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San Simeon Creek Instream Flows Assessment

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Cover photos: Overview of San Simeon Creek during winter 2022 (top left), habitat surveys during 2022 (top right and bottom left), and adult steelhead observed in 2022 (bottom right).

Table of Contents

Tables

Figures

Appendices

Attachments

Acronyms and Abbreviations

°C	Celsius
°F	degrees Fahrenheit
1D	one dimensional
AFY	acre-feet per year
AWS	area weighted suitability
CCSD	Cambria Community Services District
CDFW	California Department of Fish and Wildlife
CDP	Coastal Development Permit
cfs	cubic foot per second
cm	centimeter
CRLF	California red-legged frog
EWD	Environmental Water Demand
ft	foot
ft^2	square foot
gpm	gallons per minute
GPS	global positioning system
HSC	habitat suitability criteria
IFIM	Instream Flow Incremental Methodology
mg/L	milligram per liter
NMFS	National Marine Fisheries Service
ppt	part per thousand
SEFA	System for Environmental Flow Analysis
SZF	stage-of-zero-flow
TAC	Technical Advisory Committee
WRF	Water Reclamation Facility
WSCP	Water Shortage Contingency Plan
WSE	water surface elevation

1 INTRODUCTION

The Cambria Community Services District (CCSD) commissioned Stillwater Sciences to conduct this instream flow study to quantify the amount of streamflow that will support key species and habitat in lower San Simeon Creek. Water service provided by CCSD has the potential to influence surface flows in San Simeon Creek, but information about how surface flow conditions affect aquatic habitat for sensitive species is lacking. Findings from this study (Task 1) and concurrent groundwater studies (Task 2) will be used to identify a sustainable amount of groundwater that can be extracted during operation of the San Simeon groundwater wells and long-term operation of the Water Reclamation Facility (WRF, formerly the Sustainable Water Facility) without adversely affecting riparian and wetland habitat or surrounding agricultural activities. This report focuses on surface flow conditions and how those conditions influence aquatic habitat for special status species in lower San Simeon Creek where it flows over the groundwater basin (Figure 1). Results from this study will help inform basin management protocols and environmental monitoring plans based on the instream flow needs identified during this study.

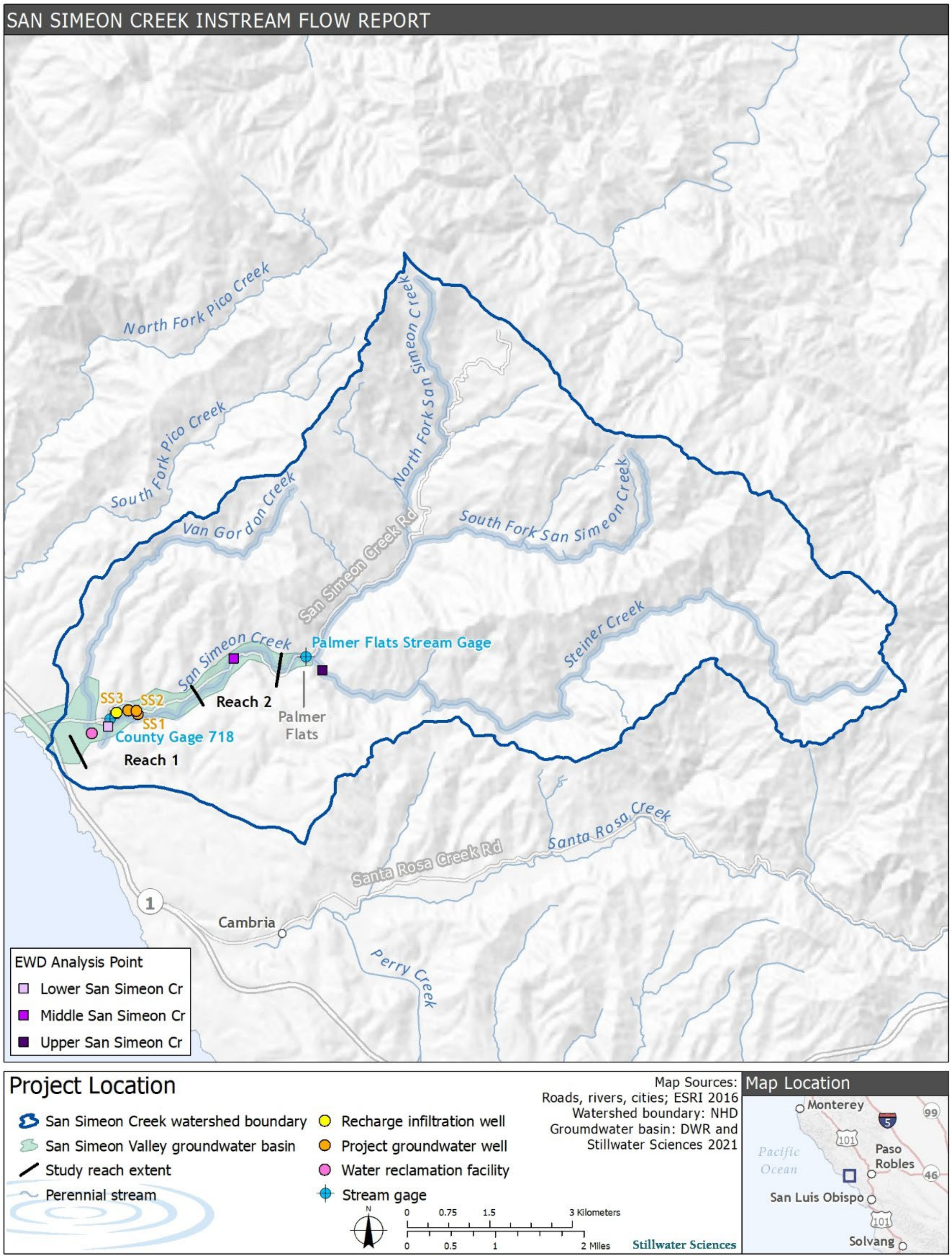
CCSD provides water service to the unincorporated town of Cambria. All of Cambria's potable water is supplied from groundwater wells operated by CCSD. CCSD operates three groundwater wells that extract water from the basin beneath San Simeon Creek and two groundwater wells that extract water from the basin beneath Santa Rosa Creek. In addition to the three groundwater wells CCSD operates along San Simeon Creek, CCSD has a fourth groundwater well that is located downstream near the confluence of San Simeon and Van Gordon Creek and is only used during operation of the WRF. CCSD constructed the WRF in 2014 under an emergency Coastal Development Permit (CDP) to address water shortage conditions in the community of Cambria during a historical drought event. The WRF enables CCSD to provide a reliable water supply to residents of Cambria during water shortages by using a combination of advanced water treatment, groundwater recharge, and groundwater extraction during periods of declared water shortages.

The WRF is designed to supply water by pumping brackish subsurface water from the western (i.e., coastal) edge of the groundwater basin. That water is then treated and reinjected back into the groundwater basin via a recharge infiltration well located upstream near the three existing San Simeon groundwater wells to maintain groundwater levels that allow for extraction. Through groundwater augmentation, the WRF was designed to provide up to 250 acre-feet of water to the community of Cambria during the dry season (typically late spring through fall). Furthermore, when operational, the WRF is designed to provide up to 100 gallons per minute (gpm) (equivalent to 0.23 cubic foot per second [cfs]) for surface water augmentation to maintain water levels in San Simeon Creek Lagoon.

Under CCSD's current emergency CDP, the WRF is allowed to operate only during declared Stage 3 water shortages. As part of its 2020 Urban Water Management Plan, CCSD replaced its three-stage Emergency Water Conservation Program (legacy program) with a new six-Stage Water Shortage Contingency Plan (WSCP). The legacy program's Stage 3 met the definition of a water shortage emergency per California Water Code Section 350 and was intended to conserve the water supply for critical uses only: human consumption, sanitation, and fire protection. Stages 4, 5, and 6 of the WSCP meet the definition of a water shortage emergency, with Stages 5 and 6 being the closest equivalent to the legacy program Stage 3. Ordinance 03-2021, which describes the WSCP in detail, including implementation criteria and procedures to initiate water shortage stages, can be viewed in CCSD's Public Repository.[1]

Sustained, long-term use of the WRF during the dry season is being considered as part of the regular CDP application. Operation of the San Simeon groundwater wells and the WRF may affect the distribution and/or behavior of sensitive aquatic species in stream sections where streamflow is affected by groundwater pumping and groundwater infiltration. Sensitive species that occur in Simeon Creek include federally threatened south-central California coast steelhead (anadromous *Oncorhynchus mykiss*), tidewater goby (*Eucyclogobius newberryi*), and California red-legged frog (*Rana draytoni*) (National Marine Fisheries Service [NMFS] 2013, Rathburn et al. 1993).

[1] Available at: www.cambriacsd.org/public-repository.



Note: EWD = Environmental Water Demand

Figure 1. Study Area.

2 BACKGROUND

The San Simeon Creek watershed drains a 35-square-mile area of the southern Coast Range. Originating from the flanks of the Santa Lucia Mountains, San Simeon Creek transitions from mountainous headwater terrain (maximum elevation approximately 3,400 feet [ft] above mean sea level) to lower gradient valley depositional areas before draining to the Pacific Ocean approximately 2.5 miles north of the town of Cambria. San Simeon Creek has two major tributary basins with their headwaters in the Santa Lucia Mountains: Van Gordon Creek and Steiner Creek (Figure 1). Streamflow entering from these tributaries has been shown to be important for maintaining surface flows in San Simeon Creek (D.W. Alley and Associates 2004).

Instream flows for San Simeon Creek were previously assessed during a county-wide assessment conducted by Stillwater Sciences (2014) to estimate the Environmental Water Demand (EWD) for watersheds throughout San Luis Obispo County. EWD is defined as the minimum amount of surface flows required to sustain aquatic habitat and ecosystem processes. The purpose of the EWD study was to provide a preliminary estimate of the magnitude and timing of instream flows that would support steelhead in creeks of San Luis Obispo County but was not intended to provide sufficient detail for establishing regulatory or mandatory water permit limits. The Stillwater 2014 report explicitly recommended site-specific analysis to establish flow recommendations, such as the study described here.

In an attempt to avoid estimating EWD for locations that naturally dry out (without human water extractions) during the summer/fall seasons, analysis points for estimating EWD were selected based on modeling that predicted locations with perennial flows and a high potential for suitable summer rearing habitat for juvenile steelhead (Boughton and Goslin 2007). EWD was then estimated at each analysis point based on a predictive model (Stillwater Sciences 2014). Within San Simeon Creek, EWD was estimated at three locations: (1) lower San Simeon Creek, just upstream of Van Gordon Creek, (2) middle San Simeon Creek, just upstream of the San Simeon Creek Road Bridge, and (3) upper San Simeon Creek, which is within Steiner Creek just upstream from the confluence with San Simeon Creek (Figure 1 and Table 1).

Table 1. Environmental water demand estimates for San Simeon Creek (from Stillwater Sciences 2014).

Analysis Point	Drainage Area (mi^2)	Environmental Water Demand (cfs)	
		Spring	Summer
Lower San Simeon Creek	26.2	1.6	0.5
Middle San Simeon Creek	24.3	1.5	0.5
Upper San Simeon Creek	9.8	0.8	0.3

Notes: cfs = cubic feet per second; mi^2 = square mile

Limited streamflow data exist for San Simeon Creek. Mean daily streamflow data was recorded for the Palmer Flats Gage (formerly#14) covering the period from October 1970 through September 1995 after which time the gage was discontinued. The U.S. Geological Survey (USGS) established a second stream gage (USGS Gage #11142300) located near CCSD wells in October of 1987 and operated it until July 1989, after which the county of San Luis Obispo took over operation of this gage (County Gage #718, formerly County Gage #22) and monitored streamflow through 2003. However, after 2003, the county stopped maintaining the stage discharge rating curve and recorded only stage levels. Therefore, data from this gage location included in this study covers only the periods from 1987 to 1989 (USGS Gage #11142300) and 1987 through 2003 (County Gage #718, formerly County Gage #22). Mean daily flow for each gage location is provided in Appendix A.

Similar to other Central Coast Range watersheds, San Simeon Creek naturally exhibits seasonal surface flow and extensive intermittent reaches due to highly variable patterns of precipitation and the complex geology of the region (NMFS 2013). Flows in San Simeon Creek closely follow the seasonal precipitation patterns of the region. The available stream gage data from San Simeon Creek shows the highest flows generally occur in the winter when maximum daily flows can exceed 1,000 cfs, while minimum flows during the summer are often 0 cfs (Table 2). Flood flows in San Simeon Creek typically increase, peak, and subside rapidly in response to high-intensity rainfall. This hydrologic attribute is characteristic of a “flashy” hydrograph, whereby a rapid increase in discharge occurs over a relatively short period with a quickly developed peak discharge in relation to normal baseflow. During the dry season, the lower section of San Simeon Creek often goes dry from near the confluence with Steiner Creek downstream to approximately the confluence with Van Gordon Creek (D.W. Alley and Associates 2004). While flashy flows and intermittent reaches are natural occurrences of coastal streams in Central California, San Simeon Creek has a number of groundwater pumps—municipal and agricultural—that likely increase the extent and frequency of intermittent flows above that which would occur under natural conditions.

Table 2. Mean daily flow for San Simeon Creek based on data collected at County Gage #718 (formerly County Gage #22) located just downstream of CCSD wells based on data collected from 1987 through 2003 and at the Palmer Flats Gage (formerly County Gage #14) based on data collected from 1970 through 1995.

Month	Daily Flow Statistics at County Gage[1]				Daily Flow Statistics at Palmer Flats Gage[1]			
	Min (cfs)	Mean (cfs)	Max (cfs)	Median (cfs)	Min (cfs)	Mean (cfs)	Max (cfs)	Median (cfs
October	0.0	0.2	51.0	0.0	0.0	0.2	15.0	0.0
November	0.0	10.1	1,200.0	0.0	0.0	12.2	832.0	0.0
December	0.0	23.3	1,020.0	0.0	0.0	25.7	920.0	1.0
January	0.0	83.6	1,480.0	9.4	0.0	66.0	1,592.0	10.0
February	0.0	115.7	2,590.0	35.5	0.0	72.6	1,106.0	14.0
March	0.0	72.2	4,270.0	25.0	0.0	73.5	1,530.0	23.0
April	0.0	16.5	286.0	8.7	0.0	20.4	1,164.0	7.9
May	0.0	4.3	215.0	1.2	0.0	4.9	67.0	1.9
June	0.0	0.7	7.0	0.0	0.0	1.9	20.0	0.2
July	0.0	0.1	3.6	0.0	0.0	1.2	21.0	0.0
August	0.0	0.0	0.2	0.0	0.0	0.4	20.0	0.0
September	0.0	0.0	0.0	0.0	0.0	0.1	18.0	0.0

Notes: CCSD = Cambria Community Services District, cfs = cubic feet per second

[1] While data were recorded daily for several seasons, there are periods when no flow was recorded. It is unknown whether the lack of data represents dry conditions or whether data were not collected for other reasons. Therefore, blank data cells were not included in calculation of statistics.

