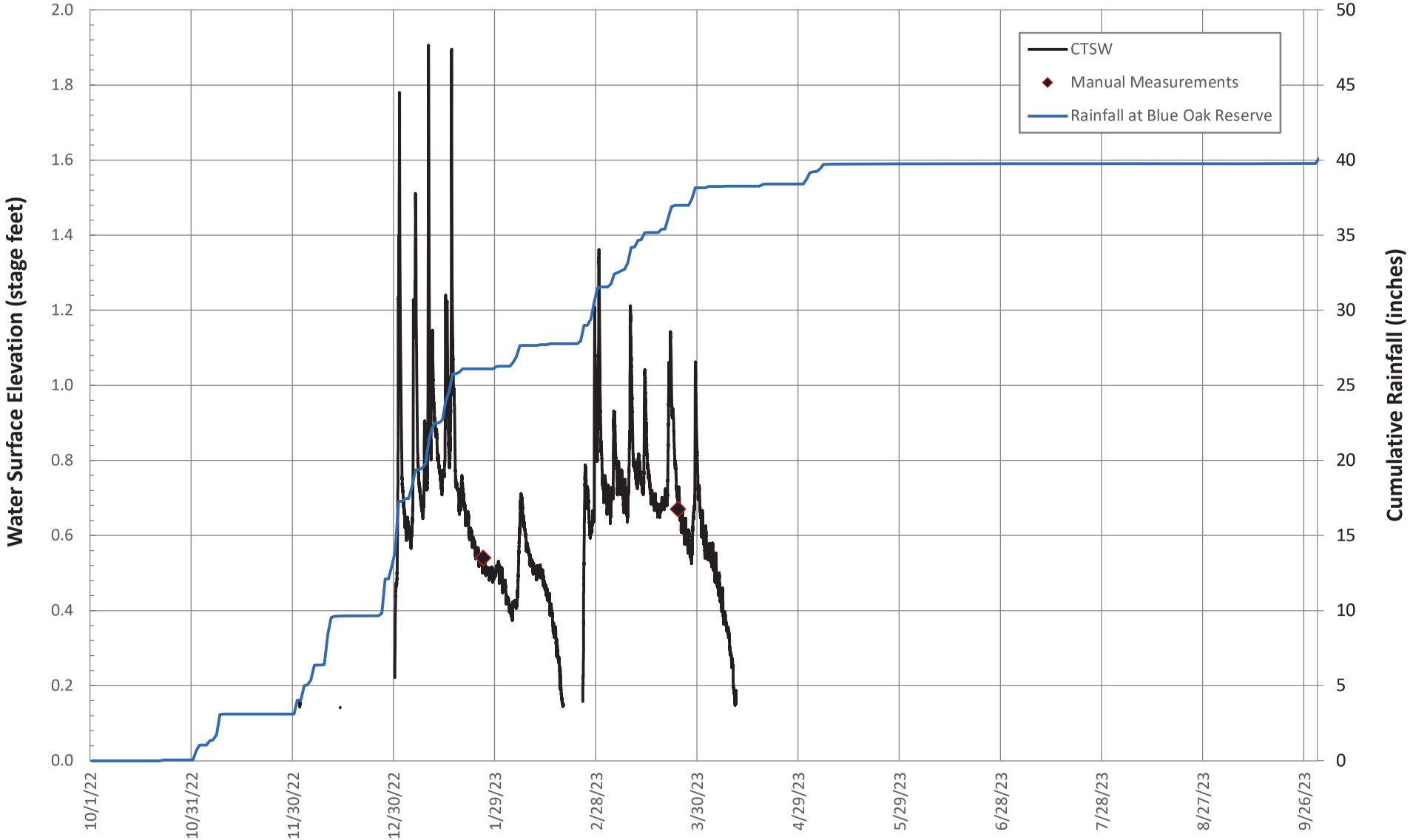
Figure 10. WY2023 water levels in the agricultural ditch (ADWW) and Piezometer 16-3 near Seasonal Wetlands SW02 and SW04, San Felipe Creek Restoration Project, Santa Clara County, California.



Balance Hydrologics

WY23 All Figures.xlsx

Figure 11. Corral Trail seasonal wetland CTSW water levels during WY2023, San Felipe Creek Restoration Project, Santa Clara County, California. Wetland ground surface varies, but is located at a stage of approximately 0.2 feet.

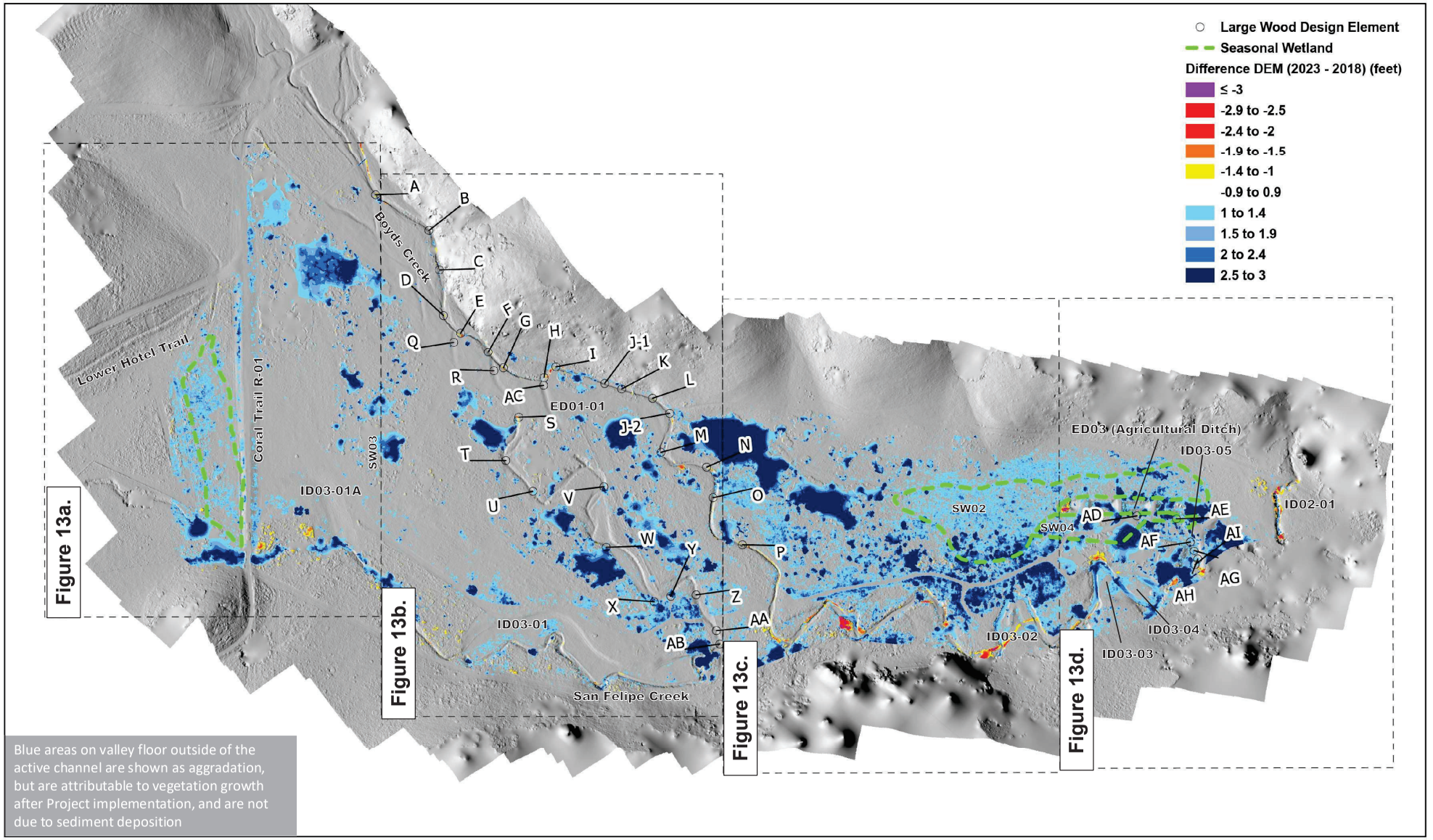


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Figure 12. **2023 and 2018 DEM comparison, San Felipe Creek Restoration, Joseph D. Grant Park, Santa Clara County, California**

