Cambria Community Services District
Water Reclamation Facility
Adaptive Management Plan
Annual Report
2022

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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 2022 to December 2022.

The AMP 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 and results of the AMP monitoring per AMP requirements. 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 took well readings either bimonthly or monthly from the wells 16D1, MW4, MW1, MW2, MW3, 9M1, 9P2, 9P7, 9L1, RIW1, SS4, MIW, SS3, SS2, SS1, 11B1, 11C1, PFNW (Palmer Flats New Well), 10A1, 10G2, 10G1, 10F2, 10M2, 9J3, and the lagoon (Figure 1).

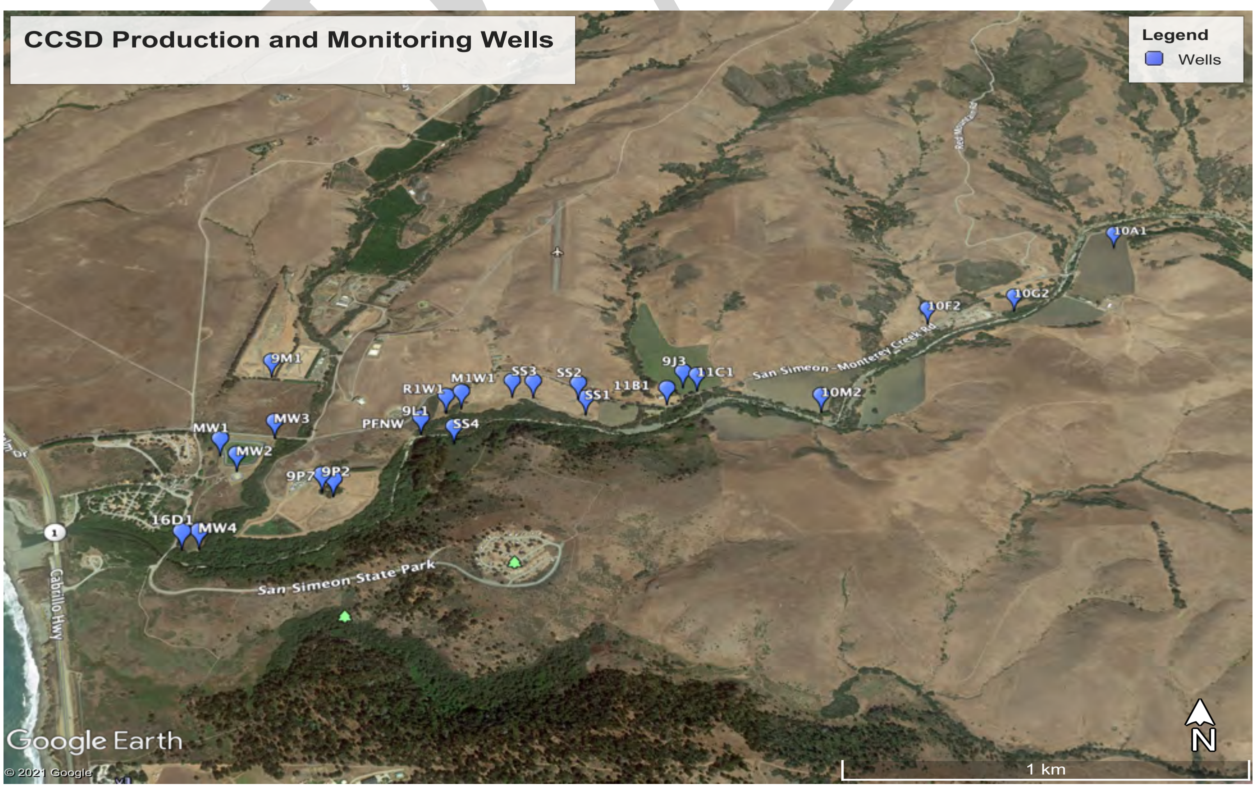

Figure 1. CCSD Production and Monitoring Wells.

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, located on State Park's property, and 9M1, located on private property. PNFW is a USGS monitoring well, and 9J3 is a domestic use well. In April 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 performed 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 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, 2021, and 2022. Each annual CRAM survey was compared with previous surveys to evaluate habitat conditions.

Special Status Species Surveys

Per AMP guidelines, there were non-protocol level visual surveys for California red-legged frogs (*Rana draytonii*), tidewater gobies (*Eucyclogobius newberryi*), and south-central California coast steelhead (*Oncorhynchus mykiss*) Distinct Population Segment (DPS). Species surveys for this report were for baseline species data and are not to be considered an assessment of habitat quality.

California red-legged frog surveys followed the protocol 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, four biological surveys were conducted at seven survey sites to collect habitat, hydrological, water quality, and species information (Figure 2).

Figure 2. AMP monitoring survey site locations.

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 the 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 the 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 to State Parks property	Downstream of Van Gordon confluence	
Site 7	Van Gordon	Trail behind MW-4 behind Van Gordon Reservoir	Upstream from the trail before the debris jam	35°35'43.10 "N 121° 7'13.85"W
Site 8	Van Gordon	Inside the locked gate of the AWTP	Down trail through riparian	35°35'48.06 "N 35°35'48.06 "N

Srvey Conditions

Survey condition data included survey times, weather, time and stage of high and low tides, if the sandbar was open, and the water level at 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 were 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, instream and overhead cover percentages were estimated. The soil moisture levels on both stream 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 four depth readings across the wetted width. Stream flow rate was measured with a Global Water Flow Probe. Flow is a calculation of the wetted area times the rate. The area was 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, and W of the 9P7 concrete pad. A photo of 9P7 and the surrounding trees were taken for evaluation.

Species

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

Photo Points

Photographs were taken with an iPhone 13 Pro Max at each survey site using the 0.5 lens. The photographs were taken from the center of the stream in four directions: upstream, right bank, downstream, and left bank. Aerial photographs were taken with a Mavic 2 Pro using Litchi Waypoint to GPS points. The images were used to determine any changes in vegetation composition or health.

3.0 RESULTS

3.1 Groundwater Monitoring

CCSD production well data is presented below for average depth (in feet) for 2022 (Figure 3).

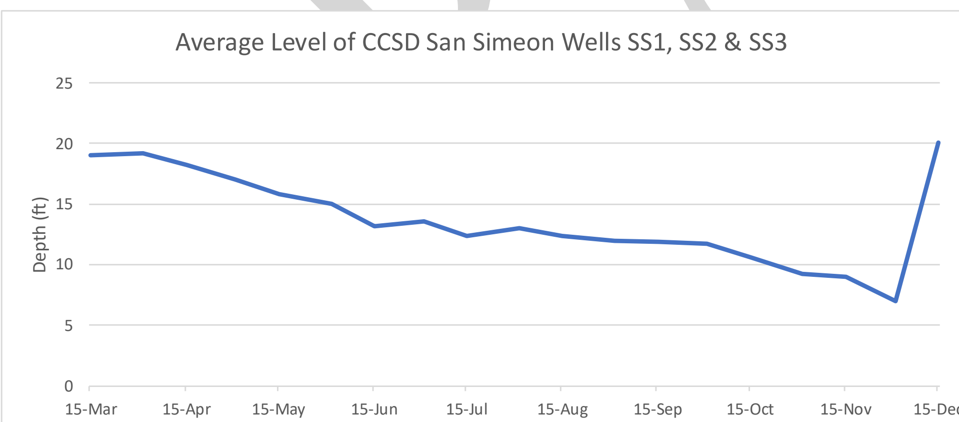

Figure 3. Graph showing average depth levels of wells SS1, SS2, and SS3.

3.2 CRAM Surveys

A Van Gordon Creek CRAM survey was completed on August 4, 2022. Van Gordon Creek is a riverine non-confined system that had an Index Score of 67.7. A 2015 CRAM survey on Van Gordon Creek had an Index Score of 66, a 2020 CRAM survey had an Index Score of 69, and a 2021 CRAM survey had an Index Score of 68. A comparison of the CRAM surveys shows minor variations in the scoring of the attributes which contributed to the different scores. There appear to be minor changes on Van Gordon Creek between the 2015 to 2022 surveys besides an increase in non-native vegetation.

A San Simeon Creek CRAM survey was completed approximately one mile upstream from the creek mouth on August 3, 2022. San Simeon Creek is a riverine non-confined system that had an Index Score of 74. A 2015 CRAM survey on lower San Simeon Creek had an Index Score of 81, a 2020 CRAM survey had an Index Score of 78, and a 2021 CRAM survey had an Index score of 74. A comparison of the CRAM surveys shows a steady increase in invasive plant species.