Instream flows provide many functions throughout the year, including sufficient flow for fish migration and rearing (Figure 2), suitable water quality in San Simeon Creek Lagoon, and essential geomorphic processes. The central focus in this study is to evaluate a range of flows and assess their ability to protect basic ecological processes that occur throughout the year but are most limiting when flows are at their lowest (dry season; late spring through fall).

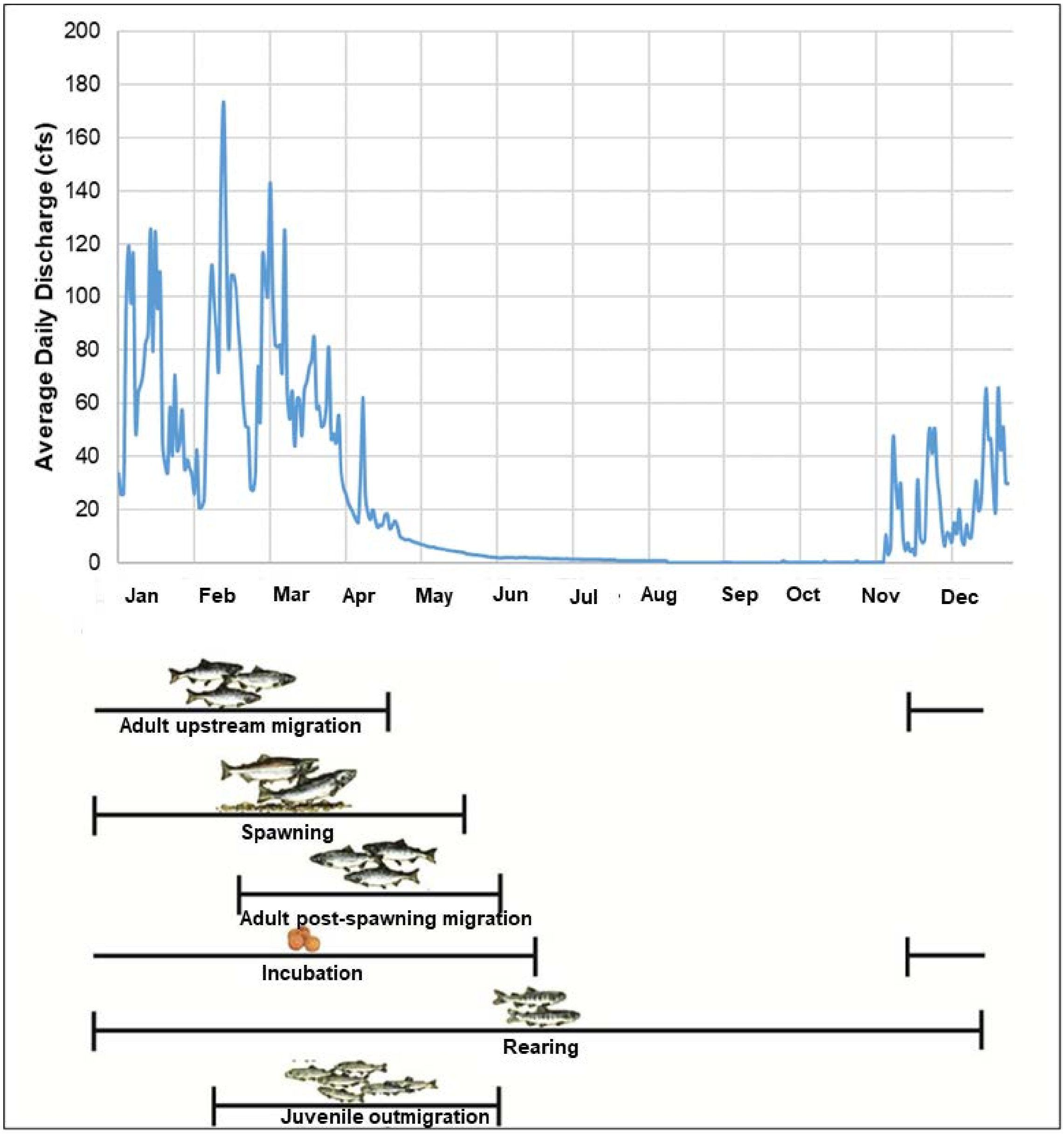


Figure 2. Average daily flows in San Simeon Creek, based on Palmer Flats Gage data for the period from 1970 through 1995 with life-history timing of steelhead (Shapovalov and Taft 1954).

Streamflow in lower San Simeon Creek is influenced by groundwater levels. During the winter when the groundwater basin is full, streamflow is generally steady; however, when basin-wide pumping exceeds the amount of streamflow contributions to the groundwater basin, groundwater levels quickly decline. This decline typically begins in the late spring when streamflow reaches about 1.3 cfs at the Palmer Flats Gage near the upstream end of the groundwater basin (Yates and Konynenburg 1998). Groundwater levels within the San Simeon groundwater basin generally become saturated after the first streamflow event in the winter, and the San Simeon Groundwater basin remains full until early summer, when the groundwater levels begin to recede before stabilizing near their minimum elevation, which typically occurs by the beginning of September and remains there until the first streamflow event recharges the groundwater basin (CCSD 2015).

2.1 Special Status Species

Special status aquatic species that occur in San Simeon Creek include two federally listed fish species—steelhead and tidewater goby—and one federally listed amphibian—California red-legged frog (CRLF).

2.1.1 Steelhead

Lower San Simeon Creek supports a population of federally threatened south-central California coast steelhead (NMFS 2013). One of the primary threats to steelhead production in San Simeon Creek was identified by NMFS includes reducing instream flow and water availability (NMFS 2013). Steelhead found in the San Simeon Creek watershed belong to the South-Central California Coast Distinct Population Segment, which includes steelhead populations that inhabit coastal stream networks from the Pajaro River (San Benito County) south to, but not including, the Santa Maria River (NMFS 2013). Within this Distinct Population Segment, the population of steelhead in the San Simeon Creek watershed has been identified as a Core 1 population, which means it has the highest priority for recovery actions, has a known ability or potential to support viable populations, and has the capacity to respond to recovery actions. One critical recovery action listed by NMFS includes the implementation of operating criteria to ensure streamflow allows for essential steelhead habitat functions (NMFS 2013).

Adult steelhead generally leave the ocean to return to their natal streams from December through March and spawn in late winter or spring (Meehan and Bjornn 1991, Behnke 1992). Spawning occurs primarily from January through April (Hallock et al. 1961, Moyle 2002). Female steelhead construct redds in suitable gravels (0.39–1.18 inches in diameter [Moyle 2002]), often in pool tailouts and heads of riffles, or in isolated patches in cobble-bedded streams. Steelhead eggs incubate in the redds for 3 to 14 weeks, depending on water temperatures (Shapovalov and Taft 1954, Barnhart 1991). After hatching, young steelhead remain in the gravel for an additional 2 to 5 weeks while absorbing their yolk sacs and then emerge in spring or early summer as fry (Barnhart 1991).

After emergence, steelhead fry use shallow, low-velocity habitats, typically found along stream margins and in low-gradient riffles (Hartman 1965, Fontaine 1988). As fry grow and improve their swimming abilities in late summer and fall, they increasingly show a preference for higher water velocity and deeper mid-channel areas near the thalweg (the deepest part of the channel) in locations with cover (Hartman 1965, Everest and Chapman 1972, Fontaine 1988). Locations with high water velocity and cover likely provide juvenile steelhead with resting locations while they watch for drifting invertebrates being carried by flow. Aquatic invertebrates comprise a key item in the diet of juvenile steelhead. After rearing in freshwater for 1 to 3 years, juvenile steelhead migrate to the ocean, typically from March through June.

San Simeon Creek Lagoon conditions have an important influence on anadromous fish survival because steelhead must pass through these areas during upstream adult migration and downstream smolt outmigration. In some central California coast watersheds, seasonal lagoons have also been shown to provide a critical role in supporting steelhead populations by providing important juvenile steelhead rearing habitat. Juvenile steelhead that rear in lagoon habitat over the summer have been shown to have rapid growth rates compared to growth in upstream locations (Hayes et al. 2008). Larger steelhead that reared in seasonal lagoon habitat in Scott Creek (Santa Cruz County), for example, were found to account for greater than 80% of the returning adult population (Bond et al. 2008). In some cases, lagoons have the potential to contribute to the majority of steelhead smolt produced in small coastal watersheds (Smith 1990). Water quality conditions within lagoon habitat reported to support steelhead rearing include the following criteria:

- Water temperatures between 15–24 degrees Celsius (°C) (59–75.2 degrees Fahrenheit [°F]) (Hayes et al. 2008).
- Salinities less than 10 parts per thousand (ppt) (Daniels et al. 2010).
- Dissolved oxygen concentrations greater than 5 milligrams per liter (mg/L) (ISU 2008, as cited in Daniels et al. 2010).

Flows to support steelhead migration in San Simeon Creek were previously assessed by D. W. Alley and Associates (1992). The study focused on water depth at critical riffles located within the lower 4 miles of San Simeon Creek. D. W. Alley (1992) estimated that flows to support adult steelhead upstream migration ranged from approximately 21 cfs to 68 cfs, depending on the critical riffle location, while juvenile steelhead downstream migration was supported at flows ranging from approximately 4 cfs to 11 cfs. Studies monitoring the downstream migration of steelhead in San Simeon Creek observed juvenile steelhead migration primarily during April and May with higher catch often occurring during periods of increased flows (Table 3) (Nelson 1995, Nelson et al. 2005).

Table 3. Steelhead outmigrant trapping results summary for San Simeon Creek in 1993 and 2005 (Nelson 1995, Nelson et al. 2005).

Week	Parr	Silvery Parr	Smolt	Rainbow Trout Coloration	Kelt	Total	Stream Flow (date)
1993 Outmigrant Trapping							
April 7	0	0	1	0	0	1	Not recorded
April 12	0	0	0	0	0	0	Not recorded
April 19	0	0	4	0	0	4	Not recorded
April 26	0	0	5	0	0	5	Not recorded
May 3	0	0		0	0	0	6.27 (May 5, 1993)
May 10	0	0		0	0	0	4.41 (May 12, 1993)
May 17	0	0		0	0	0	2.65 (May 19, 1993)
May 24[a]	Na	Na	Na	Na	Na	Na	5.29 (May 25, 1993)
2005 Outmigrant Trapping							
March 14	1	2	0	0	0	3	Not recorded
April 11	1	4	16	0	0	21	Not recorded
April 18	1	5	11	0	1	18	15.8 (April 20,2005)
April 25	0	33	17	3	0	53	31.3 (April 28,2005)
May 2	8	11	2	0	0	21	9.6 (May 4,2005)

Week	Parr	Silvery Parr	Smolt	Rainbow Trout Coloration	Kelt	Total	Stream Flow (date)
May 9	49	10	1	0	0	60	11.6 (May 11,2005)
May 16	11	0	0	0	0	11	7.2 (May 18,2005)
May 23	9	0	0	0	0	9	4.9 (May 24,2005)
May 30	30	0	0	0	0	30	3.7 (June 2,2005)
June 6	1	0	0	0	0	1	2.4 (June 7,2005)

[a] Traps were removed after the week of May 17 in 1993; however, the week of May 24 is included in the table to show an increase in flow that may have triggered additional smolt migration.

2.1.2 Tidewater goby

Tidewater goby is federally listed as endangered under the federal Endangered Species Act (59 Federal Register 5494 5499) and designated as a species of special concern by the State of California. Critical habitat was designated for tidewater goby in San Simeon Creek Lagoon (USFWS 2013). Tidewater goby is an estuarine/lagoon-adapted species that is endemic to the California coast, mainly in small lagoons and near stream mouths in the uppermost brackish portion of larger bays (Moyle 2002, USFWS 2005).

Tidewater gobies are short lived (generally 1 year) and highly fecund fish (females produce 300–500 eggs per batch and spawn multiple times per year) that disperse infrequently via marine habitat but have no dependency on marine habitat for their life cycle (Swift et al. 1989, Lafferty et al. 1999). Reproduction is generally associated with the closure and filling of the estuary (late spring to fall), typically beginning in late April or May and continuing into the fall, although the greatest numbers of fish are usually produced in the first half of this period. Breeding occurs in slack shallow waters of seasonally disconnected or tidally muted lagoons, estuaries, and sloughs. Males dig burrows vertically into sand, 4 to 8 inches deep, and defend the burrows until hatching (SCR Project Steering Committee 1996). Their diet consists mainly of small animals, usually mysid shrimp (*Mysidopsis bahia*), gamarid amphipods (*Gammarus roeseli*), and aquatic insects, particularly chironomid midge (Diptera: Chironomidae) larvae (Swift et al. 1989, Swenson 1997, Moyle 2002). Juvenile and adult tidewater gobies are reported to prefer water temperatures of 12–24°C (54–75°F), within a tolerance range of 6–25°C (42–77°F) (Stillwater Sciences 2006).

The USFWS (2013) states that habitat characteristics required to sustain the tidewater goby's life history processes include the following:

> Persistent, shallow (in the range of approximately 0.3 to 6.6 ft), still-to-slow-moving lagoons, estuaries, and coastal streams with salinity up to 12 ppt, which provide adequate space for normal behavior and individual and population growth that contain one or more of the following: (a) Substrates (e.g., sand, silt, mud) suitable for the construction of burrows for reproduction; (b) Submerged and emergent aquatic vegetation, such as pondweed (Potamogeton pectinatus), widgeongrass (*Ruppia maritima*), bulrush (*Typha latifolia*), and sedges (*Scirpus* spp.), that provides protection from predators and high flow events; or (c) Presence of a sandbar(s) across the mouth of a lagoon or estuary during the late spring, summer, and fall that closes or partially closes the lagoon or estuary, thereby providing relatively stable water levels and salinity.

Monthly visual observation surveys conducted in San Simeon Creek Lagoon from May 1992 through April 1993, documented observations of more than 7,000 juvenile and more than 1,000 adult tidewater gobies (Rathburn et al. 1993). More recently, during a single day of beach seining in October 2014, more than 1,000 tidewater gobies were captured in San Simeon Creek Lagoon (D.W. Alley 2015)

2.1.3 California red-legged frog

CRLF is federally listed as threatened and is a California Department of Fish and Wildlife (CDFW) Species of Special Concern. The species' range occurs from south of Elk Creek in Mendocino County to Baja California, with isolated remnant populations occurring in the Sierra foothills from sea level to approximately 8,000 ft (Stebbins 1985, Shaffer et al. 2004). Currently, most CRLF populations are largely restricted to coastal drainages on the central coast of California.

