Point Blue Report

Annual Report

Pacheco Creek Reserve Contingency Planting Project

Report to the Santa Clara Valley Habitat Agency

February 2021

Conservation science for a healthy planet

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February, 2020

Point Blue Conservation Science

STRAW Project

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Point Blue Conservation Science – Point Blue's 140 staff and seasonal scientists conserve birds, other wildlife and their ecosystems through scientific research and outreach. At the core of our work is ecosystem science, studying birds and other indicators of nature's health. Visit Point Blue on the web www.pointblue.org.

Table of Contents

PROJECT SUMMARY

The Pacheco Creek Preserve is a 55-acre property located in the southeastern portion of the Santa Clara County on the southeast side of Highway 152 (SR 152), approximately 13.6 miles east of Gilroy. There is a federally owned property to the east-southeast of the site which provides a buffer between the site and private land.

The acquisition of the Pacheco Creek property by the Santa Clara Valley Habitat Agency (Agency) provides key contributions to the Santa Clara Valley Habitat Plan (Summary, Pacheco Creek Mitigation Area, January 2016) in terms of management considerations. The Pacheco Creek property is located in conservation analysis zone Pacheco-6 (moderate conservation effort) and could contribute to conservation analysis zone requirements identified for Pacheco 1-6 and Plan-wide requirements. At the species-level, the site protects potential habitat for 9 of the 18 covered species. At the natural-community level, the site protects a healthy riparian woodland natural community (willow riparian forest and scrub and mixed riparian forest and woodland and Central California sycamore alluvial riparian) and provides opportunities for enhancement and restoration of these same land cover types. At the landscape level, the site protects land on either side of SR 152 at one of two key crossing points targeted under the Habitat Plan to protect and provide opportunities to enhance wildlife movement across the road. It protects 0.65 miles of Pacheco Creek and contributes to the protection of 2 linkages (#15 Henry W. Coe State Park southeast to San Benito County line and #17 Main stem of Pacheco Creek).

In October 2017, the Agency requested the assistance of Point Blue Conservation Science's (Point Blue) Students and Teachers Restoring A Watershed Program (STRAW) for contract in revegetation and habitat enhancement, local classroom involvement in restoration implementation, as well as maintenance and monitoring of plantings. STRAW sub-contracted Prunuske Chatham, Inc. (PCI) to assist with the revegetation planning and implementation.

The goal of the project is to enhance wildlife habitat with the establishment of a diverse palette of native tree and shrub species utilizing a climate-smart restoration approach to prepare the system for the consequences of climate change. Key considerations in the design plan include: 1) enhancement of Sycamore Alluvial Woodland Habitat (SAW); 2) inclusion of native heat/drought-tolerant woody species; 3) incorporating plant species that benefit special-status wildlife species such as the Least Bell's Vireo; California Red-legged Frog, California Tiger Salamander, and the San Joaquin Kit Fox; and 4) involving local schools and community members in hands-on restoration and stewardship.

Figure 1 illustrates the Oak Contingency Planting area which is a total of 7.25 acres. The planting zone and design plan were developed by PCI and adapted by STRAW and were chosen given the mix of Cortina very gravelly loam and Garretson gravelly loam soil types which support both upland oak woodland and riparian forest natural communities.