3.3 Special Status Species Surveys

Non-protocol level visual surveys were completed for California red-legged frogs, tidewater gobies, and steelhead trout. The California red-legged frog surveys were conducted 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.

The study area is 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, 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 and south.

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 (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 (USFWS 2000, Ford et al. 2013). Males usually appear at breeding pools two to four weeks before females and commence vocalizations (USFWS 2010). Egg masses are laid 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 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 manufactured structures such as culverts (USFWS 2010).

California red-legged frog water quality requirements vary widely (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 temperatures 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 nine 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, and 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.

<u>Species Status and Distribution</u>

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), the California red-legged frog has multiple occurrences in and around the study area (CDFW 2020a, CDFW 2020b). 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 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). Following is a table with frog survey results since 2020.

Date	California red-legged frogs in San Simeon Creek
9-28-2022	12
9-12-2021	16
2-21-2021	10
6-10-2021	14 (plus 30-50 tadpoles)

10-11-2020	24
3-18-2020	7

San Simeon Creek is mostly arroyo 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 pools. The pool habitat is created from willow tree root wads, and the creek is allowed to meander naturally.

One fall California red-legged frog survey was completed in 2022. The September 28, 2022, nighttime survey was from 19:30 to 21:05. The moon phase was 14%, the air temperature was 57 degrees Fahrenheit, the water temperature was 62 degrees Fahrenheit, the humidity was 91%, and the wind was from the north-northwest at three mph. The survey conditions were clear and calm. The average depth was 10 inches, and the maximum depth was approximately 2.5 feet. Eleven small adults or subadults and one metamorph CRLFs were observed (Figure 4).

Figure 4. CRLF survey September 28, 2022.

Steelhead Trout and Tidewater Goby

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, and some stay in freshwater while others move to marine habitats (NOAA 2015). The fish that remain 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 ten parts per thousand (ppt), water temperatures below 72 degrees Fahrenheit, and dissolved oxygen of greater than five 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 the amount of 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 day, fish metabolic rates increase (generally doubling with each ten °C increase in water temperature) and they require more oxygen. It is estimated that steelhead would survive for only 15-30 minutes with 1-2 ppm DO" (CCSD 2017, pg. 26).

<u>Species Status and Distribution</u>

Steelhead Trout is a Federally threatened species under the Endangered Species Act. Steelhead trout were initially 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 about 5.3 miles from the mouth. San Simeon Creek was planted with hatchery trout again from 1947 to 1950. 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 (Alley 2004, CEMAR 2020). In 1992 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 below 5.0 ppm (Rathbun et al. 1993). They also observed exotic brown bullhead catfish that may have washed down from a stock pond on an upstream drainage. In 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). 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 usually found at the bottom of estuarine slow-water habitats less than six 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 primarily 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 goby is 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). The following table shows if fish were present during fish surveys since 2020.

Date	Steelhead	Tidewater Goby
11-5-2022	No	Yes
6-17-2022	Yes	No
5-8-2022	No	No
9-26-2021	Yes	No
4-25-2021	Yes	Yes
10-11-2020	Yes	No
8-30-2020	Yes	No
5-25-2020	Yes	No

Survey Results

On May 8, 2022, and November 5, 2022, visual steelhead trout and tidewater goby surveys within the study area on Van Gordon Creek and San Simeon Creek were completed. The visual surveys consisted of walking around the study area to characterize the habitat, assess site conditions, and record visually observed fish species.

The May 8, 2022, survey was from 10:00 to 12:00. Van Gordon creek was dry, as was San Simeon Creek above Site 3. The high tide of 3.95 feet was at 03:15; 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. The water temperature was 60.5 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 5% surface algae at the confluence and 100% near the upper end of the survey area. The subsurface algae ranged from 75 to 100%. The instream cover, on average, was 10%, and overhead cover ranged from 0 to 80%. The maximum depth was 2.2 feet, the average depth was less than 1.0 feet, and the flow ranged from 0 to 2.8 ft/sec. Dissolved oxygen ranged from 4 to 8 ppm, total dissolved solids ranged from 250 to 751 mg/L, and salinity ranged from 0.19 to 0.58 ppt.

Hundreds of three-spined stickleback (*Gasterosteus aculeatus*), ranging in size from 0.75 to 2.5 inches in length, were observed between sites 4 and 5. During the survey, no steelhead trout or tidewater goby were observed.

The November 5, 2022, survey was from 13:30 to 14:45. The only wetted area was on San Simeon Creek between sites 4 and 5. The high tide of 5.47 feet was at 08:49; the sandbar was not breached. The air temperature was 64 degrees Fahrenheit at the beginning of the survey and 60 degrees Fahrenheit at the end of the survey. The skies were mostly clear during the survey. The water temperature was 59 degrees. The surveyed habitats were runs with mostly cobble and gravel substrates. The substrate embeddedness was 100%, with 10 to 20% surface algae and 100% subsurface algae. The instream cover was 10%, and the overhead cover on average was 20%. The maximum depth was 1.9 feet, the average depth was 1.0 feet, and the flow was 0.1 ft/sec. Dissolved oxygen ranged from 2.38 to 6.58 ppm, and total dissolved solids ranged from 771 to 885 mg/L, salinity was between 0.59 and 0.69 ppt. Three-spined stickleback were observed between both sites and in small isolated pools further upstream. A Prickly sculpin was seen at Site 4. No steelhead trout were observed. Tidewater goby schools (approximately four schools of 20 fish) were observed at and around Site 5.

On June 17, 2022, CCSD staff observed two adult steelhead trout from the walking bridge on San Simeon Creek, which were approximately 16-18 inches in length.

3.4 Instream and Riparian Habitat Monitoring

Five surveys were conducted in 2022 during January, February, May, August, and November.

Survey Conditions

The sandbar was first breached for the January 16, 2022, survey but was closed for the February 14, 2022, survey and stayed closed for the remainder of the year; this was a very short time for the sandbar to be open compared to the previous year.

The graph below presents the San Simeon Creek County of San Luis Obispo Sensor 718 water level. This water level sensor is located just upstream of Site 2 (Figure 5).

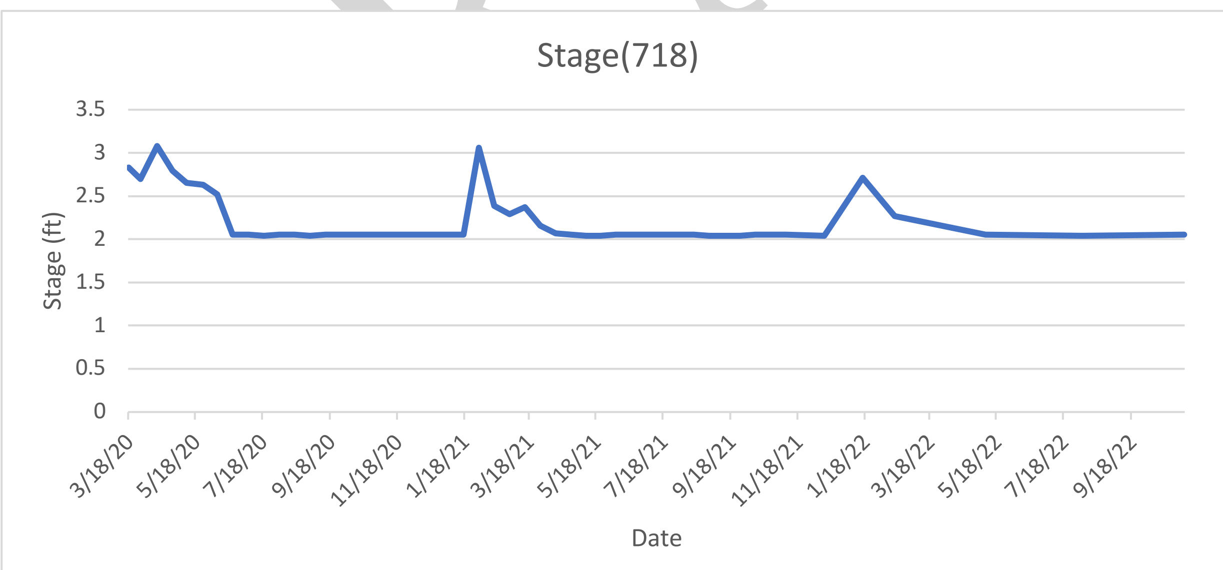

Figure 5. County of San Luis Obispo Water Sensor 718.