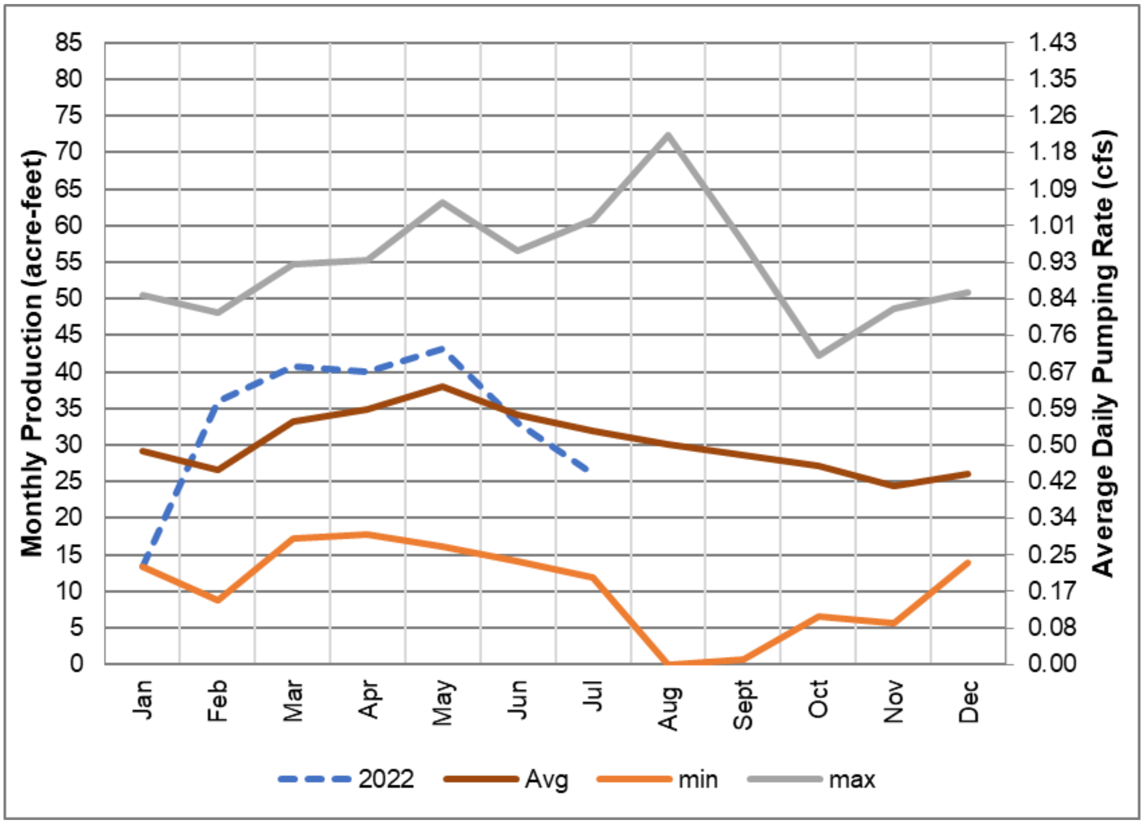
CFLF habitat includes wetlands, wet meadows, ponds, lakes, and low-gradient, slow-moving stream reaches. Breeding generally occurs from December through April in aquatic habitats characterized by still or slow-moving water with deep pools (usually 2.3 ft deep or greater) and emergent and overhanging vegetation (Jennings and Hayes 1994). Breeding sites can be ephemeral or permanent; if ephemeral, inundation is usually necessary into the summer months (through July or August) for successful metamorphosis. Although some adults may remain resident year-round at favorable breeding sites, others may disperse overland up to 1 mile or more (Fellers and Kleeman 2007). Movements may be along riparian corridors, but many individuals move directly from one site to another without apparent regard for topography or watershed corridors (Bulger et al. 2003). CRLFs sometimes enter a dormant state during summer or in dry weather (aestivation), finding cover in small mammal burrows, moist leaf litter, root wads, or cracks in the soil. However, CRLFs in coastal areas are typically active year-round because temperatures are generally moderate (USFWS 2002, Bulger et al. 2003). CRLF eggs and tadpoles require daily average water temperatures <23°C (73.4°F) (USFWS 2002) and salinities of 4.5 ppt or below (Jennings and Hayes 1990).

2.2 Operations Information

CCSD operates the three groundwater wells located along lower San Simeon Creek fairly consistently throughout the year (Figure 3). Existing water right conditions limit pumping to an annual maximum of 799 acre feet per year (AFY) from the San Simeon aquifer and of that amount up to 370 AFY can be pumped during the dry season (defined as "from the time the creek ceases flow at the Palmer Flats Gage, until October 31") (Water Systems Consulting 2021). CCSD typically extracts between 24 to 38 acre-feet per month (Figure 3), which equates to daily average extraction rates of approximately 0.41 cfs to 0.64 cfs; however, pumping rates can be as high as 85 acre-feet per month, which equates to 1.43 cfs (Water Systems Consulting 2021).

In addition to the wells operated by CCSD, numerous private wells irrigate farmlands on flat areas adjacent to the San Simeon creek channel. Agricultural pumping within the valley has been estimated at approximately 180 AFY (CDM Smith 2014). The majority of agricultural pumping occurs from two agricultural operations: one located along the upstream end of the basin spanning from just upstream of the three CCSD wells to just downstream of Steiner Creek and the other is located adjacent to the WRF. The upstream agricultural operation currently uses approximately 130 AFY and only plants half of the total acreage each year, indicating that at full production groundwater pumping there could increase up to 260 AFY (Yates 2022). This rate is estimated to require pumping at rates ranging from 0.24 cfs to 0.42 cfs during the spring (April and May). The agricultural pumping that occurs adjacent to the WRF, is allocated up to 183.5 AFY; however, recent use has averaged around approximately 15 AFY per year. The maximum pump capacity of this well is 275 gpm (0.61 cfs) (Warren 2023).

The influence of the two major agricultural wells on groundwater levels as well as CCSD wells was assessed under the Task 2 groundwater modeling effort (Appendix B). Results from the expanded groundwater model indicate that pumping from the private well located adjacent to the WRF has a smaller influence on groundwater basin conditions compared to the pumping from the well located upstream of CCSD wells (Appendix B). This smaller influence is likely attributed to the stabilizing effects of San Simeon Creek Lagoon on the groundwater levels in the coastal end of the basin.



Notes: cfs = cubic feet per second; CCSD = Cambria Community Services District

Figure 3. Monthly well extraction volume from CCSD San Simeon basin wells in 2022 and average, minimum, and maximum monthly well extraction volumes with average daily pumping rates for the period from 2012 through July 2022**.**

2.3 Study Goals and Objectives

CCSD initiated two tasks to gather information about its operations within the San Simeon groundwater basin. Task 1 includes this instream flow study, which focuses primarily on surface flow conditions within lower San Simeon Creek. Task 2 entails groundwater modeling related to the instream flow study efforts and aims to quantitatively estimate the effects of operational changes on groundwater levels, groundwater inflow to San Simeon Creek Lagoon, and ocean boundary outflow using a modified, existing groundwater model of the San Simeon Creek basin. The analysis included in Task 2 focuses on drought periods when the WRF would likely be operated and when potential ecological impacts would be most severe (Appendix B), while Task 1 focuses on the amount of surface flows needed to support aquatic species. The goal of the Task 1 and 2 studies is to inform water allocation in the San Simeon Creek watershed as it relates to sensitive species that occur in lower San Simeon Creek. Results from both studies will be used to inform CCSD's Adaptive Management Plan for San Simeon Creek.

This report focuses on surface flows and identifies flows needed for sensitive species and habitats in lower San Simeon Creek assessed under Task 1. The study objective is to determine the relationship between habitat and streamflow as it relates to the needs of aquatic species in lower San Simeon Creek with operation of the San Simeon groundwater wells and long-term operation of the WRF having the potential to alter surface flow.

2.4 Study Area

The Study Area focuses on the section of San Simeon Creek where surface flows are most likely influenced by groundwater pumping and recharge associated with CCSD's operations. It covers an approximately 3.5-mile section of San Simeon Creek that runs along the San Simeon Valley groundwater basin, which begins just upstream of the lagoon and extends upstream to the Palmer Flats area located just downstream of Steiner Creek (Figure 1). This section of San Simeon Creek is between two major tributaries—Van Gordon Creek at the downstream end and Steiner Creek at the upstream end—and within the alluvial section of the watershed, where surface flows infiltrate into the groundwater basin. The stream channel within the Study Area is characterized as a low-gradient, broad channel with substate that is predominately sand and gravel with lesser amounts of cobble channel (Nelson et al. 2005).

Surface flow in San Simeon Creek within the Study Area generally occurs during the late fall through late spring with flows typically becoming intermittent between May and July, depending on water year type. Previous habitat mapping efforts found the section of San Simeon Creek within the Study Area to have diverse channel characteristics and substrate composition; however, it was treated as a single reach because it was intermittent during the 2005 survey (Nelson et al. 2005). For modeling purposes, the two distinct sections within the Study Area were treated as separate reaches. The modeling focused on the larger downstream reach (Reach 1) that extends along CCSD well field (Figure 1). While this study covered both reaches within the Study Area, modeling was limited to the Reach 1 because it is more accessible and closer to CCSD operations.

3 METHODS

3.1 Technical Advisory Committee

This project engaged stakeholders by creating a Technical Advisory Committee (TAC). The TAC included individuals from the CDFW, California State Parks, California Coastal Commission, San Luis Obispo County, and the Upper Salinas-Las Tablas Resource Conservation District. The TAC provided guidance on the technical approach during study plan development.

3.2 Habitat Typing

Surveys to delineate aquatic habitat units were conducted in nearly 3 miles of continuous stream channel of lower San Simeon Creek. Because this section of the creek was dry at the start of this study (early December 2021), habitat mapping was conducted during the winter after flows returned to San Simeon Creek within the Study Area and the stream stage level had become stable at County Gage #718. Winter base flow conditions were targeted to facilitate the evaluation of habitat composition, while low flows made distinct habitat unit breaks most apparent. Habitat units were classified using a three-tiered habitat mapping classification system (Hawkins et al. 1993) to assist in the identification of individual habitat units in the field. Level III categories were generally modified/adopted from McCain et al. (1990). Figure 4 shows the relationship among the three levels.

Habitat mapping was conducted by a team of two biologists on foot within the two Study Reaches. Individual habitat units were designated a habitat type (e.g., riffle, run, pool) using the habitat types described in Table 4. Each habitat unit was identified where the unit length was greater than the active channel width (Flosi et al. 2010). The length of each habitat unit was measured using a hip chain, which was referenced back to a known starting point or landmark. The mapping was contiguous, so each habitat unit abutted to the next unit. Each distinct habitat unit was numbered consecutively in an upstream direction, beginning at the downstream end of the Study Reach.

Data from the habitat mapping were used to characterize each Study Reach. A single Study Reach (Reach 1) near CCSD's operations in San Simeon Creek was selected for one-dimensional (1D) modeling to assess streamflow conditions and available habitat for steelhead. Habitat typing data were used to establish study sites that were appropriate for use in the 1D model and representative of conditions throughout the Study Reach to allow for data extrapolation.

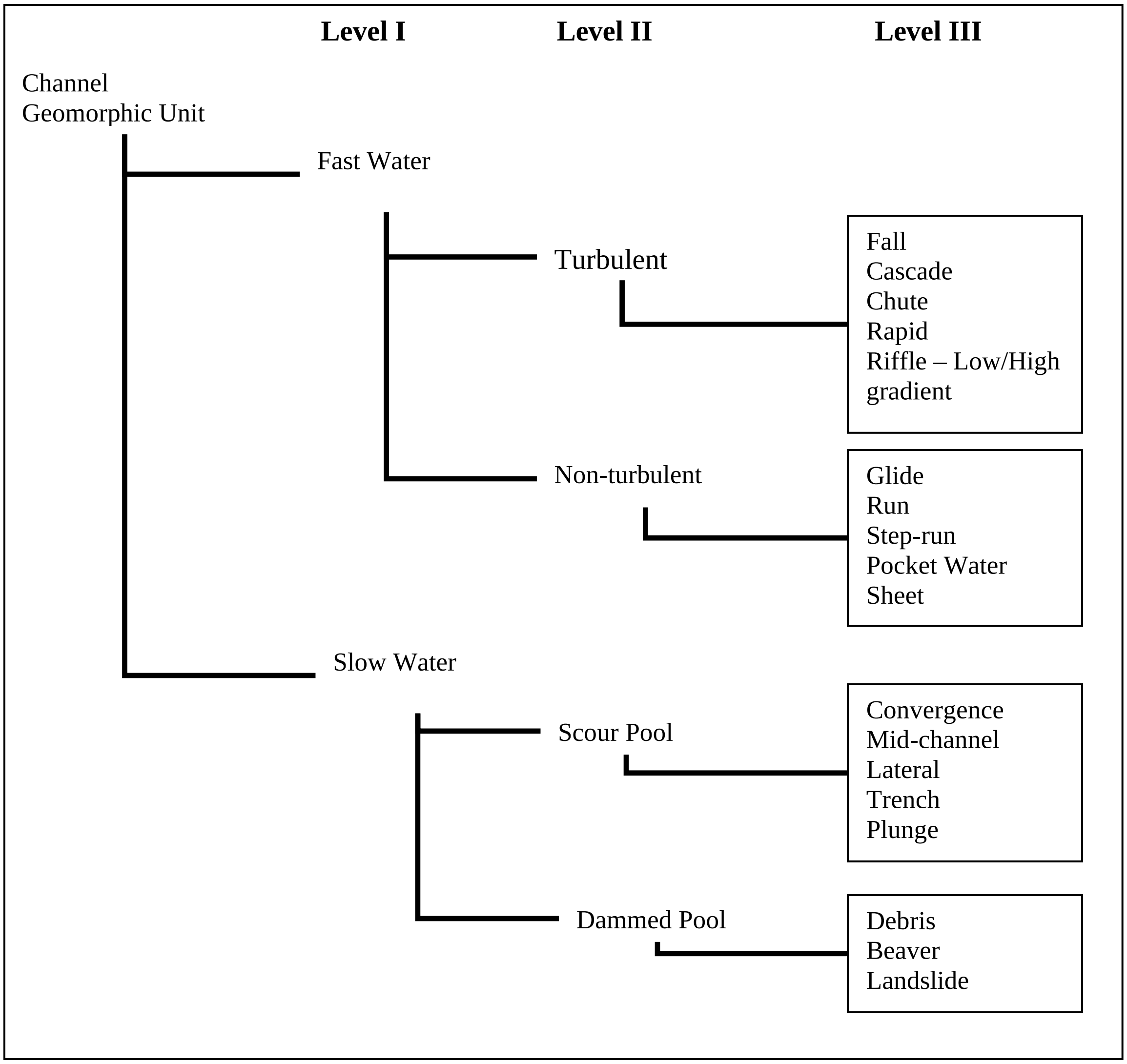


Figure 4. Three-tiered habitat mapping classification system adapted from Hawkins et al. (1993) and McCain et al. (1990).

