Cambria Community Services District Water Reclamation Facility Adaptive Management Plan Annual Report 2021

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Table of Contents

1.0 INTRODUCTION

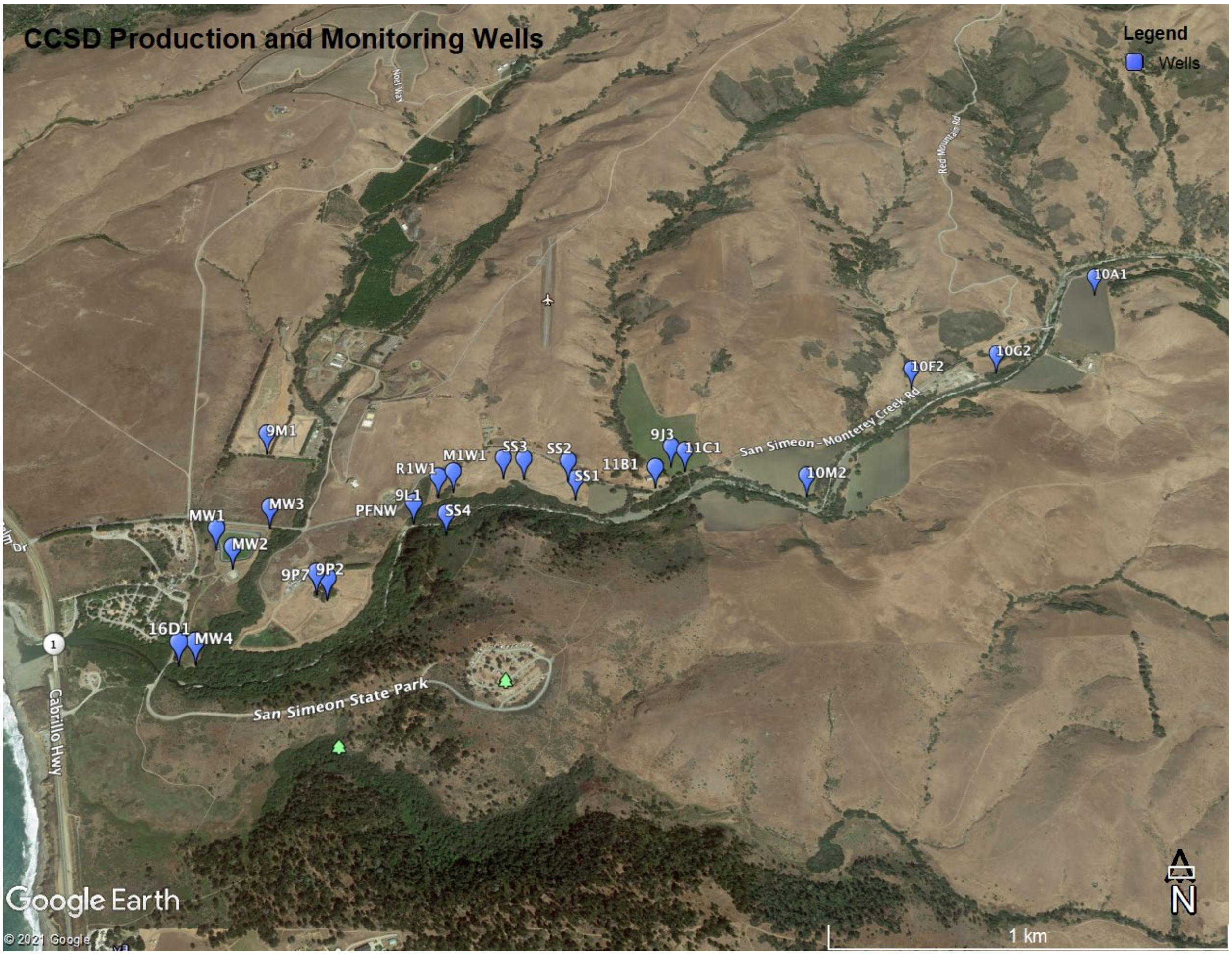
This annual report is per requirements contained within the Cambria Sustainable Water Facility Project (SWF), now called the Water Reclamation Facility (WRF), Adaptive Management Plan (AMP) for the Cambria Community Services District (CCSD, Michael Baker International 2017). The AMP requires annual reporting of completed surveys to analyze potential impacts to sensitive biological resources from the operation of the WRF. The WRF is currently not in operation. Therefore data collected for this annual report will form baseline conditions for possible future WRF operations. The annual report covers the period from January 2021 to December 2021.

AMP monitoring requires hydrological and biological monitoring, including California Rapid Assessment Method (CRAM) surveys, special status species surveys, and instream and riparian habitat monitoring. This report provides the methods, results, and discussion of the AMP monitoring per AMP requirements and the results of a hydrological modeling effort that provided information to update AMP thresholds, monitoring measures, and performance standards. The WRF has not been in operation, so the AMP water budget for the WRF is not discussed in this monitoring report.

2.0 METHODS

2.1 Groundwater Monitoring

CCSD employees take well readings either bimonthly or monthly from: 16D1, MW4, MW1, MW2, MW3, 9M1, 9P2, 9P7, 9L1, RIW1, SS4, MIW, SS3, SS2, SS1, 11B1, 11C1, PFNW, 10A1, 10G2, 10G1, 10F2, 10M2, 9J3, and the lagoon (Figure 1).



SS1, SS2, and SS3 are CCSD production wells and 16D1, MW4, MW1, MW2, MW3, SS4, M1W1, 11B1, 11C1, 10A1, 10G2, 10G1, 10F are monitoring wells. 9P2 and 9P7 are currently monitoring wells but can provide gradient controls. 9L1 was an irrigation well but is currently a monitoring well. R1W1 and 10M2 were built for the WRF and are currently monitoring wells. Additional monitoring wells include SS4 and Lagoon, both located on State Park's property, and 9M1 which is located on private property. PFNW (Palmer Flats New Well) is a USGS monitoring well, and 9J3 is a domestic use well. In April of 2021, CCSD installed four piezometers (SWMFW 1, SWMFW2, SWMFW3, SWFMW4) between well 9P7 and 16D1 for a proposed hydrological pump test.

2.2 Groundwater Quality Monitoring

Semiannually, CCSD performs water quality analysis at wells SS3, SS4, 9P7, 16Dl, and 9N2 for nitrate/nitrogen, total dissolved solids, sodium, chloride, sulfate, boron, and pH. Additional water quality monitoring is required for WRF mitigation water per the Regional Water Quality Control Board's Permit for low threat discharges. Due to the non-operation of the WRF, no analysis has been performed. Once the WRF is in operation, this water quality data will be included in future reports.

2.3 Biological Monitoring

CRAM Surveys

The California Rapid Assessment Method was completed at Van Gordon Creek and San Simeon Creek. CRAM surveys evaluate wetland conditions based on landscape setting, hydrology, physical structure, and biological structure. CRAM surveys were completed on San Simeon Creek in 2005, 2007, 2015, and 2020. Each annual survey was compared with previous surveys to evaluate habitat conditions.

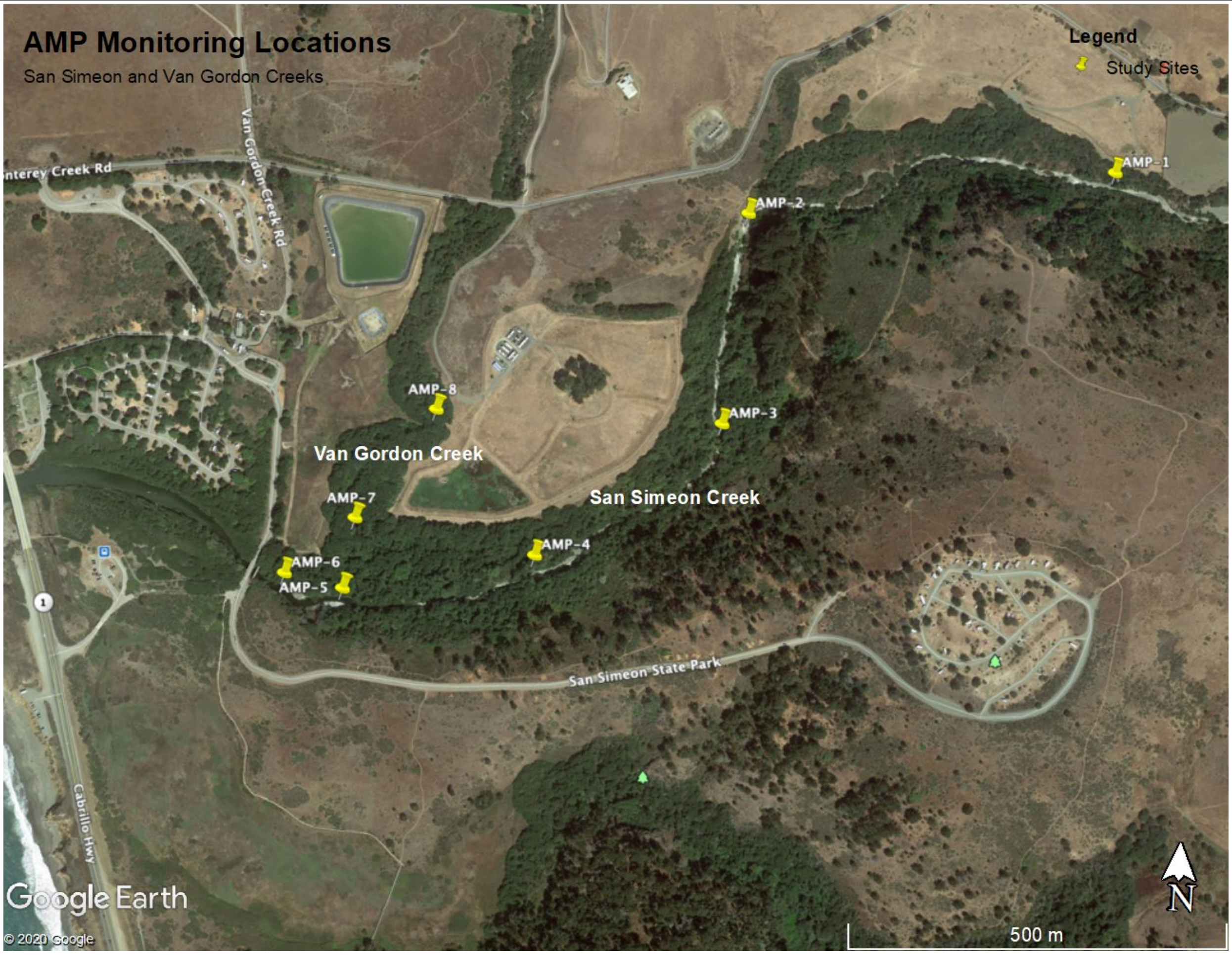
Special Status Species Surveys

Per AMP guidelines, non-protocol level, visual surveys for California red-legged frogs (*Rana draytonii*), tidewater gobies (*Eucyclogobius newberryi*), and south-central California coast steelhead Distinct Population Segment (DPS) were completed. Species surveys for this report were for baseline species data and include a discussion of the species distribution and habitat requirements.

California red-legged frog surveys followed the protocol contained in the "Revised Guidance on Site Assessments and Field Surveys for the California Red-legged Frog" (USFWS, 2005b). Prior to the fieldwork, a review of documents concerning the project site study area and the surrounding areas, including a search of the California Natural Diversity Database was completed. The daytime survey consisted of walking around the project site study area to characterize the habitat, assess site conditions, and prepare for the nighttime survey. The night survey consisted of walking upstream, using 400-800 lumen adjustable flashlights and 8 X 40 binoculars while scanning for eyeshine and identifying all amphibians observed. Approximately 0.60 acres were surveyed for each survey day.

Instream and Riparian Habitat Monitoring

Per methods described in the AMP, biological surveys were conducted at 7 survey sites twice a month to collect habitat, hydrological, water quality, and species information (Figure 2).



As identified in the AMP, survey sites are located on San Simeon Creek and Van Gordon Creek within CCSD property. The survey sites are described below by survey site number, creek, access description, site description, and GPS coordinates.