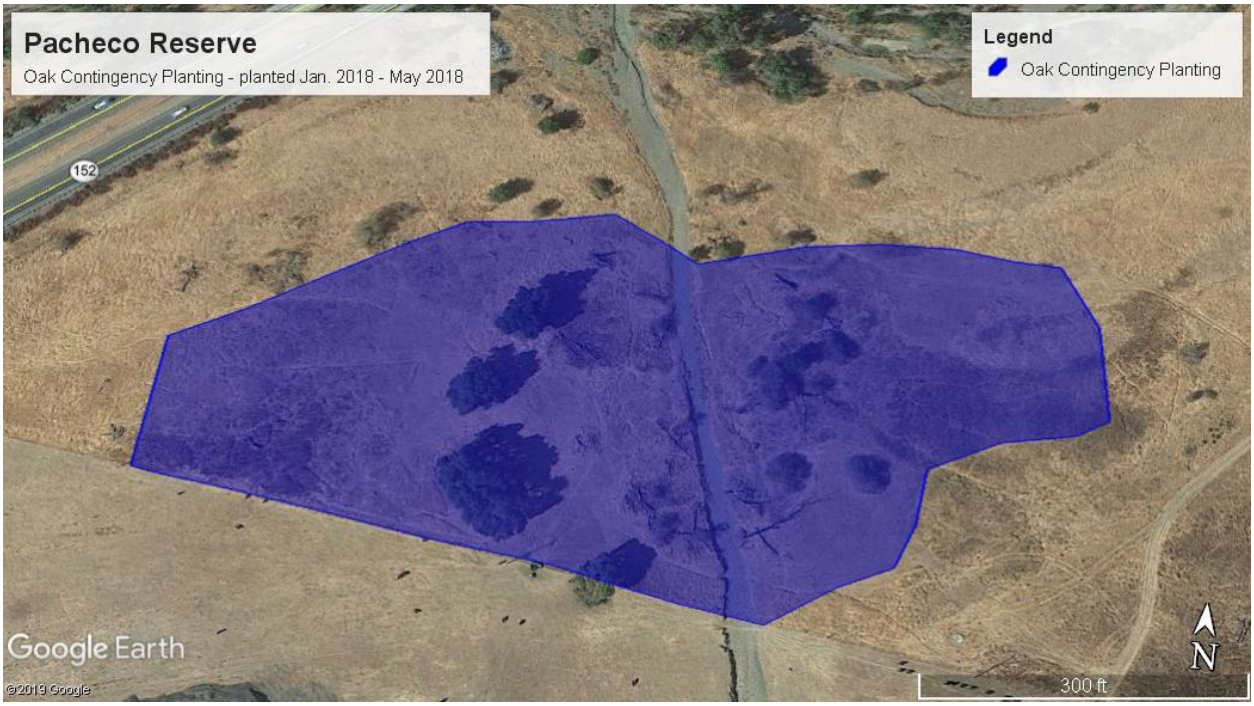

Figure 1. Oak Contingency Planting area. Additional replanting occurred in March to June 2020 within the boundaries of this planting area.

PLANTING IMPLEMENTATION

K-12 students, community volunteers, and STRAW staff were involved in plant installation for the Oak Contingency Planting area. Table 1 describes the planting dates as well as schools and community volunteers involved.

Volunteers installed acorns and container plants with browse protection from deer and hare by using deer cages above ground. Seed baskets were used for oak plantings as direct acorn seed was utilized in planting. Seed baskets extended below-ground by 10 inches to protect roots from ground squirrel and gopher activity. Coir weed mats were also installed by volunteers to deter invasive plant growth directly around plants. Tree wrap was later used on trees and woodier shrubs to deter rodent girdling. STRAW staff installed dripline irrigation for each plant after installation.

Table 1. Volunteer participation in Pacheco Creek Reserve Contingency Planting Project at Pacheco Reserve in 2017-2020.

Date Installed	Community Volunteers	# of Volunteers
1/18/18	Tres Pinos Elementary	31
1/19/18	Rucker Elementary, Pinnacles NP Intern Volunteer	66

1/26/18	Cerra Vista Elementary, San Benito Arts Council Coordinator	139
4/17/18	R.O. Hardin Elementary, Pinnacles NP, Santa Clara County Parks, BioSITE, Bar SZ Ranch	109
5/15/18	Cerra Vista Elementary	67
5/16/18	Cerra Vista Elementary	65
3/10/20	Tres Pinos Elementary	27
	Total Volunteers	**504**

Figures 2 and 3. Students installing seed baskets and using direct-seed method to plant acorns. Acorns were collected on site by Point Blue staff. Benefits to direct-seed planting include preservation of site-specific genetics, increased overall survivorship, and plants that establish and grow at a relatively faster rate compared to container plants.

Figures 4 and 5. Valley oak acorns planted in March 2020 display germination and growth in May 2020 (left) and late August 2020 (right).