0 200 400 800 Feet

SCALE: 1:3,000

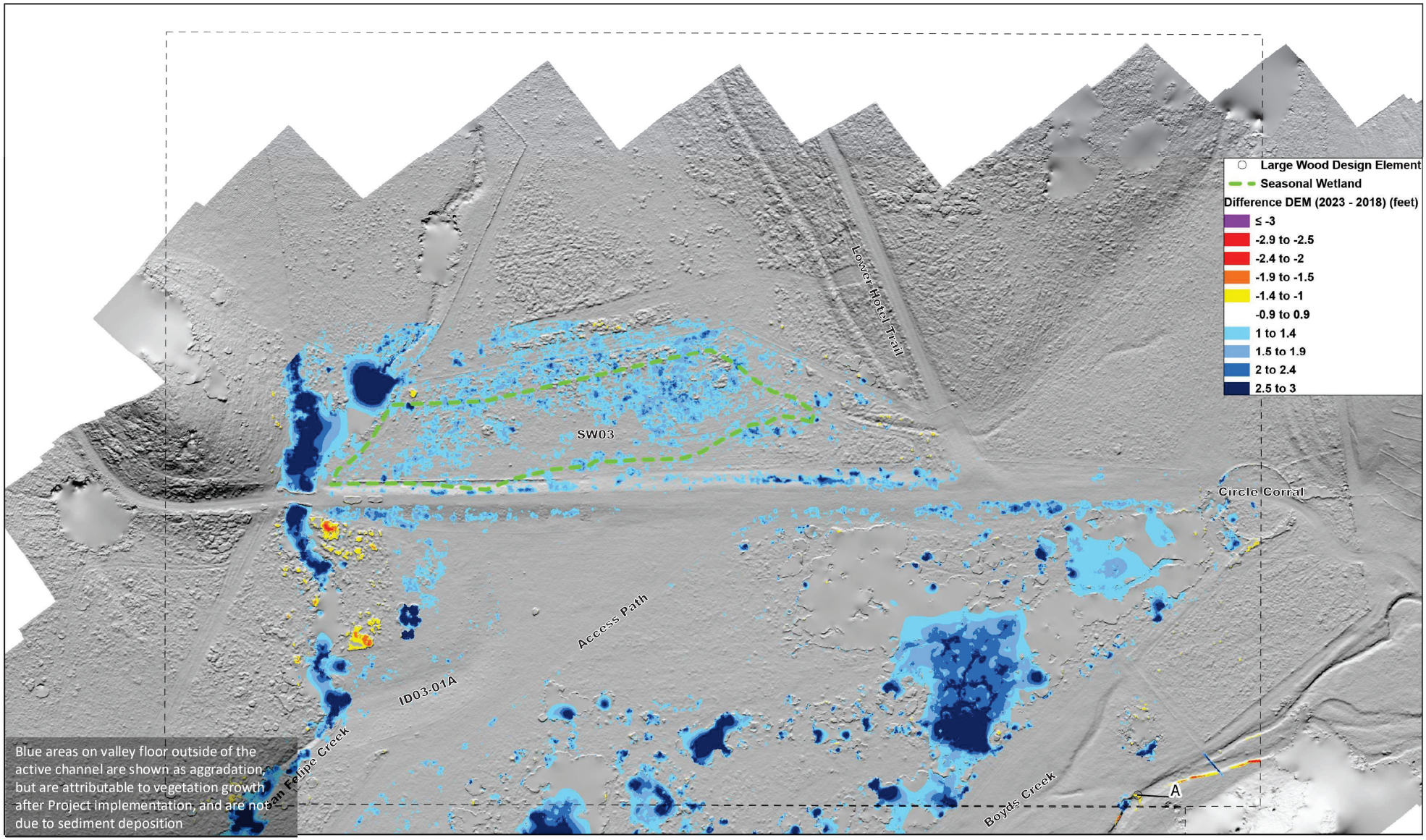

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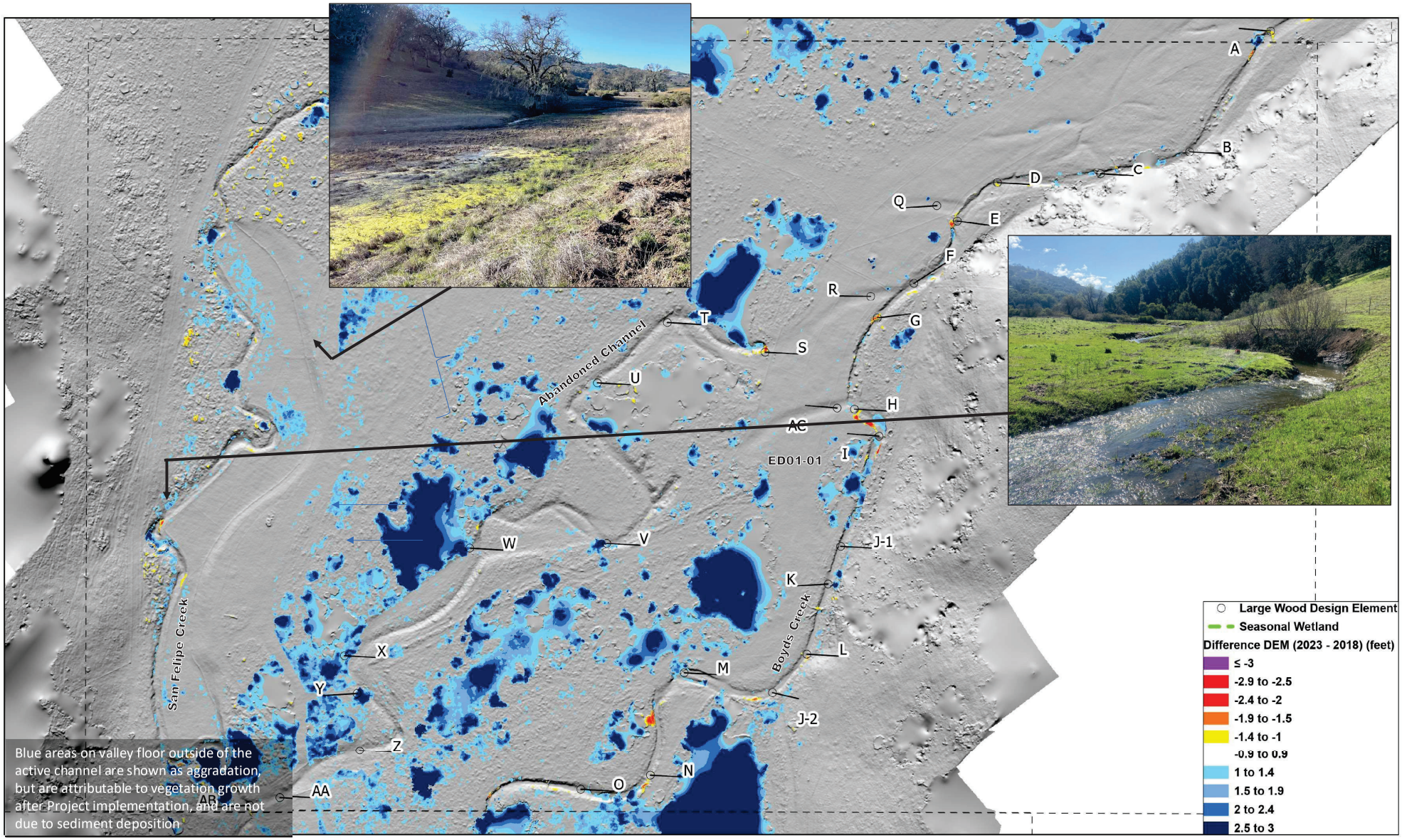
Figure 13a. **2023 and 2018 DEM comparison, San Felipe Creek Restoration, Joseph D. Grant Park, Santa Clara County, California**

0 100 200 400 Feet

SCALE: 1:1,300

N



Balance Hydrologics™

Figure 13b. 2023 and 2018 DEM comparison, San Felipe Creek Restoration, Joseph D. Grant Park, Santa Clara County, California

0 100 200 400 Feet

SCALE: 1:1,300

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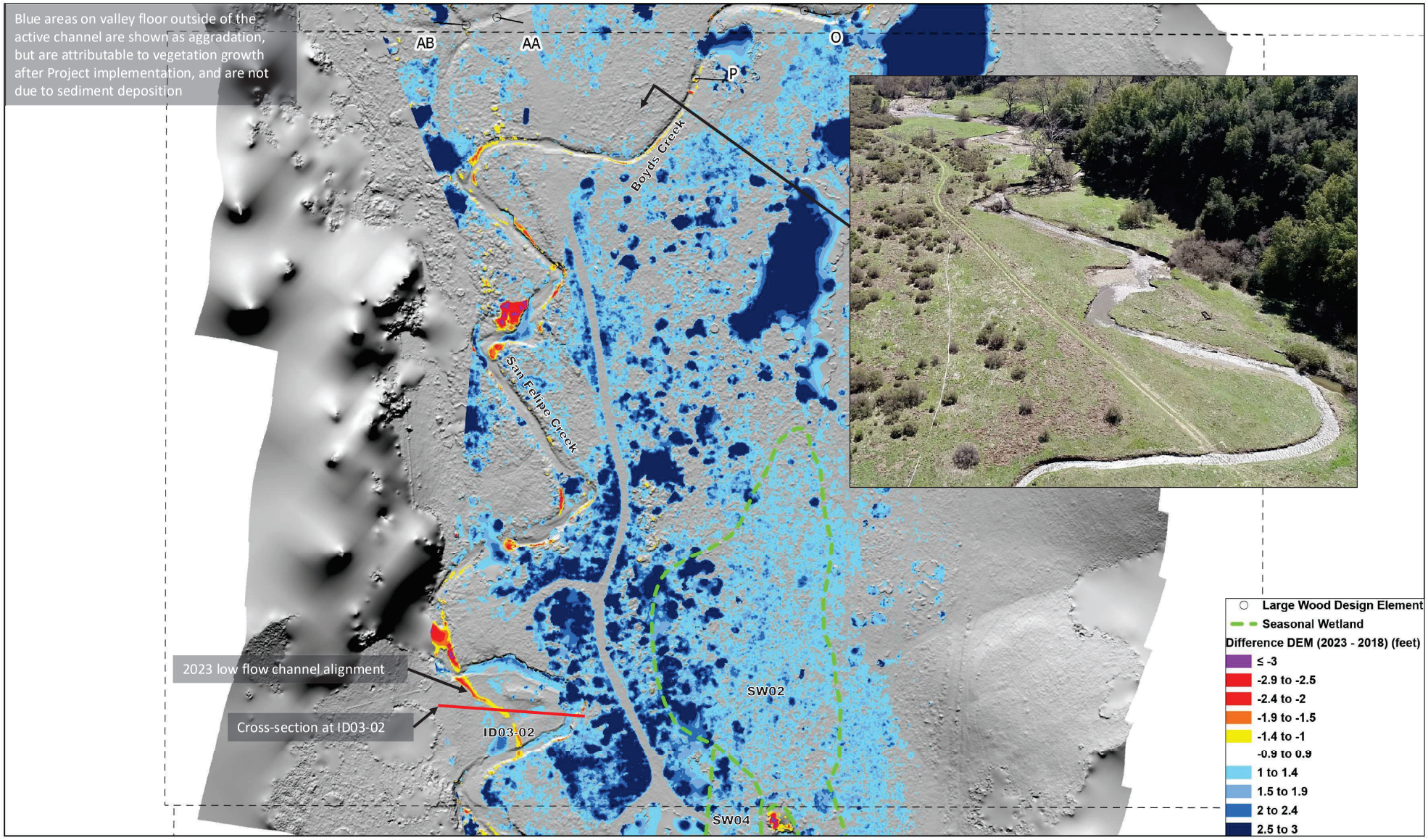

Balance Hydrologics™

Figure 13c. **2023 and 2018 DEM comparison, San Felipe Creek Restoration, Joseph D. Grant Park, Santa Clara County, California**

