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2016 Photo Monitoring

Santa Lucia Preserve,
Monterey County, California

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Preface

This report has been prepared for the Santa Lucia Conservancy and presents the 2016 photo monitoring results of four major streams flowing through Santa Lucia Preserve– Las Garzas, Potrero, San Jose, and San Clemente Creek. These data are part of a long term dataset, and will serve to assess changes brought by the Soberanes Fire runoff.

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1 Introduction

The Santa Lucia Preserve (SLP) is a 20,000 acre low density development in Monterey County, CA. The Santa Lucia Conservancy (SLC) is a non-profit organization established to manage 18,000 undeveloped acres of the SLP. Four streams within the SLP are monitored by the SLC: Las Garzas Creek, San Jose Creek, Potrero Creek and San Clemente Creek (Figure 1). Since the formation of the SLC in 1995, photo monitoring data have been collected intermittently by various organizations. This report presents photo monitoring images collected from eight monitoring sites (Figure 1).

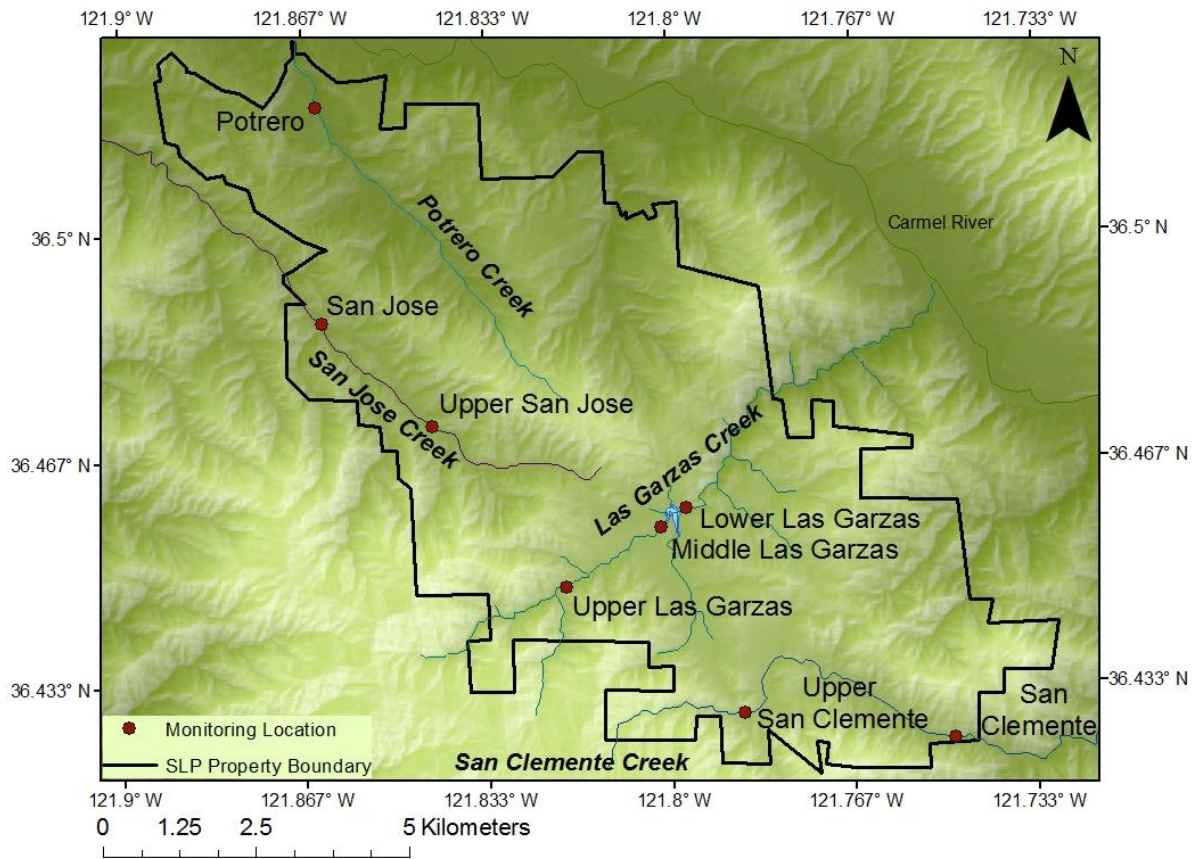


Figure 1: Map of Santa Lucia Preserve showing eight monitoring sites on four streams within the property boundary.