Habitat

There were minor instream habitat changes throughout the year for each survey site. 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	75
Site 2	Riffle	Riparian vegetation	Cobble, gravel	50
Site 3	Run	Large woody debris	Cobble, gravel	50
Site 4	Run	Large & small woody debris	Cobble, gravel	50 - 100
Site 5	Run	Riparian vegetation	Cobble, silt	100
Site 7	Run	None	Gravel, silt	75 - 100
Site 8	Riffle	None	Cobble, gravel	75

Surface and Subsurface Algae

Surface and subsurface algae percentages for each survey site are presented (Figures 6 and 7).

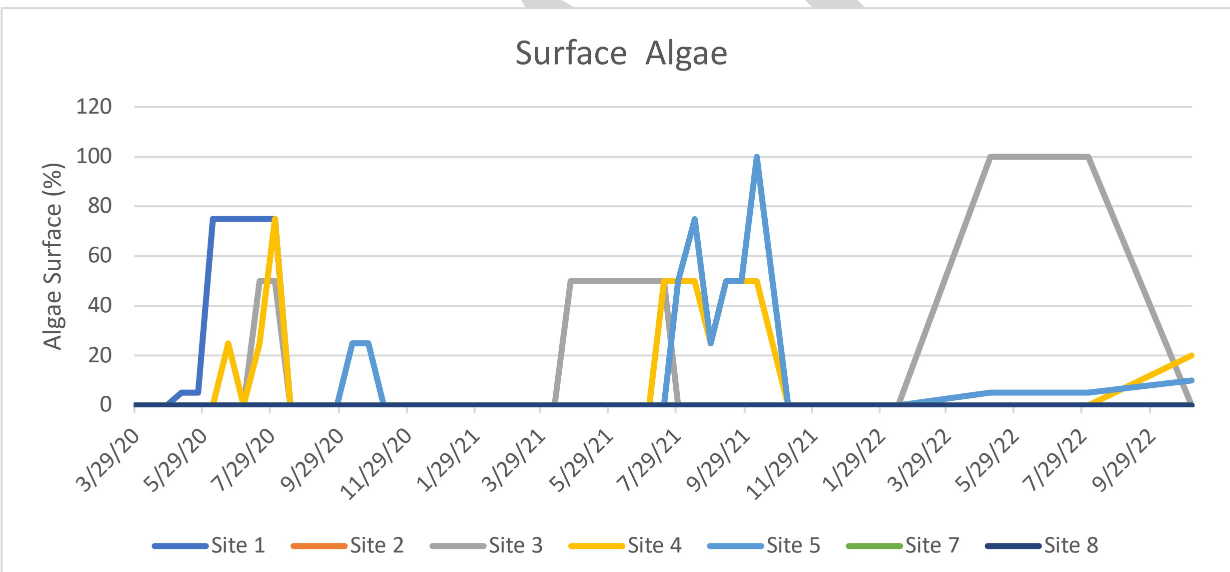

Figure 6. Surface algae.

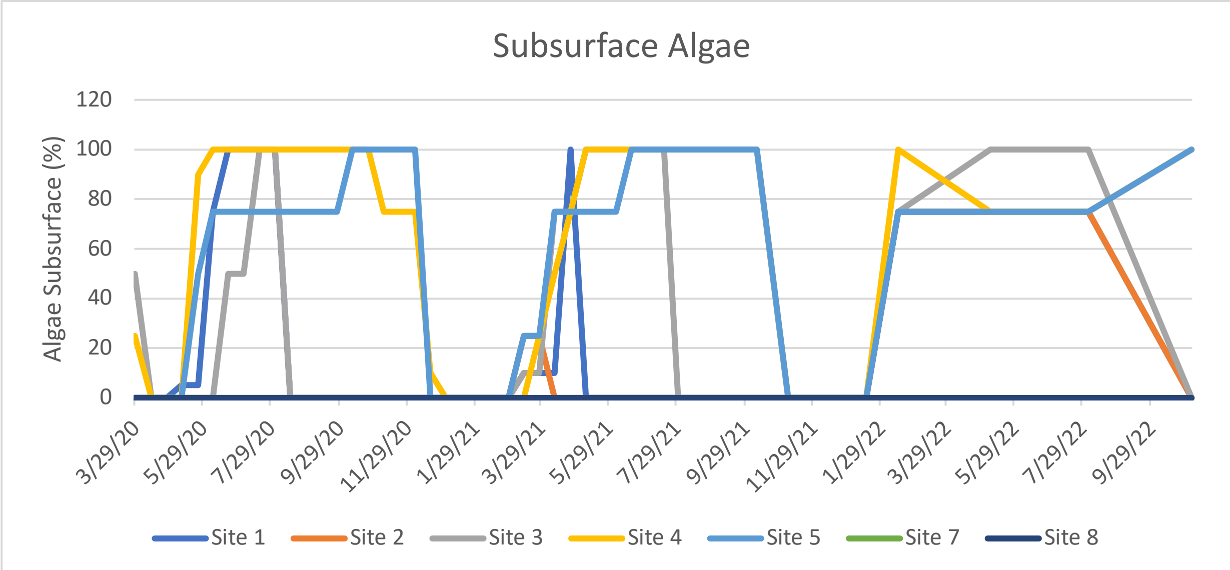

Figure 7. Subsurface algae.

Vegetation

The graphs below present the survey data for instream and overhead cover, riparian width, and riparian moisture (Figures 8 through 11). 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.