0 100 200 400 Feet

SCALE: 1:1,300

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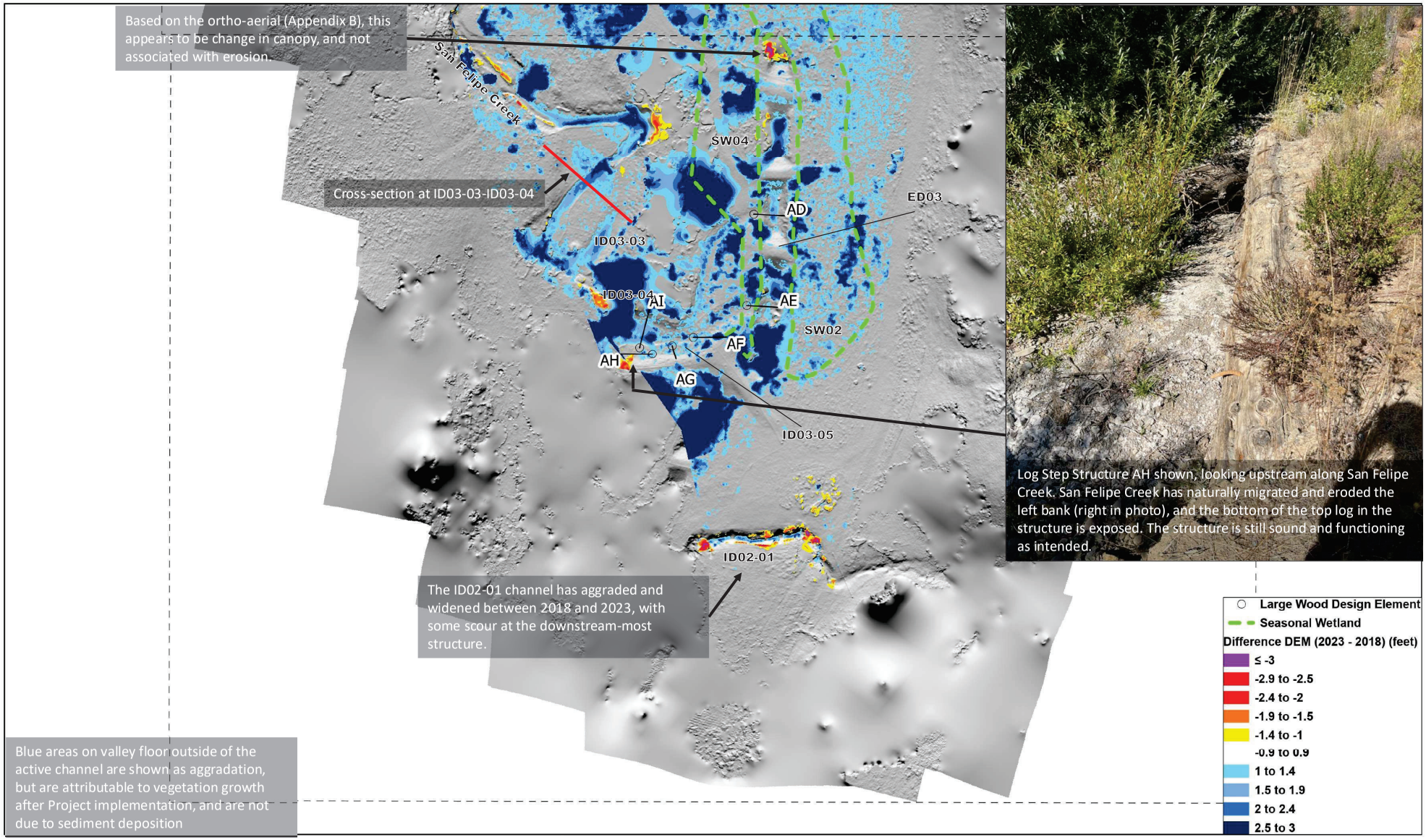

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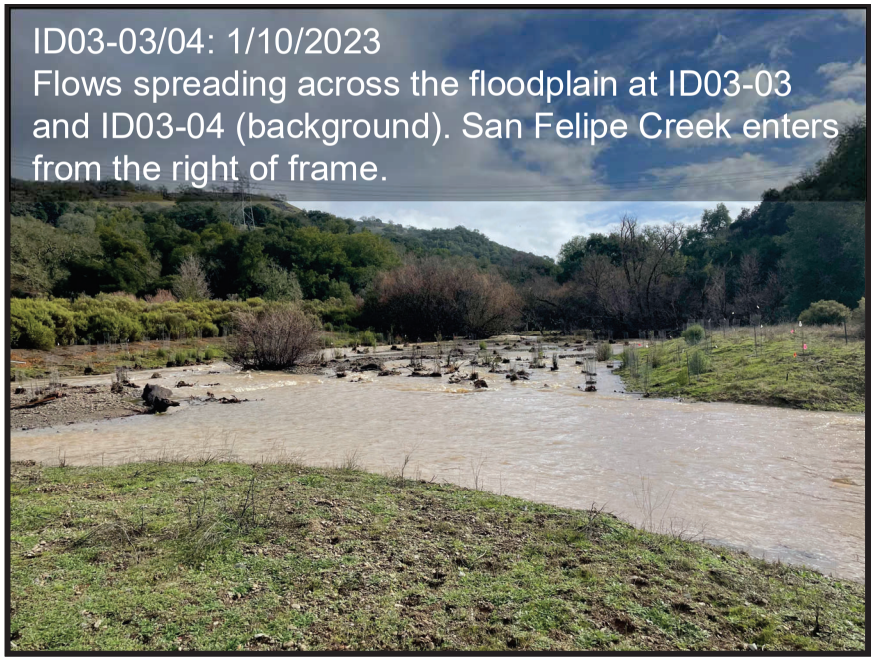
Figure 13d. **2023 and 2018 DEM comparison, San Felipe Creek Restoration, Joseph D. Grant Park, Santa Clara County, California**

0 100 200 400 Feet

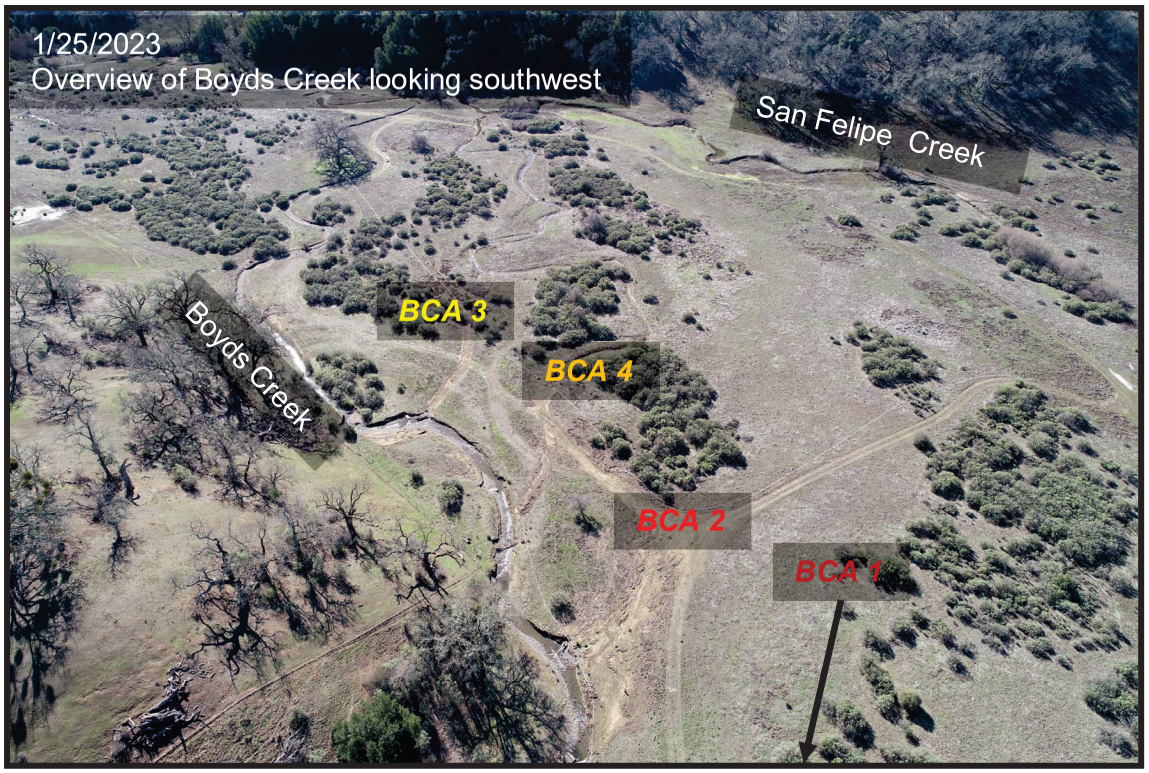
SCALE: 1:1,300

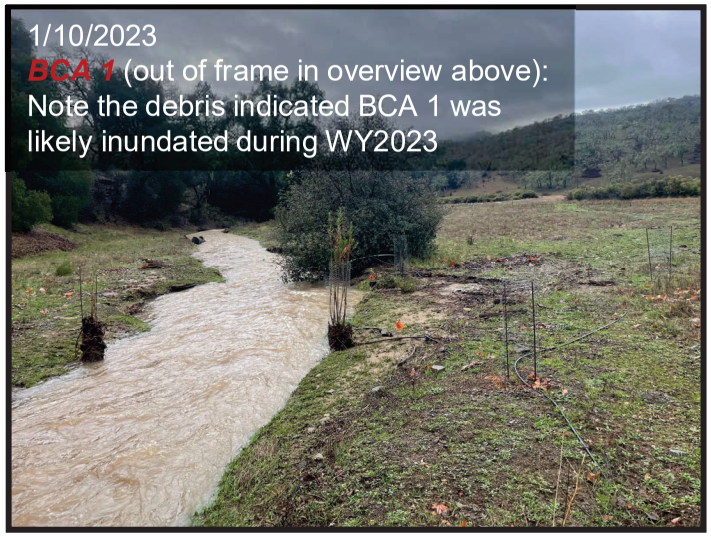
ID03-02: 1/10/2023
Floodplain inundation occurred and low flow channel relocated to the center of the created floodplain feature. San Felipe Creek enters from the right of the frame.



Balance Hydrologics

Figure 14. San Felipe Creek on January 10, 2023 at created floodplain ID03-01a (Top), ID03-02 and ID03-03/04 (Bottom) WY2023. San Felipe Creek Restoration Project, Joseph D. Grant Park, Santa Clara County, California. The created floodplain areas pictured here were inundated during WY2023.





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222108 Photo Figures

Figure 15. Observations of flow in all Boyds Creek distributary channels, January 10, 2023. Year 5 San Felipe Creek Restoration Project, Joseph D. Grant Park, Santa Clara County, California. Physical Success Criterion 3 was met in 2023. We are not concerned about the progression of the pre-existing knickpoint on BCA 4, the channel has not headcut to the buried log grade control installed as part of the project.

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Figure 16. Plantings at living log jams, September 23, 2020 (left), April 28, 2021, September 23, 2022 and October 3, 2023. Year 5 San Felipe Creek Restoration Project, Joseph D. Grant Park, Santa Clara County, California. See replaced log in red oval in 2021 and 2022 photos.