Survey Site Number	Creek	Access Description	Site Description	GPS Coordinates
Site 1	San Simeon	Well field	Trail by SS-1	35°36'0.23"N 121° 6'33.42"W
Site 2	San Simeon	Trail behind MW-4 behind Van Gordon Reservoir	Below rock pool, approx. 0.4 miles upstream of Van Gordon confluence	35°35'57.55"N 121° 6'53.39"W
Site 3	San Simeon	Trail behind MW-4 behind Van Gordon Reservoir	Draw a line from 9P7 along road to the creek	35°35'48.09"N 121° 6'54.29"W

Site 4	San Simeon	Trail behind MW-4 behind Van Gordon Reservoir	Low flow channel in summer	35°35'41.88"N 121° 7'4.04"W
Site 5	San Simeon	Trail behind MW-4 behind Van Gordon Reservoir	Upstream of Van Gordon confluence	35°35'40.00"N 121° 7'14.25"W
Site 6	San Simeon	No Access on State Parks property	Downstream of Van Gordon confluence	
Site 7	Van Gordon	Trail behind MW-4 behind Van Gordon Reservoir	Upstream from trail before debris jam	35°35'43.10"N 121° 7'13.85"W
Site 8	Van Gordon	Inside locked gate of the AWTP	Down trail through riparian	35°35'48.06"N 35°35'48.06"N

Survey Conditions

Survey condition data includes survey times, weather, time, and stage of high and low tides, if the sandbar is breached, and water levels for the San Simeon Creek County of San Luis Obispo Sensor 718, that records stage data near the well field.

Habitat

At each survey site, instream habitat data was collected for stream type (run, riffle, pool), instream cover type (large woody debris, small woody debris, bedrock, rootwad), substrate type (cobble, gravel, silt), percentage of substrate embeddedness, and estimated percentage of algae on the surface and the subsurface.

Vegetation

At each survey site, vegetation was measured with percentage estimates of instream and overhead cover and soil moisture levels within riparian forests on both banks were taken with a General soil moisture meter. For both stream banks, riparian widths were measured with aerial photographs and verified during site surveys.

Hydrology

At each survey site, maximum wetted width and depth were measured with a stadia rod, and average depth was calculated from 4 depth readings across the wetted width. Stream water rate was measured with a Global Water Flow Probe. Flow is a calculation of the wetted area times the rate. The area is determined by averaging four depth measurements times the wetted width.

Surface Water Quality

At each survey site, water quality was assessed using a YSI ProSolo ODO/CT optical meter to measure temperature in Fahrenheit, dissolved oxygen in parts per million (ppm), total dissolved solids in milligrams per liter (mg/L), and salinity in parts per trillion (ppt).

9P7 Soil Moisture

9P7 soil moisture was measured using a General soil moisture meter at cardinal points N, S, E, W of the 9P7 concrete pad. A photo of 9P7 and the surrounding trees were taken.

Species

Species observed during data collection were documented at each survey site. Types and abundance of non-native species were documented.

Photo Points

At each survey site, photos were taken with an iPhone 11 Pro Max using the 0.5 lens. The photos were taken from the center of the stream in four directions: upstream, right bank, downstream, left bank. Aerial photographs were taken with a Mavic 2 Pro using Litchi Waypoint to GPS points. These photos were used to determine any changes in vegetation composition or health. There were two additional video and still photo locations for stream flow analysis: PS-1, the San Simeon Creek bridge on Van Gordon Creek Road and PS-2, the San Simeon Creek bridge on Highway 1.

3.0 RESULTS

3.1 Groundwater Monitoring

CCSD production well data is presented below for average depth (in feet) for 2020. Well levels will be used for baseline data (Figure 3).

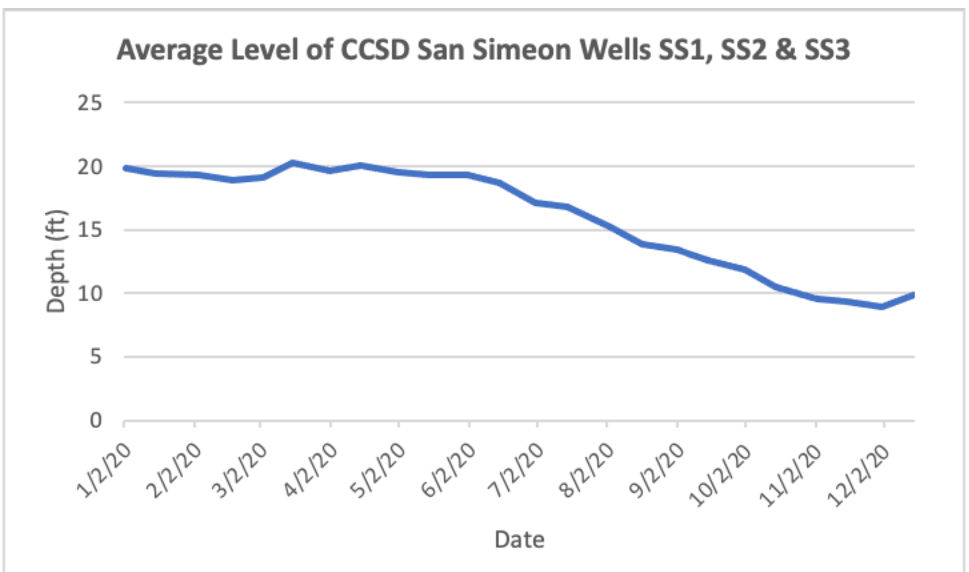


Figure 3. Graph showing average depth levels of wells SS1, SS2, and SS3.

3.2 CRAM Surveys

A Van Gordon Creek CRAM survey was completed on July 31, 2021. Van Gordon Creek is a riverine non-confined system that had an Index Score of 68. A 2015 CRAM survey on Van

Gordon Creek had an Index Score of 66 and our 2020 CRAM survey had an Index Score of 69. A comparison of the three CRAM surveys shows minor variations in the scoring of the attributes which contributed to the different scores. There do not appear to be any significant changes on Van Gordon Creek between the 2015 to 2021 surveys.

A San Simeon Creek CRAM survey was completed, approximately one mile upstream from the creek mouth, on August 1, 2021. San Simeon Creek is a riverine non-confined system which had an Index Score of 74. A 2015 CRAM survey on lower San Simeon Creek had an Index Score of 81 and our 2020 CRAM survey had an Index Score of 78. A comparison of the three CRAM surveys shows a slight decrease in structural patch richness and number of co-dominant species from 2015 to 2021 even though these variations are minor they could be due to an increase in invasive plant species.

3.3 Special Status Species Surveys

Non-protocol level visual surveys for California red-legged frogs, tidewater gobies, and steelhead trout were completed. The California red-legged frog surveys were completed under Cindy Cleveland's U.S. Fish and Wildlife California red-legged frog 10(a)(1)(a) Recovery Permit TE71222B-1 that expires on 08.03.2025. All three species were observed during the surveys.

The study area is located at 35°35'44"N/121°07'27"W, with agricultural uses to the north, San Simeon State Park to the south and west, and onsite CCSD percolations ponds and wells on the northeast and east. Beyond San Simeon State Park and CCSD properties are rolling hills that support livestock, agricultural crops, and native habitats. San Simeon Creek is mostly unconsolidated alluvium underlain by bedrock (USGS 1998). The banks of San Simeon Creek are lined with Central Coast Arroyo Willow Riparian Forest dominated by dense stands of arroyo willow. San Simeon Creek is approximately 35 square miles with two main forks, the north fork, and the south fork.

California Red-Legged Frog

Federally listed California red-legged frogs are the largest native frog in the western United States (USFSW 2010). Historically, California red-legged frogs occurred in California and Baja California from sea level to approximately 5,000 feet (USFWS 2010). The lower abdomen and underside of the hind legs are usually red or pink in color, and they have prominent dorsal folds (USFWS 2000).

Over their range, breeding for the California red-legged frog takes place from late November to late April, however, timing can vary depending on rainfall as it influences breeding behaviors (USFWS 2000, Ford et al. 2013). Males usually show up at breeding pools two to four weeks ahead of females and commence vocalizations (USFWS 2010). Egg masses are laid in areas in areas of still water among emergent vegetation, twigs, or other structures (USFWS 2010, Ford et al. 2013). Eggs hatch in 6-14 days and tadpoles metamorphose in 3.5-7 months (USFWS 2010). Juveniles usually move to shallow portions of the breeding area or nearby areas with water (Ford et al. 2013). Adult California red-legged frogs may disperse from breeding sites at any time of the year and some move to dry season refuges after breeding (USFWS 2010, Ford et al. 2013).

California red-legged frogs occur in both aquatic and terrestrial habitats within 1 to 2 miles of breeding sites. Habitat for the California red-legged frog includes still or slow-moving water in ponds, reservoirs, marshes, streams, and other permanent bodies of water and the surrounding upland habitats (USFWS 2000). California red-legged frogs can forage, shelter, and use cover in almost any moist and cool habitats during the summer; this includes upland habitats containing mammal burrows, logs, and manmade structures such as culverts (USFWS 2010).
California red-legged frog water quality requirements can widely vary (Ford et al. 2013). Water temperatures for egg-laying are usually less than 60.8° Fahrenheit (Cook 1997). Embryos tolerate stream water temperatures between 48 and 70° Fahrenheit (USFWS 2000). Adult frogs prefer water temperature above 60° Fahrenheit but are common at 50° Fahrenheit (Ford et al. 2013). The authors have seen high numbers of CRLFs in estuarine and streams when surface water temperatures are approaching 80° Fahrenheit, although there were likely nearby refuge areas with cooler water temperatures. California red-legged frogs are sensitive to high salinity. Salinity over 4.5 ppt has been shown to kill frog eggs and levels at 7.0 ppt cause larvae to die (USFWS 2000). The maximum salinity tolerance is 9 ppt for adults (Cook 1997). Turbidity ranges for California red-legged frogs are 0.9 NTU to 326 NTU, dissolved oxygen ranges are 0-24.5 mg/L, nitrate ranges from 0-4.0 mg/L (Ford et al. 2013). Water depth influences water temperatures and predator avoidance. California red-legged frogs need deep water areas (usually deeper than one yard) for predator avoidance.

Species Status and Distribution

California red-legged frogs are listed as federally threatened species and a California Department of Fish and Wildlife California species of special concern. The entire study area is in California red-legged frog critical habitat (USFWS 2020). According to the California Natural Diversity Database (CNDDB), there are multiple occurrences of the California red-legged frog in and around the study area (CDFW 2020a, CDFW 202b). In 1992 and 1993, federal researchers completed 26 California red-legged frog surveys in San Simeon Creek and Lagoon (Rathbun et al., 1993). They observed 379 California red-legged frogs with 125 frogs under <60 mm and 254 frogs >60 mm. During the 1992 and 1993 surveys, adult California red-legged frogs and tadpoles were also observed in Van Gordon Creek (Rathbun et al. 1993).

In 1997, Cindy Cleveland observed adult California red-legged frogs in San Simeon Lagoon. In 2014, RBF Consulting, A Michael Baker International Company, completed two mark-recapture night surveys in San Simeon Lagoon and Creek with a total of 53 observed California red-legged frogs (RBF Consulting 2015). In 2015, Cleveland Biological, LLC found 15 juvenile and adult California red-legged frogs in lower San Simeon Creek (Cleveland Biological, LLC 2015). California red-legged frogs are also known to occur in watersheds within two miles of the study area: Pico Creek (Cindy Cleveland pers. ob.), Leffingwell Creek, and Santa Rosa Creek (RBF 2015).

Survey Results

The study area is located at 35°35'44"N/121°07'27"W, with agricultural uses to the north, San Simeon State Park to the south and west, and the onsite CCSD percolations ponds and wells on the northeast and east. Beyond San Simeon State Park and CCSD property are rolling hills that support livestock, agricultural crops, and native habitats. San Simeon Creek is mostly unconsolidated alluvium underlain by bedrock (USGS 1998). The banks of San Simeon Creek are lined with Central Coast Arroyo Willow Riparian Forest dominated by dense stands of arroyo willow (*Salix lasiolepis*).

San Simeon Creek is mostly arroyo willow and red willow, with an understory of common nettle, California blackberry, mugwort, western poison oak, some American black nightshade, red osier dogwood, and abundant hemlock and non-native Cape ivy or German ivy. There is also a healthy population of Western sycamores. The survey area has good habitat quality for California red-legged frogs, with some naturally formed deep pools. The pool habitat is created from willow tree rootwads and the creek allowed to meander. There is not an abundance of emergent vegetation, however, this is not because the system is out of balance.

On February 21, 2021, June 10, 2021, and September 12, 2021, daytime and nighttime California red-legged frog surveys were performed by Cindy Cleveland and Paul Cleveland within the study area that extended from the mouth of Van Gordon Creek upstream for approximately 900 feet.