The Soberanes Fire started in late July 2016 by an unattended campfire on Soberanes Canyon Trail in Garrapata State Park. The fire burned a total of 206 square miles and crossed into the Carmel Watershed in early August. The SLP was widely burned by both wildfire and backfires, and was also a major center for fire-fighting and containment activities. Containment work involved cutting many miles of firebreaks along the watershed slopes and across rivers. San Jose Creek was subject to a controlled burn and was a staging area for firefighters (Figure 2, A & B). These

fire-related disturbances have the potential to impact stream water quality and channel morphology (Merrill and Casaday 2003). Best management practices, including placing locally-sourced boulders to reestablish the low-flow channel, have been employed after the evacuation of heavy equipment and firefighting efforts in the SLP (Figure 2, C & D). The goal of this report is to continue a baseline data set for photo monitoring to capture future impacts of the fire such as erosion, deposition and debris flows. The most recent photo monitoring images (taken in November 2016) are compared to both the oldest available corresponding images and the most recent previous photos taken in August 2014. All additional historical photographs of the SLP beginning in 1998 are available in the SLC office and in Paddock et al. (2011).



Figure 2. Bulldozer fire break impacts on the banks of San Jose Creek. A & B are before the bulldozer impacts were mitigated. Photos C & D show the fire break after the site was regraded and repaired. Photos taken from a single location on a trail looking away from the stream (C) and across the stream (D).

1.1 Photo Monitoring

Photo monitoring is a method used to record long term qualitative changes in stream channels. Photographs are used to analyze potential changes in channel substrate, channel morphology, and vegetation. Photographs are collected annually in low flow conditions because the channel is more exposed. Positioning of the photographer, distance from an established point, height above ground, inclination angle, bearing, and focal length are all factors that should be held constant (CARCD 2001).

From 1998 to 2003 several photo monitoring sites were established by installing white PVC pipe vertically in the stream bed. In 2009 and in 2011, two additional sites were included for a total of eight monitoring sites.

1.2 Monitoring Locations

This report presents photo monitoring images collected from eight monitoring sites (Appendix A, Figure 1). There are two monitoring sites on San Clemente Creek. The site named "San Clemente" is 30 meters upstream from the gage, a half mile upstream from the property line. The site named "Upper San Clemente" is 50 meters downstream from the intersection of Robinson Canyon Road and San Clemente Creek, 5 meters upstream of the footbridge.

There are two monitoring sites on San Jose Creek. The site named "San Jose" is the downstream site located upstream of a cement weir. The site named "Upper San Jose" is located near Lot 46, near Rancho San Carlos Road.

There are three monitoring sites on Las Garzas Creek. The site named "Lower Garzas" is 50 meters downstream from Moore's Lake. The site named "Middle Garzas" is upstream of Moore's Lake, upstream of the culvert. The site named "Upper Garzas" is 50 meters upstream of the intersection of Las Garzas Trail Road and Las Garzas Creek.

There is one monitoring site on Potrero Creek. The site is located in the lower reach of the creek, 50 meters downstream of the gage.

2 Methods

Photographs of eight monitoring sites were taken in November 2016 with cellular phones. A photo was taken downstream of the PVC pipe looking upstream. Another photo was taken upstream of the PVC pipe looking downstream. Photographs from 8 monitoring sites were compared with previous photos taken 1–14 years in the past. If the PVC pipe was dislodged or broken, it was replaced and located as closely as possible to the original location. All references to “left” or “right” bank are from the perspective of the downstream view, independent of the direction of the photograph.

3 Results

Photo Monitoring

The following descriptions of geomorphic change in the SLP creeks are drawn from cursory analysis of photographic pairs shot from approximately the same position and direction in 2016 as they were in various previous years. While some of the photo pairs represent decadal-scale changes, these changes do not necessarily indicate long-term continuous “trends.” In all photo pairs, the differences might be trends, seasonal changes, or the results of a single geomorphically-important flood event that occurred sometime during the time span.

San Clemente

San Clemente has more cobbles and boulders visible in the channel and floodplain in 2016 than in 1998 in both upstream and downstream views. The physical rearrangement of boulders in the photos indicates that large particles have been transported into place as well as being exhumed by the removal of finer sediment deposits. In 1998 there was a woody debris accumulation across the channel. In 2016 the debris has accumulated a bit further upstream. In the upstream view, the bar on the left bank, at the base of the downed Redwood tree, has stabilized and grown over with grassy vegetation (Figures 3–6).