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Figure 17. Comparison of San Felipe Creek at created floodplain ID03-02 between Year 1,Year 2 and post-adaptive management repair in Year 3 and Year 4. looking downstream. San Felipe Creek Restoration Project, Joseph D. Grant Park, Santa Clara County, California. The ID03-02 Floodplain was en

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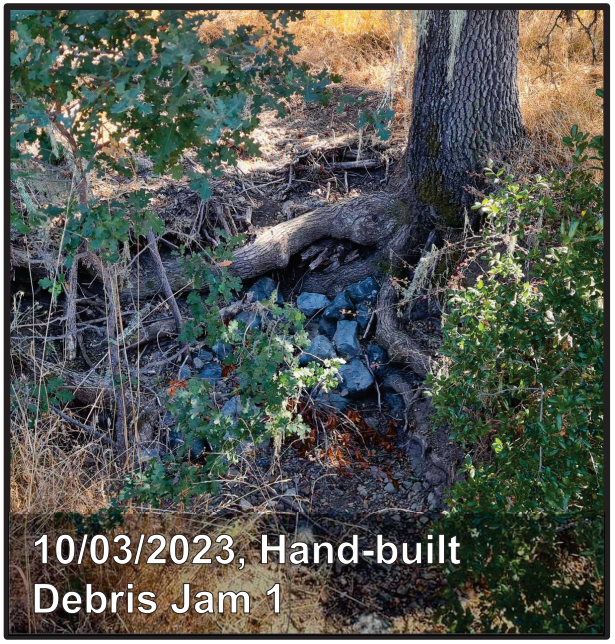
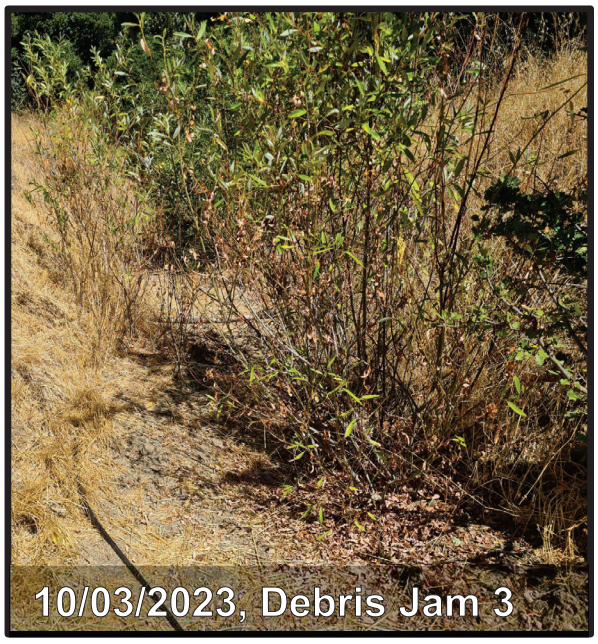
Figure 18. Corral Trail and drainage lens and Lower Hotel Trail Arizona crossing, October 3, 2023. San Felipe Creek Restoration Project, Joseph D. Grant Park, Santa Clara County, California.





Note: Staked debris jams are numbered in downstream order, upper left to lower right.

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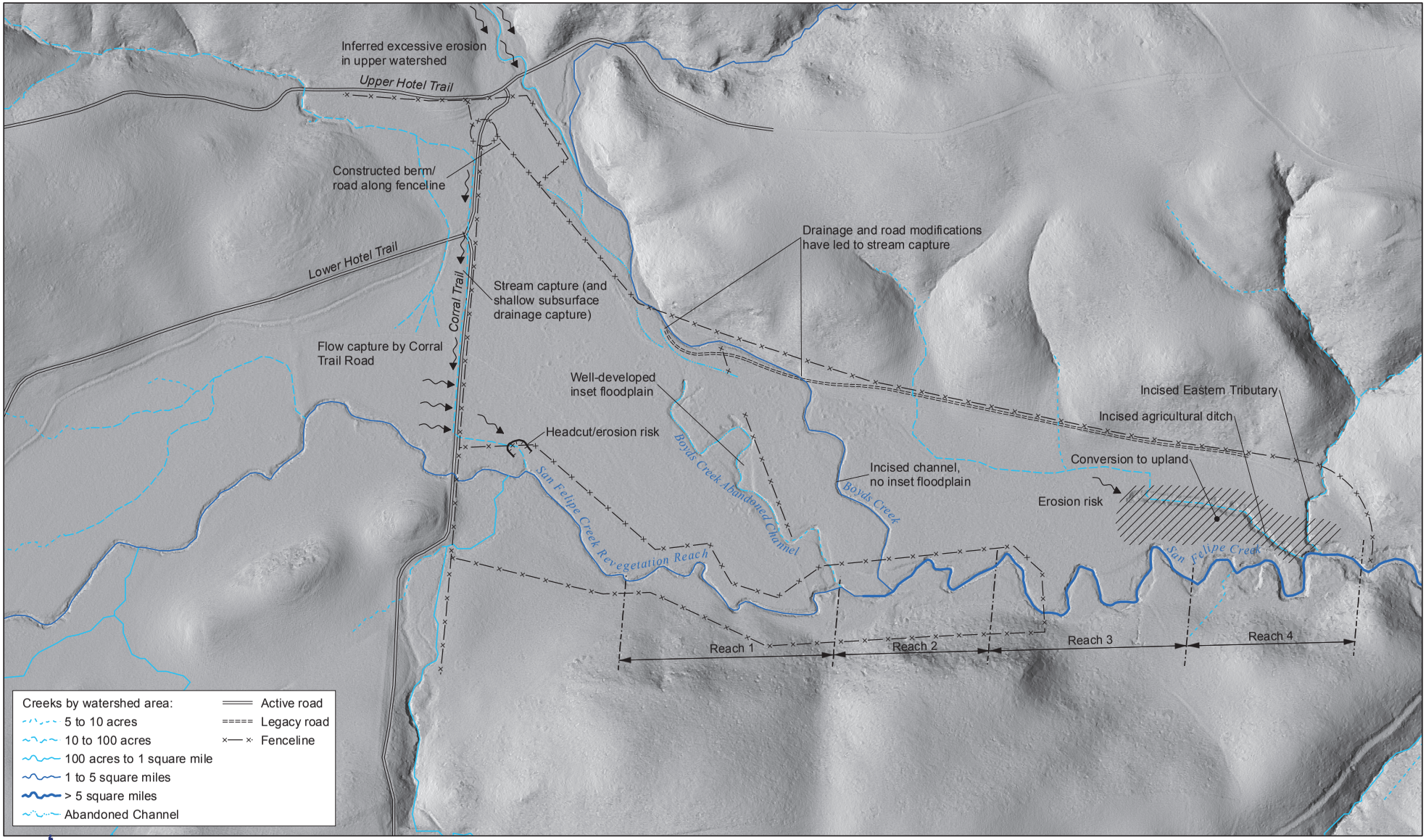
Figure 19. Staked debris jams at ID02-01, September 23, 2022, San Felipe Creek Restoration Project, Joseph D. Grant Park, Santa Clara County, California.

APPENDICES

APPENDIX A

Impairment Map



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Y:\GIS\Projects\215108 San Felipe Creek\FIGURES\215108 impairment map.mxd

Plate 2. San Felipe Creek Impairment Map, Santa Clara County, California

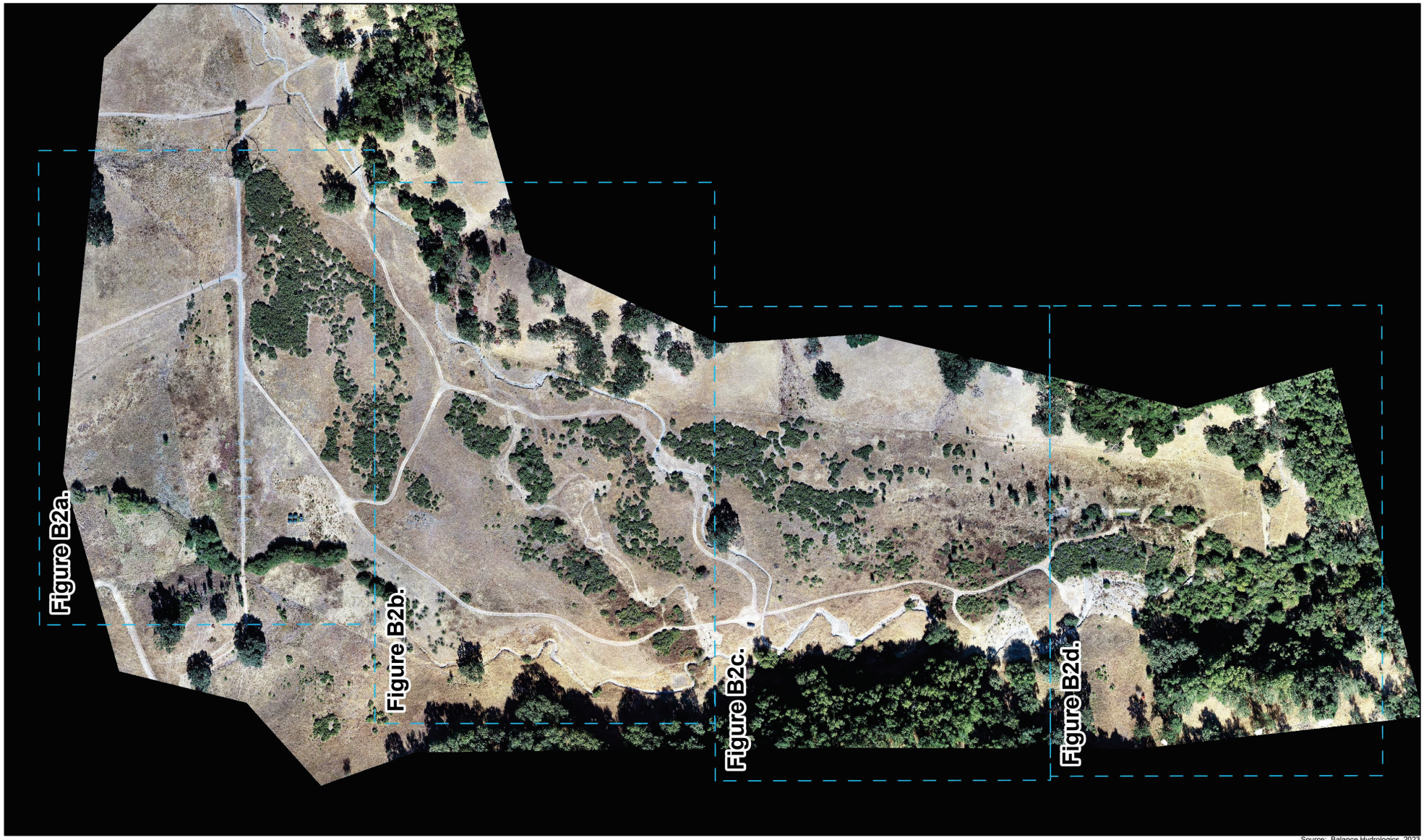
Note: impairment map was created pre-restoration.