The February 21, 2021, survey was from 10:00 to 13:00 and 18:30 to 20:00. The moon phase was 30%, the air temperature was 58 degrees Fahrenheit, the water temperature was 56 degrees Fahrenheit, the humidity was 80%, and the wind was from the west at 1-2 mph. The survey conditions were clear and cool. The average depth was 1 foot, and the maximum depth was approximately 3.1 feet. The survey conditions were calm. Stream flow was 0.2 cfs, and the water was clear. Ten California red-legged frogs, all adults, were observed, and two frogs were heard jumping into the creek (Figure 4).

Figure 4. CRLF survey February 2, 2021.

The June 10, 2021, survey was from 9:00 to 13:00 and 21:00 to 23:30. The moon phase was 0%, the air temperature was 63 degrees Fahrenheit, the water temperature was 62 degrees Fahrenheit, the humidity was 70%, and the wind was from the west at 1 mph. The survey conditions were clear and cool. The average depth was 1 foot, and maximum depth was approximately 3 feet. Stream flow was 0.1 cfs, and the water was clear. The survey conditions were calm. Fourteen small adult and subadult and approximately 40 tadpole CRLFs were observed (Figure 5).

Figure 5. CRLF survey June 10, 2021

The September 12, 2021 survey was from 21:00 to 23:30. The moon phase was 41%, the air temperature was 65 degrees Fahrenheit, the water temperature was 65 degrees Fahrenheit, the humidity was 79%, and the wind was from the west at 1 mph. The survey conditions were clear and calm. The average depth was 1 foot, and maximum depth was approximately 3 feet. Stream flow was 0.1 cfs, and the water was clear. Sixteen small adult and subadult and one metamorph CRLFs were observed (Figure 6).

Figure 6. CRLF survey September 12, 2021.

Steelhead Trout and Tidewater Gobies

Steelhead trout

Steelhead trout are silvery-white on the underside with a heavily speckled body and a pink to red stripe along their sides (NOAA 2015). Adult female steelhead trout prepare a redd (or nest) in a stream and deposit eggs in 4 to 5 'nesting pockets' within a single redd. Steelhead trout are hatched in cool, fast-running streams, some stay in freshwater while others move to marine habitats (NOAA 2015). The fish that stay in freshwater are called rainbow trout; the fish that migrate to the ocean are steelhead trout. Juvenile steelhead may spend up to 7 years in freshwater before migrating to the ocean for up to 3 years before migrating back to freshwater to spawn (NOAA 2015). Young trout feed primarily on zooplankton, and adults feed on aquatic and terrestrial insects, mollusks, crustaceans, fish eggs, and other small fishes (NOAA 2015).

Optimal conditions for steelhead trout in San Simeon Creek are believed to be salinity of less than 10 parts per thousand (ppt), water temperatures below 72 degrees Fahrenheit, and dissolved oxygen of greater than 5 parts per million (ppm) (CCSD 2017). Steelhead trout can live in dissolved oxygens habitats with 1-2 ppm however, this is usually for only short periods as described in the AMP, "typically only in the morning when the temperature is low and DO is at its lowest due to overnight algal respiration. Algae conduct photosynthesis during the day when the sun is out, consuming carbon dioxide and producing high amounts of oxygen. At night the opposite trend occurs with photorespiration: algae consume and can nearly deplete oxygen while simultaneously producing high levels of carbon dioxide, thus leading to substantially lower DO levels overnight and into the early morning. Steelhead ecology is such that these temporary nightly drops in DO are tolerable because the temperature is generally cooler and metabolic rate is reduced; as water temperature increases over the course of the day, fish metabolic rates increase (generally doubling with each 10°C increase in water temperature) and they require more oxygen. It is estimated that steelhead would be able to survive for only 15-30 minutes with 1-2 ppm DO" (CCSD 2017 pg. 26).

Species Status and Distribution

Steelhead Trout is listed as a Federally threatened species under the Endangered Species Act. Steelhead trout were originally listed on January 5, 2006, and the listing was updated on April 14, 2014 (NOAA 2015). The study area is in steelhead trout critical habitat, and San Simeon Creek steelhead trout are within the south-central California coast steelhead DPS (NOAA 2015).

Titus provides a detailed history of steelhead trout in San Simeon Creek, which is summarized below (Titus et al. 2010). California Department of Fish and Game (CDFG, now Fish and Wildlife) surveyed San Simeon Creek in the 1930s and found that spawning grounds for steelhead were common except in the upper areas [upper area not defined]. The middle and lower portions of San Simeon dried up in late summer over several years, which resulted in a loss of rearing habitat. In 1932 the creek was stocked with 10,000 juvenile steelhead trout and in 1933 with 8,000 juvenile steelhead trout. During 1948 CDFG surveys, they found abundant spawning substrates and juveniles (approximately 160-250 trout/100 meters) and a bedrock barrier approximately 5.3 miles from the mouth. San Simeon Creek was planted with hatchery trout again from 1947 to1950. Surveys in the 1960-1970s showed high-quality spawning gravels but had limited steelhead trout populations. They theorize that upstream gravel mining operations and a historic mercury mine could have impacted steelhead trout populations. Surveys in the 1980-1990s found lower numbers of steelhead and noted the impacts to steelhead from upstream gravel mining and diminished creek flows.

From 1990 to 2002, scientists and volunteers rescued steelhead trout held in a pond on Van Gordon Creek for the summer (Alley 2004, CEMAR 2020). In1992 and 1993 researchers surveyed San Simeon Creek for steelhead trout and found one juvenile steelhead trout in San Simeon Lagoon and one juvenile in lower San Simeon Creek (Rathbun et al. 1993). They speculate that the low number of steelhead trout in the lagoon may have been related to dissolved oxygen levels that were below 5.0 ppm (Rathbun et al. 1993). They also observed exotic brown bullhead catfish that may have washed down from a stock pond located on an upstream side drainage. In a 2004 Alley and Associates summarized fish surveys they completed from 1994 to 2003 for San Simeon Creek and found an increase in steelhead trout population in relation to streamflows (Alley 2004).

Tidewater Goby

The tidewater goby is a small, elongate fish with large pectoral fins that rarely exceed 2 inches in length with differences in color between male and female gobies; the males are nearly transparent, and the females are darker (USFWS 2015). The tidewater goby is an endemic fish found in year-round California coastal lagoons, estuaries, and marshes (USFWS 2015). Sandbars influence tidewater goby populations by providing a barrier, and lower salinities, between marine and freshwater habitats (USFWS 2013). Artificial breaching of a sandbar limits tidewater goby habitats by increasing the salinity and decreasing ponded areas. Natural breaching of the sandbar usually occurs during the winter when tidewater goby breeding is at a low point in the lifecycle (USFWS 2013). Tidewater gobies can be flushed into marine habitats during seasonal breaching of sandbars, but may not survive for long periods in the marine environment (USFWS 2015).

They are most often found at the bottom of estuarine slow water habitats less than 6 feet in depth, but they often move upstream into freshwater streams (USFWS 2013). They have been documented in slack freshwater habitats 5 miles upstream from the San Antonio lagoon in Santa Barbara County but are mostly found in tidally influenced habitats (USFWS 2015).

Tidewater gobies prefer a sandy substrate for breeding and may have a wide tolerance for salinity, oxygenation, and temperature, especially over short periods or seasonally (USFWS 2015). Population sizes vary from a few fish to thousands of individuals. Reproduction peaks in spring but may occur year-round. Reproduction begins with a male goby digging a 10 to 20 centimeters nesting burrow in the substrate, while the female goby lays 300 to 500 eggs (USFWS 2015). The eggs, which stick to the walls of the burrow, are guarded by the males until they hatch approximately 9 to 11 days later. They have been documented in waters with salinities of 0 to 42 parts per thousand, temperatures of 46 to 77 degrees Fahrenheit, and depths of 10 to 79 inches (USFWS 2005a). Spawning water temperatures range between 48 and 77 degrees Fahrenheit and salinity ranges between 1 and 30 ppt, but gobies can live with higher salinities (USFWS 2013).

<u>Species Status and Distribution</u>
Tidewater gobies are listed as a Federally threatened species under the Endangered Species Act. The study area is in tidewater goby critical habitat (USFWS 2013, USFWS 2020).

Surveys completed in 1993 by a federal researcher found tidewater gobies in the San Simeon lagoon and 500 meters upstream (Rathbun et al. 1993). During the surveys, tidewater goby numbers peaked during the summer months after reproducing in the lagoon. Twelve monthly surveys found 7,962 juvenile (< 31 mm) and 3,573 adult gobies (>31 mm). In 2014, San Simeon Lagoon was seined to monitor tidewater goby populations and nine seine hauls resulted in 1,002 tidewater gobies (Alley 2015).

Survey Results

On July 5, 2021, and September 12, 2021, Cindy Cleveland and Paul Cleveland conducted steelhead trout and tidewater goby surveys were conducted within the study area located on Van Gordon Creek and San Simeon Creek. The visual surveys consisted of walking around the study area to characterize the habitat, assess site conditions, and record visually observed fish species.

The July 5, 2021, survey was from 10:00 to 13:45. The high tide of 3.20 feet was at 09:13; the sandbar was not breached. The air temperature was 65 degrees Fahrenheit at the beginning of the survey and 74 degrees Fahrenheit at the end of the survey. The skies were foggy at the beginning of the survey but quickly cleared. The water temperature was 65.5 degrees Fahrenheit at the Van Gordon and San Simeon Creek confluence. The surveyed habitats were a mix of pools and runs with mostly cobble and gravel substrates. The substrate embeddedness was on average 75%, there was no surface algae at any survey site and almost 100% subsurface algae near the Van Gordon and San Simeon Creek confluence; there was filamentous algae in between survey sites. The instream cover on average was 15%, and overhead cover on average was 15%. The maximum depth was 4.5 feet, the average depth was 1.0 feet, and the flow was 0.1 to ft/sec. Dissolved oxygen was 9.02 ppm, total dissolved solids was 349 mg/L, and salinity at the top of the water column was 0.4 ppt, and at the bottom of the water column was 0.46.

Hundreds of three-spined stickleback (*Gasterosteus aculeatus*) ranging in size from 0.75 to 2.5 inches in length were observed throughout the study area. Also observed were prickly sculpin (*Cottus asper*), approximately 2-3 inches in length. During the survey no steelhead trout were observed but were documented during monitoring surveys on April 25, 2021, when a 24-inch trout was seen in a pool above site 2; in the same location, one was observed the year before. In April, the pool was approximately 10 feet by 60 feet in size with a maximum depth of 3.5 feet, a water temperature of 57.2 degrees Fahrenheit, and 3.37 ppm dissolved oxygen. Possible steelhead trout fry were seen near Site 5 on May 9, 2021. On June 5, 2021, a dead female steelhead trout, 18 inches in length was seen on the ground next to the above-referenced pool. No tidewater gobies were observed during this survey, however, tidewater gobies have been observed within the survey area during monitoring surveys.

The September 12, 2021, survey was from 15:00 to 18:30. The high tide of 3.64 feet was at 03:14; the sandbar was not breached. The air temperature was 62 degrees Fahrenheit at the beginning of the survey and 64 degrees Fahrenheit at the end of the survey. The skies were clear during the survey. The water temperature was 65 degrees Fahrenheit at the Van Gordon and San Simeon Creek confluence. The surveyed habitats were a mix of pools and runs with mostly cobble and gravel substrates. The substrate embeddedness was on average 75%, there was 50% surface algae, almost 100% subsurface algae, and filamentous algae in between survey sites. The instream cover on average was 15%, and overhead cover on average was 15%. The maximum depth was 2.5 feet, the average depth was 1.0 feet, and the flow was 0.1 to ft/sec. Dissolved oxygen was 9.02 ppm, total dissolved solids was 349 mg/L, salinity at the top of the water column was 0.58 ppt, and at the bottom of the water column was 0.84. Observed fish include three-spined stickleback and prickly sculpin.

3.4 Instream and Riparian Habitat Monitoring

Survey Conditions

The sandbar was first breached for the January 31 survey but was closed for the February 28 survey and stayed so for the remainder of the year. This was a very short time for the sandbar to be open compared to 2020, when the sandbar was open when the surveys began in March and remained open until the middle of May.

San Simeon Creek County of San Luis Obispo Sensor 718 water level is presented in the graph below. This water level sensor is located just upstream of Site 2 (Figure 7).