Table 4. Habitat types to be used in mapping for the San Simeon Creek instream flow study (adapted from McCain et al. 1990, Armantrout 1998, Payne 1992, McMahon et al. 1996, and Hawkins et al. 1993).

I. Fast Water:	**Riffles, rapid, shallow stream sections with steep water surface gradient.**
A. Turbulent:	**Channel units having swift current, high channel roughness (large substrate), steep gradient, and non-laminar flow and characterized by surface turbulence.**
1. Fall:	Steep, vertical drop in water surface elevation. Generally not modellable.
2. Cascade:	Series of alternating small falls and shallow pools; substrate usually bedrock and boulders. Gradient high (more than 4%). Generally not modellable.
3. Chute:	Narrow, confined channel with rapid, relatively unobstructed flow and bedrock substrate.
4. Rapid:	Deeper stream section with considerable surface agitation and swift current; large boulder and standing waves often present. Generally not modellable.
5. Riffles:	Shallow, lower-gradient channel units with moderate current velocity and some partially exposed substrate (usually cobble). • Low gradient—Shallow with swift flowing, turbulent water. Partially exposed substrate dominated by cobble. Gradient moderate (less than 4%). • High gradient—Moderately deep with swift flowing, turbulent water. Partially exposed substrate dominated by boulder. Gradient steep (greater than 4%). Generally not modellable.
B. Non-turbulent:	**Channel units having low channel roughness, moderate gradient, laminar flow, and lack of surface turbulence.**
1. Sheet:	Shallow water flowing over smooth bedrock.
2. Run/Glide:	Shallow (glide) to deep (run) water flowing over a variety of different substrates.
3. Step Run	A sequence of runs separated by short riffle steps. Substrates are usually cobble and boulder dominated.
4. Pocket Water:	Swift flowing water with large boulder or bedrock obstructions creating eddies, small backwater, or scour holes. Gradient low to moderate.
II. Slow Water:	**Pools; slow, deep stream sections with nearly flat-water surface gradient.**
A. Scour Pool:	**Formed by scouring action of current.**
1. Trench:	Formed by scouring of bedrock.
2. Mid-channel:	Formed by channel constriction or downstream hydraulic control.
3. Convergence	Formed where two stream channels meet.
4. Lateral:	Formed where flow is deflected by a partial channel obstruction (streambank, rootwad, log, or boulder).
5. Plunge:	Formed by water dropping vertically over channel obstruction.
B. Dammed Pool:	**Water impounded by channel blockage.**
1. Debris:	Formed by rootwads and logs.
2. Beaver:	Formed by beaver dam.
3. Landslide:	Formed by large boulders.
4. Backwater:	Formed by obstructions along banks (recorded as a comment or note to mapping).
5. Abandoned Channel:	Formed along main channel, usually associated with gravel bars (not part of the main active channel; recorded as a comment or note to mapping).

3.3 Instream Flow Surveys

The Instream Flow Incremental Methodology (IFIM) was used to evaluate the relationship between flow and habitat quantity/quality throughout Reach 1. The IFIM applies a mesohabitat (e.g. riffle, run, and pool) and transect-based approach (commonly referred to as the 1D method) for implementing the 1D modeling component of the IFIM to address flow-habitat relationships. For this analysis, the System for Environmental Flow Analysis (SEFA; Jowett et al. 2017) model was applied using a one-flow velocity calibration approach, where transect and cell-specific data were derived from field survey data. The SEFA model calculates a habitat index that reflects the area weighted suitability (AWS) (previously referred to as the weighted usable area) based on simulation of water depths and velocities from the 1D hydraulic models. Cross sections (transects) are used to represent the stream, and habitat suitability criteria (HSC) are applied which define the physical and hydraulic characteristics considered suitable for specific species and life stages. Details of the approach are provided below.

3.3.1 Study site selection for one-dimensional modeling

Study sites were selected for 1D modeling within Reach 1. Prior to study site selection, Reach 2 was removed from the process due to access limitations. The study sites for 1D modeling were selected within Reach 1 using a combination of random selection and professional judgment following the procedure outlined in CDFW (2015). The procedure is based on the number and overall proportion of habitat types and provides assurance that all major habitat types will be sampled in relative proportion to the overall reach (Table 5). To account for habitat variation within the Study Reach, Reach 1 was subdivided into three sub-sections of approximately equal length (Table 6).

Within each sub-section, the habitat unit corresponding with the least abundant mesohabitat served as the basis for random selection. These units were assigned sequential numbers, and a random number was generated for each unit. The randomly selected units were then located in the field and included as a study site if they appeared representative of that habitat type within Reach 1 and appeared to be modellable based on perpendicular flow and level water surface area. In the event a randomly selected unit was determined to be unrepresentative or not modellable, the second randomly selected unit was chosen. From that starting habitat unit, transect locations were established in adjacent habitat units (heading upstream or downstream) until the requisite number of transects was placed in the specified habitat units, as described below, to create a cluster of study sites to facilitate collection of transect data.

Table 5. Number of mesohabitat units by type for each Study Reach.

Habitat Code	Mesohabitat	Total Length (ft)	Length Relative Freq.	Number	Number Relative Freq.
Reach 1					
LGR	Low-gradient Riffle	1,751	21.3%	26	34.2%
GLD	Glide	1,290	15.7%	6	7.9%
RUN	Run	2,441	29.7%	21	27.6%
LSP	Lateral Scour Pool	557	6.8%	4	5.3%
MCP	Mid-channel Pool	2,181	26.5%	19	25.0%
SUM		**8,220**	**100.0%**	**76**	**100.0%**
Reach 2					
LGR	Low-gradient Riffle	1,816	22.1%	23	38.3%
GLD	Glide	134	1.6%	1	1.7%
RUN	Run	2,157	26.2%	18	30.0%
LSP	Lateral Scour Pool	801	9.7%	4	6.7%
MCP	Mid-channel Pool	2,000	24.3%	14	23.3%
SUM		**6,908**	**100.0%**	**60**	**100.0%**

Table 6. Reach 1 sub-sections for transect selection.

Mesohabitat	Total Length (ft)	Length Relative Freq.	Number	Number Relative Freq.
Sub-section A				
Low-gradient riffle	605	23%	10	37%
Glide	324	12%	2	7%
Run	620	23%	6	22%
Pool	1,101	42%	9	33%
SUM	**2,650**	**100.0%**	**27**	**100.0%**
Sub-section B				
Low-gradient riffle	709	25%	9	35%
Glide	634	22%	3	12%
Run	1,079	38%	8	31%
Pool	439	15%	6	23%
SUM	**2,861**	**100.0%**	**26**	**100.0%**
Sub-section C				
Low-gradient riffle	437	16%	7	31%
Glide	332	12%	1	4%
Run	924	34%	8	35%
Pool	1,016	38%	7	30%
SUM	**2,709**	**100.0%**	**23**	**100%**

3.3.2 Transect placement

Twelve transects were established to model three riffle, three run, three pool, and three glide habitats within Reach 1. Individual transect locations were selected in the field. Transects were placed within representative habitat types for Reach 1. For modeling purposes, individual transects were weighted to represent the proportion of each mesohabitat type (i.e., riffle, run, pool, and glide) in the reach. These proportions were calculated based on habitat unit lengths resulting from the habitat mapping data. Each habitat type was apportioned its respective length of the entire reach (e.g., riffles are 35% of the reach). To develop reach-wide estimates of habitat suitability, each transect in a habitat type was weighted equally based on the reach representation of the habitat type (e.g., each of five riffle transects would be weighted at 7% per transect if riffles represented 35% of the reach). Transect weights are shown in Table 7. Transect locations are shown in Figure 5.

Table 7. Transect weighting for San Simeon Creek instream flow study.

Habitat Type	Number of Habitat Units	Number of Transects	Reach Representation (%)[a]	Weight per Transect (%)
Pool	23	3	33	11
Riffle	26	3	21	7
Run	21	3	30	10
Glide	6	3	15	5
Total	**76**	**12**	**100**	**--**

[a] Habitat percentage, by length, and normalized to 100%.

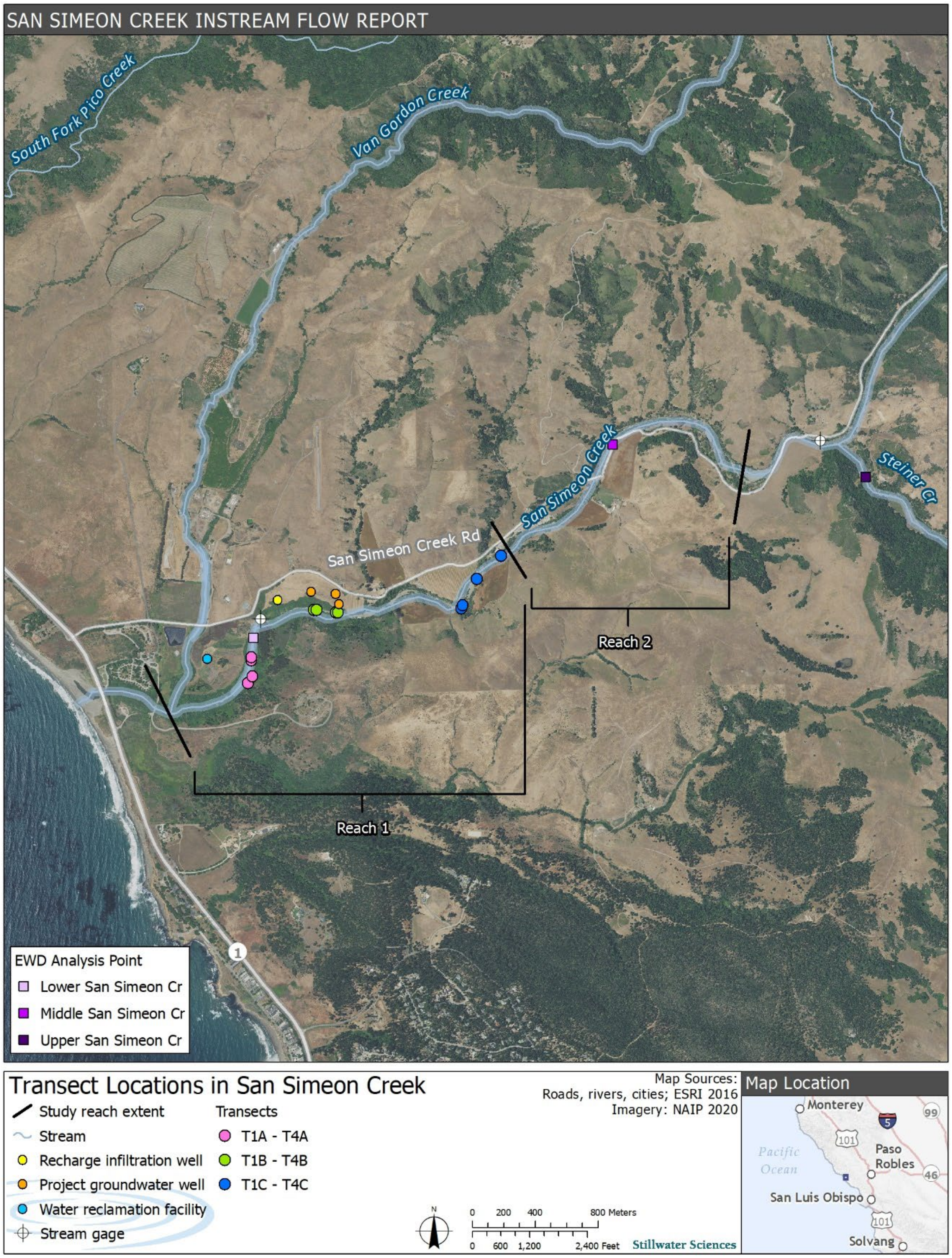


Figure 5. San Simeon Creek transect locations for one-dimensional modeling.

3.3.3 Hydraulic data collection and model development

Calibration flows were selected to allow the model to simulate habitat conditions over a range of flows from 0.2 cfs to 7.6 cfs. Three calibration flows were used to develop the 1D model. Calibration flows typically allow habitat index simulation to be extrapolated down 40% from the low flow and up 250% from the high flow. Therefore, calibration flows targeted a low of approximately 0.5 cfs and a high of approximately 3.0 cfs with a mid-flow between these two values (i.e., 1.25 cfs), which would allow the model to simulate habitat index values for flows ranging from 0.2 cfs to 7.6 cfs. A wider range of flows could have been included in the model simulations; however, this study focused on lower flows that are more likely to be influenced by CCSD's operations, which are based on the maximum capacity of CCSD's pumps (i.e., 1.43 cfs).

Water surface elevation (WSE) and stream discharge measurements were made at each site during each of the three separate calibration flow events. Depth and velocity were measured for calibration purposes at each transect during a single flow event (the "one flow" method). Data collection and recording were conducted using the standardized procedures and guidelines established in the IFIM field techniques manuals (Trihey and Wegner 1981, Milhous et al. 1984) and procedures described in CDFW (2013). The techniques for measuring discharge followed the guidelines outlined by CDFW (2020). The WSE (or stage) measurements were taken across each transect at three calibration flows (low, medium, and high).

Water depths and mean column water velocities were measured across each transect during the high calibration flow. The number of cells sampled for depth and velocity was based on a goal of retaining a minimum of 15–20 stations that would remain in-water at the low calibration flow. Additional data collected during the field surveys included water surface slope and stage-of-zero-flow (SZF).

3.3.3.1 Velocity measurements

The standard method for determining mean column velocity was a single measurement at six-tenths of the water depth in depths less than 2.5 ft, and a two-tenths and eight-tenths measurement for depths between 2.5 ft and 4.0 ft. All three points were measured where depths exceed 4.0 ft, or where the vertical velocity distribution in the water column does not follow the standard pattern (slowing toward the substrate), and one or two points would not be adequate to derive an accurate mean column velocity. For example, an irregular vertical velocity distribution often occurs behind or adjacent to boulders or downstream from velocity chutes.

3.3.3.2 Model calibration

The existing HSC developed for the Big Sur River (Holmes et al. 2014) were used for this study. The Big Sur HSC includes criteria for water depth, mean column velocity, and focal point velocity for three life stages of steelhead, including steelhead fry: (fish < 6 centimeters [cm]) and two size classes of juveniles (6–9 cm and 10–15 cm). Coordinates for HSC are provided in Appendix C.

The SEFA model, version 1.8 build 5 (Jowett et al. 2014), was used for 1D modeling during this study. Stage-discharge relationships were developed from measured discharge and stage using a SZF log/log regression formula. The SZF method requires a minimum of three sets of stage-discharge measurements and an estimate of the SZF for each transect. All transects in Reach 1 used three sets of stage-discharge measurements. The SZF estimates were based on either the thalweg depth of a transect or the thalweg depth of a downstream hydraulic control. The quality of the stage-discharge relationships was evaluated by examination of mean error and slope output from the model.