Basemap source: EarthScope LiDAR mapping (2007)

0 150 300 600 Feet

APPENDIX B

October 3, 2023, Ortho-Aerial Photograph



Source: Balance Hydrologics, 2023

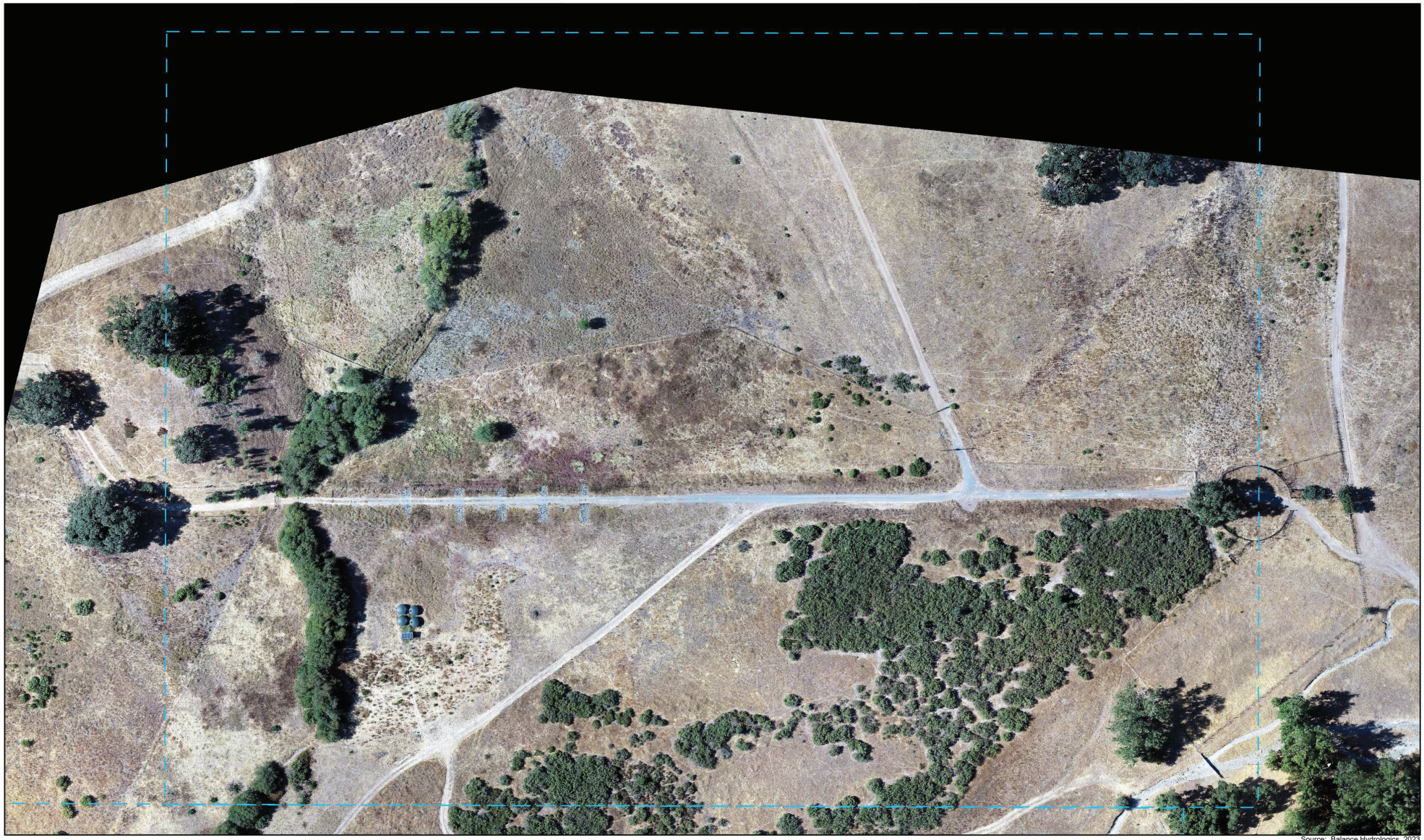
Balance Hydrologics™

Figure B1. Orthomosaic image, October 3, 2023, San Felipe Creek Restoration, Joseph D. Grant Park, Santa Clara County, California

0 200 400 800 Feet

SCALE: 1:3,000

N



Source: Balance Hydrologics, 2023

Balance Hydrologics™

Figure B2 a. Orthomosaic image, October 3, 2023, San Felipe Creek Restoration, Joseph D. Grant Park, Santa Clara County, California

0 100 200 400 Feet

SCALE: 1:1,300

N

Source: Balance Hydrologics, 2023

Balance Hydrologics™

Figure B2 b. Orthomosaic image, October 3, 2023, San Felipe Creek Restoration, Joseph D. Grant Park, Santa Clara County, California

0 100 200 400 Feet

SCALE: 1:1,300

N

Source: Balance Hydrologics, 2023

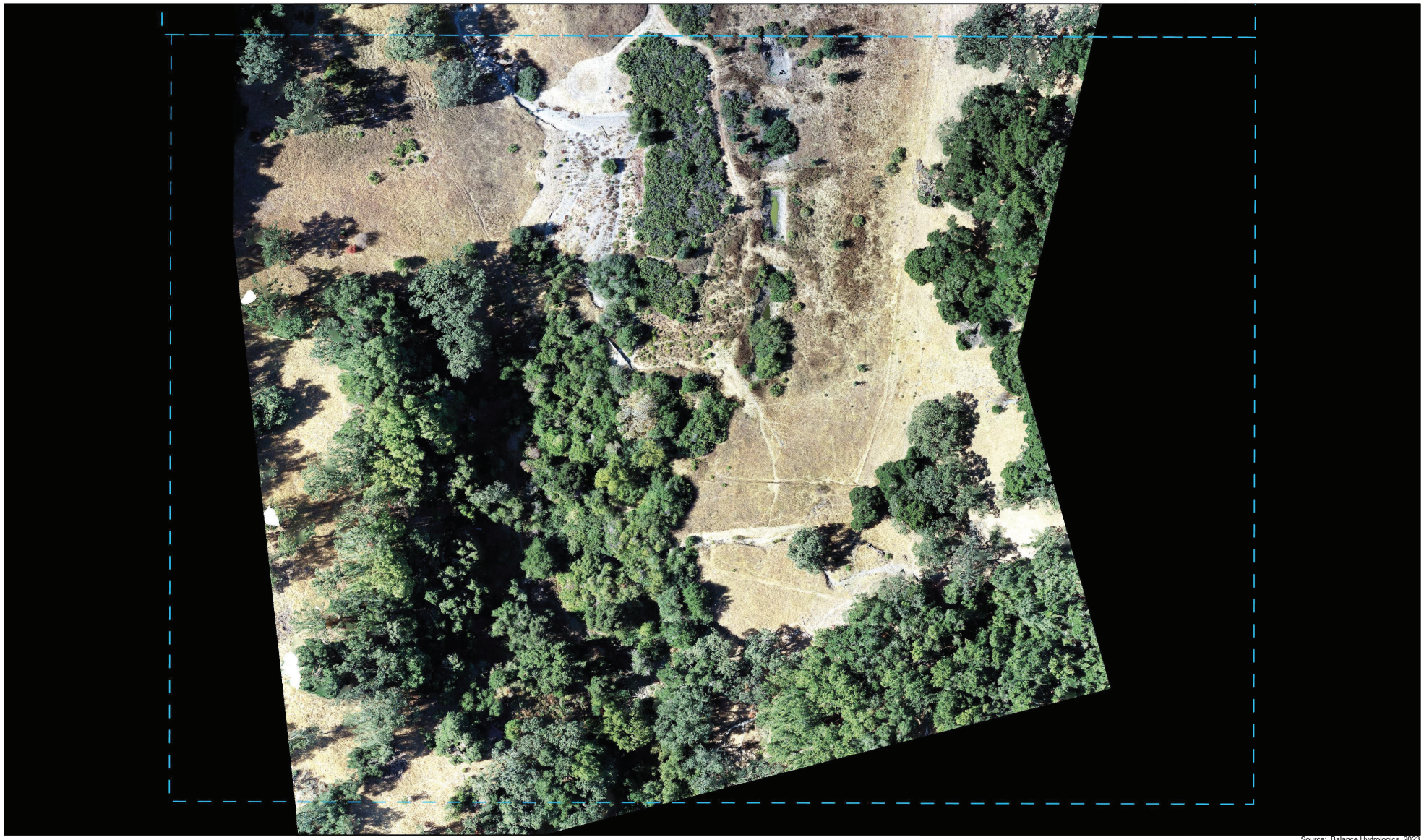
Balance Hydrologics™

Figure B2 c. Orthomosaic image, October 3, 2023, San Felipe Creek Restoration, Joseph D. Grant Park, Santa Clara County, California

0 100 200 400 Feet

SCALE: 1:1,300

N



Source: Balance Hydrologics, 2023

Balance Hydrologics™

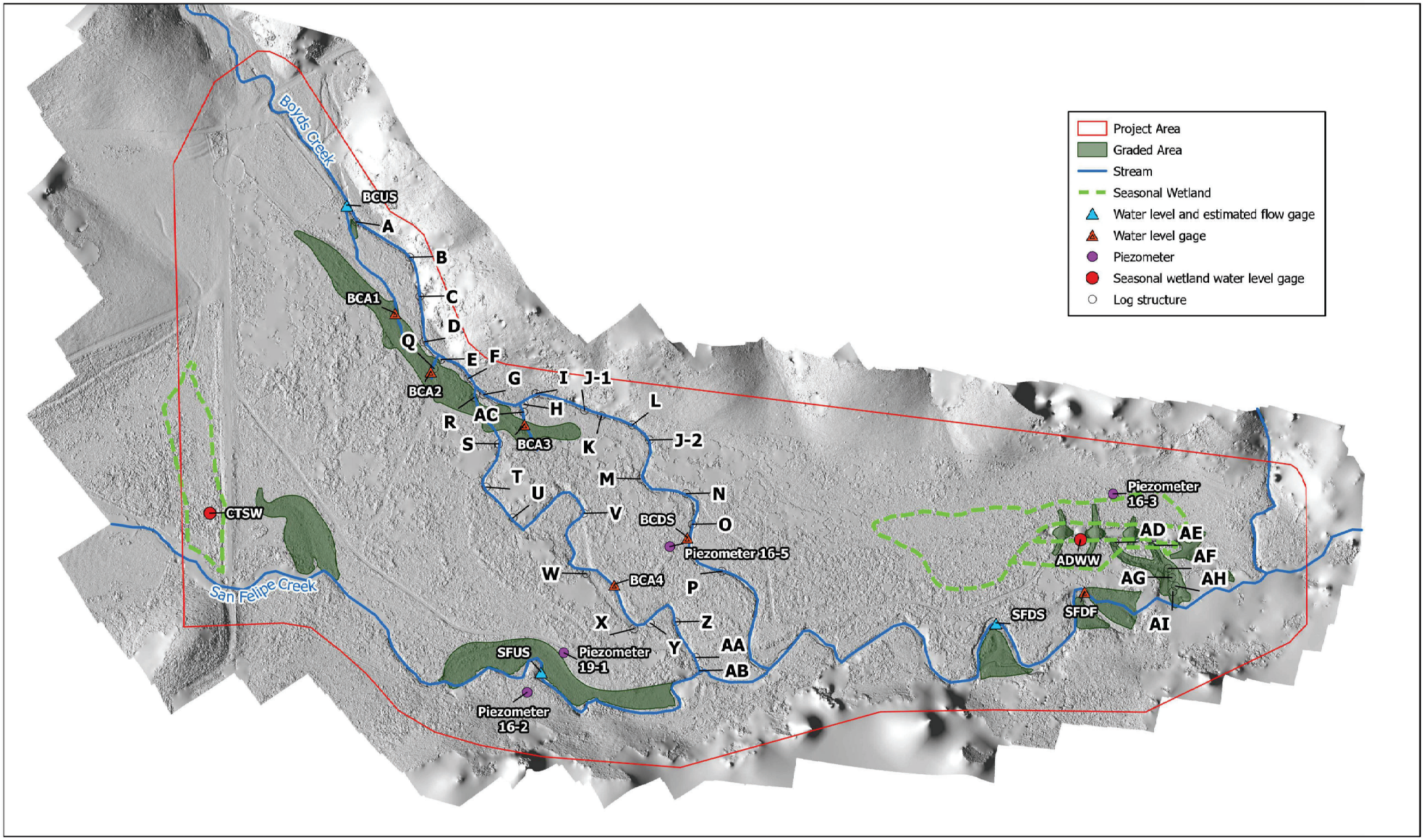
Figure B2 d. Orthomosaic image, October 3, 2023, San Felipe Creek Restoration, Joseph D. Grant Park, Santa Clara County, California