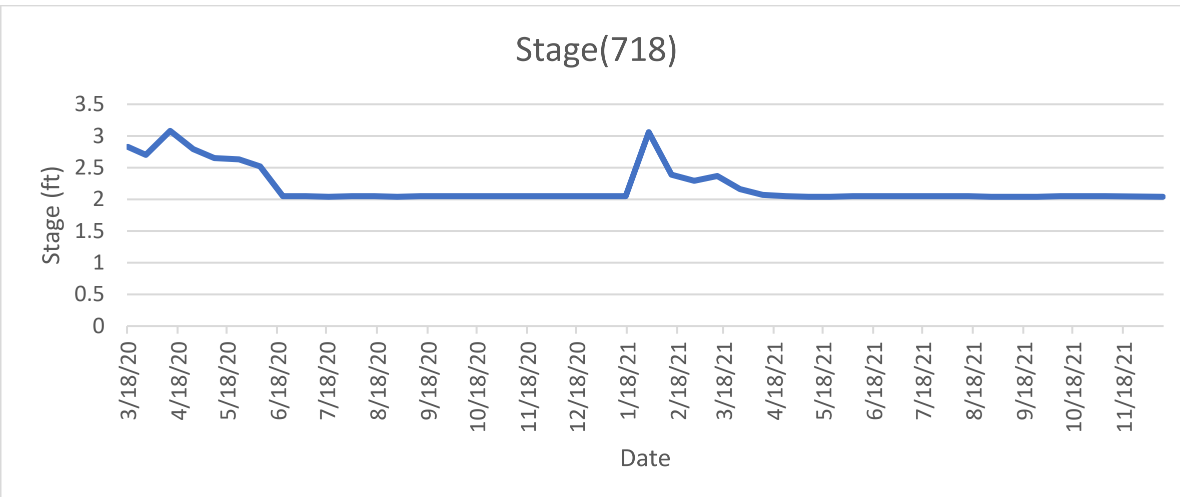


Figure 7. County of San Luis Obispo Water Sensor 718.

Habitat

For each survey site, there were minor instream habitat changes throughout the year. Below is a summary of what typically occurred at each site.

	Stream Type	Instream Cover Type	Substrate Type	Substrate Embeddedness (%)
Site 1	Pool	Small woody debris	Cobble, silt	85
Site 2	Riffle	Riparian vegetation	Cobble, gravel	25
Site 3	Pool	Large woody debris	Cobble, gravel	50 - 100
Site 4	Run	Large & small woody debris	Cobble, gravel	25 - 75
Site 5	Run	Riparian vegetation	Cobble, silt	50 - 90
Site 7	Riffle	None	Gravel, silt	75
Site 8	Run	None	Cobble, gravel	75

Surface and Subsurface Algae

Surface and subsurface algae percentages for each survey site are also presented. Surface algae appears correlated with daylight hours and low flows. Subsurface algae follows a similar correlation but is more persistent in the winter months (Figures 8 and 9).

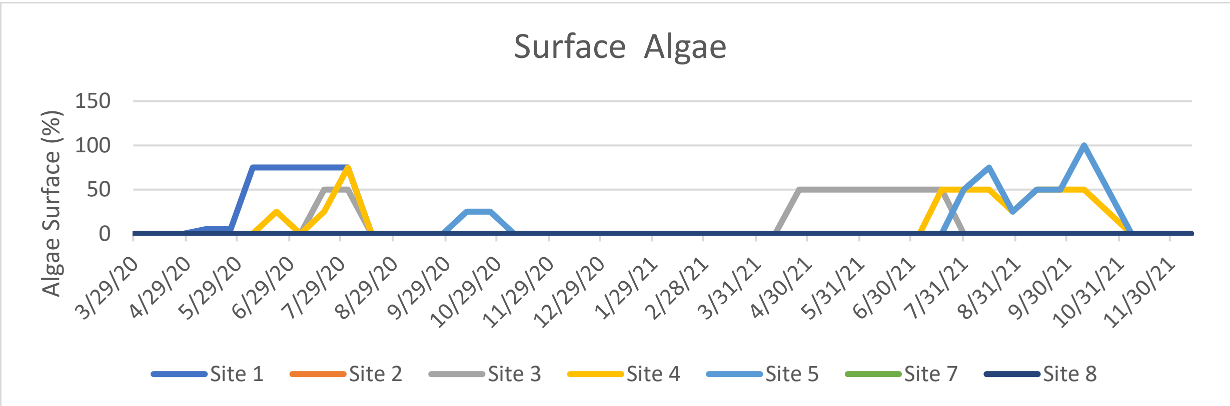


Figure 8. Surface algae.

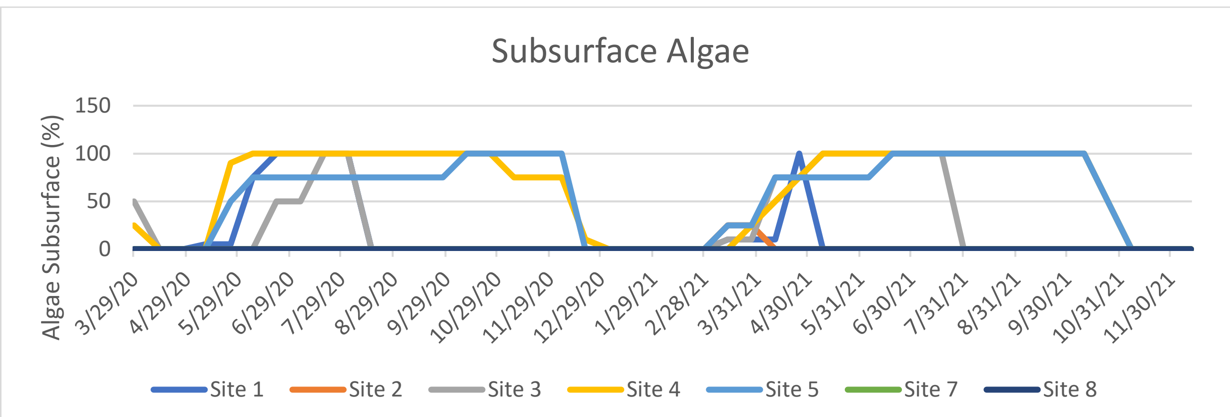


Figure 9. Subsurface algae.

Vegetation

The graphs below present data on instream and overhead cover, riparian width, and riparian moisture (Figures 10 through 13). Instream and overhead cover and riparian width did not change during the year. Riparian moisture changed often – sometimes the change was due to weather, but the readings would also vary if measurements were taken within inches of each other; the usefulness of this data is in question. Aerial photos of riparian vegetation were analyzed with no observed significant changes.

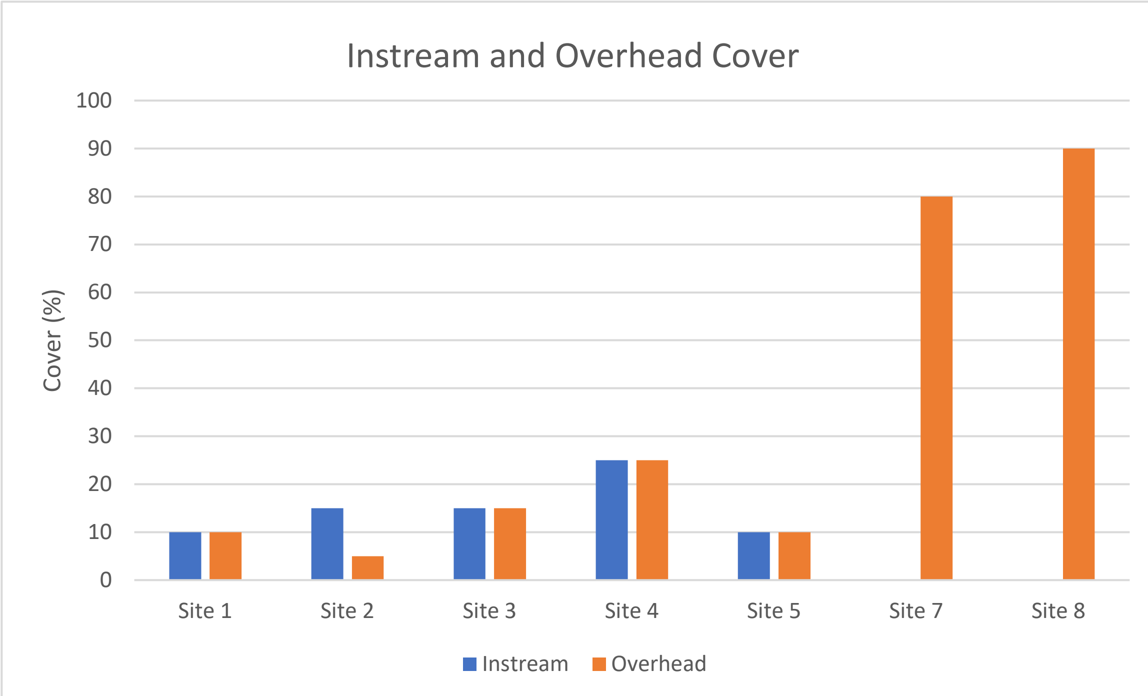


Figure 10. Instream and overhead cover

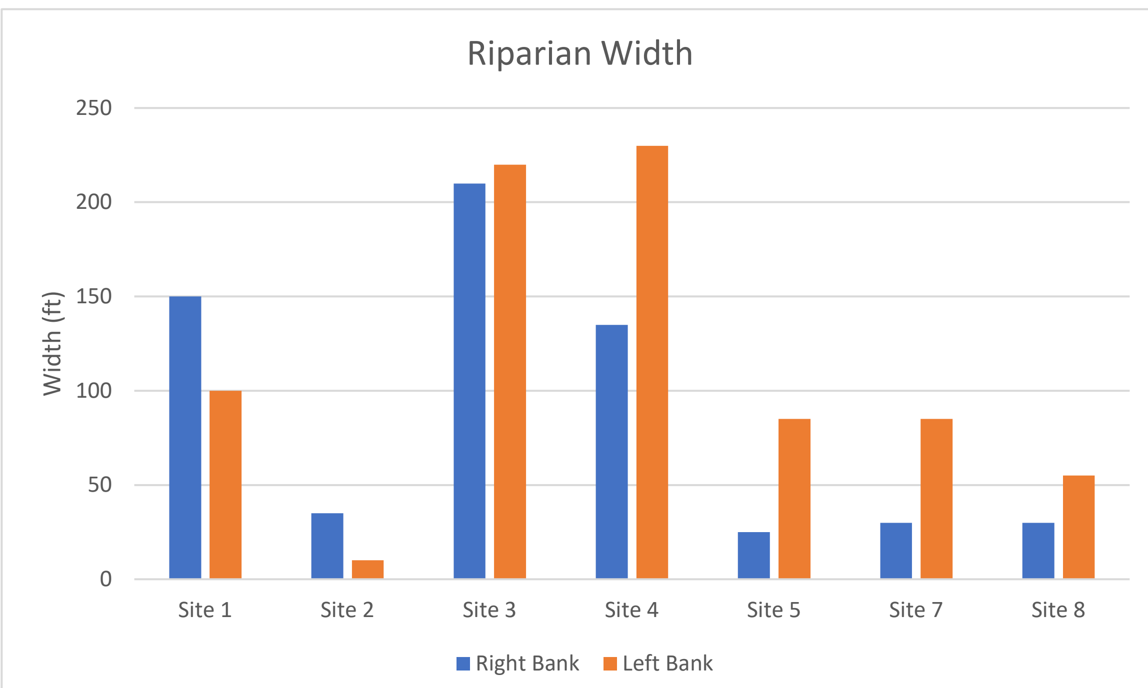


Figure 11. Riparian width.