PCI developed an initial plant list (Table 2) for STRAW restoration activities, and from that list Point Blue conducted a climate-smart restoration assessment. In general, climate models predict more extreme weather events along with warmer temperatures. Climate projections (Table 3) were collected from Cal-Adapt (cal-adapt.org) to give a sense for future climate conditions at Pacheco Reserve. Other climate models, such as Climate-Smart Watershed Analyst (climate.calcommons.org/tbc3/sf-bay-watershed-analyst), can provide even more insight for projecting seasonal water balances and seasonal precipitation patterns. The planting palette included drought tolerant species (e.g. live oak, buckeye, sagebrush) and species diversity to provide insurance against unknowns. Diverse food sources as well as structure and flowering/fruiting timing help support wildlife facing climate stresses. To meet these needs, 18 species of trees, shrubs, and forbs were selected for the planting palette. Figures 6 and 7 below describe the planting palette's climate-smart performance. As we began to source plants, we made adaptations to the original planting list and design plan based on limited plant stock availability onsite and at nurseries. These adaptations are described below. In some cases we bumped up numbers planted to fill in for species we were unable to locate. Further, Point Blue began replanting in winter/spring 2020 to account for previous year's mortality.

Table 2. Planting palette for the Pacheco Creek Reserve Contingency Planting Project. The actual number planted reflects adjusted planting number totals due to available plant stock.

Scientific Name	Common Name	Original number to plant per design	Actual number planted	Replanting numbers 2020	Plant Material
Aesculus californica	CA Buckeye	15	28	7	Container pots, direct seed
Artemisia californica	Coastal Sagebrush	40	8	0	Container pot
Baccharis pilularis	Coyote Brush	40	0	0	Container pot
Frangula californica	CA Coffeeberry	30	50	0	Container pot
Heteromeles arbutifolia	Toyon	30	14	0	Container pot
Mimulus aurantiacus	Sticky Monkeyflower	40	38	0	Container pot
Prunus ilicifolia	Holly Leaf Cherry	30	36	0	Container pot
Quercus agrifolia	Coast Live Oak	50	61	19	Direct seed
Quercus douglasii	Blue Oak	5	0	0	Direct seed
Quercus lobata	Valley Oak	25	8	57	Direct seed, container pot
Platanus racemosa	CA Sycamore	60	0	0	Container cuttings
Rosa californica	CA Rose	0	6	0	Container pot
Sambucus nigra ssp. caerulea	Blue Elderberry	20	32	0	Container pot
	Totals	**385**	**281**	**83**	

Table 3. Modeled climate projections for annual averages from Cal-Adapt, grid cell 37.03125, -121.34375. Historic values observed from 1950-1990, modeled projected values are for 2070-2099. Modeled projections feature two scenarios: RCP 4.5 – Emissions peak around 2040, then decline. RCP 8.5 – Emissions continue to rise strongly through 2050 and plateau around 2100.

Climate Variable	Historic Annual Mean	Modeled Projection RCP 4.5	Modeled Projection RCP 8.5
Maximum temperature	70.9 degrees F	76.0 degrees F	78.7 degrees F

Minimum temperature	44.1 degrees F	49.4 degrees F	52.5 degrees F
Precipitation	20.2 inches	22.1 inches	25.1 inches
Extreme heat days*	4 days	19 days	31 days

**Extreme heat days are defined as a day in a year when the daily maximum temperature exceeds the 98th historical percentile of daily maximum temperatures based on observed historical data from 1961-1990 between April and October. The threshold temperature for this grid cell is 96.7 degrees F.*