0 100 200 400 Feet

SCALE: 1:1,300

N

APPENDIX C
Log Structure Locations



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W:\Projects\215108 San Felipe Creek\monitoring locations.aprx

Appendix C. **Log structure locations, San Felipe Creek Restoration Project, Joseph D. Grant Park, Santa Clara County, California**

0 200 400 800 Feet

SCALE: 1:3,000

N

APPENDIX D

Surface Water Station Observer Log, WY2023

Appendix D. Surface water station observer log: San Felipe Creek Restoration Project
Water Year 2023

	Site Conditions			*Streamflow*				*Water Quality Observations*			*High-Water Marks*		*Remarks*
Date/Time	Observer(s) [1]	Stage (staff) [2]	Hydrograph [4]	Measured Discharge	Estimated Discharge	Instrument Used [5]	Estimated Accuracy [6]	Water Temperature	Specific Conductance at field temp. [8]	Specific Conductance at 25 °C	Estimated stage at staff plate	Inferred dates?	
(mm/dd/yr)		(feet)	*(R/F/S/B)*	*(cfs)*	*(cfs)*	*(AA/PY/Hach)*	*(e/g/f/p)*	*(°C)*	*(µmhos/cm)*	*(at 25 °C)*	*(feet)*	*(mm/dd/yr)*	
SFUS													
1/10/2023 12:07	cs, zr	3.30	U	33.31	…	Hach	g	…	…	…	…	…	Water is turbid, ~6 in visibility; about 0.3 cfs flowing over left bank floodplain
1/25/2023 14:38	jh	2.50	B	0.82	1.01	Hach	f	10.6	335	462	…	…	Water slightly hazy; noticeably more sediment in channel than Boyds Creek; ponded water on left bank floodplain
3/24/2023 11:01	jh	2.68	B	3.97	4.95	Hach	g	7.9	213	316	3.00	3/21/2023	Stage was 2.68 ft at 10:20; water slightly hazy; there is ~0.05 ft gap between staff plates; grass growing on channel bottom at hydraulic control downstream of gage; ponded water on left bank floodplain
10/3/2023 17:11	em		D								2.62		Dry at gage
SFDS													
1/10/2023 14:10	cs, zr	1.38	U	72.72	…	Hach	f	…	…	…	…	…	Stage was 1.50 ft at 12:30, dropping to 1.45 ft at 13:48, and 1.31 ft at 14:30
1/25/2023 13:26	jh	…	B	1.83	2.05	Hach	f	11.9	262	350	…	…	Gage disconnected from flow; new channel formed through floodplain between BDA and gage; fresh deposition of sands/fines in channel meander raises that channel ~2.5 ft above active channel
3/24/2023 12:00	ds	…	B	…	…	…	…	…	…	…	…	…	Gage disconnected from flow
10/3/2023 12:01	eg		D										Moved from abandoned meander to just downstream of ID03-02 into main channel
SFDF													
1/10/2023 13:55	cs, zr	2.51	U	72.72	…	Hach	f	…	…	…	4.00	12/31/2022	…
1/25/2023 13:46	jh	1.50	B	…	…	…	…	…	…	…	…	…	Flow split into 3 paths upstream of gage, main path is through center of floodplain, 2 smaller paths at edges of floodplain
3/24/2023 11:43	jh, ds	1.95	B	…	…	…	…	…	…	…	…	…	Flow still split into 3 paths; new willow stakes planted and marked with pink flags
10/3/2023 00:00	eg		D										Logger returned to stilling well with some sediment in well, ~0.3 ft higher than when removed
BCUS													
1/10/2023 11:12	cs, zr	1.15	R	46.33	…	Hach	f	…	…	…	3.00	12/31/2022	Raining through measurement, unsure if flow is rising or falling
1/25/2023 11:14	jh	0.00	B	0.73	0.68	Hach	e	6.7	148	229	3.10	early January	Water clear; lowered stilling well/logger at 10:49
3/24/2023 10:14	jh	0.49	B	10.71	13	Hach	g	…	…	…	2.55	3/21/2023	Water slightly hazy, but bottom is visible at all locations; high velocity is creating a hydraulic step at staff/stilling well, water surface is 0.70 ft on the upstream side of the staff and 0.45 ft on the downstream side
10/3/2023 15:55	em	dry	D	…	…	visual	…	…	…	…	2.80	unknown	
BCA1													
1/10/2023 11:25	cs, zr	dry	NF	…	0	visual	e	…	…	…	…	…	No flow at BCA1
1/25/2023 11:30	jh	dry	NF	…	0	visual	e	…	…	…	…	…	Channel is dry
3/24/2023 10:20	jh	dry	NF	…	0	visual	e	…	…	…	…	…	Channel is dry
10/3/2023 16:15	eg	dry	NF		0	visual							
BCA2													
1/10/2023 11:27	cs, zr	0.62	U	…	5	visual	p	…	…	…	…	…	…
1/25/2023 11:30	jh	dry	NF	…	0	visual	e	…	…	…	0.70	early January	Channel is dry
3/24/2023 10:20	jh	dry	NF	…	0	visual	e	…	…	…	…	…	Channel is dry
10/3/2023 16:05	eg	dry	NF		0	visual							dirt in stilling well, levelogger is slightly higher when returned to well
BCA3													
1/10/2023 11:35	cs, zr	0.60	U	…	3.6	visual	p	…	…	…	…	…	…
1/25/2023 11:30	jh	dry	NF	…	0	visual	e	…	…	…	1.20	early January	Channel is dry
3/24/2023 10:20	jh	dry	NF	…	0	visual	e	…	…	…	…	…	Channel is dry
10/3/2023 15:55	eg	dry	NF		0	visual							dirt in stilling well, levelogger is slightly higher when returned to well
BCA4													
1/10/2023 12:46	cs, zr	n/a			0.5	visual	p						based on photo of BCA4
1/25/2023 11:30	jh	…	B	…	0.3	visual	p	…	…	…	2 ft above current WSE	early January	Flow is preferencing this channel over the other avulsion channels and Boyds Creek downstream of BCA3
3/24/2023 10:45	ds	…	B	…	0.3	visual	p	…	…	…	…	…	Secondary Boyds channel is flowing; flow estimate may be low
10/3/2023 16:34	em		D			visual							

	Site Conditions			Streamflow				Water Quality Observations			High-Water Marks		Remarks
Date/Time	Observer(s)[1]	Stage (staff)[2]	Hydrograph[4]	Measured Discharge	Estimated Discharge	Instrument Used[5]	Estimated Accuracy[6]	Water Temperature	Specific Conductance at field temp.[8]	Specific Conductance at 25 °C	Estimated stage at staff plate	Inferred dates?	
(mm/dd/yr)		(feet)	*(R/F/S/B)*	*(cfs)*	*(cfs)*	*(AA/PY/Hach)*	*(e/g/f/p)*	*(°C)*	*(µmhos/cm)*	*(at 25 °C)*	*(feet)*	*(mm/dd/yr)*	
BCDS													
1/10/2023 14:52	cs, zr	1.95	U	42.79	…	Hach	f	…	…	…	3.70	12/31/2022	Raining through measurement, unsure if flow is rising or falling
1/25/2023 12:36	jh	0.22	B	…	0.002	visual	p	…	…	…	2.20	early January	Interemittent flow with lengths of dry channel through this area; slightly more flow (Qest 0.01 cfs) ~30 ft downstream of gage
3/24/2023 11:00	ds	0.82	B	…	2.000	visual	p	8.8	109	158	3.25	early January	Stage was 0.87 ft at 11:00; removed racked debris from gage at 11:05, causing stage to drop to 0.82 after removal
10/3/2023 14:55	eg		D								3.00	unknown	
ADDW													
1/25/2023 13:54	jh	6.60	B	…	…	…	…	9.4	56	79	…	…	Only top of staff is visible; water murky
3/24/2023 13:26	jh, ds	6.69	B	…	…	…	…	10.0	55	77	…	…	Staff just barely underwater; ponds are at maximum capacity and are spilling into each other
10/3/2023 14:09	eg												logger is muddy and wet in stilling well
CTSW													
1/25/2023 15:02	jh	0.54	B	…	…	…	…	10.0	294	413	…	…	Water mostly clear; water surface below the pipes in the drainage lenses
3/24/2023 09:55	ds	0.67	B	…	…	…	…	7.9	76	112	1.70	3/21/2023	Water trickling through drainage lens pipes; lots of water spread out on downstream side of road
10/3/2023 10:29	eg		D	…	…	…	…	…	…	…	…	…	no water ponded tip of logger was moist when removed

Notes:

1. Observer Key: cs = Clay Sorenson; jh = John Hardy; zr = Zan Rubin, eg = Emma Goodwin, em = Ella Myr, cp = Camille Pauley
2. Stage: Water level observed at outside staff plate
3. Water surface elevation based on auto level survey to site benchmarks
4. Hydrograph: Describes stream stage as rising (R), at peak (P), falling (F), steady (S), baseflow (B), no flow (NF), dry (D), or uncertain (U).
5. Instrument: If measured, typically made using a standard (AA) or Pygmy (PY) bucket-wheel ("Price-type") current meter or 5 gallon bucket (bkt), plastic bag (bag), If estimated, from rating curve (R) or visual (V).
6. Estimated measurement accuracy: Excellent (E) = +/- 2%; Good (G) = +/- 5%; Fair (F) = +/- 9%; Poor (P) estimated percent accuracy given
7. High-water mark (HWM): Measured or estimated at location of the staff plate
8. Specific conductance: Measured in micromhos/cm in field; then adjusted to 25degC by equation (1.8813774452 - [0.050433063928 * field temp] + [0.00058561144042 * field temp^2]) * Field specific conductance

APPENDIX E

Ground Water Station Observer Log, WY2023

Appendix E. Groundwater station observer log: San Felipe Creek Restoration Project
Water Year 2023