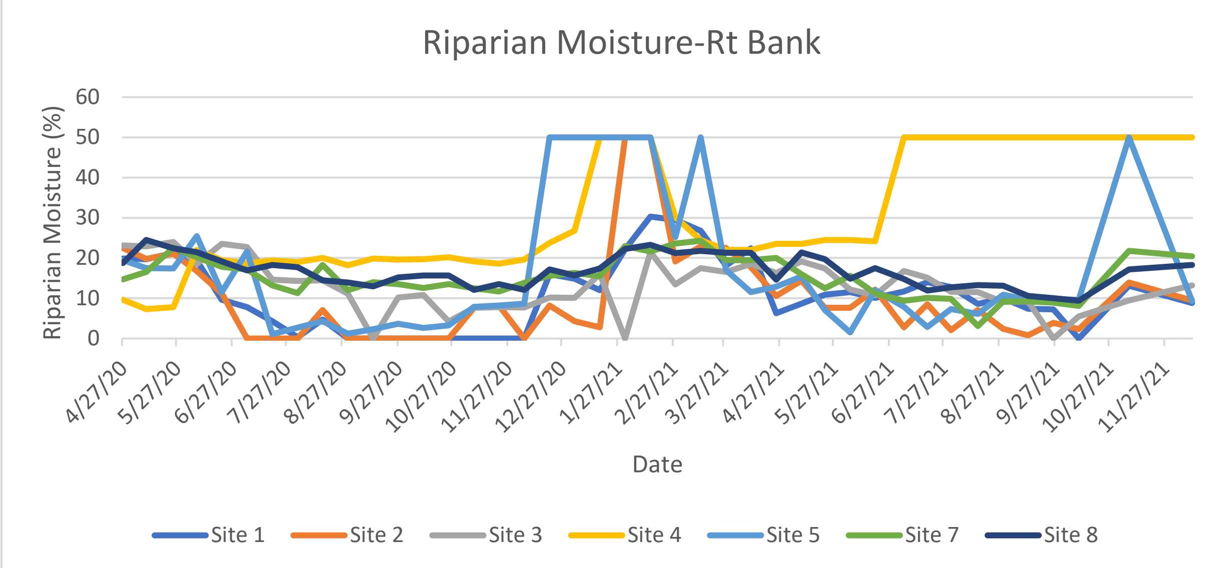


Figure 12. Riparian moisture on the right bank.

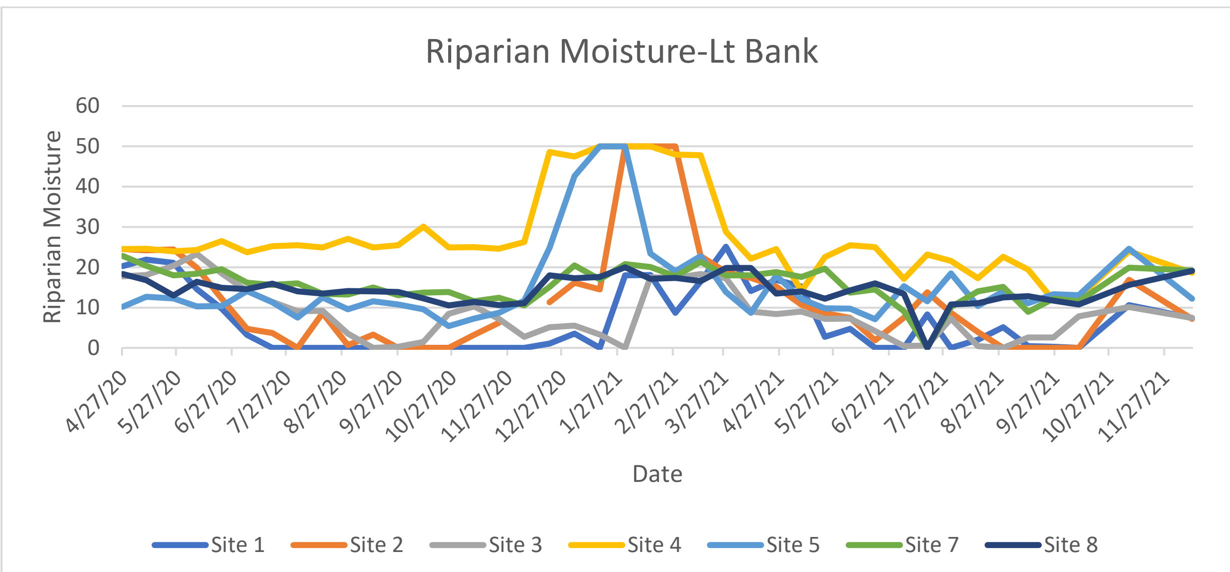


Figure 13. Riparian moisture on the left bank.

Hydrology

In 2020, Van Gordon Creek had water until May, but in 2021 it had water only into February. Similarly, San Simeon sites other than 4 & 5 had water in 2020 until July, but in 2021 had water only into May.

Wetted width, maximum depth, and average depth were measured year-round at Sites 4 and 5; other survey sites went dry in the following order from first to last: Site 7, 8, 2, 1, 3. The graphs below show seasonal variation. They also show that there were more months of flow in 2020 than in 2021. And even though 2021 had fewer wetted months, the width, depth, and flow were greater than the previous year, most likely attributed to a change in stream morphology.

All of these graphs, especially the flow data, show the rapid rise and fall of a typical coastal creek. Further discussion of Sites 4 and 5 follows (Figures 14 through 17).

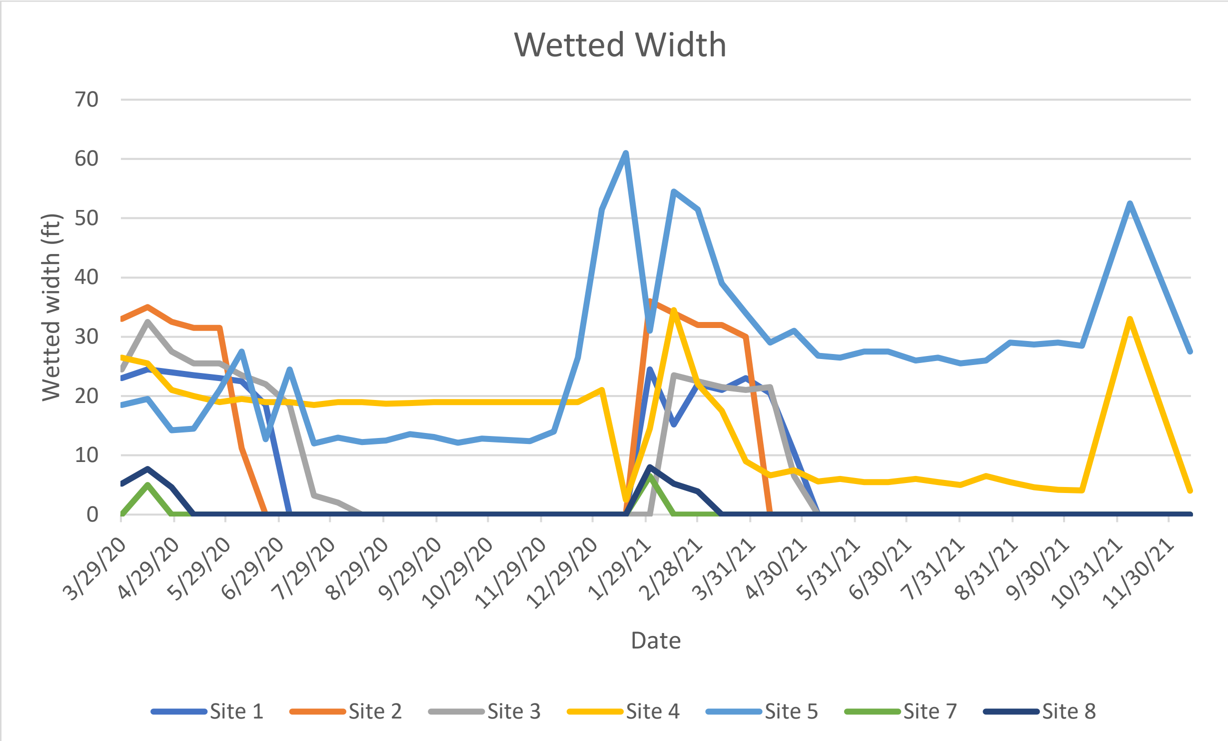


Figure 14. Wetted width.

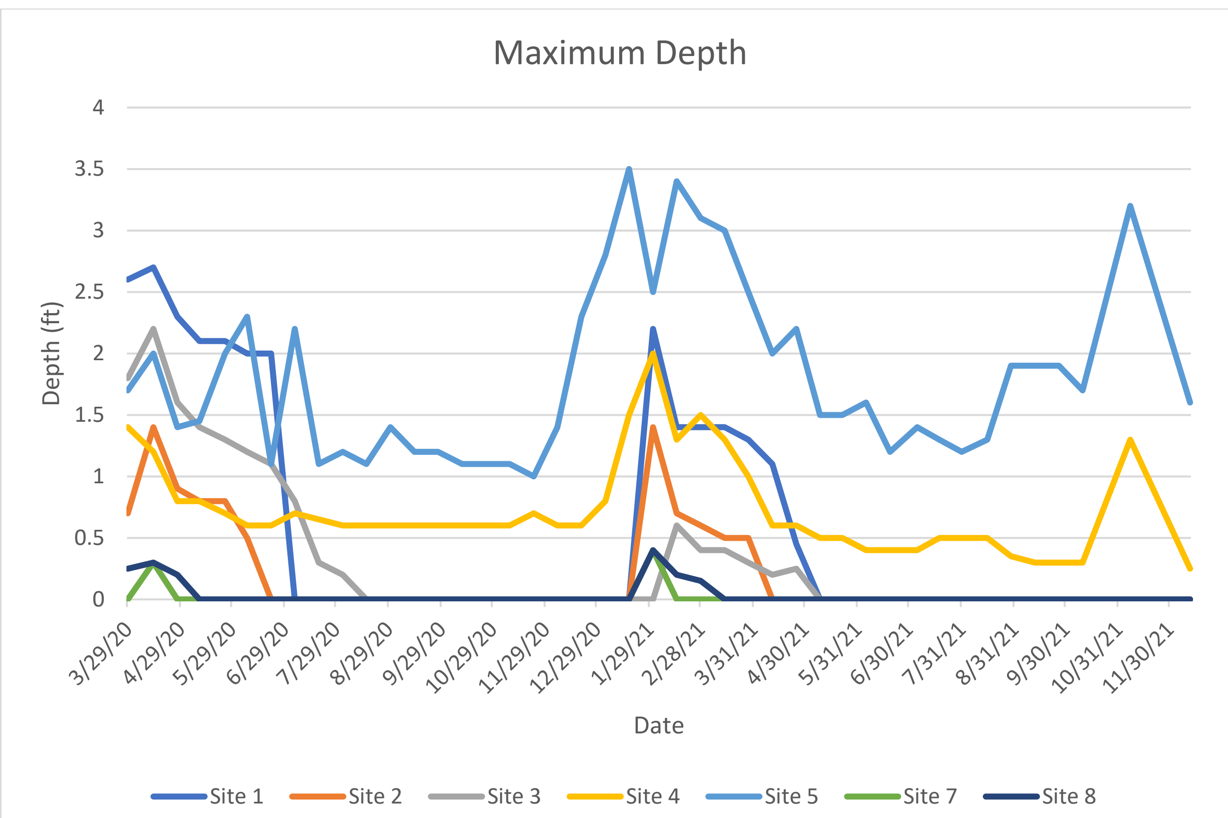


Figure 15. Maximum depth.

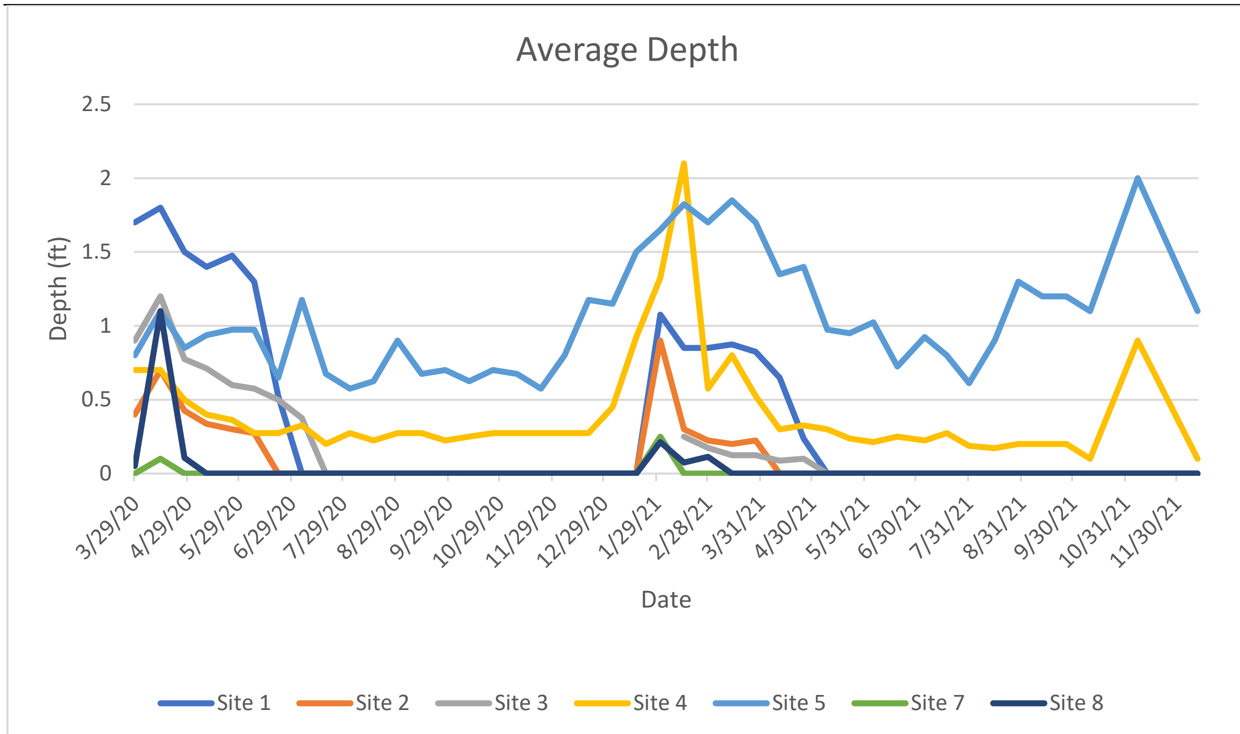


Figure 16. Average depth.