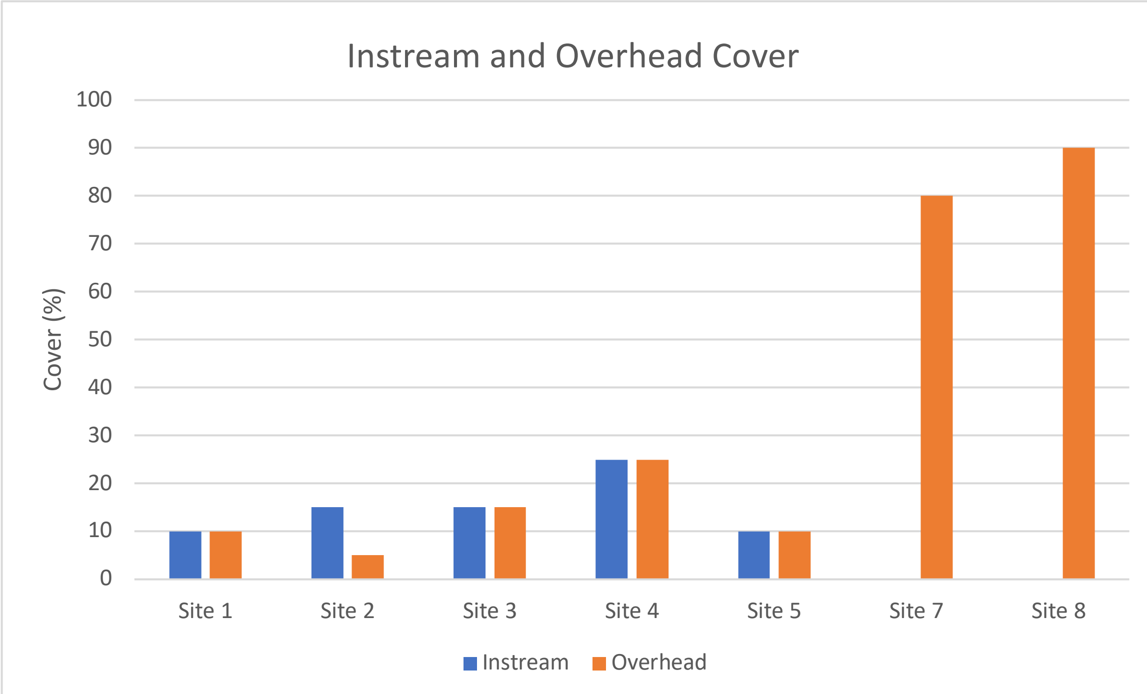

Figure 8. Instream and overhead cover

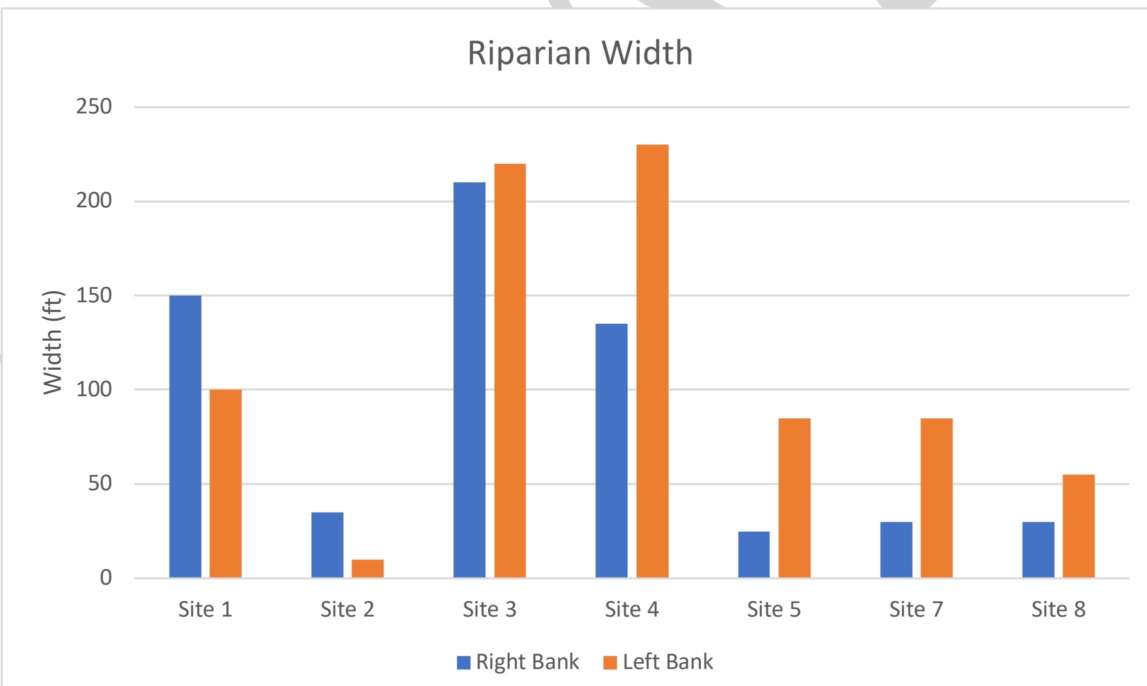

Figure 9. Riparian width.

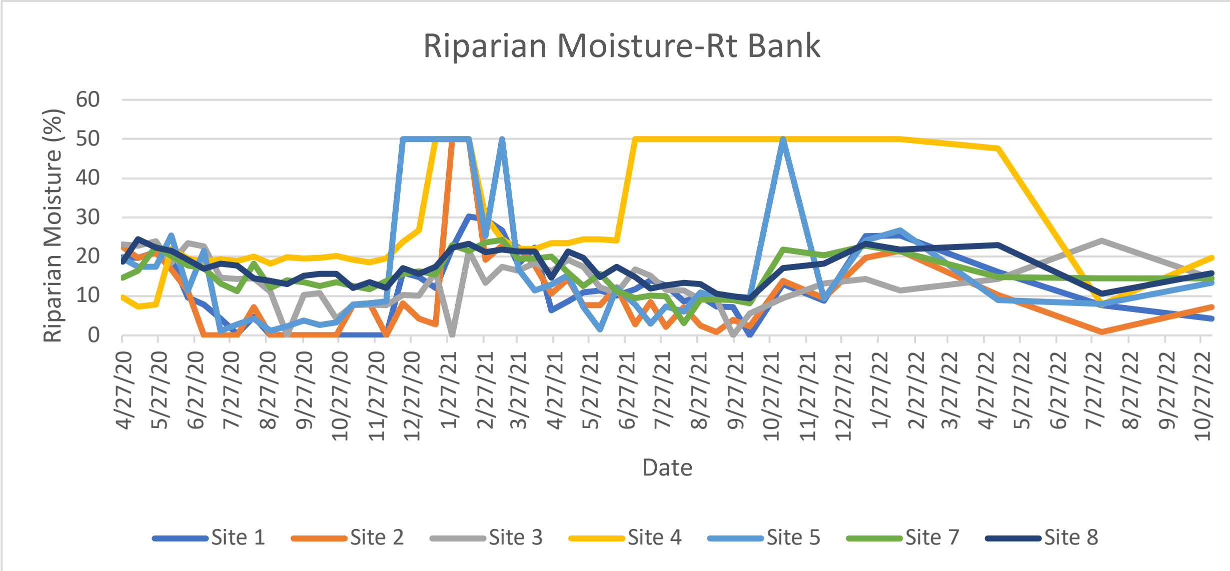

Figure 10. Riparian moisture on the right bank.

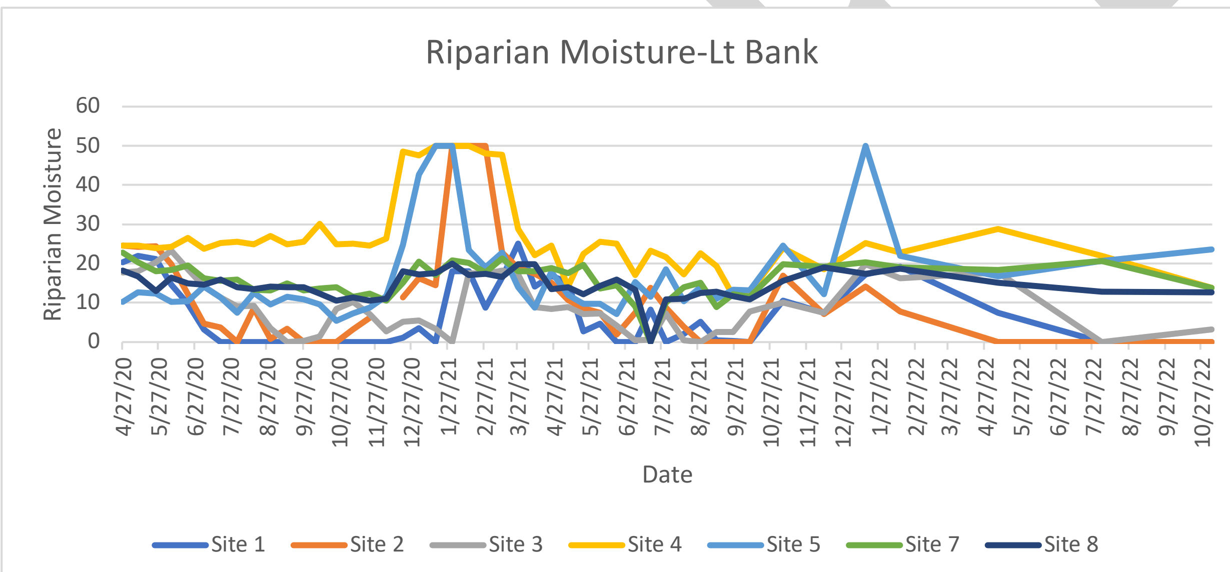

Figure 11. Riparian moisture on the left bank.

Hydrology

Van Gordon Creek was dry during all the 2022 surveys. On San Simeon Creek, sites 4 and 5 had water all year. All other sites had water during the January and February surveys but were dry during the May, August, and November surveys.

Wetted width, maximum depth, average depth, and flow were measured year-round at sites 4 and 5 but only during January and February for the other sites when they had water (Figures 12 through 15).