Upper San Clemente

The site was established in 2011. There have been minor changes in the channel from 2011 to 2016. There is more sand present within the channel in 2016 as compared to 2011. There is dense vegetation and coarse woody debris (Figure 7–10).

San Jose

San Jose has had an increase in vegetation in 2016 compared to 1999 in both upstream and downstream views. The increased vegetation has stabilized the channel banks and visible bar. There is large woody debris moving through the system, as old debris visible in 1998 is no longer visible in 2016 and new woody debris has accumulated in the channel and on the channel banks. Local changes include fine particle deposition where there was woody debris in 1999, visible on the right bank in the downstream photo and fewer cobbles (Figures 11–14).

Upper San Jose

It is difficult to analyze potential change at Upper San Jose because of the sparse lighting of the photographs from 2000. There has been a large increase in vegetation and woody debris from 2000 to 2016 (Figures 15–18). Between the photomonitoring site and where Figure 2 was taken, field technicians noted a large deposit of fine sediment was not present in the past years.

Lower Garzas

Lower Garzas has an increase in riparian forest growth and channel bank vegetation in 2016 compared to 1999. There appear to be fewer cobbles in 2016 as well. There is an accumulation of woody debris, not shown in the photographs, that has created a pool where there was a riffle in 1999 (Figures 19–22).

Middle Garzas

The comparison of the photographs of Middle Garzas is difficult because of the dense vegetation that has accumulated along the channel banks. Vegetation type also seems to have shifted from ferns and reeds to larger woody trees and shrubs. The dense vegetation has stabilized the banks in 2016 (Figures 23–26).

Upper Garzas

The oldest photograph available for Upper Garzas is from 2009. The rebar at this site has been knocked over and now sits at a 45-degree angle. There have been no visible changes apparent from photo monitoring in 2009 and 2013 (Figures 27–30).

Potrero

The Potrero channel has shifted from the right bank to the left bank between 2003 and 2016. The channel change is visible in the downstream photo and the exposed sand bar. There has been an increase in large woody vegetation from 2003 to 2016. Particle size appears to remain constant (Figures 31–34).

4 Discussion

Photo monitoring results indicate that there have been no unexpected changes in stream morphology for many years in the four streams in this study. Riparian vegetation continues to become more dense and there are small changes in particle size, common with changing seasonal flows, noted for Potrero and San Jose Creeks. We recommend the continuation of annual photo monitoring to capture potential fire-related impacts to stream channel morphology.

5 Photo Monitoring Images



Figure 3: Downstream view of San Clemente Creek in March 1998



Figure 4: Downstream view of San Clemente Creek on (A) August 18, 2014 and (B) November 4, 2016



Figure 5: Upstream view of San Clemente Creek in March 1998



Figure 6: Upstream view of San Clemente Creek on (A) August 18, 2014 and (B) November 4, 2016



Figure 7: Upstream view of Upper San Clemente August 2011



Figure 8: Upstream view of Upper San Clemente on (A) August 18, 2014 and (B) November 4, 2016



Figure 9: Downstream view of Upper San Clemente August 2011



Figure 10: Downstream view of Upper San Clemente on (A) August 18, 2014 and (B) November 4, 2016



Figure 11: Downstream view of San Jose Creek in August 1999



Figure 12: Downstream view of San Jose Creek on (A) August 18, 2014 and (B) November 4, 2016.



Figure 13: Upstream view of San Jose Creek in August 1999



Figure 14: Upstream view of San Jose Creek on (A) August 18, 2014 and (B) November 4, 2016



Figure 15: Downstream view of Upper San Jose Creek in September 2000



Figure 16: Downstream view of Upper San Jose Creek on (A) August 18, 2014 and (B) November 4, 2016



Figure 17: Upstream view of upper San Jose Creek in September 2000



Figure 18: Upstream view of upper San Jose Creek on (A) August 18, 2014 and (B) November 4, 2016



Figure 19: Downstream view of Lower Las Garzas Creek in October 1999



Figure 20: Downstream view of Lower Las Garzas Creek on (A) August 18, 2014 and (B) November 4, 2016