The one-flow velocity method, using a single set of velocities collected at the high calibration flow, was used for all transects for velocity calibration. This technique uses a single set of measured velocities to predict individual cell velocities over a range of flows. Simulated velocities are based on measured data and a relationship between a fixed roughness coefficient (Manning's 'n') and depth. In some cases, roughness was modified for individual cells if substantial velocity errors were noted at simulation flows. Predicted velocities were examined to detect any significant deviations and determine whether velocities change consistently with stage and total discharge.

3.3.3.3 Quality control

Considerable effort was made to maintain strict quality control throughout all aspects of field data collection. To ensure quality control in the collection of field data for the San Simeon Creek instream flow study, the following procedures and protocols were used:

1. Staff plates were established and continually monitored throughout the course of collecting data on each transect. If significant changes were observed, WSEs were re-measured following collection of transect water velocity measurements.
2. Each day prior to water velocity measurements, all electromagnetic meters were calibrated as needed. Meters were continually monitored during the daily course of data collection to ensure that they were functioning properly.
3. All transects/cross sections were located using global positioning system (GPS). An independent benchmark was established for each set of transects. This benchmark was placed in either an immovable tree, boulder, or other naturally occurring object that would not be subject to tampering, vandalism, or movement. Upon establishment of headpin and tailpin elevations, a level loop was shot to check the auto-level for measurement accuracy. Allowable error tolerances on level loops were set at 0.02 ft. This tolerance was also applicable to both headpin and tailpin measurements, unless extenuating circumstances (e.g., pins under sloped banks, shots through dense foliage) explained discrepancies and the accompanying headpin or tailpin was free of excessive error. Pins were placed adjacent to the water's edge well above the high WSE, and the transects were profiled beyond the pins to an elevation estimated to be at least 250% of the high target flow.
4. Multiple WSEs were measured across complex transects (e.g., riffle, pocket water). The more complex and uneven a transect' s water surface, the greater the number of measurement locations were established. For example, a riffle transect may require more frequent water surface measurements, while a pool transect may require only bank elevations. WSE measurements at each calibration flow were made at the same location across each transect.
5. All pin elevations and WSEs were calculated during field measurement and compared to previous measurements. Changes in stage since the previous flow measurement were calculated. Patterns of stage change were compared between transects and determined if reasonable. If any discrepancies were discovered, potential sources of error were explored and noted.
6. All data calculations were completed in the field (given adequate time and daylight), including pin elevations, WSEs, and discharges. Discharges were compared between all transects measured on the same day and site to ensure that each transect computed flow reasonably (<10 to 15% error) and accurately. Velocity data stations were evenly spaced,

except near abrupt velocity or depth breaks where they were more frequent. High velocity plumes also had more frequent sample stations to avoid excessive (>5% of total flow) station discharges. The total number of stations established across a transect retained at least 20 in-water stations at the lowest measured flow to permit accurate discharge simulation with extrapolation.

7. Digital photographs were taken of all transects from downstream, across (e.g., from head pin to tail pin) and from upstream at the three calibration flows. An attempt was made to shoot each photograph from the same location at each of the three levels of flow. These photographs provide a valuable record of the streamflow conditions (including velocity and depth), water surface levels, and channel configurations that could be used to confirm site conditions at the time of the hydraulic model calibration.

3.4 Stream Flow Analysis

Limited streamflow data exist for San Simeon Creek. Streamflow was previously monitored at two stream gages in the San Simeon Creek watershed. The Palmer Flats Gage (formerly County Gage #14) located just upstream of the Study Area near the confluence of San Simeon Creek and Steiner Creek was operated from October 1970 through September 1995. The lower San Simeon Stream Gage (Couty Gage #718, formerly County Gage #22) was established by the USGS in 1987 and then operated by the county, which continued to monitor streamflow at this location until 2003 after which point the gage only recorded stream stage level.

Stream flow analysis, including exceedance curves, was performed for San Simeon Creek based on the 1970–1995 period of record for the Palmer Flats Gage. Streamflow data from the county gage was not included in this analysis because the period of record only covered a 16-year period (1987 to 2003). Palmer Flats is located just upstream of the San Simeon Creek groundwater basin and is not affected by groundwater pumping. In addition, there are no tributary inflows between Palmer Flats and the Study Area outside the rainy season. As such, streamflow at the Palmer Flats Gage indicates the maximum potential surface flow available within the Study Area during the late spring through fall, in the absence of CCSD operations. Downstream of the Palmer Flats Gage, some amount of surface flow is naturally lost to groundwater infiltration during low-flow periods (typically from spring through fall) as San Simeon Creek flows over the groundwater basin. The rate of loss in surface flow within the Study Area is likely increased during periods when CCSD groundwater pumping occurs.

Exceedance curves graphically display the probability that a flow of a given magnitude will be exceeded at a given location. Spring flows (April through June) were assessed for evaluating juvenile steelhead migration. Exceedance curves were also generated to assess low-flow conditions during critical juvenile steelhead rearing periods including spring and summer (April through September). When applied to each season, the exceedance curves provide an estimate of the percentage of time that migration or rearing flows are equaled or exceeded. Values for San Simeon Creek at Palmer Flats were generated based on mean daily gage data covering 1970–1995.

Stream flow and channel observations were recorded during surveys conducted in the late spring/early summer (May and June) where crews delineated channel locations with intermittent and dry flows within both Study Reaches. Locations of isolated pools at least 1.0 ft deep were also recorded. Photographs and GPS coordinates were recorded at the upstream and downstream ends of intermittent and dry stream sections. Maps were created to show the channel conditions during May and June.

3.5 Juvenile Steelhead Passage Assessment

The potential influence of CCSD operations on juvenile steelhead passage was assessed using streamflow-passage thresholds previously identified for the Study Area by D.W. Alley and Associates (1992) and the daily average streamflow data from the Palmer Flats Gage (1970–1995).[2] D.W. Alley and Associates (1992) concluded that streamflow ranging from 4 to 11 cfs was required to provide juvenile fish passage. For this assessment, juvenile passage conditions were assessed for both the 4-cfs threshold and the 11-cfs threshold during the peak juvenile migration season (March through May). To estimate how CCSD groundwater pumping operations may have reduced passage duration, 2 cfs was subtracted from the streamflow values recorded at the Palmer Flats Gage to account for potential loss to groundwater infiltration between the Palmer Flats Gage and CCSD wells (based on Yates and Konyenburg 1998), and additional surface flow was subtracted based on a range of groundwater extraction rates for CCSD wells. Groundwater extraction rates from a large private well (owned by Pedotti) located between the Palmer Flats Gage and CCSD groundwater wells was also included to account for cumulative loss to groundwater extractions.

This assessment included the following assumptions:

- A total of 2.0 cfs of surface flow is lost to the groundwater basin between the Palmer Flats Gage and CCSD wells.
- The range of extraction rates for CCSD wells are from a low of 0.64 cfs, which is the upper end of CCSD's average pumping rates, and a high of 1.43 cfs, which is the maximum extraction capacity of CCSD wells.
- The estimated maximum pumping rate for the Pedotti private well is 0.42 cfs.
- One hundred percent of CCSD and private pumping during March through May results in a direct equivalent streamflow reduction. For example, if CCSD pumping occurs at a rate of 0.64 cfs, then it was assumed to result in a direct streamflow reduction of 0.64 cfs (conservatively high).

Four scenarios were included in the juvenile steelhead passage assessment for each of the two streamflow passage thresholds (i.e., 4 cfs and 11 cfs). They include:

1. A total combined pumping rate of 1.85 cfs based on the maximum CCSD pumping rate of 1.43 cfs plus private well (Pedotti) pumping rate of 0.42 cfs.
2. 1.43 cfs based on the maximum CCSD pumping rate
3. 1.06 cfs pumping rate based on the upper end of CCSD's average daily pumping rate of 0.64 cfs plus the private well (Pedotti) pumping rate of 0.42 cfs.
4. 0.64 cfs which is the upper end of the average daily pumping rate CCSD

[2] Juvenile fish passage conditions were assessed at the three most limiting riffles in the Study Area during the D.W. Alley and Associates (1992) assessment. All the critical riffles were identified downstream of the Palmer Flats Gage; therefore, flows identified at Palmer Flats likely differ to some degree from the flows at the three critical riffles. To account for this difference, this assessment subtracted potential surface flow loss that may occur between the Palmer Flats Gage and any flow loss due to CCSD operations and flow loss due to private groundwater well extractions.

3.6 San Simeon Creek Lagoon Habitat Assessment

Existing monthly water quality and stage elevation data from San Simeon Creek Lagoon (collected by the California State Parks) was evaluated to assess the relationship between surface flow and aquatic habitat conditions for steelhead and tidewater goby in San Simeon Creek Lagoon. Water quality data collected from the San Simeon Creek Lagoon were compared with water quality criteria (e.g., temperature, dissolved oxygen, and salinity) reported to be suitable for steelhead (described in Section 2.1.1), tidewater goby (described in Section 2.1.2), and CRLF (Section 2.1.3) to assess habitat conditions for special status aquatic species.

Grab samples were collected near the water surface and just above the substrate at three locations distributed throughout the lagoon, including the lower section of the lagoon (downstream of Highway 1), the middle section of the lagoon (approximately 500 ft upstream of Highway 1), and the upper section of the lagoon (just upstream of the footbridge crossing at the State Parks Campground. In addition, observations of the lagoon berm (open versus closed) were recorded during each sampling event. Samples were typically collected each month from December 2019 through July 2022 with the exception of August 2021, December 2021, May 2022, and June 2022 when no samples were collected.

3.7 California Red-legged Frog Habitat Assessment

Suitable breeding habitat for CRLF was assessed during field surveys. CRLF breeding habitat (described in Section 2.1.3) was surveyed within the Study Reach during the habitat typing surveys described under Section 3.2. Locations where suitable breeding habitat was identified were measured for maximum water depth, photographed, and flagged for follow-up measurements and observations. CRLF breeding habitat locations were surveyed during three flows concurrent with the hydraulic model field surveys ranging from approximately 0.5 cfs to approximately 3.0. Two additional surveys of the CRLF breeding locations were conducted as flows ceased and the channel became dry during May and June 2022. Maximum water depth was recorded during each survey and photographs were taken to document habitat conditions.

3.8 Van Gordon Creek

Habitat surveys were expanded to include an assessment of conditions Van Gordon Creek during June 2023 while surface flows were present. The assessment included a qualitative assessment of habitat conditions for sensitive species using visual surveys and review of previous habitat surveys in Van Gordon Creek along with a review of the expanded groundwater model (Yates 2022) to evaluate how groundwater extraction could influence surface flows in Van Gordon Creek.

4 RESULTS

4.1 Habitat Characterization

Stream habitat typing was conducted in December 2021 beginning at the upstream end of the lagoon and extending approximately 2.9 miles upstream. Two distinct reaches were identified during the habitat typing survey. Reach 1 was characterized by a wide active channel flowing through gravel and sand substrate (Figure 6), while Reach 2 had a confined channel with larger substrate (Figure 7). Stream habitat in Reach 1 was primarily composed of nearly equal amounts of pool and run habitat, followed by low-gradient riffle habitat and glide habitat (Figure 8). In Reach 2, stream habitat was primarily composed of pool habitat, followed by similar amounts of run and low-gradient riffle habitat. Substrate in Reach 1 was dominated by sand and gravel, while the dominant substrate in Reach 2 was cobble followed by gravel (Figure 8).

Figure 6. Example of habitat conditions in Reach 1 showing a wide active channel with gravel and sand substrate. December 20, 2021.

Figure 7. Example of habitat conditions in Reach 2 showing confined channel and cobble substrate. December 20, 2021.

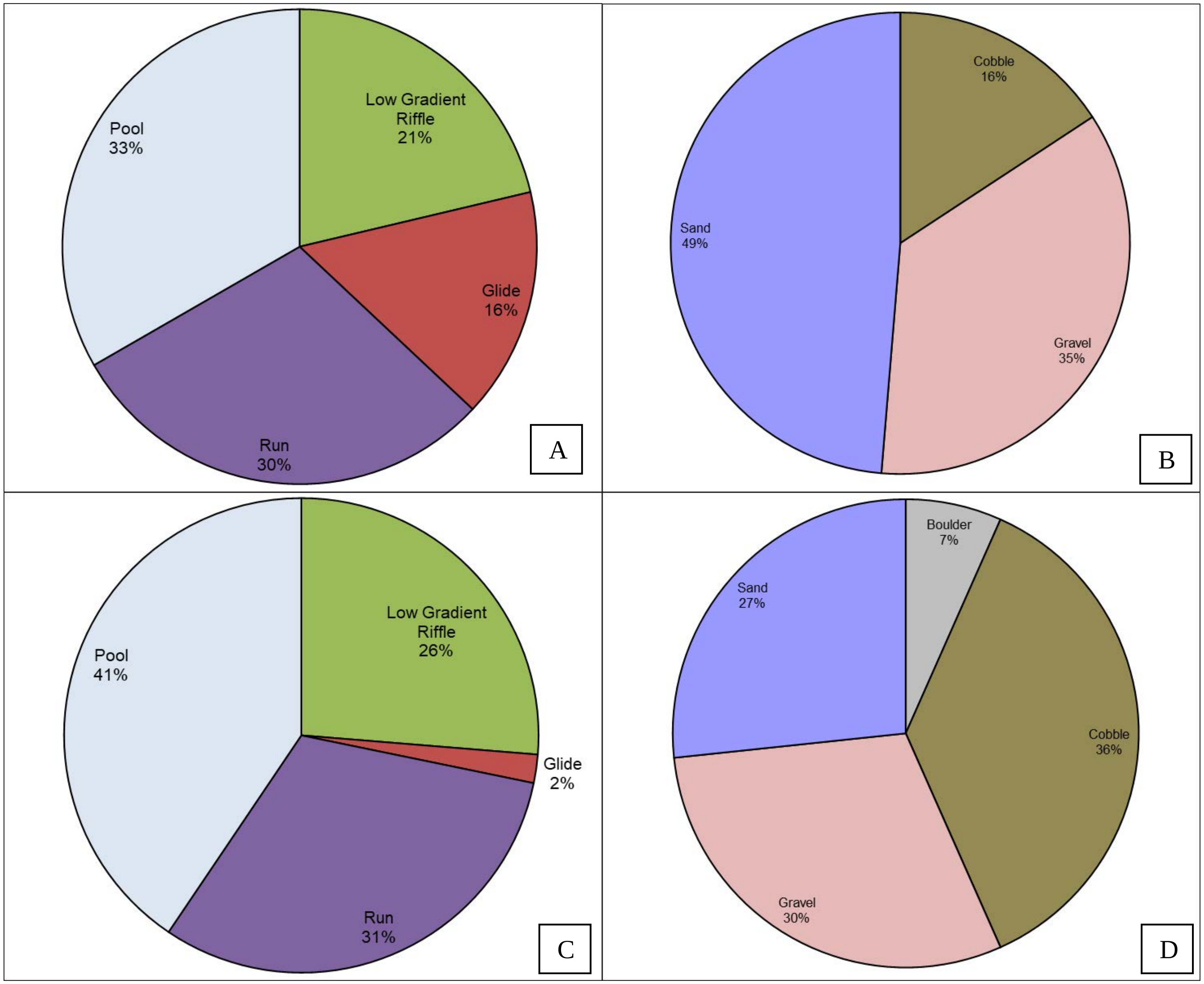


Figure 8. Habitat composition (by length) and dominant substrate in Reach 1 (A and B) and in Reach 2 (C and D).