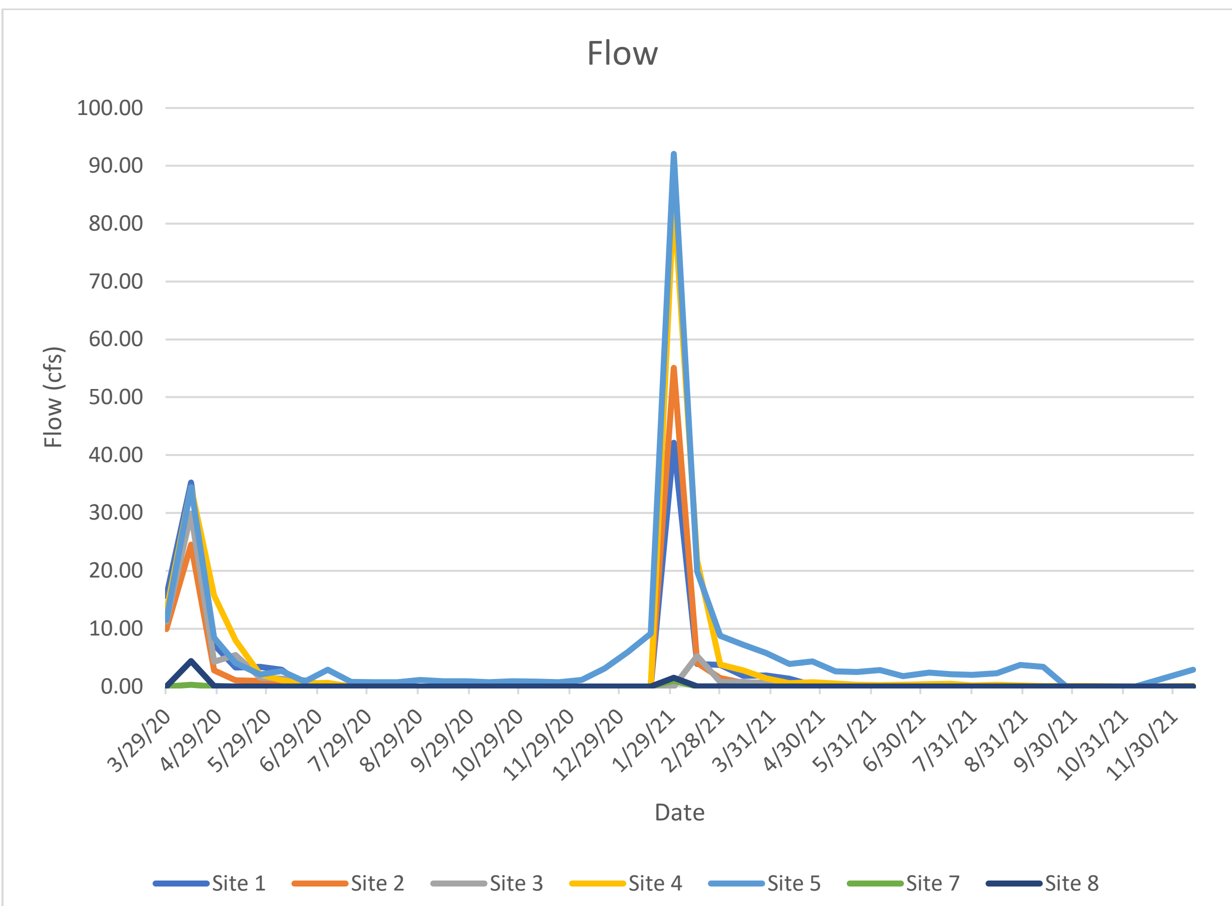


Figure 17. Flow.

Hydrology at Sites 4 and 5

These two sites have year-round water providing habitat for aquatic species. Comparing two years of data shows more annual variation in wetted width than in wetted depth. Site 4 was wider in 2020 which may be due to a shorter high flow season in 2021 or the change in habitat due to a tree falling directly on the site. Site 5 showed just the opposite, with a greater width in 2021. This may be due to the sandbar opening to the ocean for only one month and causing water to back up. This theory is supported by higher salinity levels in 2021, indicating more of a tidal effect further upstream than in 2020. Wetted depth was similar during both years at Site 4. At Site 5, the depth increased during higher tides in the winter months.

Flow data is presented for low flow months of May through November. Site 4 showed a steady decline inflow. Site 5 had more fluctuation because of tidal influence which, due to a greater wetted area, calculated a greater flow. Flow is a measurement of stream rate times wetted area.

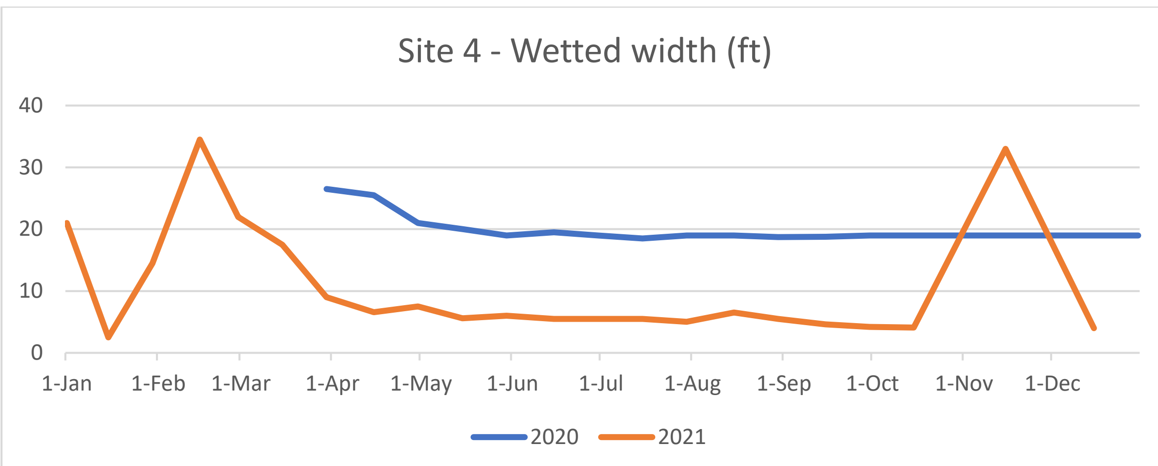


Figure 18. Site 4 Wetted width.

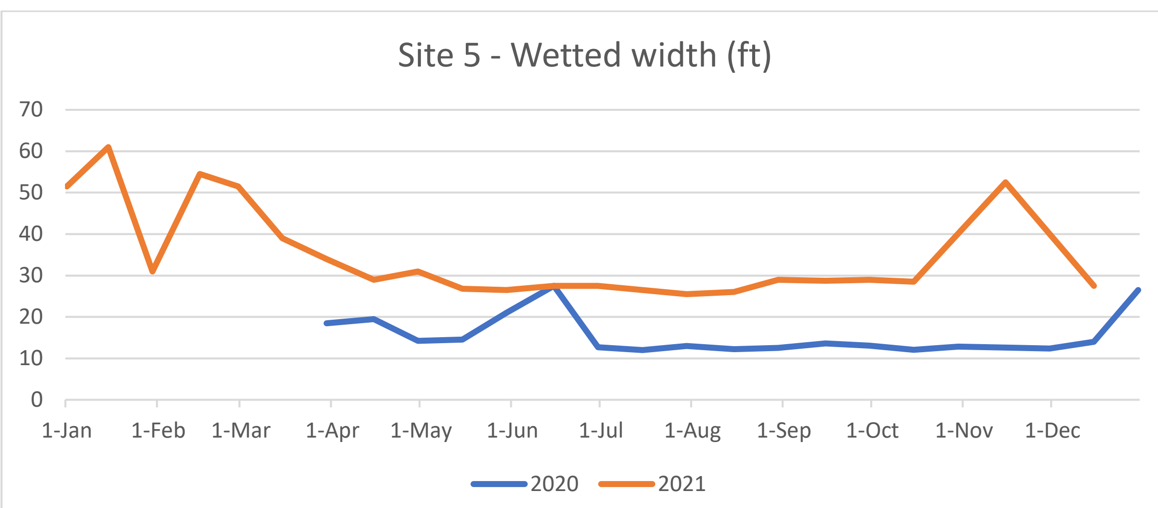


Figure 19. Site 5 Wetted width.

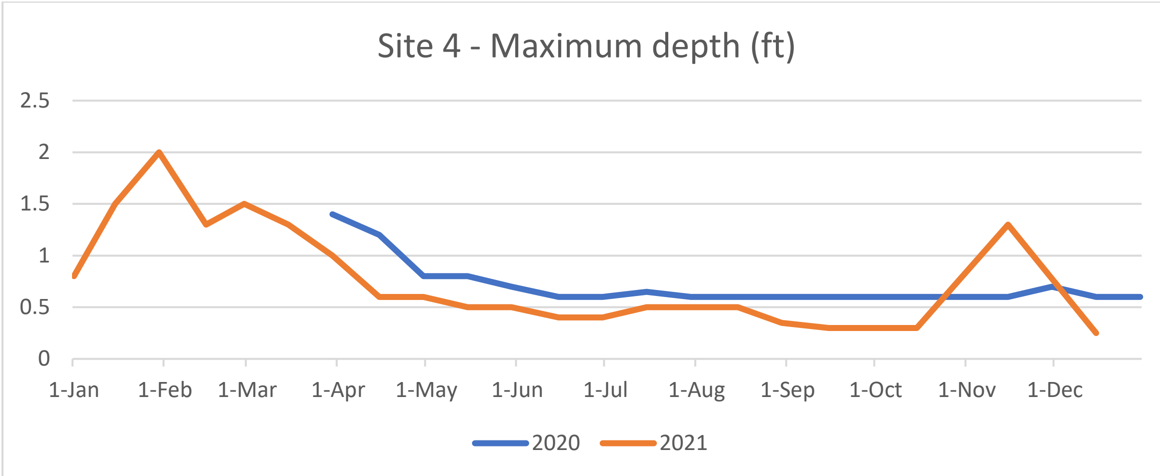


Figure 20. Site 4 Maximum depth.

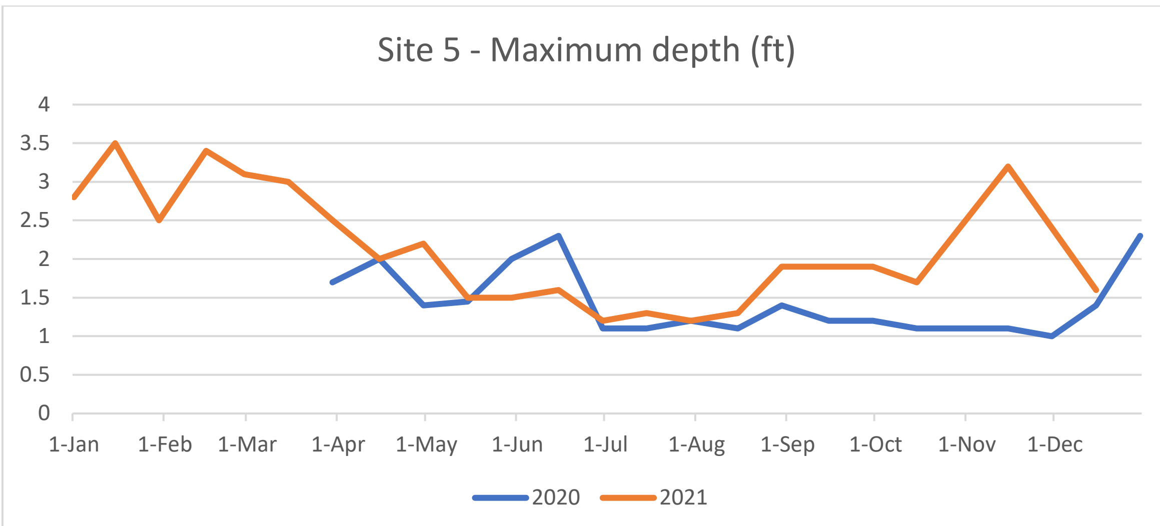


Figure 21. Site 5 Maximum depth.