Figure 21: Upstream view of Lower Las Garzas Creek in October 1999

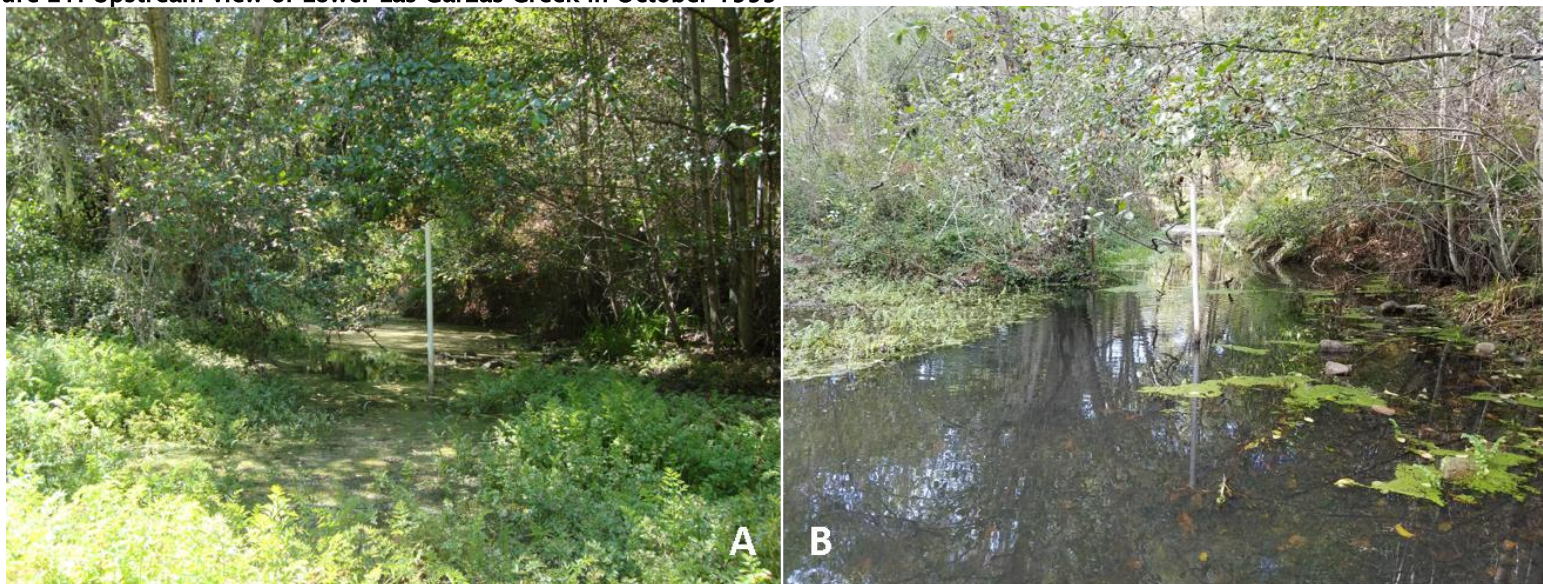


Figure 22: Upstream view of Lower Las Garzas Creek in (A) August 18, 2014 and (B) November 4, 2016