4.2 Hydraulic Modeling

A total of 11 transects were used in development of the 1D model. The transects represent the variation in available steelhead habitat present in the Study Area (Figure 5).

4.2.1 Flow habitat relationship

Data were collected on 12 randomly selected survey transects in 2021, with three transects selected per mesohabitat type in Reach 1 of San Simeon Creek. The hydraulic calibration of 1D transects involves applying guidance standards from the literature to the model outputs to ensure the model performance meets existing standards. In situations where transect outputs did not meet the standards, the transect data were further evaluated to determine whether an error was made in the data collection or entry process, whether the stage-discharge relationship was altered between surveys by a change in the transect lateral or longitudinal profile, or whether the transect was a poor candidate for hydraulic modeling in 1D.

Based on this assessment, one survey transect had to be omitted from further analyses. Transect T4C was omitted from the modeling analysis because changes in WSE across the transect were detected at lower flows, causing poor modeling performance. The remaining 11 survey transects attained a predictive relationship for the hydraulic model. All transect locations are provided in Figure 5, with transect T4C omitted from analysis.

Results of the 1D analysis of AWS versus flow relationships for fry and juvenile steelhead rearing are presented in Figure 9 and Table 8. To facilitate comparison and analysis, the results are also presented with a normalized y-axis scale representing "percent of maximum" AWS (Figure 10). The shape of the steelhead fry curves show increasing habitat as a function of flow up until 2.4 cfs at which point habitat begins to decrease. The curves for both size classes of juvenile steelhead illustrate increasing habitat over the range of simulated flows. Flows that provide 50% of the maximum AWS include 0 cfs for steelhead fry and approximately 1 cfs for both size classes of juvenile steelhead (Figure 10 and Table 9) The analysis was based on a total of 11 transects distributed throughout the Study Reach (Table 7). Transect-specific profiles and calibration flows are shown in Appendix D; see Appendix E for modeled velocity distributions. Upstream, downstream, and cross-channel photos of all transects are presented in Appendix F.

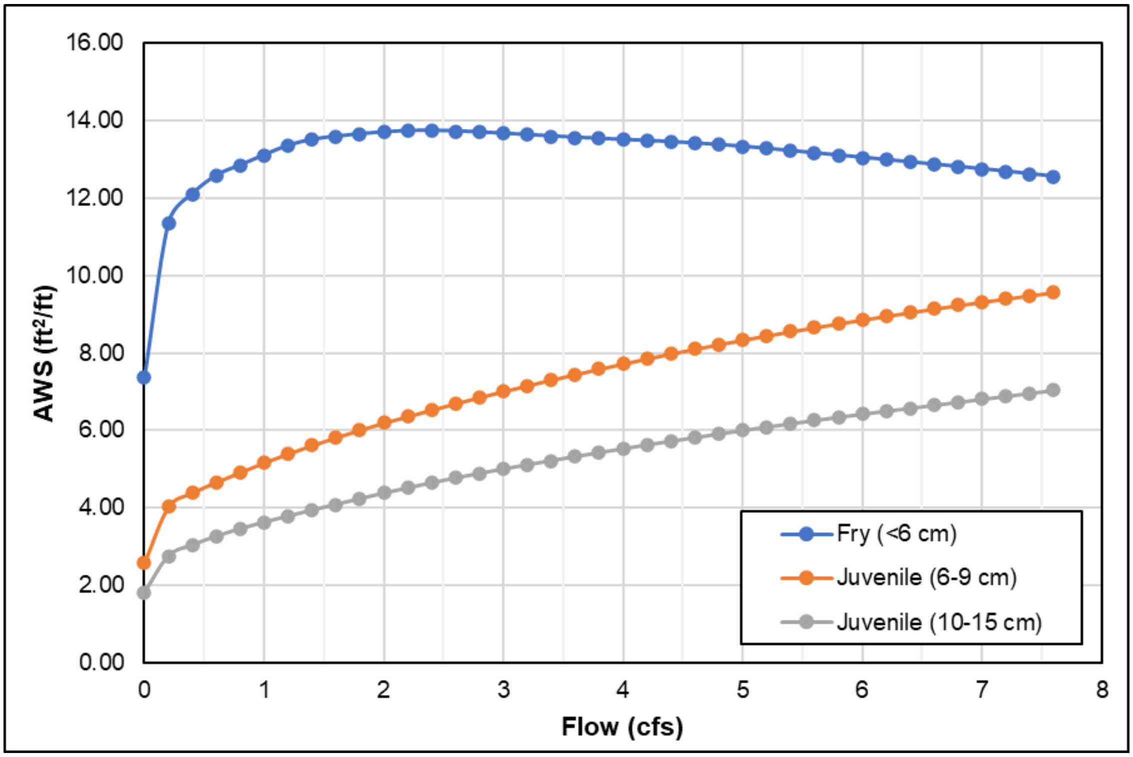


Figure 9. Flow habitat relationships (area weighted suitability) for fry and juvenile steelhead rearing in lower San Simeon Creek.

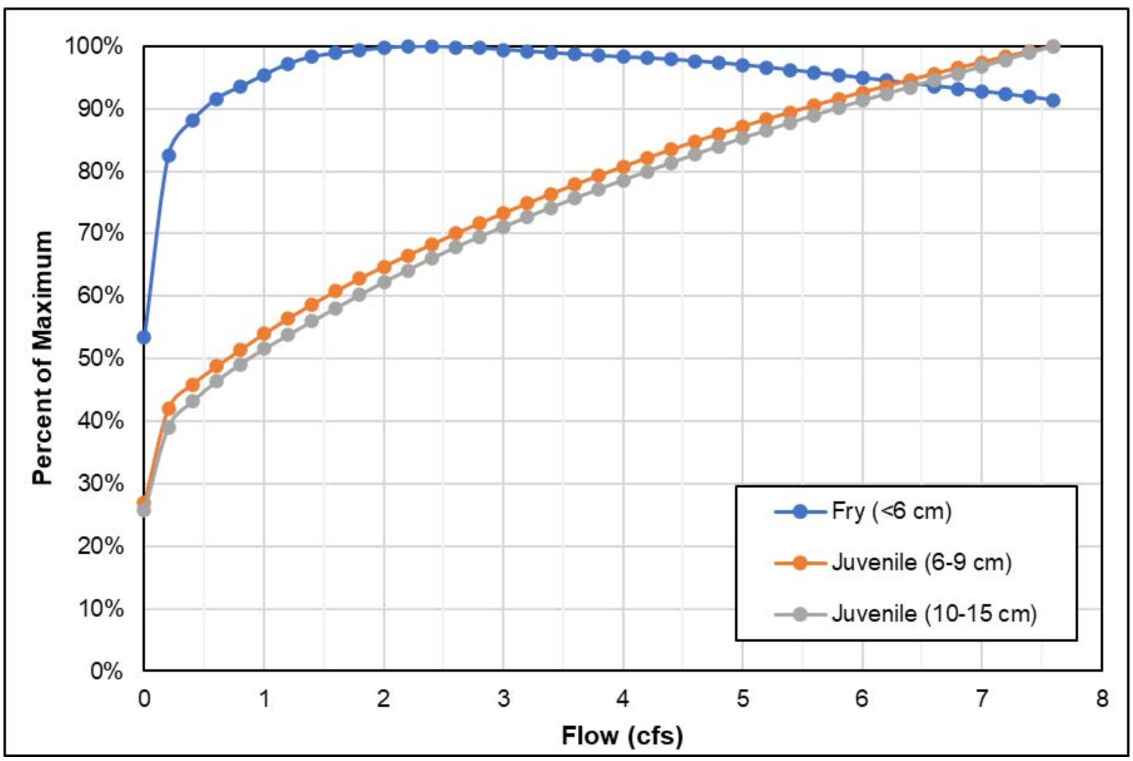


Figure 10. Percent of maximum area weighted suitability for fry and juvenile steelhead rearing in lower San Simeon Creek.

Table 8. Area weighted suitability (ft^2/ft) and percent of maximum habitat area at modeled flows (cfs) for fry, juvenile, and juvenile steelhead rearing life stages in lower San Simeon Creek. Maximum values are underlined and highlighted in yellow.

Flow (cfs)	Area Weighted Suitability (ft^2/ft)			Percent of Maximum Area Weighted Suitability		
	Fry (<6 cm)	Juvenile (6–9 cm)	Juvenile (10–15 cm)	Fry (<6 cm)	Juvenile (6–9 cm)	Juvenile (10–15 cm)
0.0	7.36	2.58	1.81	54%	27%	26%
0.2	11.36	4.03	2.75	83%	42%	39%
0.4	12.11	4.39	3.03	88%	46%	43%
0.6	12.59	4.67	3.26	92%	49%	46%
0.8	12.85	4.92	3.46	93%	51%	49%
1.0	13.11	5.17	3.63	95%	54%	52%
1.2	13.36	5.40	3.78	97%	56%	54%
1.4	13.51	5.62	3.94	98%	59%	56%
1.6	13.59	5.82	4.09	99%	61%	58%
1.8	13.66	6.01	4.24	99%	63%	60%
2.0	13.71	6.20	4.38	100%	65%	62%
2.2	13.74	6.37	4.52	100%	67%	64%
2.4	13.75	6.53	4.65	100%	68%	66%
2.6	13.73	6.70	4.77	100%	70%	68%
2.8	13.70	6.86	4.89	100%	72%	69%
3.0	13.67	7.01	5.00	99%	73%	71%
3.2	13.64	7.16	5.11	99%	75%	73%
3.4	13.60	7.31	5.22	99%	76%	74%
3.6	13.57	7.45	5.32	99%	78%	76%
3.8	13.54	7.59	5.43	98%	79%	77%
4.0	13.51	7.72	5.53	98%	81%	79%
4.2	13.48	7.86	5.63	98%	82%	80%
4.4	13.45	7.98	5.72	98%	83%	81%
4.6	13.42	8.11	5.82	98%	85%	83%
4.8	13.38	8.22	5.91	97%	86%	84%
5.0	13.33	8.34	6.00	97%	87%	85%
5.2	13.28	8.45	6.09	97%	88%	87%
5.4	13.22	8.56	6.17	96%	89%	88%
5.6	13.17	8.66	6.26	96%	91%	89%
5.8	13.11	8.76	6.34	95%	92%	90%
6.0	13.05	8.86	6.42	95%	93%	91%
6.2	12.99	8.96	6.50	95%	94%	92%
6.4	12.93	9.05	6.58	94%	95%	93%
6.6	12.87	9.14	6.65	94%	96%	95%
6.8	12.81	9.23	6.73	93%	97%	96%
7.0	12.75	9.32	6.81	93%	97%	97%
7.2	12.69	9.41	6.88	92%	98%	98%
7.4	12.63	9.49	6.96	92%	99%	99%
7.6	12.56	9.57	7.04	91%	100%	100%

Notes: cfs = cubic feet per second; cm = centimeter; ft^2/ft = square foot per foot

Table 9. Area weighted suitability (ft^2/ft) for steelhead rearing in lower San Simeon Creek.

Steelhead Life Stage	Flow for Maximum Area Weighted Suitability (cfs)	Flow for 50% of Maximum Area Weighted Suitability (cfs)
Fry	2.4	0.0
Juvenile (6–9 cm)	7.6	0.8
Juvenile (10–15 cm)	7.6	1.0

Notes: cfs = cubic feet per second; cm = centimeter; ft^2/ft = square foot per foot

The SZF rating statistics were favorable for most of the 11 transects used in the mode with the standard calibration metrics of beta exponents between 2 and 5 and percent mean errors <10% (Table 10). Coefficients greater than 5 were observed at four transects and a single transect had a mean error greater than 10%. However, based on a comparison of measured and simulated WSE, these variances would not significantly influence AWS results (Table 11). The log/log rating curves were created by fitting the line through the survey flow, thus the measured and simulated WSE are the same for the survey flow. The average difference between the calibration and simulated WSE is 0.01 ft for mid flow (Calibration 1) and 0.00 ft for low flow (Calibration 2). The greatest difference between measured and simulated WSE was 0.02 ft for middle flow and 0.01 ft for low flow.

All predicted WSEs were within the threshold in the USFWS guidelines for the Physical Habitat Simulation System, or PHABSIM, which recommends a difference of 0.1 ft or less (USFWS 1994) between surveyed and modeled WSE (Table 11). Velocities for each reach were simulated using the recommended range up to 2.5 times the highest measured flow (USGS 2001).

Table 10. Stage-of-zero-flow ratings for survey transects.

Transect# and Habitat Type	Selected Rating	Exponent	Constant (A)	SZF	R^2	Mean Error
1A glide	SZF rating	5.67	14.71	97.12	0.999	2.19
2A run	SZF rating	6.95	1,371.92	98.05	0.992	5.63
3A pool	SZF rating	2.94	25.02	98.65	0.998	2.61
4A glide	SZF rating	3.24	64.06	100.14	0.991	5.54
1B run	SZF rating	4.06	59.64	197.34	1.000	1.20
2B riffle	SZF rating	4.19	127.95	197.43	0.999	2.19
3B pool	SZF rating	3.75	35.02	199.18	0.999	2.01
4B riffle	SZF rating	6.55	13,411.81	199.87	0.976	10.15
1C riffle	SZF rating	5.91	90.52	295.16	0.995	3.98
2C run	SZF rating	4.47	47.51	295.91	1.000	0.71
3C pool	SZF rating	4.70	69.70	300.81	0.971	9.78
~~4C glide~~	~~SZF rating~~	~~2.15~~	~~7.04~~	~~301.06~~	~~0.801~~	~~28.41~~

* Transect 4C was removed from analysis because the percent mean error was >10% (indicated by strikethrough).

Table 11. Survey and calibration flow water surface elevation details for survey transects.