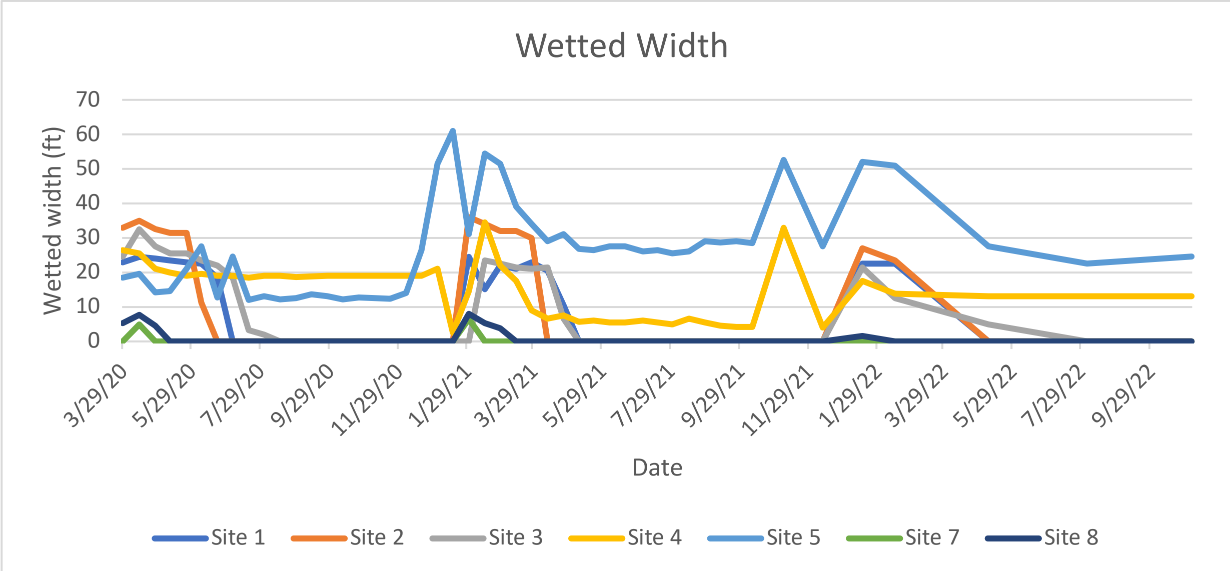

Figure 12. Wetted width.

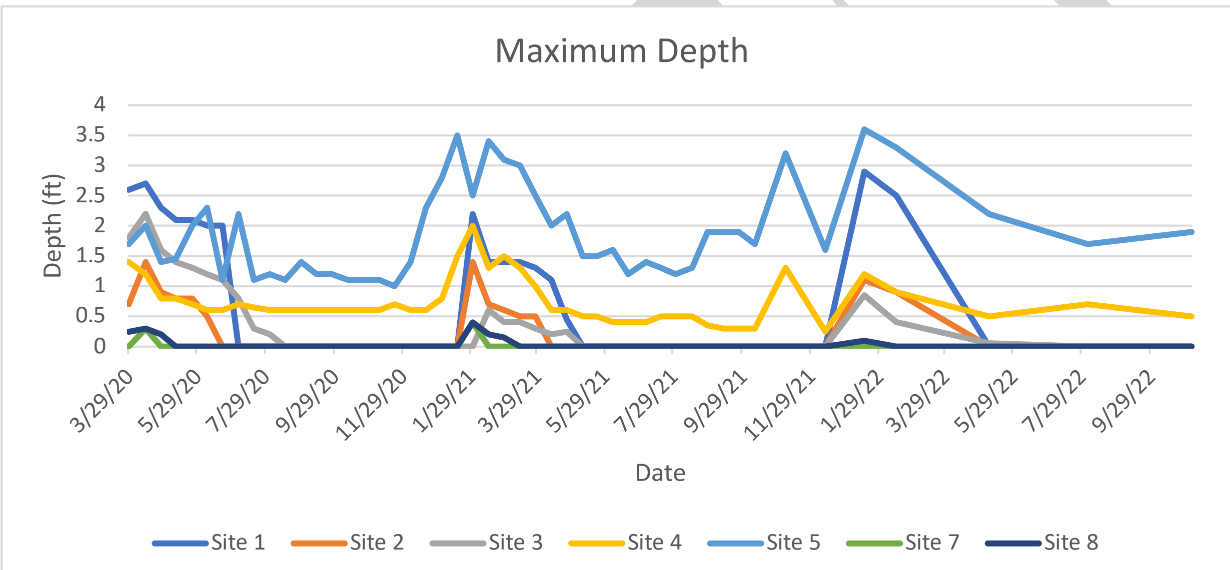

Figure 13. Maximum depth.

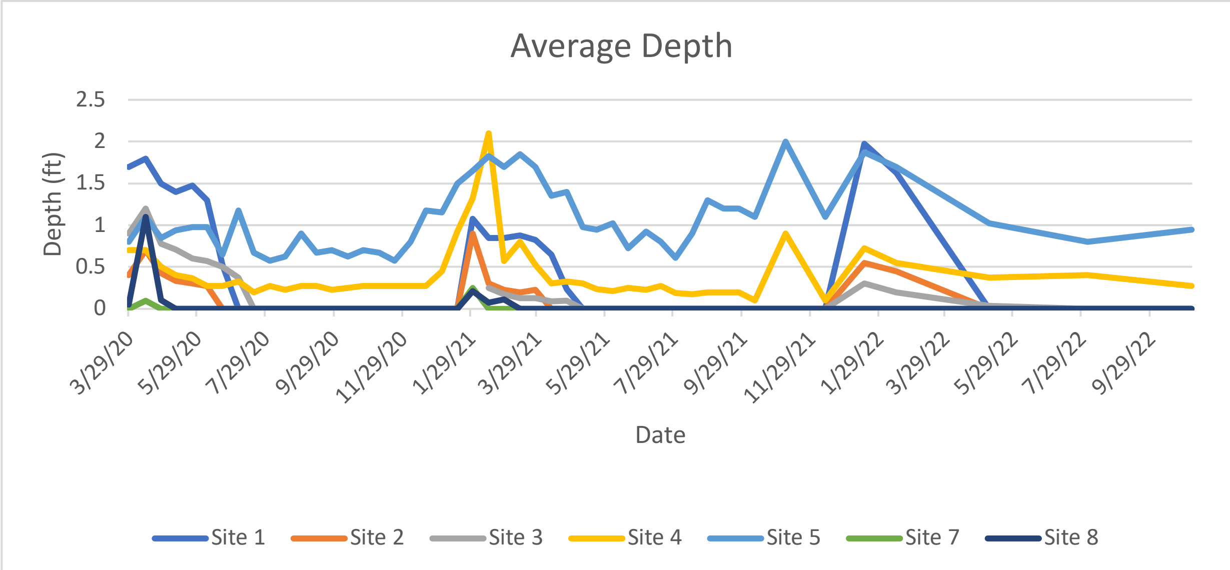

Figure 14. Average depth.

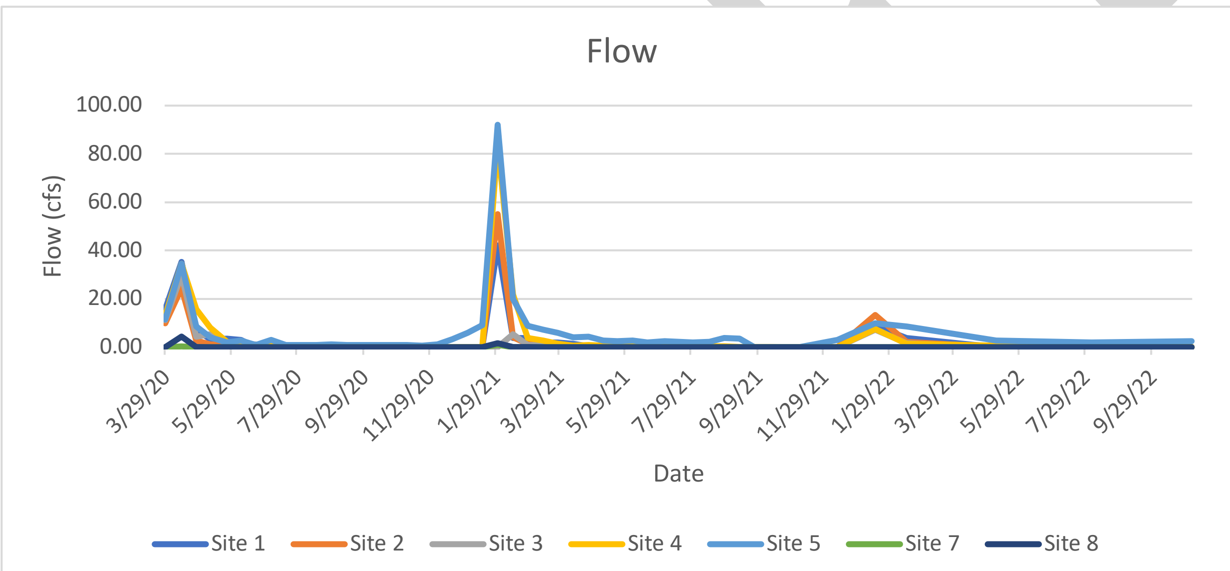

Figure 15. Flow.