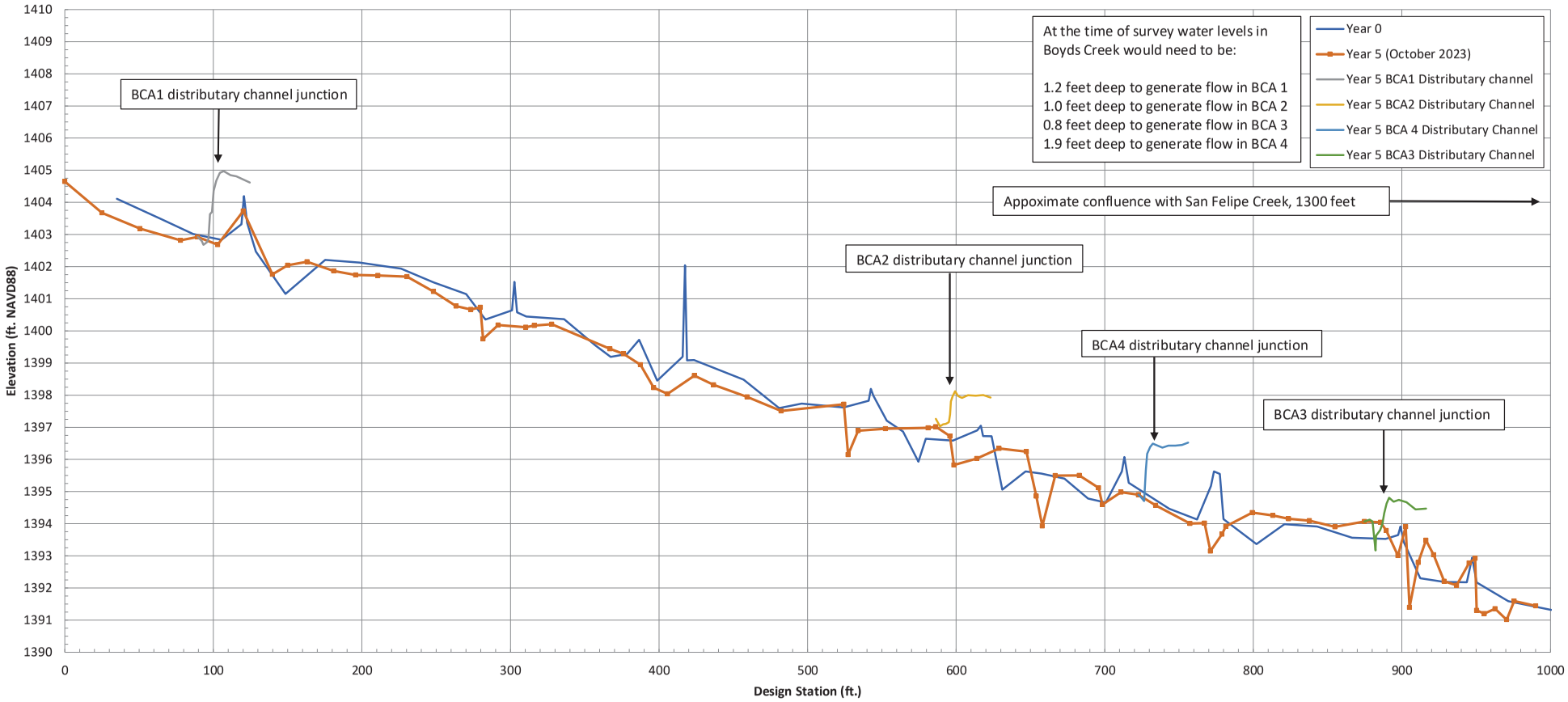
	Site Conditions			*Water Quality Observations*			*Remarks*
Date/Time	Observer(s)[1]	Depth to Water[2]	Water Surface Elevation[3]	Water Temperature	Specific Conductance at field temp.[8]	Specific Conductance at 25 °C	
(mm/dd/yr)		(feet)	NAVD88 (feet)	*(°C)*	*(µmhos/cm)*	*(at 25 °C)*	
Piezometer 16-2							
1/25/2023 14:21	jh	4.31		10.4	90	127	Did not download, left logger in piezo during DTW measurement
3/24/2023 10:26	ds	3.96		10.2	75	104	No stratification in SCT
10/3/2023 17:35	em	n/a		…	…	…	dry
Piezometer 19-1							
1/25/2023 14:14	jh	6.22		13.4	208	268	Did not download, left logger in piezo during DTW measurement
3/24/2023 10:15	ds	5.93		11.2	202	274	No stratification in SCT
10/3/2023 17:01	em	n/a		…	…	…	dry
Piezometer 16-5							
1/25/2023 12:31	jh	4.81		12.0	119	158	Did not download, left logger in piezo during DTW measurement
3/24/2023 10:55	ds	4.17		8.5	117	170	
10/3/2023 15:02	em	n/a		…	…	…	dry
Piezometer 16-3							
1/25/2023 13:59	jh	2.32		10.8	178	243	Did not download, left logger in piezo during DTW measurement
3/24/2023 13:17	ds	1.87		11.4	215	287	~2 inches of ponded water at surface adjacent to piezo
10/3/2023 12:19	eg	n/a		…	…	…	dry

Notes:

1. Observer Key: cs = Clay Sorenson; jh = John Hardy; zr = Zan Rubin, eg = Emma Goodwin, em = Ella Myr, cp = Camille Pauley
2. Depth to Water: Depth to surface of water level from reference point of piezometer, measured with a well sounder
3. Water surface elevation based on auto level survey to site benchmarks
8. Specific conductance: Measured in micromhos/cm in field; then adjusted to 25°C by equation (1.8813774452 - [0.050433063928 * field temp] + [0.00058561144042 * field temp^2]) * Field specific conductance

APPENDIX F

Year 5 Survey Comparison



NOTE: Changes in sinuosity can result in modest changes in longitudinal alignment from year-to-year.

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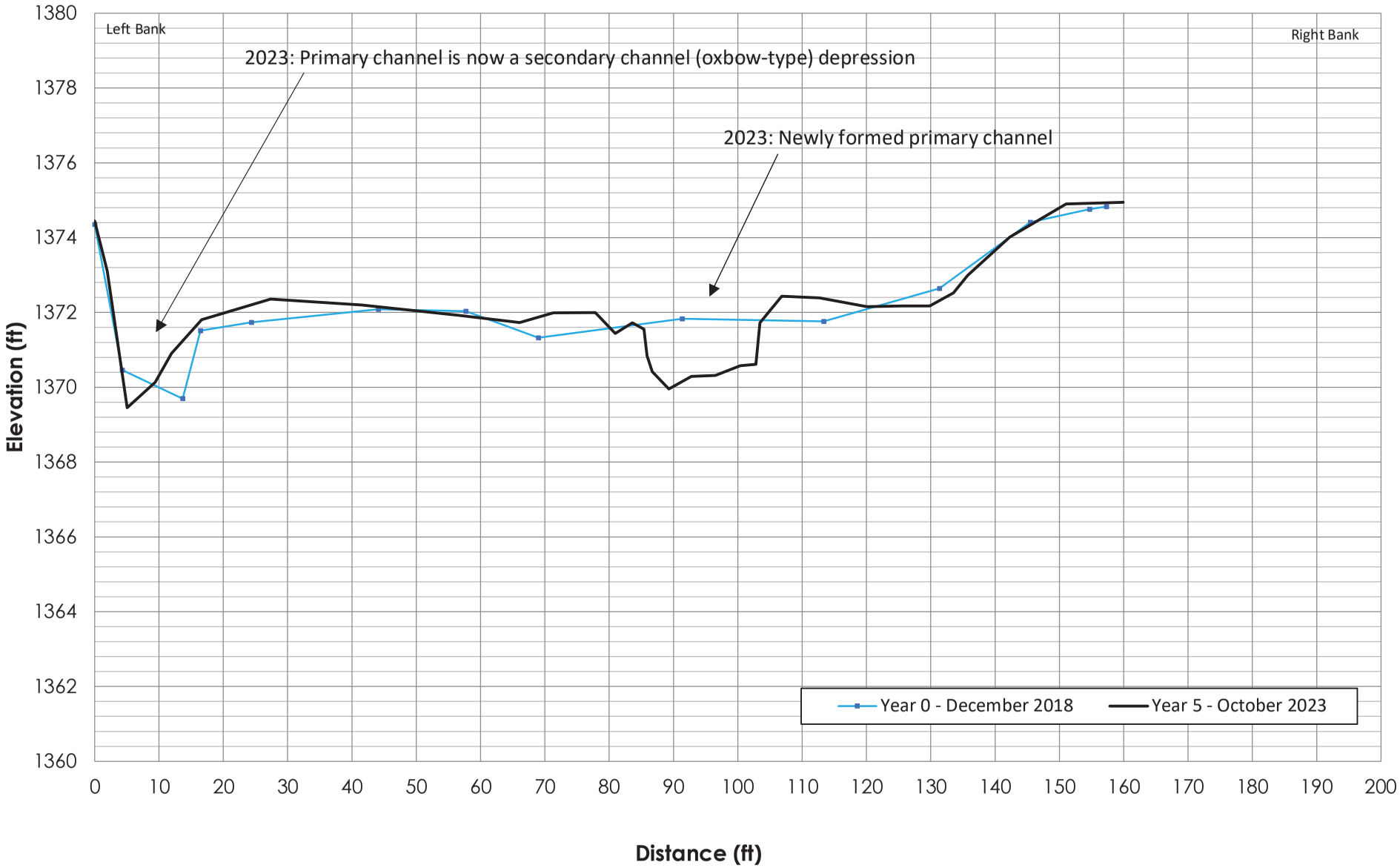
Figure F1. Longitudinal Profile Comparison between Year 0 and Year 5, Boyds Creek, San Felipe Creek Restoration Project, Santa Clara County, California.