Figure 23: Downstream view of Middle Las Garzas Creek in November 2000

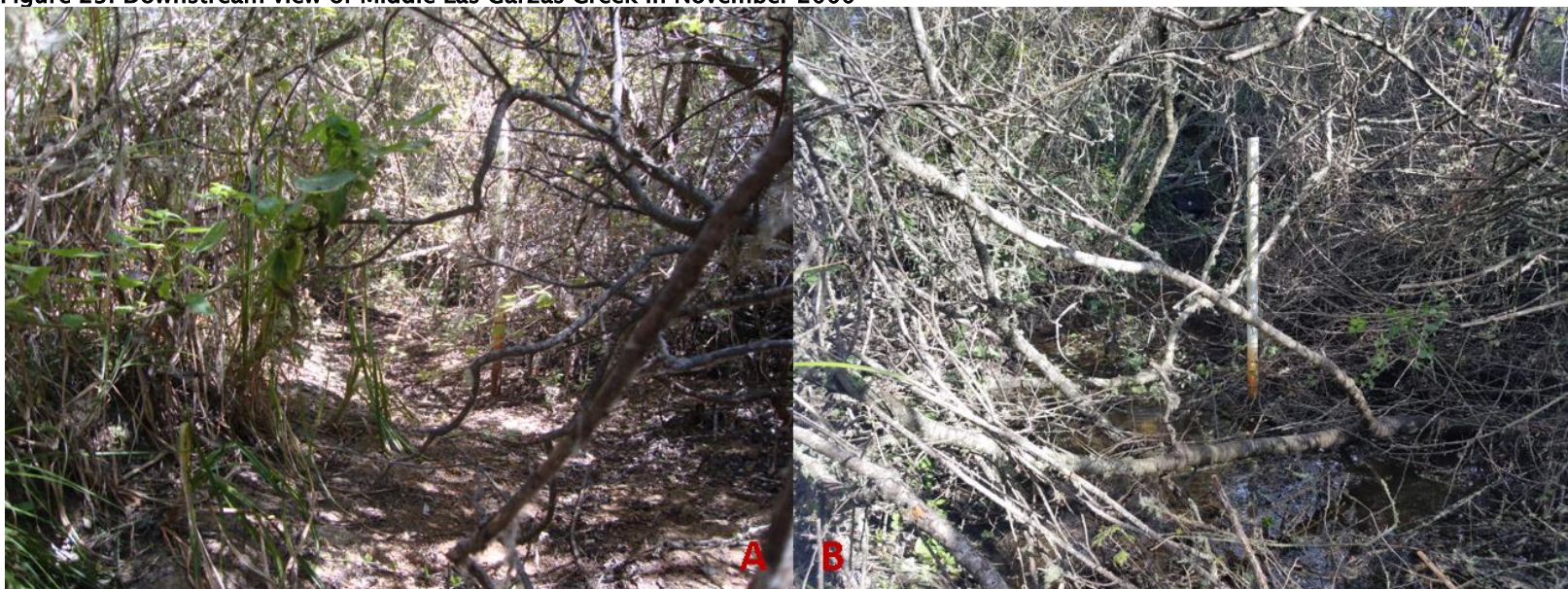


Figure 24: Downstream view of Middle Las Garzas Creek on (A) August 18, 2014 and (B) November 4, 2016

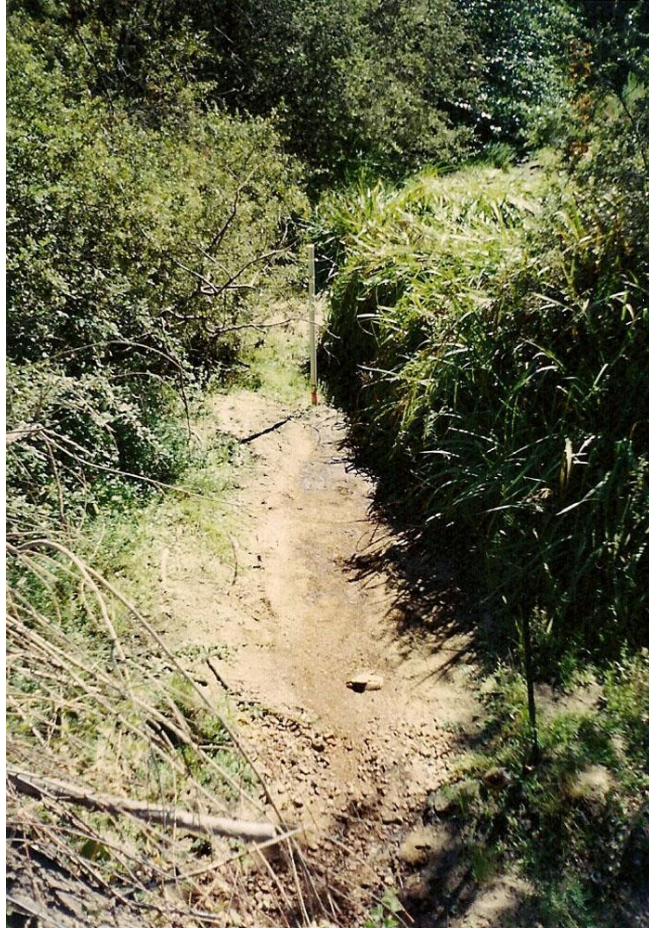


Figure 25: Upstream view of Middle Las Garzas Creek in August 2000 (estimate of date)



Figure 26: Upstream view of Middle Las Garzas Creek on (A) August 18, 2014 and (B) November 4, 2016



Figure 27: Downstream view of Upper Las Garzas Creek in August 2009



Figure 28: Downstream view of Upper Las Garzas Creek on (A) August 18, 2014 and (B) November 4, 2016, Rebar was bent over approximately 45 degrees