Hydrology at Sites 4 and 5

Sites 4 and 5 appear to have water all year. Graphs show that wetted widths for the five surveys in 2022 were constant at Site 4 and Site 5 (Figures 16 and 17). Maximum depths in 2022 were similar to previous years (Figures 18 and 19). Flow during the low flow months of May through November is similar to previous years, although Site 5 had more fluctuation, likely due to tidal influence (Figures 20 and 21).

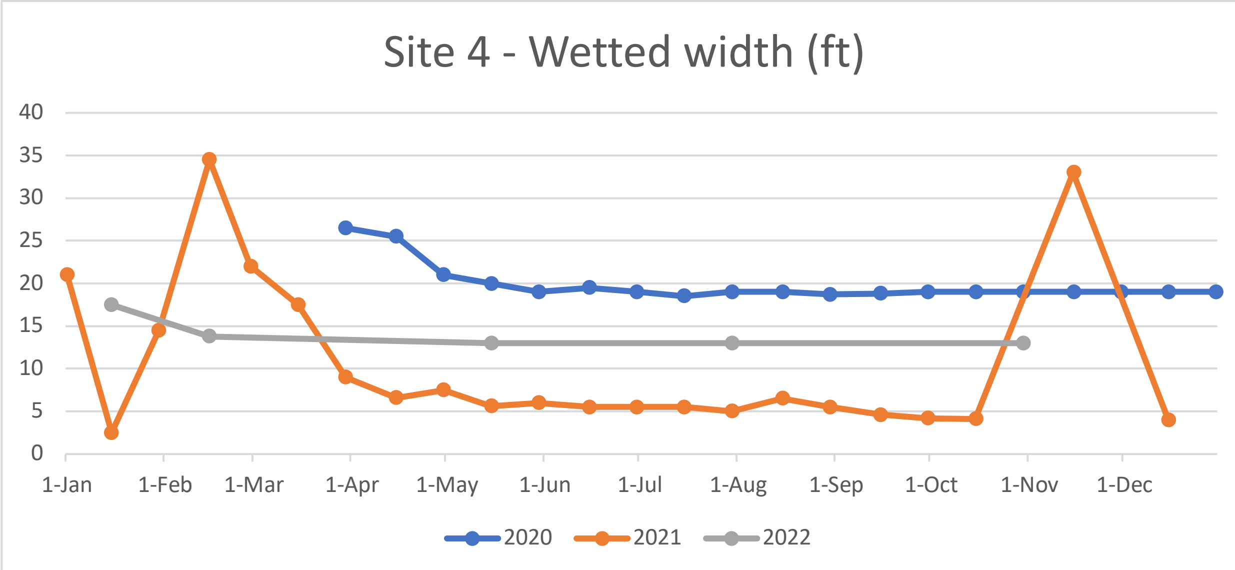

Figure 16. Site 4 wetted width.

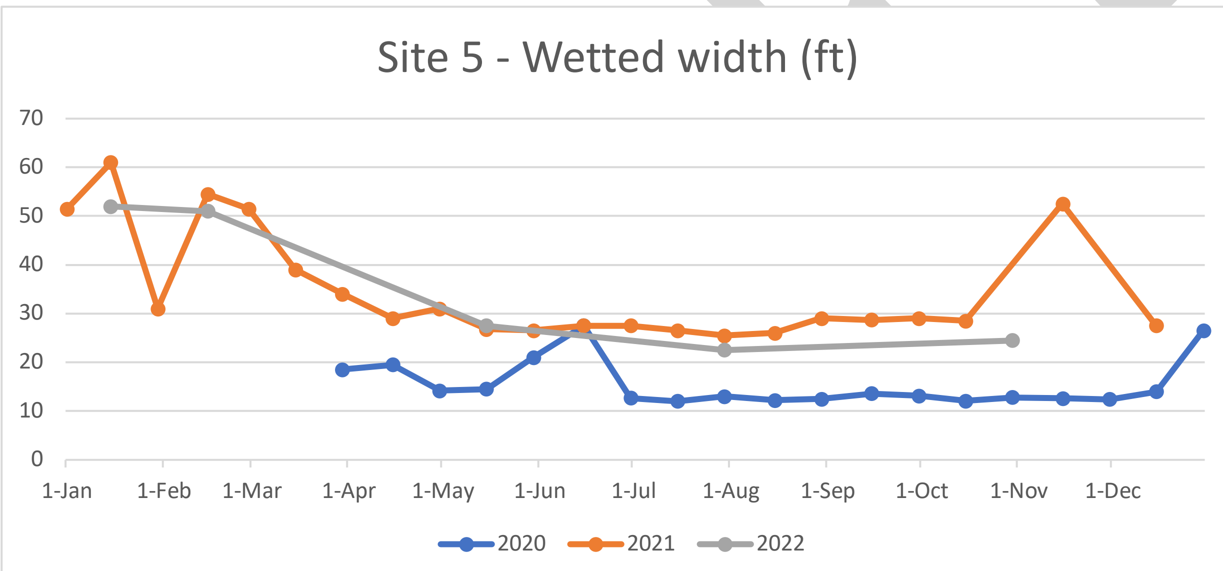

Figure 17. Site 5 wetted width.

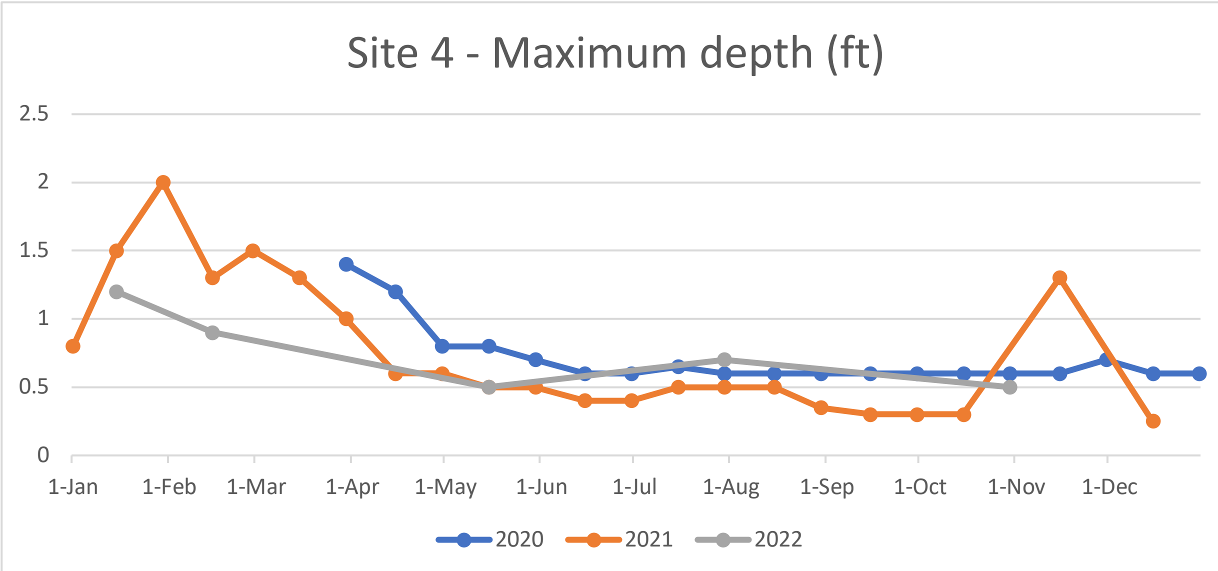

Figure 18. Site 4 maximum depth.