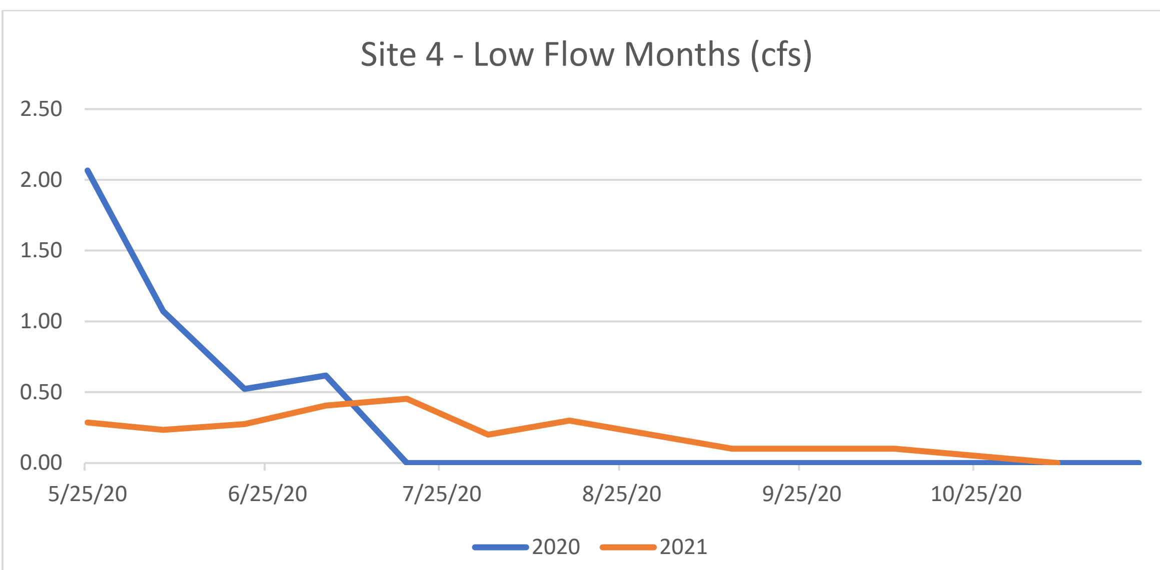


Figure 22. Site 4 Low flow months.

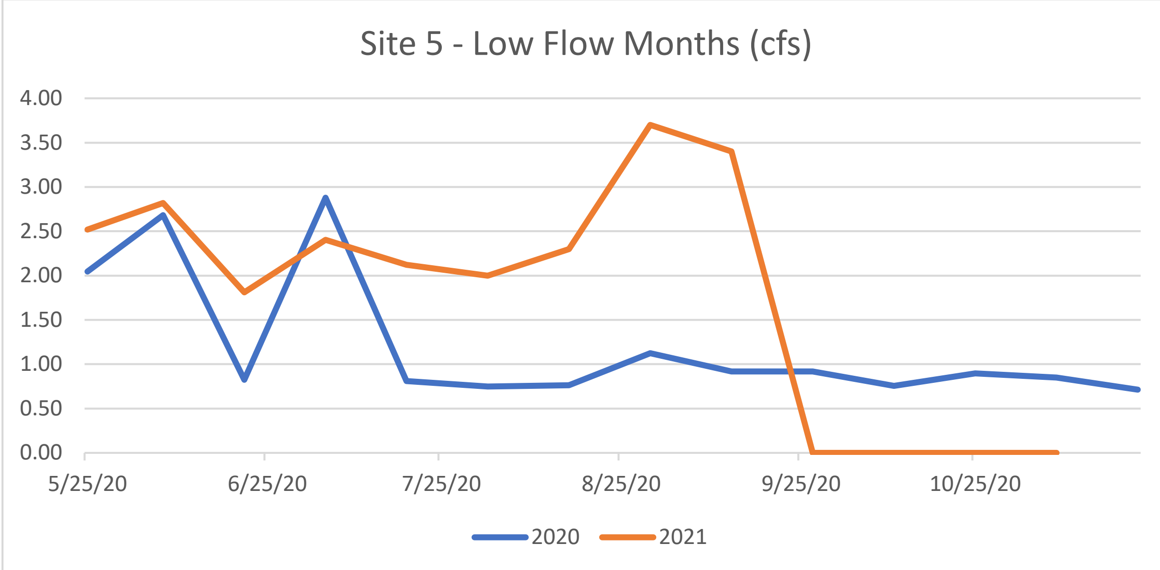


Figure 23. Site 5 Low flow months.

Surface Water Quality

Over the two years of monitoring, water temperatures and oxygen levels followed a similar pattern (Figures 24 and 25). Water temperature at Sites 4 and 5 had a low of 50.2 °F at the end of January. Site 4 peaked at 65.6 °F in July 2021, while Site 5 peaked at the same temperature in September 2021. Other sites had similar temperatures.

Dissolved oxygen at Sites 4 and 5 typically ranged between 2.5 and 10.5 ppm. Dissolved oxygen tends to decrease when temperature or salinity increase. It can also decrease with a reduction inflow. This relationship of dissolved oxygen and salinity was observed in November 2021 when dissolved oxygen dropped in one sample to 0.25 ppm and salinity increased to 20.7 ppt. On this sample date, it appears that salinity had more of a lowering effect on dissolved oxygen than did temperature, as shown in the charts below.

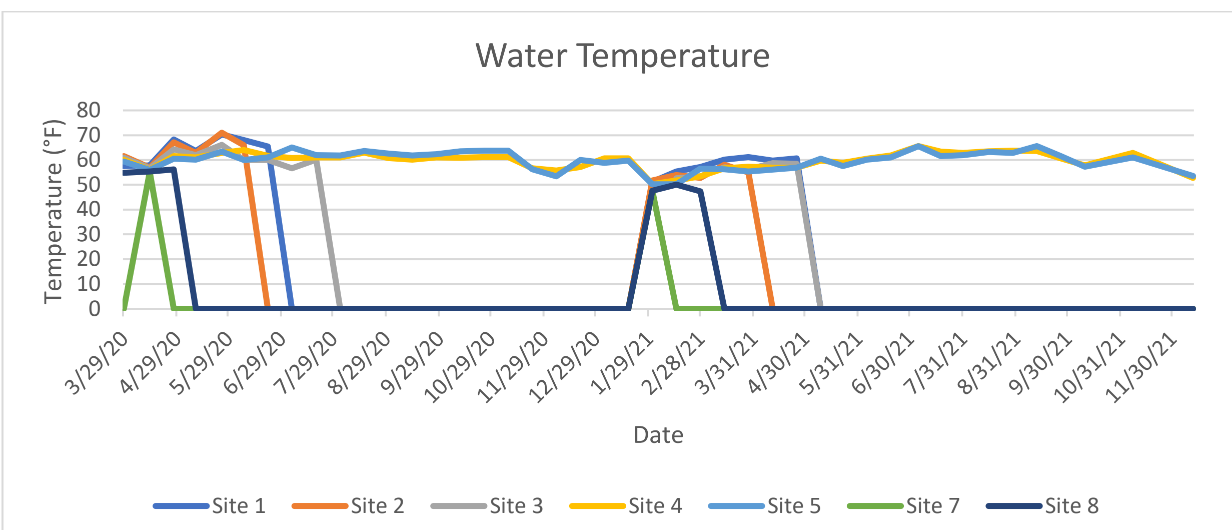


Figure 24. Water temperature.

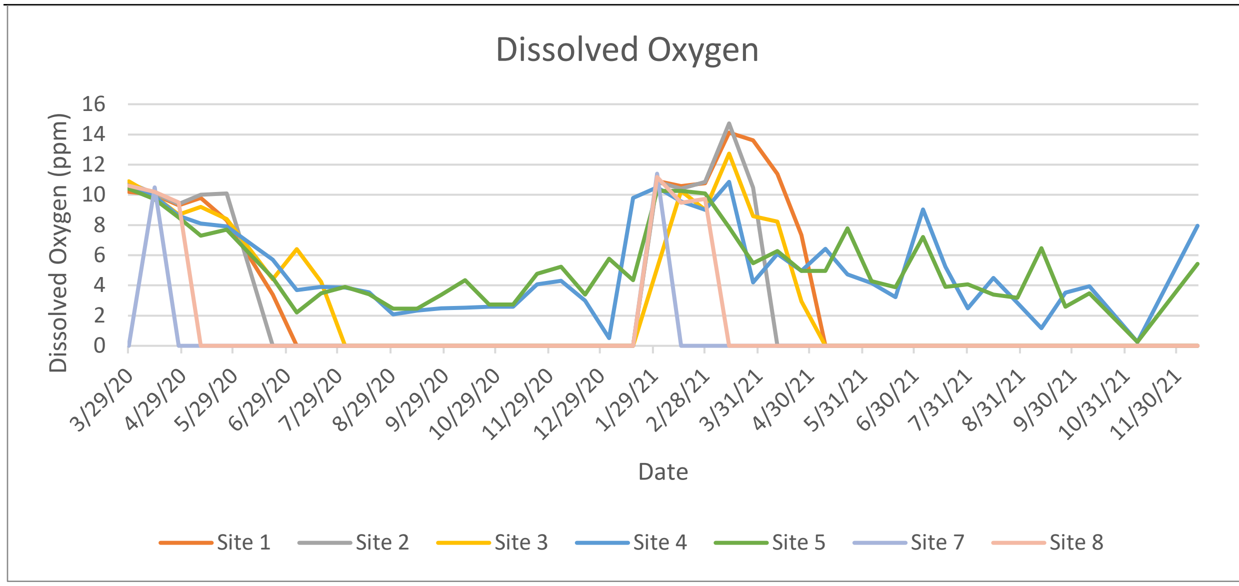


Figure 25. Dissolved oxygen.

Salinity usually ranged from 0.2 to 0.6 ppt (Figure 26). Towards the end of the year at Site 5, it began to increase and reached a level of 20.7 ppt in November, probably a result of tidal influence and a closed sandbar. Site 4 had high salinity readings in January 2021, indicating that tidal influence reached this far upstream (Figures 27 and 28).

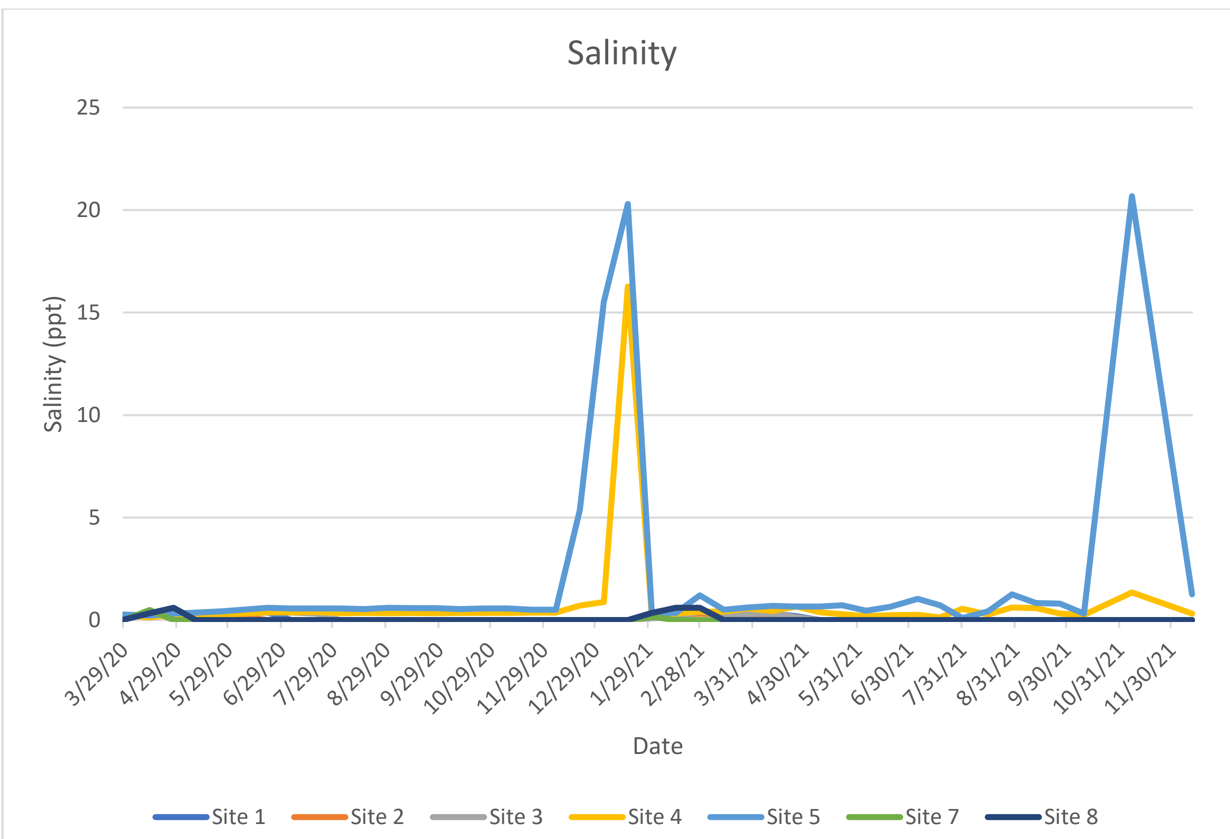


Figure 26. Salinity.