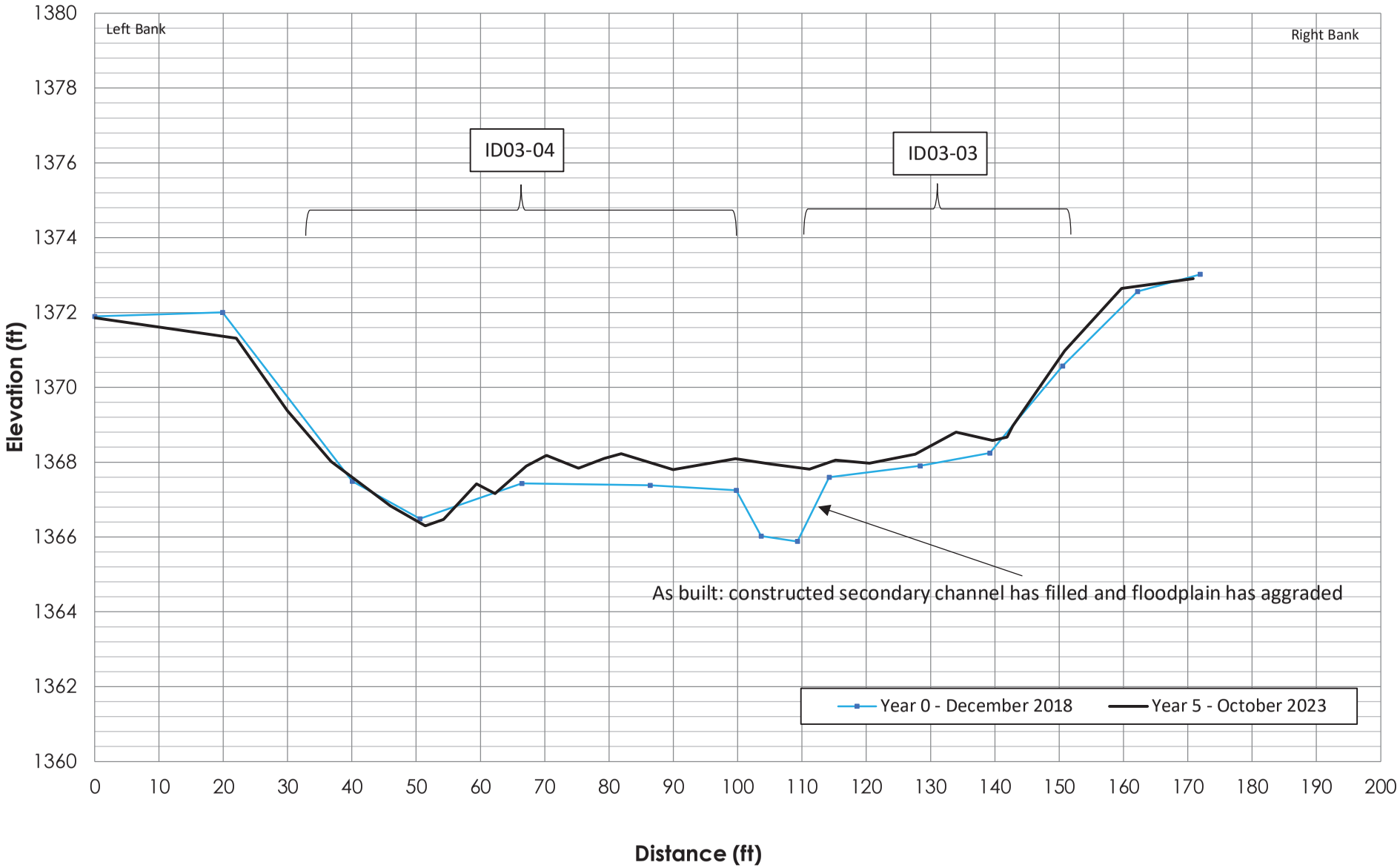
222108 Survey Master WY2023



Balance Hydrologics, Inc.

Figure F2. **Cross-section at ID03-02, Year 0 and Year 5, San Felipe Restoration Project, Santa Clara County, California**

222108 survey master 2023



Balance Hydrologics, Inc.

Figure F3. **Cross-section at ID03-03 and ID03-04, Year 0 and Year 5, San Felipe Restoration Project, Santa Clara County, California**

222108 survey master 2023

APPENDIX D PHOTO POINT MONITORING PHOTO

Photos were taken at each of the 48 permanent photo point locations on June 15, 2023. An informative subset from the photo-documentation views is presented in Appendix D. For this subset of photos, Year 1 and current year (Year 5) photos are shown for contrast. Intervening years' photos and photo points 1, 7, 11, 13, 19, 22*, 23, 28, 33, 35, 35*, 37, 39, and 40 can be furnished upon request. These photo points were removed for file size reduction and due to the limited information and/or redundant nature of the photos compared to those included in Appendix D.

Photo Point 2

Photo 2. Year 1 (2019), facing west toward SW03. Photo taken 9/30/2019

Photo 2. Year 5 (2023), facing west toward SW03. Photo taken 6/15/2023

Photo Point 3

Photo 3. Year 1 (2019), facing southwest toward ED03 and ID03-1A. Photo taken 6/19/2019

Photo 3. Year 5 (2023), facing southwest toward ED03 and ID03-1A. Photo taken 6/15/2023

Photo Point 4

Photo 4. Year 1 (2019), facing northeast toward SW03. Photo taken 6/18/2019

Photo 4. Year 5 (2023), facing northeast toward SW03. Photo taken 6/15/2023

Photo Point 5

Photo 5. Year 1 (2019), facing south toward ID03-1A. Photo taken 9/30/2019

Photo 5. Year 5 (2023), facing south toward ID03-1A. Photo taken 6/15/2023

Photo Point 6

Photo 6. Year 1 (2019), facing north toward ID03-1A. Photo taken 9/30/2019

Photo 6. Year 5 (2023), facing north toward ID03-1A. Photo taken 6/15/2023

Photo Point 8

Photo 8. Year 1 (2019), facing south toward ID03-1B. Photo taken 6/19/2019

Photo 8. Year 5 (2023), facing south toward ID03-1B. Photo taken 6/15/2023

Photo Point 9

Photo 9. Year 1 (2019), facing west toward ID03-1B. Photo taken 6/19/2019

Photo 9. Year 5 (2023), facing west toward ID03-1B. Photo taken 6/15/2023

Photo Point 10

Photo 10. Year 1 (2019), facing southwest toward ID03-1B. Photo taken 6/19/2019

Photo 10. Year 5 (2023), facing southwest toward ID03-1B. Photo taken 6/15/2023

Photo Point 12

Photo 12. Year 1 (2019), facing south toward ID03-03. Photo taken 9/30/2019

Photo 12. Year 5 (2023), facing south toward ID03-03. Photo taken 6/15/2023

Photo Point 14

Photo 14. Year 1 (2019), facing west toward ID03. Photo taken 6/19/019

Photo 14. Year 5 (2023), facing west toward ID03. Photo taken 6/15/2023

Photo Point 15

Photo 15. Year 1 (2019), facing west toward ID03. Photo taken 6/19/2019

Photo 15. Year 5 (2023), facing west toward ID03. Photo taken 6/15/2023

Photo Point 16

Photo 16. Year 1 (2019), facing east toward ED03-01 and SW04. Photo taken 6/19/2019

Photo 16. Year 5 (2023), facing east toward ED03-01 and SW04. Photo taken 6/15/2023

Photo Point 16*

Photo 16*. Year 3 (2021), facing northwest toward ED03-01. Photo taken 6/21/2021

Photo 16*. Year 5 (2023), facing northwest toward ED03-01. Photo taken 6/15/2023

Photo Point 17

Photo 17. Year 1 (2019), facing east toward ED03-01 and SW02. Photo taken 9/30/2019

Photo 17. Year 5 (2023), facing east toward ED03-01 and SW02. Photo taken 6/15/2023

Photo Point 17*

Photo 17*. Year 3 (2021), facing west toward ED03-02. Photo taken 6/21/2021

Photo 17*. Year 5 (2023), facing west toward ED03-02. Photo taken 6/15/2023

Photo Point 18

Photo 18. Year 1 (2019), facing east toward ED03-02 and SW02. Photo taken 9/30/2019

Photo 18. Year 5 (2023), facing east toward ED03-02 and SW02. Photo taken 6/15/2023

Photo Point 18*

Photo 18*. Year 3 (2021), facing southwest toward ED03-03. Photo taken 6/21/2021

Photo 18*. Year 5 (2023), facing southwest toward ED03-03. Photo taken 6/15/2023

Photo Point 19*

Photo 19*. Year 3 (2021), facing west toward ED03-02 and SW04. Photo taken 6/21/2021

Photo 19*. Year 5 (2023), facing west toward ED03-02 and SW04. Photo taken 6/15/2023

Photo Point 20

Photo 20. Year 1 (2019), facing northeast toward ED03-03 and SW04. Photo taken 6/19/2019

Photo 20. Year 5 (2023), facing northeast toward ED03-03 and SW04. Photo taken 6/15/2023

Photo Point 21

Photo 21. Year 1 (2019), facing east toward ED03-03 and AD01. Photo taken 9/30/2019

Photo 21. Year 5 (2023), facing east toward ED03-03 and AD01. Photo taken 6/15/2023

Photo Point 22

Photo 22. Year 1 (2019), facing north toward ED03-04 and AD01. Photo taken 6/19/2019

Photo 22. Year 5 (2023), facing north toward ED03-04 and AD01. Photo taken 6/15/2023

Photo Point 24

Photo 24. Year 1 (2019), facing north toward ED03-05 and AD01. Photo taken 9/30/2019

Photo 24. Year 5 (2023), facing north toward ED03-05 and AD01. Photo taken 6/15/2023

Photo Point 25

Photo 25. Year 1 (2019), facing south toward ID02. Photo taken 9/30/2019

Photo 25. Year 5 (2023), facing south toward ID02. Photo taken 6/15/2023

Photo Point 26

Photo 26. Year 1 (2019), facing west toward ID02. Photo taken 6/19/2019

Photo 26. Year 5 (2023), facing west toward ID02. Photo taken 6/15/2023

Photo Point 27

Photo 27. Year 1 (2019), facing east toward ED03-03 and SW02. Photo taken 9/30/2019

Photo 27. Year 5 (2023), facing east toward ED03-03 and SW02. Photo taken 6/15/2023

Photo Point 27*

Photo 27*. Year 1 (2019), facing west toward ED03-03. Photo taken 6/21/2021

Photo 27*. Year 5 (2023), facing west toward ED03-03. Photo taken 6/15/2023

Photo Point 29

Photo 29. Year 1 (2019), facing north toward ID01. Photo taken 9/30/2019

Photo 29. Year 5 (2023), facing north toward ID01. Photo taken 6/15/2023

Photo Point 29*

Photo 29*. Year 1 (2019), facing southwest toward ID01. Photo taken 9/30/2019

Photo 29*. Year 5 (2023), facing southwest toward ID01. Photo taken 6/15/2023

Photo Point 30

Photo 30. Year 1 (2019), facing south toward ID01. Photo taken 9/30/2019

Photo 30. Year 5 (2023), facing south toward ID01. Photo taken 6/15/2023

Photo Point 31

Photo 31. Year 1 (2019), facing east toward ID01. Photo taken 6/19/2019

Photo 31. Year 5 (2023), facing east toward ID01. Photo taken 6/15/2023

Photo Point 32

Photo 32. Year 1 (2019), facing southwest toward ID01. Photo taken 6/19/2019

Photo 32. Year 5 (2023), facing southwest toward ID01. Photo taken 6/15/2023

Photo Point 34

Photo 34. Year 3 (2021), facing east toward ID01. Photo taken 6/19/2021

Photo 34. Year 3 (2021), facing east toward ID01. Photo taken 6/15/2023

Photo Point 36

Photo 36. Year 1 (2019), facing west toward ID01. Photo taken 9/30/2019

Photo 36. Year 5 (2023), facing west toward ID01. Photo taken 6/15/2023

Photo Point 38

Photo 38. Year 1 (2019), facing north toward ED01. Photo taken 6/19/2019

Photo 38. Year 5 (2023), facing north toward ED01. Photo taken 6/15/2023