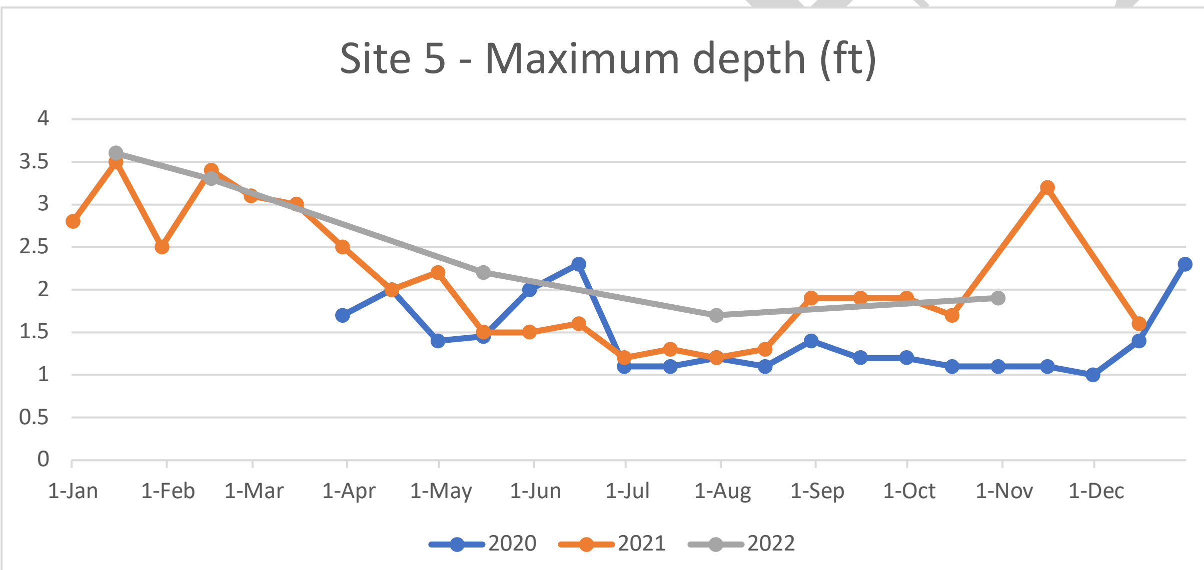

Figure 19. Site 5 maximum depth.

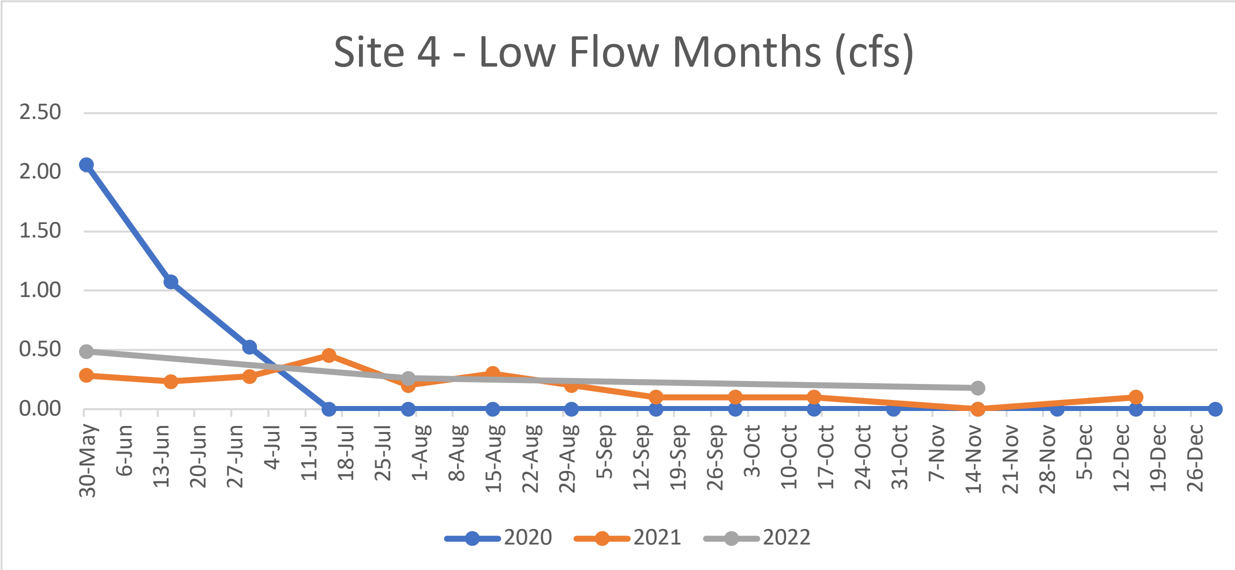

Figure 20. Site 4 low flow months.

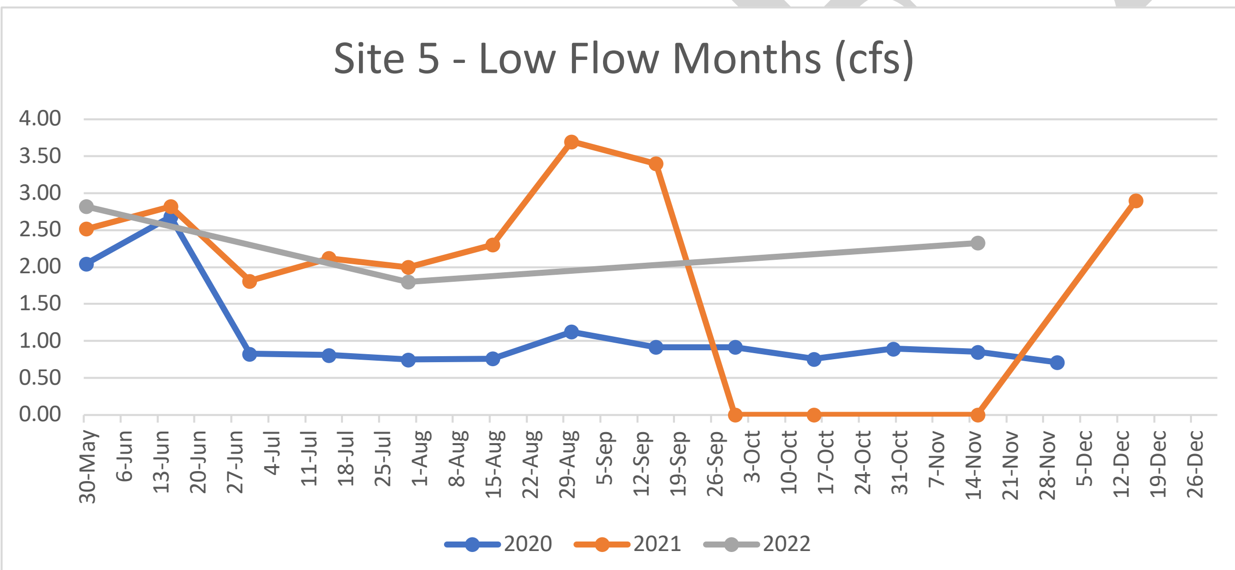

Figure 21. Site 5 low flow months.

Surface Water Quality

In 2022, the water temperature at sites 4 and 5 had a low of 56 °F in January and a high of 63 °F in August; the other sites had similar temperature patterns (Figure 22). Dissolved oxygen at sites 4 and 5 ranged between 2.4 and 10.5 ppm (Figure 23).

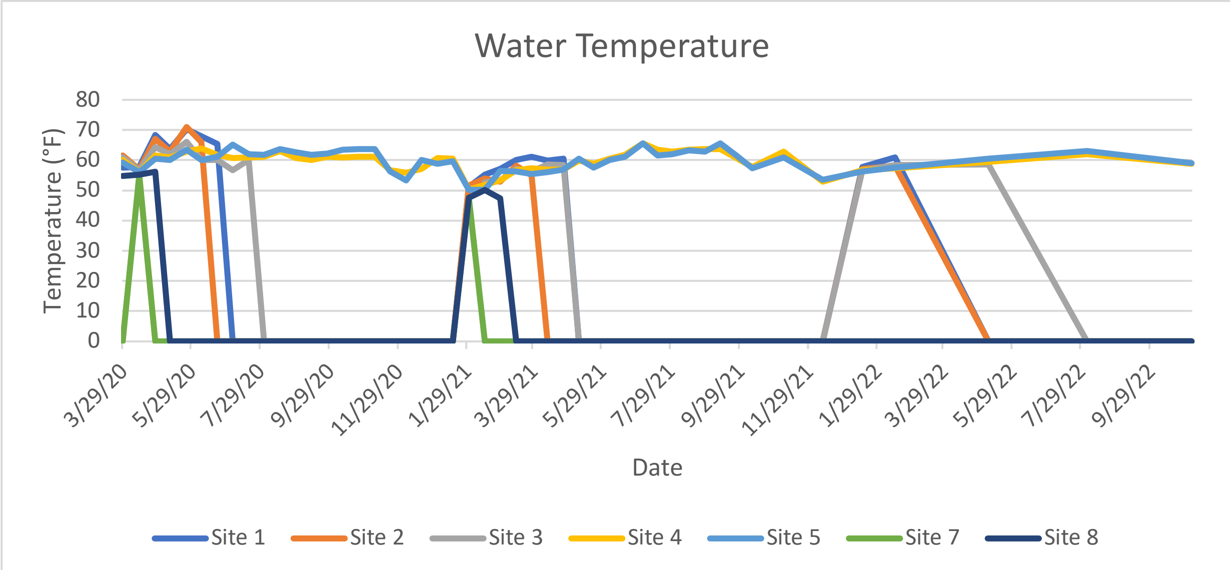

Figure 22. Water temperature.