Transect# and Habitat Type	WSE at Calibration Flow 1 (0.52 cfs)			WSE at Calibration Flow 2 (1.54 cfs)		
	Measured	**Modeled**	**Difference**	**Measured**	**Modeled**	**Difference**
1A glide	97.68	97.67	0.01	97.78	97.79	0.01
2A run	98.37	98.37	0.00	98.43	98.43	0.00
3A pool	98.92	98.92	0.00	99.02	99.04	0.02
4A glide	100.37	100.37	0.00	100.44	100.46	0.02
1B run	197.65	197.65	0.00	197.74	197.75	0.01
2B riffle	197.70	197.70	0.00	197.77	197.78	0.01
3B pool	199.51	199.51	0.00	199.60	199.61	0.01
4B riffle	200.08	200.08	0.00	200.13	200.12	0.01
1C riffle	295.58	295.58	0.00	295.65	295.66	0.01
2C run	296.27	296.27	0.00	296.37	296.37	0.00
3C pool	301.17	301.16	0.01	301.23	301.25	0.02
~~4C glide1~~	~~301.41~~	~~301.36~~	~~0.05~~	~~301.43~~	~~301.55~~	~~0.12~~

Notes: cfs = cubic feet per second; WSE = water surface elevation
* Transect 4C failed the WSE standard and was removed from analysis (indicated by strikethrough).

4.3 Stream Flow Analysis

Palmer Flats is located at the upstream end of the groundwater basin and represents unimpaired (i.e., without influence of CCSD’s operations) surface flows entering the Study Area. Note that flows at Palmer Flats during the spring and summer are generally expected to be higher than flows within the Study Area even under natural conditions due to the loss of surface flows to groundwater infiltration that naturally occurs where San Simeon Creek flows over the groundwater basin and the lack of tributary inflow or other contributions in this section of stream. Streamflow exceedance curves show streamflow at Palmer Flats during the spring is often below the 11-cfs and 4-cfs juvenile migration thresholds identified by D. W. Alley and Associates (1992) (Figure 11). By early summer (June–July), streamflow at Palmer Flats ceases in most years (Figure 12), and during late summer (August–September), surface flows are uncommon (Figure 13), suggesting that conditions to support juvenile steelhead over-summer rearing in the Study Area are also uncommon.

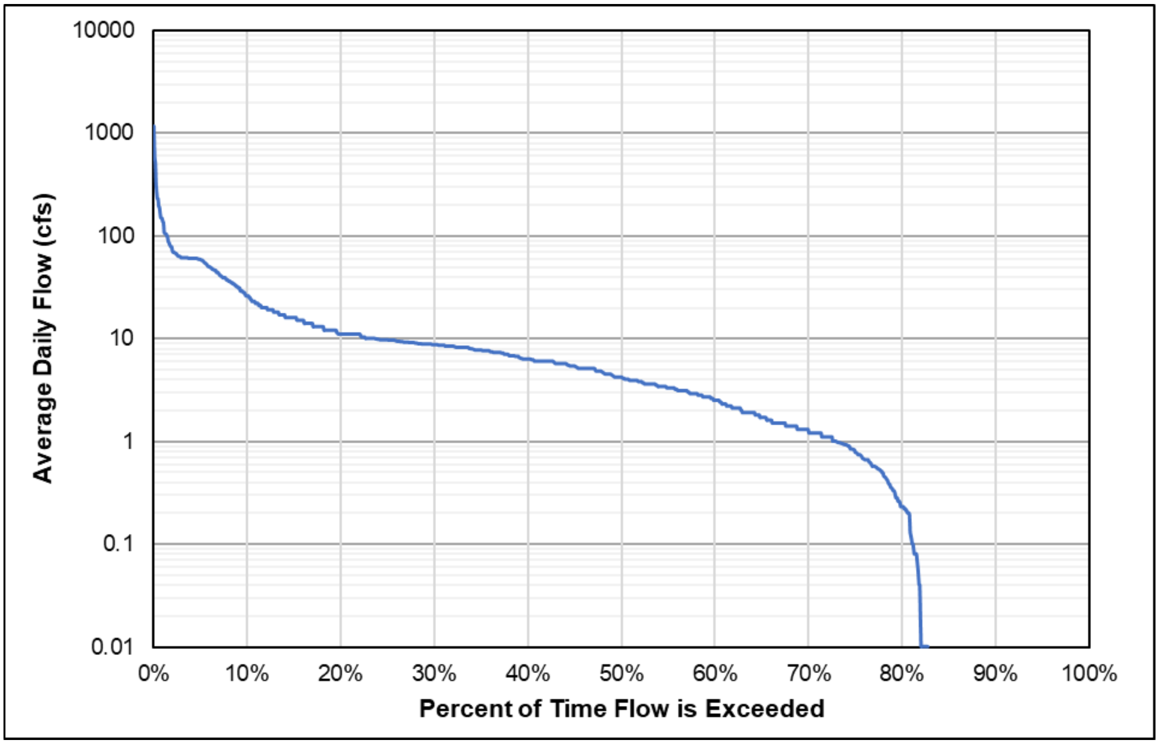


Figure 11. Palmer Flats streamflow exceedance for April and May based on flows from 1970 through 1995.

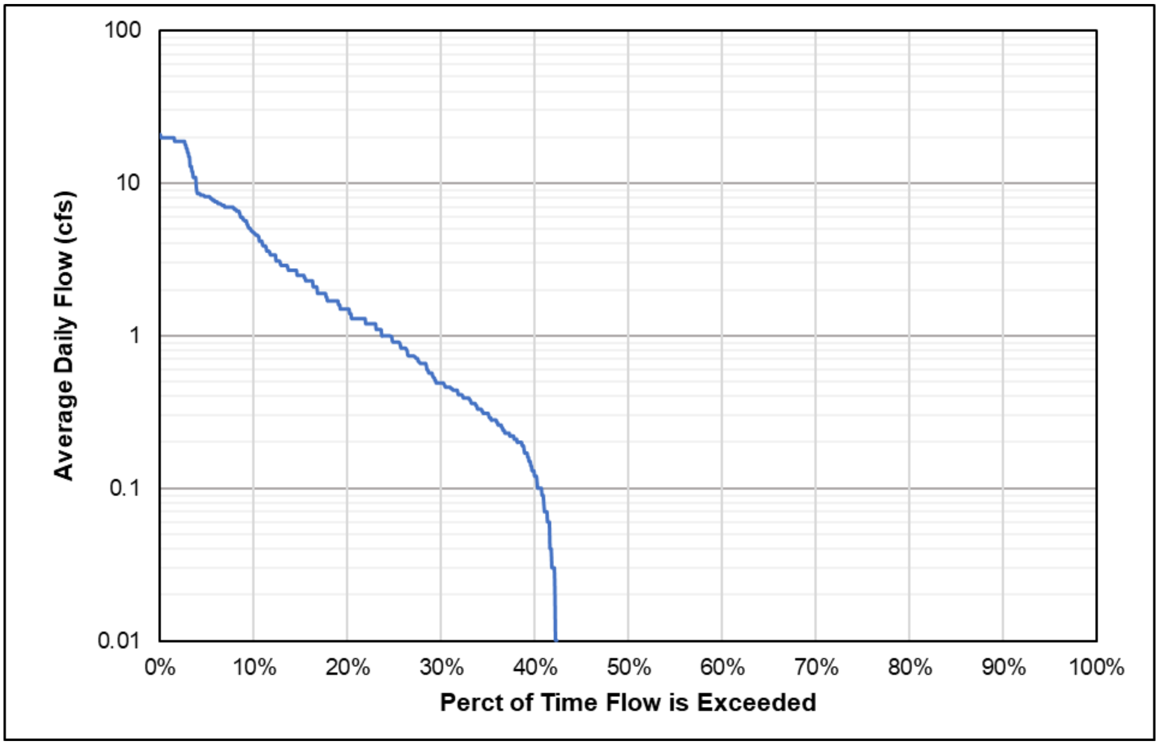


Figure 12. Palmer Flats streamflow exceedance for June and July based on flows from 1970 through 1995.

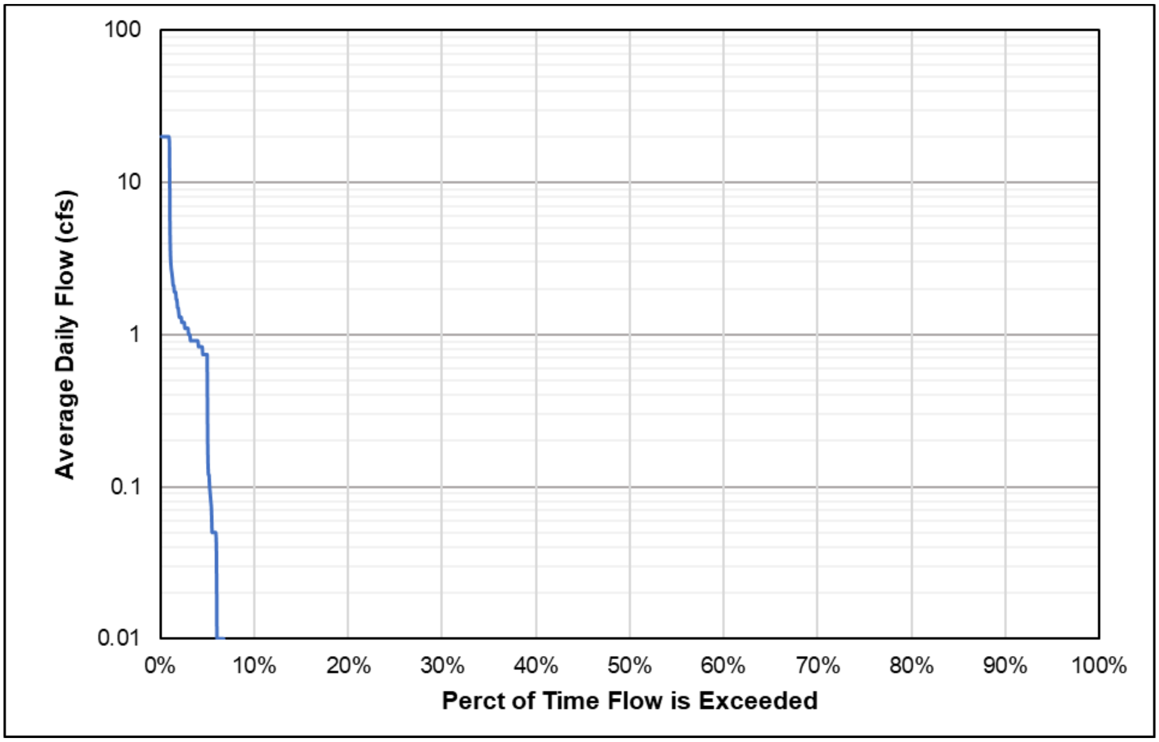
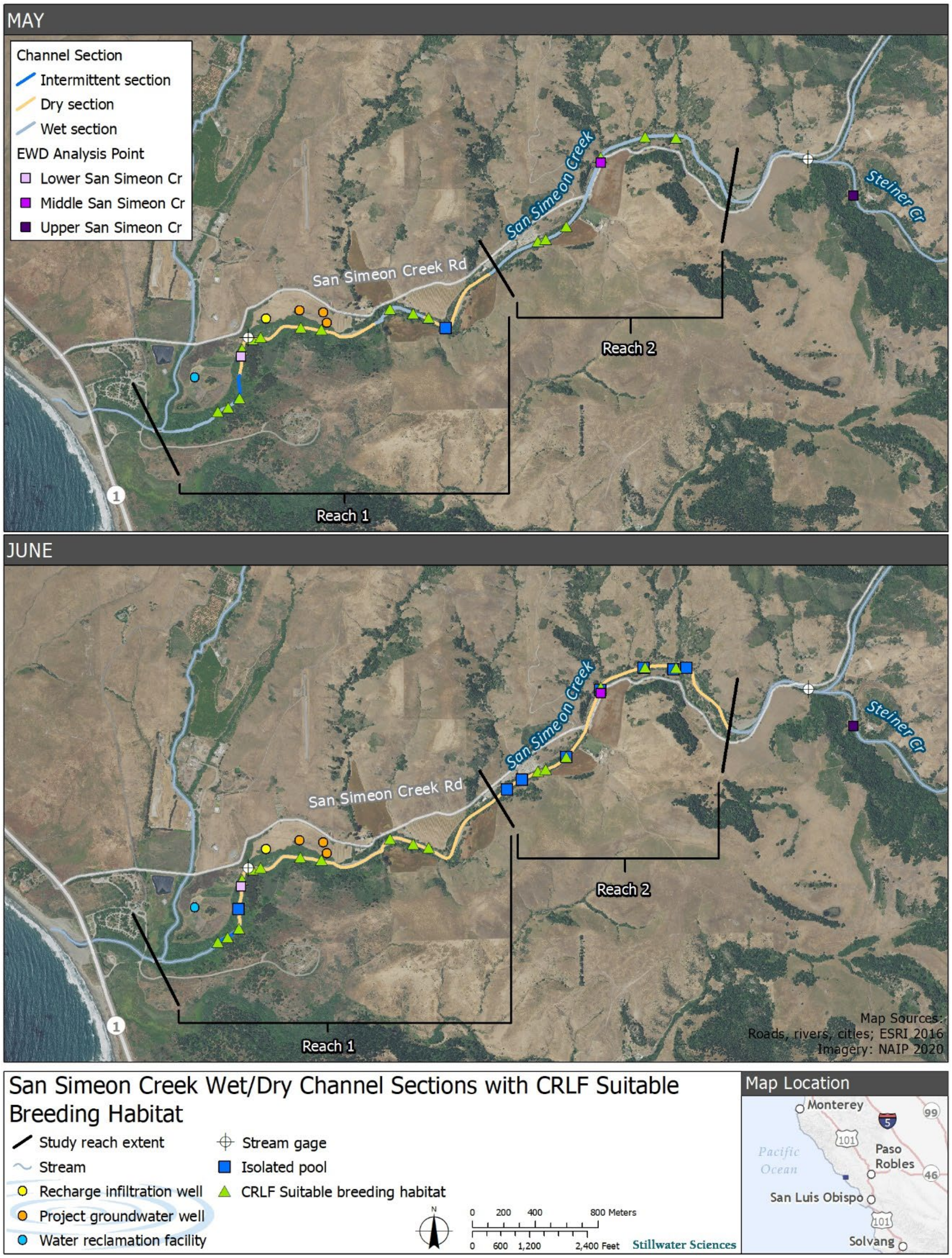


Figure 13. Palmer Flats streamflow exceedance for August and September based on flows from 1970 through 1995.

During this study, disconnected surface flows were first observed in the Study Area during April field surveys. By May 12, 2022, a large section of Reach 1 had become dry with a short section of intermittent flow and a single isolated pool, while Reach 2 remained wet throughout (Figure 14). By June 21, 2022, most of the channel within the Study Area was dry. In Reach 1, only a small section of channel upstream of the lagoon remained wet along with a single small, isolated pool (Figure 15), while nearly all of Reach 2 was dry with the exception of a few isolated pools (Figure 16).