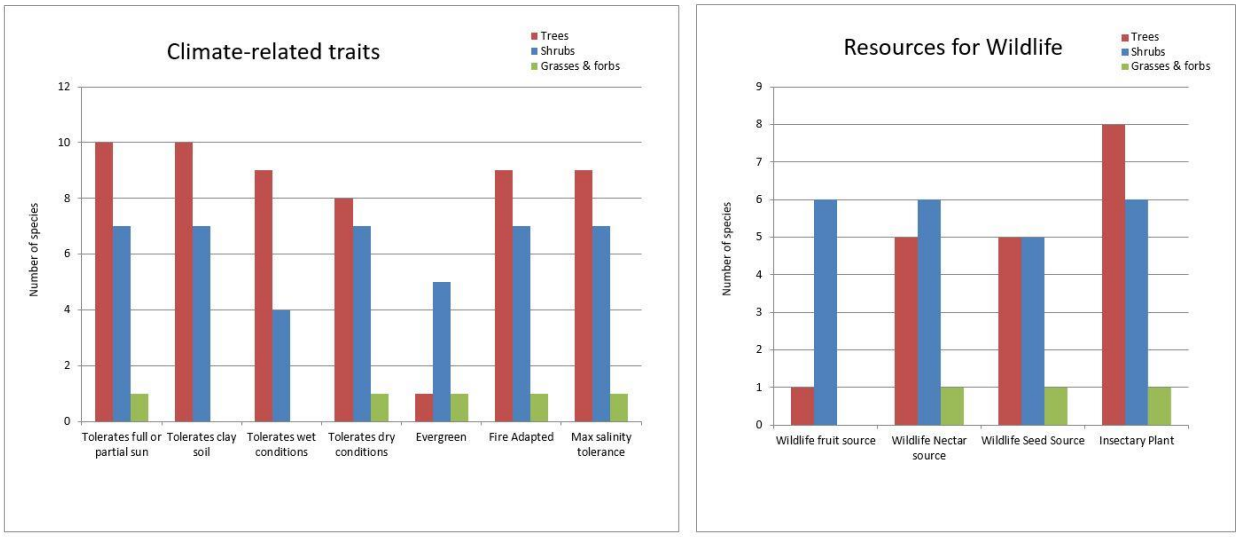

Figure 6. Evaluating the plant list with Point Blue's Climate-Smart Restoration Toolkit, each chart shows the number of species that meet specific climate-related traits and number of species provide wildlife resources. Some species exhibit several traits.

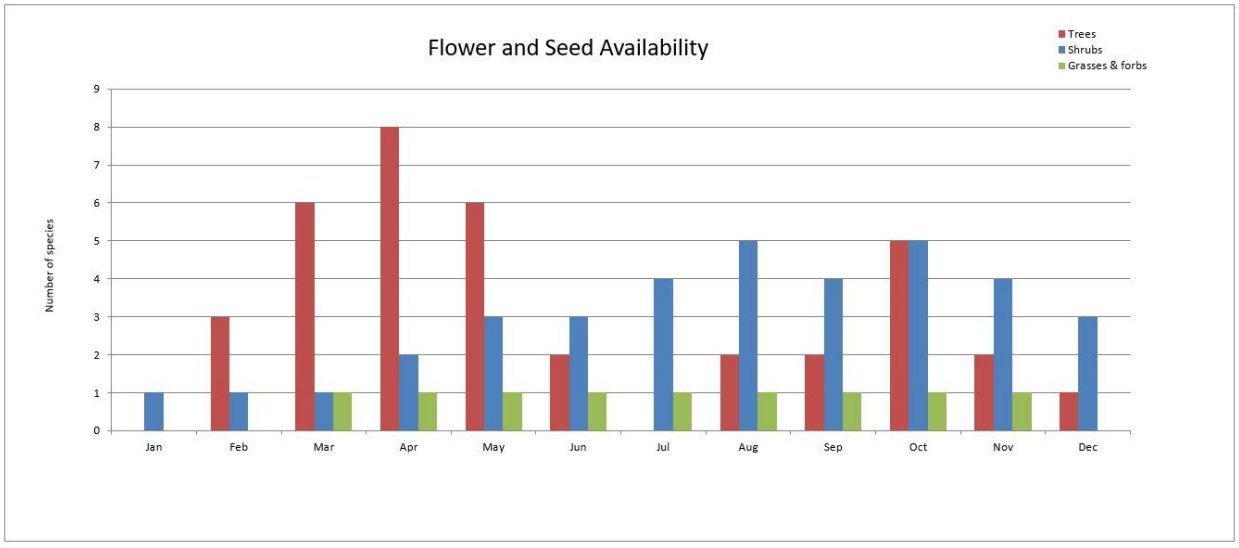

Figure 7. Evaluating the plant list with Point Blue's Climate-Smart Restoration Toolkit, this chart depicts how many plant species in our palette provide wildlife resources throughout each month of the year. An optimal spread would be to have several species of varying vegetative structure (trees, shrubs, grasses & forbs) providing wildlife resources for each month of the year. A year-round supply of wildlife resources buffers wildlife against changing climate conditions.