Figure 29: Upstream view of Upper Las Garzas Creek in August 2009

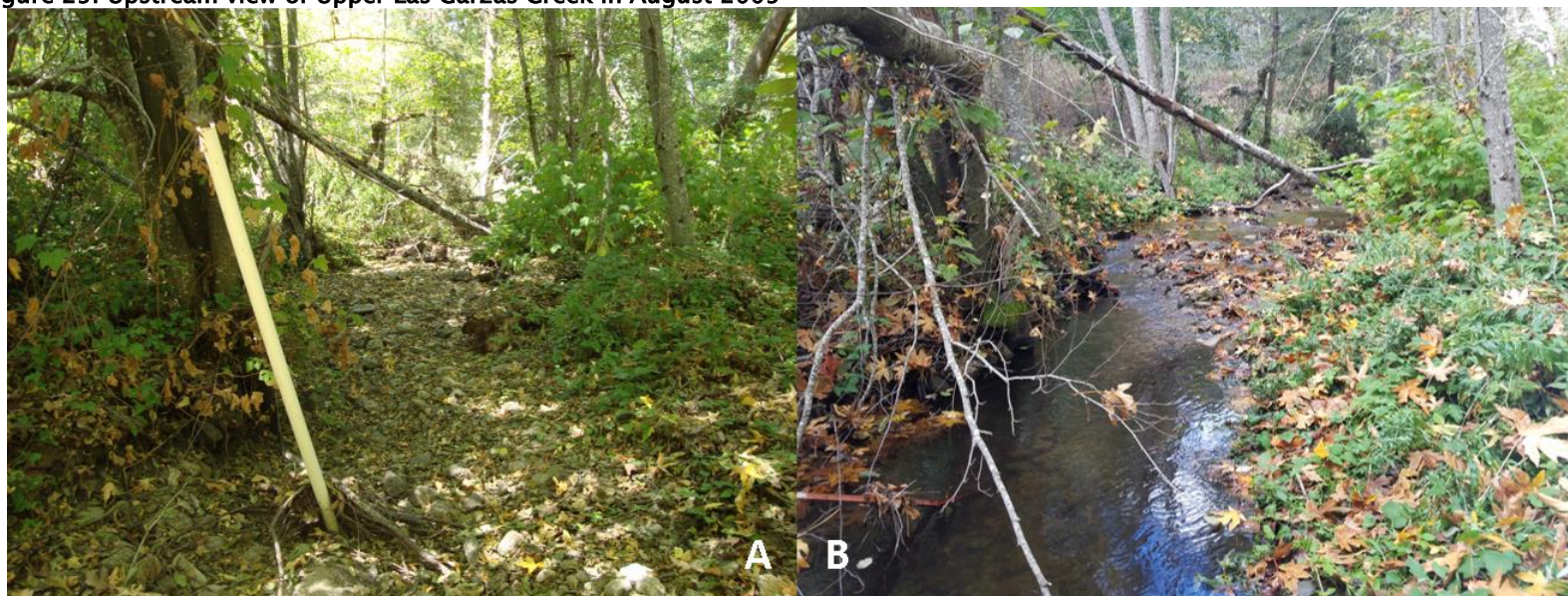


Figure 30: Upstream view of Upper Las Garzas Creek on (A) August 18, 2014 and (B) November 4, 2016. Damaged rebar in lower left corner



Figure 31: Downstream view of Potrero Creek in July 2003



Figure 32: Downstream view of Potrero Creek on (A) August 18, 2014 and (B) November 4, 2016



Figure 33: Upstream view of Potrero Creek in July 2003



Figure 34: Upstream view of Potrero Creek on (A) August 18, 2014 and (B) November 4, 2016

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7 Appendix A

Monitoring Site Locations

Site #1: Potrero Creek

Location: 36.51898°N, -121.86406°W

Directions: This site is located 50 meters downstream of the Potrero streamflow datalogger, approximately a quarter mile upstream of the preserve main gate. Immediately following the main gate, turn left onto Potrero Canyon Road. There will be a small gravel parking pad on the right side. Park here and walk 100 meters south to the site.

Site #2: San Jose Creek

Location: 36.48709°N, -121.86329°W

Directions: From the main gate, follow Rancho San Carlos Road SE. Just past the Canterra Trail intersection, the road descends steeply into San Jose Creek Canyon. Near the bottom of the hill, there is a dirt road to the right. Park on the pavement at the beginning of the dirt road. Walk 300 meters down the road to the creek. The monitoring sit is 50 meters downstream, just upstream of the cement weir.