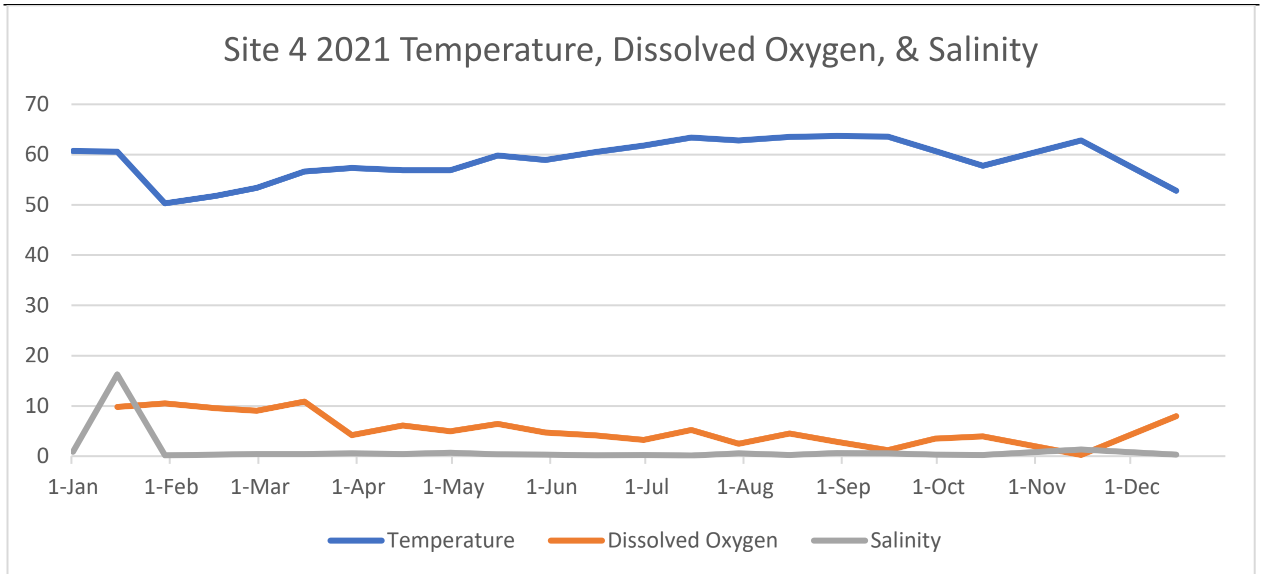


Figure 27. Site 4 2021 Temperature, Dissolved Oxygen, & Salinity.

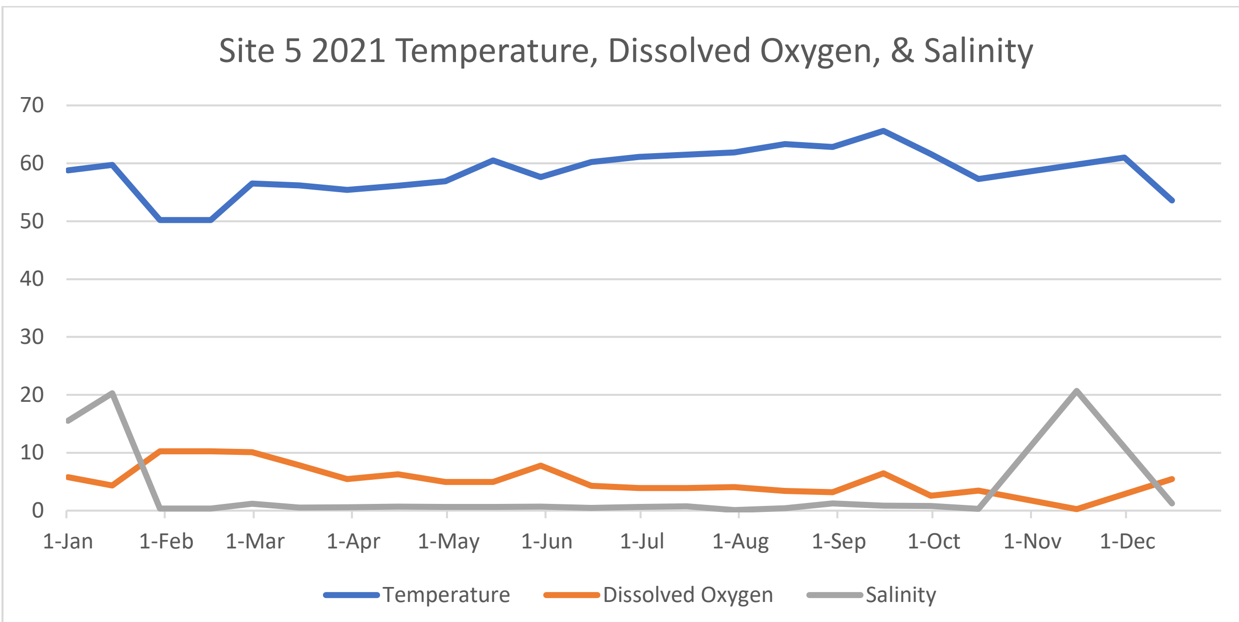


Figure 28. Site 5 2021 Temperature, Dissolved Oxygen, & Salinity.

Water temperatures were within range for the listed species. Dissolved oxygen levels dipped below optimal habitat requirements during the summer for steelhead trout. Salinity was also within range for the listed species, except for Site 5 on the last reading that was influenced by tides and the closed sandbar.

9P7 Soil Moisture

Soil moisture at the 9P7 well is presented in the graph below (Figure 29). As with other soil moisture measurements, the usefulness of this data is in question. The maximum moisture reading is 50%.

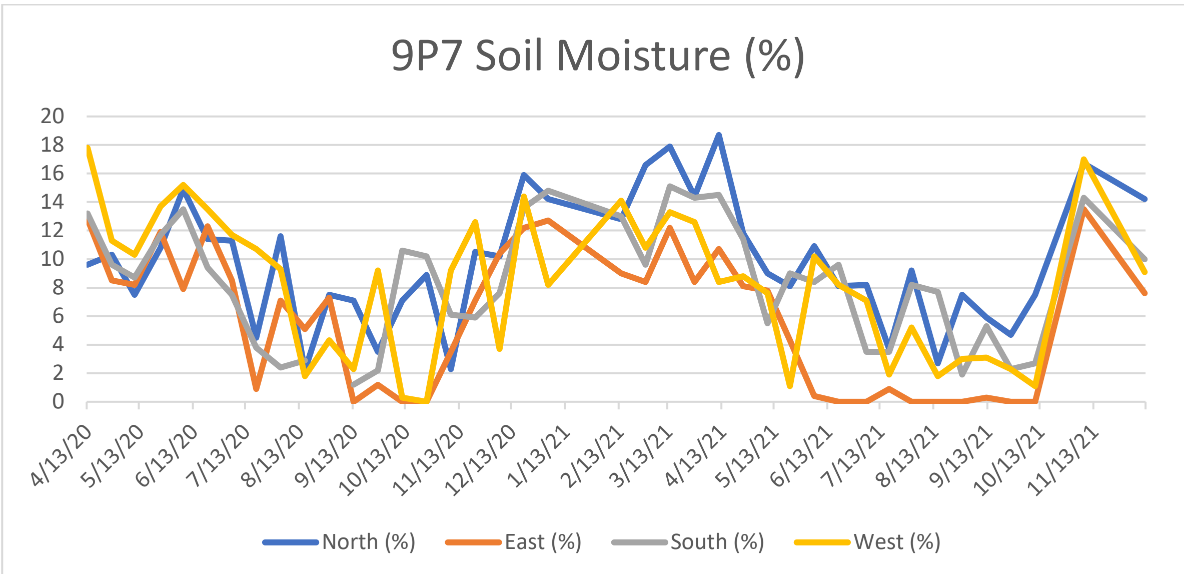


Figure 29. 9P7 Soil moisture.

Sensitive Species

Observed sensitive species include Monterey pine (*Pinus radiata*) at the percolation ponds. Photographs of this stand show there has been no change. Monarch butterflies (*Danaus plexippus*) have been observed in small numbers throughout the survey area; no change in the population size has been noted. Adult southwestern pond turtles (*Actinemys pallida*) were observed at the confluence of San Simeon and Van Gordon Creeks; no change in the population size has been noted.

Observed non-native plant species within the survey area includes: sweetclover (*Melilotus albus*), rumex (*rumex* sp.), common mustard (*Brassica rapa*), tree tobacco (*Nicotina glauca*), thistle (*carduus* sp.), fennel (*Foeniculum vulgare*), cape ivy (*Delairea odorata*), garden nasturtium (*Tropaeolum majus*), arrowweed (*Pluchea sericea*), canarygrass (*Phalaris canariensis*), bromus, poison hemlock (*Conium maculatum*), vinca (*Vinca major*), minor amounts of castor bean (*Ricinus communis*). Non-native vegetation at each survey site includes cape ivy. There has been no change in the amount of non-native plants at each survey site.

Photo Points

Ground and aerial photographs were reviewed to show any changes to riparian health and composition, and there were no observed changes. The two additional videos for stream flow analysis, taken at San Simeon Creek bridge on Van Gordon Creek Road and San Simeon Creek bridge on Highway 1, did not allow for a determination of stream flow from the video. Due to this, we propose that these two videos be eliminated from monitoring.

Thresholds to Trigger Additional Investigation and/or Adaptive Management Measures

Based upon initial results from the CCSD's hydrological modeling efforts, decreased lagoon elevation and inflow appear to be the most logical indicators of change in habitat quality (Todd Groundwater 2022). To monitor for and prevent any possible environmental impacts related to project activities, CCSD consultants and staff are analyzing data from two wells, 16D1 and MW4, both of which are located near the confluence of Van Gordon and San Simeon Creeks. Well levels below monthly historical averages would trigger an immediate investigation and, if needed, additional adaptive management measures such as increasing the volume of lagoon discharge. Existing piezometers installed in an array leading out from the WRF's extraction well (9P7) toward the lagoon and creek can be used to assist in determining if the decrease in lagoon elevation is related to project operations. These piezometers provide a profile of the extent of drawdown near 9P7 during project operations.

All adaptive management measures recommended for this project are subject to review and evaluation by permitting agencies. Baseline and monitoring data obtained through the AMP will inform the biological assessment being prepared for the Section 7 consultation with federal resource agencies.

4.0 CONCLUSION

AMP monitoring requires hydrological and biological monitoring, including California Rapid Assessment Method surveys, special status species surveys, and instream and riparian habitat monitoring at seven survey site locations to establish baseline conditions. CRAM surveys showed slight variation in Van Gordon Creek and San Simeon Creek. California red-legged frog and steelhead trout surveys showed that all life stages occur within the study area. Tidewater gobies were observed, but population dynamics are unknown. The baseline monitoring data shows stable habitats for sensitive species.

There were consistent annual fluctuations of in-stream habitat, vegetation, and water quality. Hydrology is mainly stable, with some annual variations due to morphological changes, mostly in measurements of wetted width. Flow data showed the rapid rise and fall of a typical coastal creek. Water quality shows expected seasonal fluctuations that maintain parameters for sensitive species. Baseline data will continue to be collected and analyzed at least four times a year to capture annual variations.

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