An additional change to our planting design was the omission of planting 80 sycamores (*Platanus racemosa*) in the planting area, for two reasons. First, STRAW staff was unable to locate confirmed non-hybridized sycamore plant stock at local native plant nurseries. Second, given a previous study conducted by San Francisco Estuary Institute (SFEI) and H.T. Harvey & Associates (HTH), in partnership with the Agency, we collectively determined that we didn't have enough information yet to appropriately assess non-hybridized sycamore stands to select planting material from nor an informed methodology for successful propagation techniques. According to the 2017 Sycamore Alluvial Woodlands study, groundwater levels are a crucial factor in sycamore survivability as well as periodic flooding to create conditions that support regeneration. Consultation with the Agency, California Department of Fish and Wildlife, and H.T. Harvey are needed prior to any restoration implementation involving sycamores. However, one approach to encourage sycamore regeneration could involve planting woody plant nurseries with species that are closely associated with sycamores as well as monitoring primary channels for invasive species that may outcompete sycamores.

STRAW staff procured all planting materials for restoration implementation. Acorns for Coast Live Oak (*Quercus agrifolia*) and Valley Oak (*Quercus lobata*) were sourced from several trees on site. Blue Oak (*Quercus douglasii*) was removed from the design plan as we determined that our planting zones were just below the elevation for optimal Blue Oak success. California Buckeye (*Aesculus californica*) seed was intended as planting material, but we found limited high-quality seed on site so instead purchased container plants. The remainder of plants were sourced from local nurseries who are utilizing phytosanitary best management practices for reduced risk of introducing plant pathogens to restoration sites via plant stock. Those nurseries are Central Coast Wilds, The Watershed Nursery, Capitol Wholesale Nursery, and California Flora Nursery. Further, Point Blue has consulted with Phytosphere Research principal, Ted Swiecki Ph.D., and now perform almost all phytopthora testing in-house using pear-bait and leachate testing methods.

For future plantings, we highly recommend sourcing local seed sources and conducting a contract grow. Currently, Point Blue is doing extensive research into site-specific seed collection, propagation, and planting and monitoring for any trends in survival and climate change resilience. Seed collection methods and timing protocols have been developed so seeds can be stored and grown at the Casa Grande Nursery in Petaluma, California. We did conduct small-scale seed collection efforts of Narrowleaf Milkweed (*Asclepias fascicularis*) and sent seeds into Hedgerow Farms for storage and future propagation. For future projects, we encourage discussions for future plantings so that we may be able to collect and store seeds now.

CURRENT SURVIVAL AND SITE CONDITIONS FOR OAK CONTINGENCY PLANTING

The table below (Table 4) shows the species and number of plants installed as well as plant survival numbers, height class, and health rating, either as high vigor (HV) showing healthy new growth or buds or as low vigor (LV) showing systemic stress. Plant establishment monitoring was performed on September 30th, 2020. The survival percentages in the Oak Contingency Planting area monitored for three summers after installation shows an overall survival percentage of 50%, the same percentage as last year's report. Of the surviving plants, nearly all are of high vigor, exhibiting new height and foliage growth.

Of note, the consistency in survival percentage reflects a combination of factors: 1) replanting of a total of 83 Coast Live Oak, Valley Oak, and California Buckeye trees, and 2) die-off of previously planted (2018) species.