Site#3: Upper San Jose Creek

Location: 36.47178°N, -121.84326°W

Directions: From site #2, continue heading southeast on Rancho San Carlos Road. The site is located about 2 miles up the canyon near Lot 46, just before the road splits around a group of trees. Park on the side of the road before the bridge of the Lot 46 driveway. Follow the hiking trail to the north side of the driveway, on the east side of the creek, for 50 m to the monitoring site.

Site #6: San Clemente

Location: 30 m upstream from the datalogger that is located at 36.42527°N,

121.74842°WDriving Directions: From Robinson Canyon Road, drive east on San Clemente Road.

At the Dormody Road intersection, take the left turn to continue heading down San Clemente Creek Canyon. The site is located a couple of miles down the road from the Dormody Road, and about a half a mile upstream from the San Clemente Ranch gate. Here you will find a small area off to the side of the road that is suitable for parking. (PVC marker)

Site #11: Lower Garzas Creek

Location: 36.45938°N, -121.79708°W, 100 m downstream from Moore's Lake Outflow datalogger.

Driving Directions: On Robinson Canyon Road, park alongside the road 50m south of the bridge where Moore's lake feeds into Garzas Creek. Climb over the fence and follow the abandoned gravel road to the left for about 150m to the site. (staff plate on tree upstream of crossing)

Site #9: Moore's Lake Inflow (Middle Garzas Creek)

Location: 36.45665°N, -121.80166°W

Driving Directions: From Rancho San Carlos Road heading SE, turn left onto Pronghorn Run at the equestrian center. Then turn left onto Lake Walk Trail. The stables will be on your left and the corrals on your right. The trail curves left into a willow filled wetland where it crosses Garzas Creek. There is parking 25 meters past the culvert. (PVC marker)

Site #4: Upper Garzas Creek

Location: 36.44793°N, -121.81918°W

Driving Directions: Heading SE on Rancho San Carlos Road, turn right onto Garzas Trail just past Chamisal Pass Road. Drive up Garzas Trail to the cul-de-sac loop at the end of the road. Turn left onto a driveway that heads to 9 and 10 Las Garzas Trail immediately before the loop. In ¼ mile there is a bridge that crosses Garzas Creek. The site is about 50 m upstream from the bridge. (PVC marker)

Site #10: Upper San Clemente Creek, 36.428938°N, -121.788800°W

Directions: From the southern terminus of Rancho San Carlos Road, exit the gate and head south on Robinson Canyon Road. After about 1 mile, the road makes a sharp right, crosses a small intermittent creek and then heads back sharply to the left. After this zig zag in Robinson Canyon Road, there will be a gated driveway on the east side of the road to access lots 99 and 100. Park here, go through the gate, head down the driveway about 50 yards, then head to the left to the small stream. The sampling site is directly upstream from the footbridge. Gate combo is 9910.

Site #12: Old Lower Potrero Creek

No longer being monitored according to Bruce Cyr's report

Site #7: Upper Hitchcock Creek, 36.450195°N, -121.758980°W (Has not been recently monitored)

Directions: On Black Mountain Trail, about a half-mile up the hill from the intersection with Touche Trail, the road makes a very broad curve to the left. In the middle of this curve, the road passes a saddle between the Las Garzas Creek watershed and the Hitchcock Creek watershed. From this saddle, walk (or drive if you have 4WD) down the Portugese Spring Trail down the hill to the east. About a mile down the hill, the trail cuts back sharply to the left and ends at the Portugese spring cement trough. About 200 feet south of the spring, from the trail, head down the hill toward the east, hiking down through open grassland. As you head down the hill to the east, you will enter a strip of dense patch dark green rush that cuts west through

the oaks. Follow this patch of rush down the hill until the rushes end at the edge of the oaks, and turn to the left (north) into the woods to find the monitoring site.

Site #8: tributary of Robinson Creek, 36.497824°N, -121.813132°W (has not been recently monitored)

Directions: This site is located in the small creek at the bottom of (east of) the homeland of lot 224. From the end of the paved driveway at the entrance to the homeland of lot 224, walk down the hill to the east through the open grassland area. Where the grassland grades into oak woodland, continue heading down the hill to the east into the scattered coast live oaks. The monitoring site is in the small creek in the bottom of the ravine just inside the oak woodland. This creek is NOT on the main branch of Robinson Creek, but rather a small tributary.