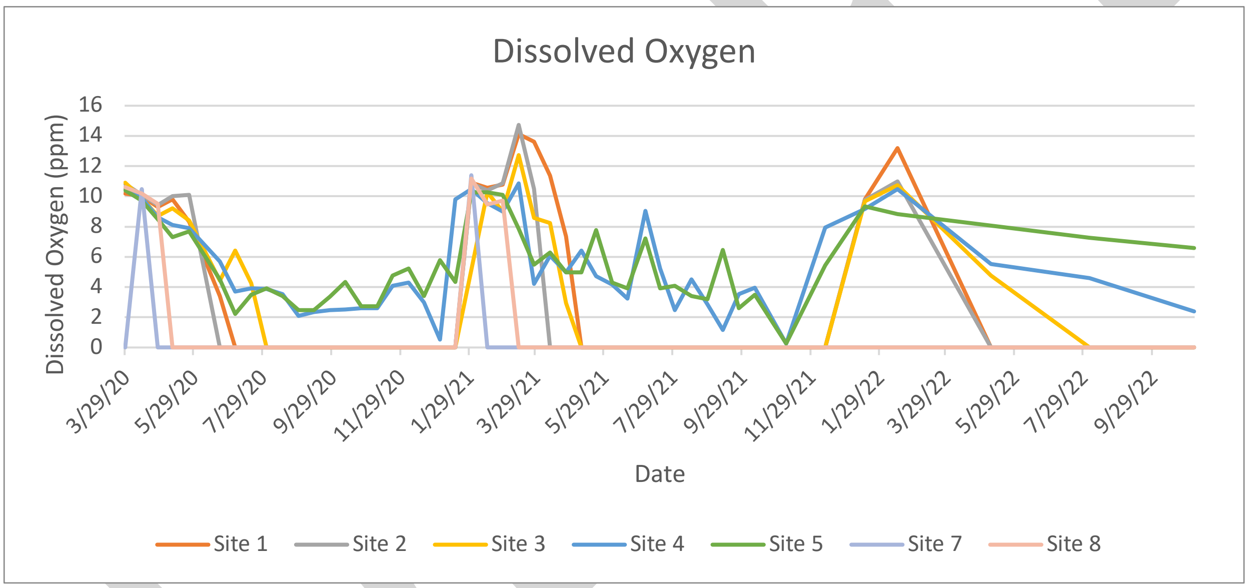

Figure 23. Dissolved oxygen.

Salinity usually ranged from 0.2 to 0.6 ppt. During the January survey, Site 5 reached a level of 20.2 ppt, probably a result of tidal influence and a closed sandbar (Figure 24).

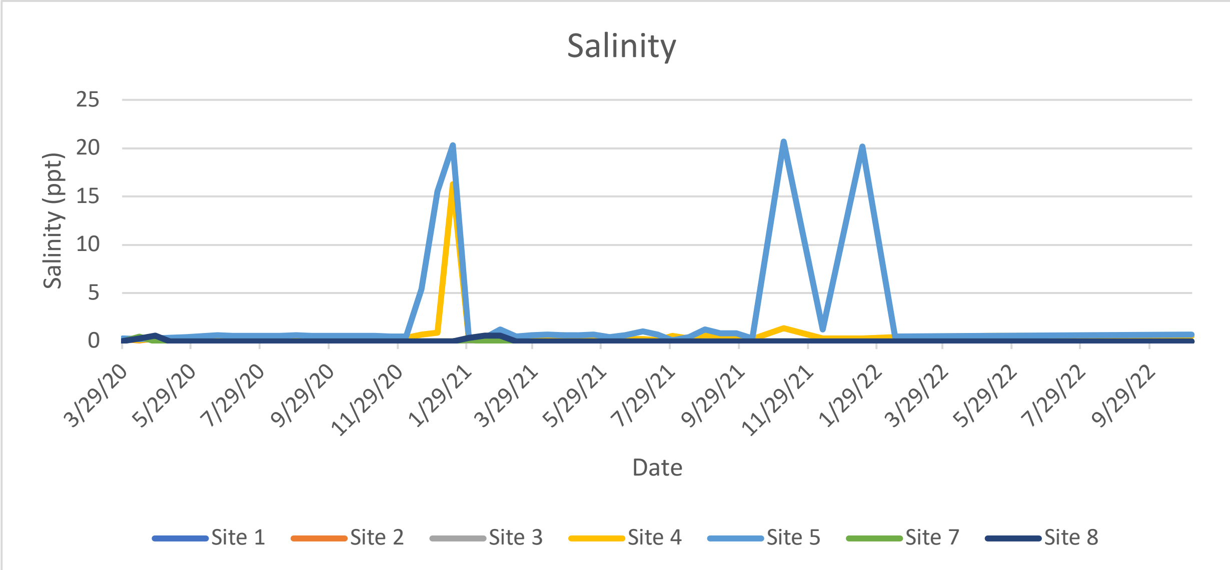

Figure 24. Salinity.

9P7 Soil Moisture

Soil moisture at the 9P7 well is presented in the graph below (Figure 25). As with other soil moisture measurements, the usefulness of this data is in question. The maximum moisture reading is 50%.

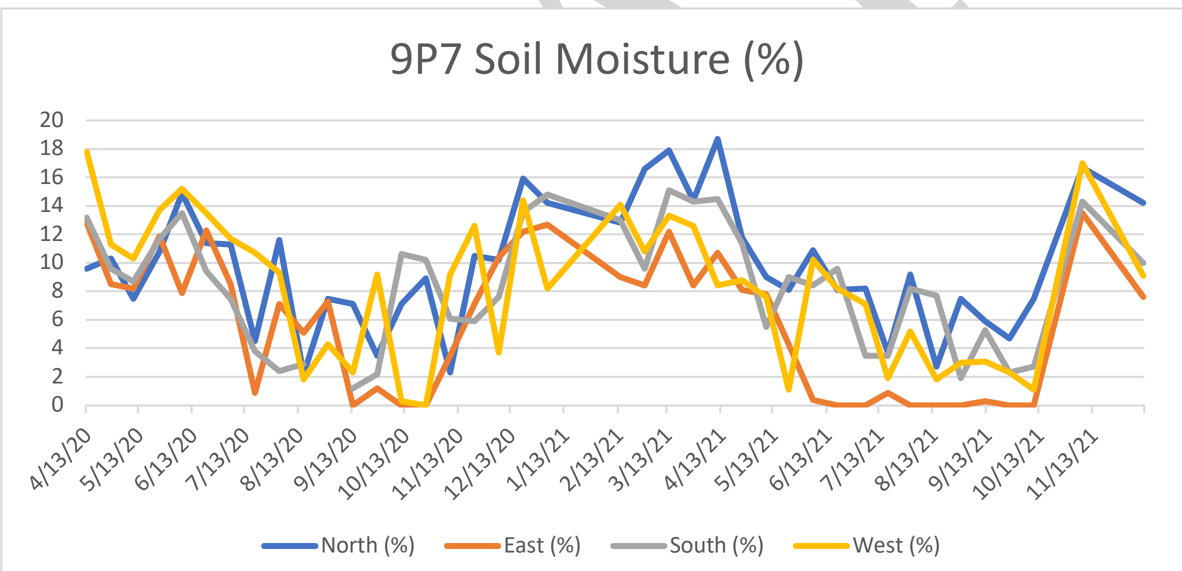

Figure 25. 9P7 Soil moisture.

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 include: 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*), and minor amounts of castor bean (*Ricinus communis*). Non-native vegetation at each survey site includes cape ivy.

Photo Points

Ground and aerial photographs were reviewed for riparian health and composition changes, and there were no observed changes.

Thresholds to Trigger Additional Investigation and/or Adaptive Management Measures

Based on the hydrological study, the trigger for additional investigations during WRF operations has been identified as the groundwater elevation at well 16D1. Well 16D1 has normal seasonal levels during dry years; anything outside of this range during WRF operations will trigger an investigation and, if needed, additional adaptive management measures. Each year the normal seasonal levels at well 16D1 will be updated.

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. Flow data showed the rapid rise and fall of a typical coastal creek. Baseline data will continue to be collected and analyzed monthly in 2023 to capture annual variations.

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