Table 4. Oak Contingency Planting area survival data after summer 2020 (Year 3 of 5 for maintenance and monitoring):

Latin Name	Common Name	Total Planted	Alive 2018	Alive 2019	Alive 2020	Survive 2020	<3ft-LV	<3ft-HV	>3ft-LV	>3ft-HV
Quercus agrifolia	Coast Live Oak	61	42	50	36	59%		19	1	16
Prunus ilicifolia	Holly leaf cherry	36	20	16	11	31%		11		
Quercus lobata	Valley Oak	8	2	2	32	400%	1	28		3
Frangula californica	CA Coffeeberry	50	41	32	30	60%		27		3
Heteromeles arbutifolia	Toyon	14	4	5	2	14%		1		1
Mimulus aurantiacus	Sticky Monkeyflower	38	15	12	9	24%		8		1
Artemisia californica	Coastal Sagebrush	8	6	3	3	38%		2		1
Aesculus californica	CA Buckeye	28	21	6	8	23%	1	7		
Sambucus nigra	Blue Elderberry	32	15	14	9	29%		1		8
Rosa californica	California rose	6	3	0	0	0%				
	Total	**281**	**169**	**140**	**140**	**50%**	**1**	**104**	**1**	**33**
						Percent	*1%*	*75%*	*1%*	*23%*

In this planting area, the irrigation line hooked up to the existing trough piping which exhibited excellent pressure throughout the summer. Irrigation was run only during maintenance visits which was typically every other week, and that amount proved to be sufficient. We continued irrigation maintenance visits through October and into November given the dry and warm weather conditions this past fall. By November, the irrigation water pressure began to taper, and we were unable to clearly diagnose the problem. This issue will need to be revisited upon reinitiating maintenance and irrigation visits this spring.

The next section provides details on each maintenance visit over the summer (Table 5). Overall, individual plants were weeded by hand-pulling inside browse protection caging. Largescale invasive species removal of hemlock and thistle was not conducted this year, but could be considered for this coming season utilizing field support from the San Jose Conservation Corps.

Overall rodent pressure was quite prevalent this year. By mid-June, we began to observe heavy girdling at the base of plants regardless of the plantings being newly installed or in their third year of growth. To account for the girdling, we installed tree wrap, however that effort didn't always thwart rodents (Figure 8) and we further observed later in the summer that rodents had climbed plants and girdled branches and even entire plants (Figure 9). Other rodent pressure included burrowing at the base of plants and exposing and girdling plant roots. By July through the rest of the fall we were repairing ¼" and ½" dripline that had been chewed through by rodents.

Figures 8 and 9. Rodent girdling pressure resulted in much of the mortality that occurred this year.

MAINTENANCE WORK PERFORMED FOR OAK CONTINGENCY PLANTING

Table 5. Maintenance work performed during summer of 2020 in the Oak Contingency Planting area. Maintenance visits typically entailed running irrigation, walking drip line and repairing leaks, and weeding.

Date	Water Duration Hours	Total Work Hours	Activities	Site Health	Observations	Notes for next visit
5/6/20	N/A	16	Reconfigured irrigation, lines had been dragged and moved for unknown reason.	Plants are looking good.		Bring pressure gauge. Hold off on any planting until irrigation fixed and running.
5/8/20	4	16	In planting zone east of the Harper Trib., weeded inside cages, repositioned emitters, and fixed browse protection cages.	Irrigation running well. Acorns planted in March are sprouting!	Saw a bobcat, and a wild pig with piglets. Bullock's Orioles are very chatty.	Continue weeding inside cages and checking irrigation.
5/15/20	4.5 (west of trib.)	12	Ran irrigation. Operated solenoid manually as controller isn't working properly to open the valve fully.	Plants are looking great!		
5/21/20	3.5 (east of trib.)	12	Watered and continued weeding plants in Zone A, east of tributary.			Bring more stands, 2 gph emitters, and figure 8's.
5/29/20	4	8	Ran irrigation in both subzones for 2 hours each.			
6/10/20	3	15	Ran irrigation in both subzones for 1.5 hours each. Planted 3 valley oaks, 3 live oaks, and 6 buckeye container plants. Installed browse protection, weed matting, and irrigation.		Looks like cattle & wild pig have been inside planting area, evidenced by toppled cages, bent posts, and dragged drip lines. No damage to plants. Hemlock is drying out,	Need to figure out how to water zone B.

					yellow star-thistle starting to flower. Elderberries are berryin'. Black-headed Grosbeaks singing!	
6/18/20	2	14	Ran irrigation and prepped for planting (scraped, dug holes).	New plants are getting hit hard by gophers.	Girdling on plants.	Purchase gopher baskets for future plantings. Notify Gerry about Zone B batteries.
6/19/20	2	16	Ran irrigation system and planted 4 valley oaks, 9 live oaks, and 3 buckeyes.			Need to get Zone B batteries charged up.
6/25/20	4	7	Ran irrigation in each subzone for 2 hours.			
7/1/20	4	8	Ran irrigation.			
7/9/20	4	4	Ran irrigation, pressure seemed unusually lower today.	Lots of girdling on newly planted plants.	Possible that cows were in planting areas, noticed fresh cow patties, knocked over and crushed cages in some cases.	Install more tree wrap, plug clearly-dead plants, realign dripline (oak section not getting H2O).
7/15/20	4	8	Ran irrigation, fixed browse protection cages, installed tree wrap.	Direct seed oaks planted in March look great and are already growing taller than seed basket cage – remove tops next time.	Saw a skunk!	Scan and be on high alert for yellow jacket nest. Got stung on west side of large oaks, nest nearby perhaps.

7/31/20	4	24	Ran irrigation. Repaired all leaks. Removed seed baskets tops from direct-seed valley oak plantings.		Lots of rodent activity! Lots of chewed-through ½" and ¼" lines, some burrowing at base of larger, established plants, girdling on brand new plants.	Bring more ½" couplers.
8/6/20	4	17	Ran irrigation.	All plants looking good overall.	Lots of rodent activity, either burrowing at the base of the plant or girdline in some cases. Took photos (Figure 10) – hard to see some 3rd-year plants perish from rodent activity.	Bring shovel to fill in ground squirrel holes near plants. Bring more 1/2" line figure 8's. Purchase more stoppers.
8/14/20	3	16	Ran irrigation and took photo points for narrow leaf milkweed locations. Water in irrigation line got very hot just after 10am.	A few more plant casualties due to rodent activity.		
8/27/20	4	12	Ran irrigation just fine.	A lot of rodent activity impacting plants.	Most of rodent impact is in subzone west of trib. Voles are not only girdling trunks of plants, but they're also climbing and girdling branches.	Bring more tree wrap. Speed baskets are ineffective because rodents come in from the top and burrow. Find a way to cinch tops.
9/1/20	3	8	Watered each subzone.			

9/16/20	4	14	Ran irrigation.	More rodent girdling on elderberry particularly .	Coffeeberry are pretty untouched (ungirdled) by rodent activity, wonder if that's just luck? Turkey mullein coming in thicker.	Bring hook tool to loosen filter in Zone A.
9/22/20	4	8	Ran irrigation.			
9/30/20	4	8	Ran irrigation. Collected monitoring data.			
10/9/20	4	8	Ran irrigation. Finished collecting monitoring data. Collected acorns.			
10/27	3	5.5	Ran irrigation.			
11/11	3	7	Ran irrigation. Trough water not running at full strength. 75% of plants were watered for 2 hours but likely didn't receive full amt of water.	Trough water not running at full strength.	Lots of pig activity, rummaging, no real damage to plants.	

Figure 10. A healthy and thriving Coast Live Oak killed by rodent burrowing that exposed and girdled roots.

SITE MONITORING PHOTOS

Figure 11. Each year, Point Blue conducts photo-monitoring surveys (year 3 of 5). Photo point locations below. Zone A = Oak Contingency Planting area photo points, and Zone B = Pacheco Reserve Enhancement/ Restoration planting area photo points.

Photomonitoring point Oak Contingency Planting_1 – Nov. 2018 (left) and Sept. 2020 (right)

Photomonitoring point Oak Contingency Planting_2 – Nov. 2018 (left) and Sept. 2020 (right)

Photomonitoring point Oak Contingency Planting_3 – Nov. 2018 (left) and Sept. 2020 (right)

Photomonitoring point Oak Contigency Planting_4 – Nov. 2018 (left) and Sept. 2020 (right)

Photomonitoring point Oak Contingency Planting_5 – Nov. 2018 (left) and Sept. 2020 (right)

Photomonitoring point Oak Contingency Planting_6 – Sept. 2018 (left) and Sept. 2020 (right)

Photomonitoring point Oak Contingency Planting_7 – Sept. 2018 (left) and Sept. 2020 (right)