Note: CRLF = California red-legged frog

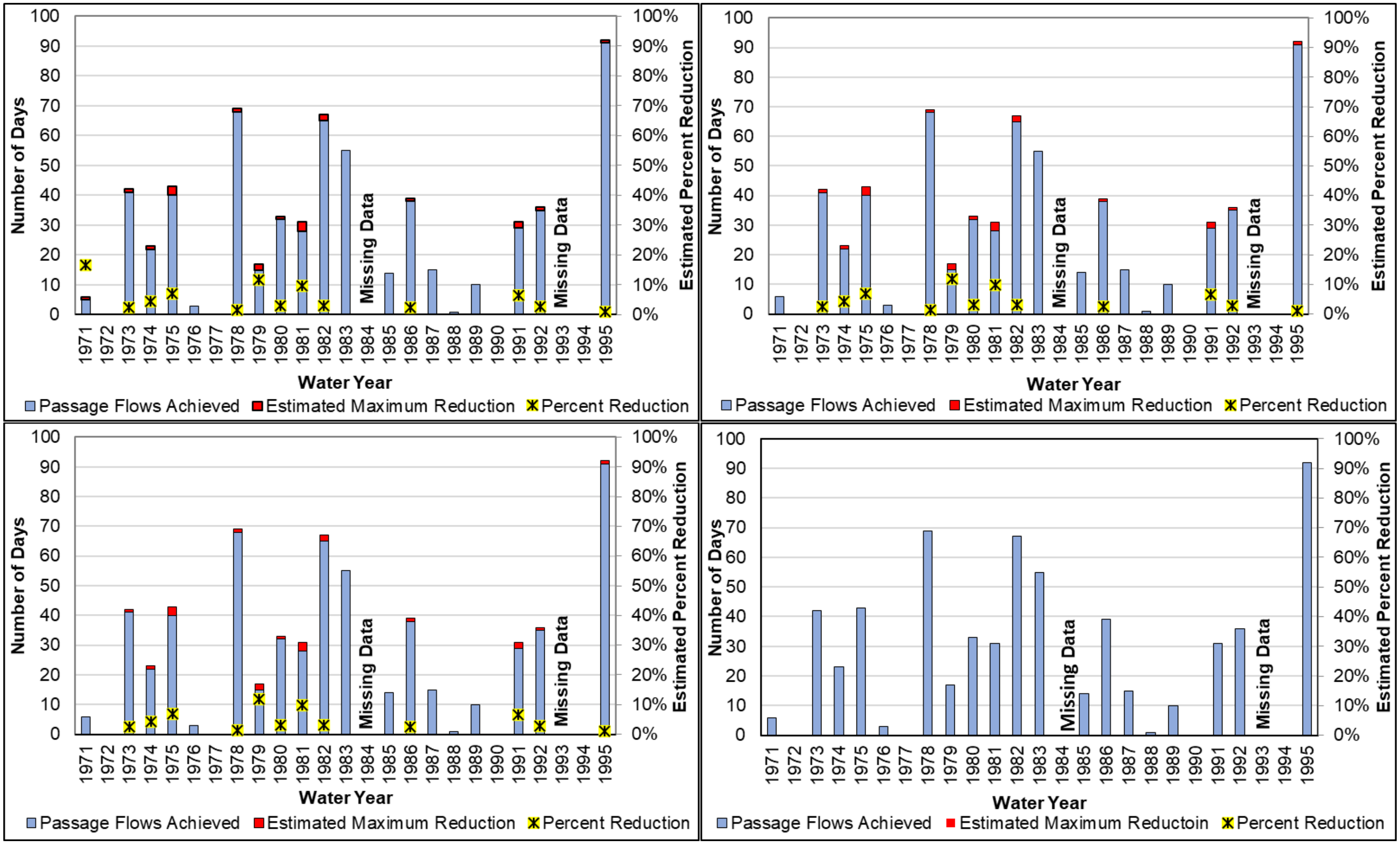
Figure 14. Dry and intermittent sections observed in San Simeon Creek during May and June 2022 with locations of isolated pools and locations were suitable California red-legged frog breeding habitat was observed during winter surveys.

Figure 15. Isolated pool habitat in Reach 1 on May 12, 2022 (top) and on June 21, 2022 (bottom).

Figure 16. Isolated pool habitat in Reach 2 on May 12, 2022 (top) and on June 21, 2022 (bottom).

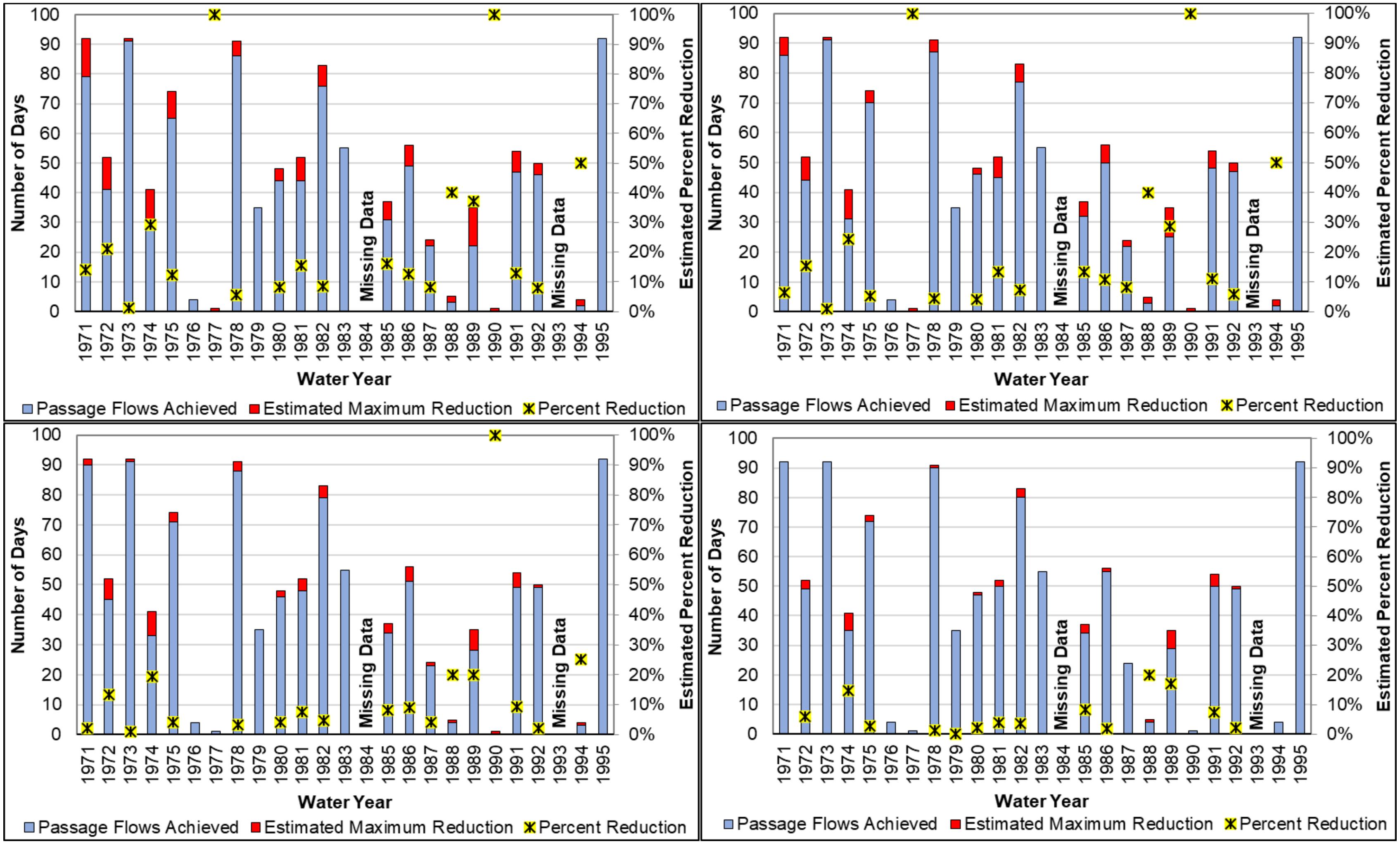
4.4 Juvenile Steelhead Passage Assessment

CCSD's groundwater pumping did not appear to have a strong influence on juvenile steelhead passage conditions during the peak migration season (March through May) under most scenarios that were assessed. During the higher juvenile fish passage threshold of 11 cfs, the analysis showed very little influence on juvenile passage duration (Figure 17) for all four scenarios assessed. At the lower passage flow threshold of 4 cfs, estimated reductions in juvenile fish passage duration were more apparent. At the maximum CCSD extraction rate, during several years, the estimated maximum reduction in passage days was greater than 10% with and without the private well pumping included. Under the average CCSD pumping scenarios, passage was less affected by pumping, and most years had less than a 10% loss of juvenile steelhead passage days (Figure 18).



Notes: CCSD = Cambria Community Services District; cfs = cubic feet per second

Figure 17. Number of days streamflow supported the 11-cfs passage threshold and the estimated maximum reduction in passage days for juvenile steelhead based on daily average flows recorded at the Palmer Flats Gage (1970–1995) during the peak juvenile steelhead migration season (March–May) under the following pumping scenarios: (A) maximum CCSD and private well pumping of 1.85 cfs, (B) maximum CCSD pumping of 1.43 cfs, (C) average CCSD pumping and maximum private well pumping of 1.06 cfs, and (D) average CCSD pumping of 0.64 cfs.



Notes: CCSD = Cambria Community Services District; cfs = cubic feet per second

Figure 18. Number of days streamflow supported the 4-cfs passage threshold and the estimated maximum reduction in passage days for juvenile steelhead based on daily average flows recorded at the Palmer Flats Gage (1970–1995) during the peak juvenile steelhead migration season (March–May) under the following pumping scenarios: (A) maximum CCSD and private well pumping of 1.85 cfs, (B) maximum CCSD pumping of 1.43 cfs, (C) average CCSD pumping and maximum private well pumping of 1.06 cfs, and (D) average CCSD pumping of 0.64 cfs.

4.5 California Red-legged Frog Habitat

Suitable breeding habitat for CRLF was abundant and widespread during the December 2021 habitat surveys conducted in Reach 1 and Reach 2 (Table 12). Most of the suitable CRLF breeding habitat was found in pool habitat that continued to meet the depth criteria for CRLF breeding even as flows decreased to almost 0 cfs. However, once flows ceased, pool habitat began to dry with only a few isolated pools remaining wet into June (Figure 14). While CRLF breeding season is typically in the winter and spring, breeding locations need to remain wetted until the tadpoles complete their metamorphosis into terrestrial forms (typically through July or August). Locations where CRLF breeding habitat remained wetted into June were limited to the downstream end of Reach 1 near the lagoon and multiple locations within Reach 2 (Figure 14). Examples of suitable CRLF breeding habitat that went dry between May and June 2022 are shown in Figure 19.

Table 12. California red-legged frog breeding habitat identified in lower San Simeon Creek during December 2021.

Reach	Habitat Unit	Avg Length (ft)	Avg Width (ft)	Area (ft^2)	Avg Depth (ft)	Max Depth (ft)	Habitat Type	Emergent Veg. Type
1	7	389	30	11,670	2.5	4.5	Off channel Pool	Willow
	9	146	23	3,358	1.0	2.4	Run	Willow
	12	91	25	2,275	1.0	2.0	MCP	Willow
	20	126	18	2,268	0.9	2.3	MCP	Willow
	26	152	18	2,736	3.0	4.5	MCP	Willow
	35	122	30	3,660	1.0	2.0	Run	Willow
	39	182	30	5,460	1.5	2.5	Run	Willow
	53	129	25	3,225	1.5	3.4	MCP	Branches
	58	177	35	6,195	1.8	2.8	Run	Willow
	61	152	30	4,560	2.5	3.6	Run	Willow
2	86	110	25	2,750	2.0	3.2	MCP	Willow
	88	270	40	10,800	2.7	4.2	MCP	Willow
	90	164	27	4,428	2.5	4.0	MCP	Willow
	112	153	50	7,650	4.0	7.5	Off channel Pool	Cattails
	122	243	30	7,290	2.8	4.5	LSP	Willow

Notes: ft = foot; ft^2 = square foot; LSP = lateral scour pool; MCP = midchannel pool

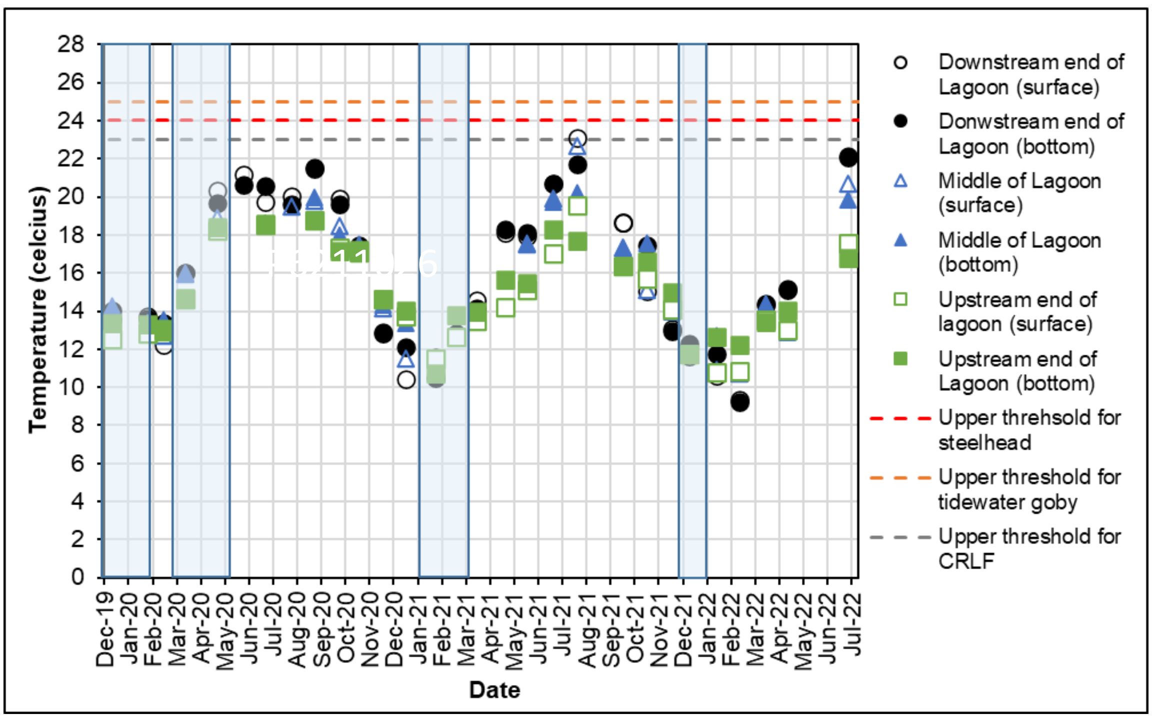
Figure 19. Locations of suitable California red-legged frog breeding habitat that remained wetted on May 12, 2022 (top left), was dry on June 27, 2022 (top right), and remained wetted throughout the survey (bottom).

4.6 San Simeon Creek Lagoon Conditions

Water quality conditions in San Simeon Creek Lagoon are generally within the suitable range for sensitive species that are likely to occur there (steelhead, tidewater goby, and CRLF) based on data collected from December 2019 through July 2022. Water temperatures were below the upper thresholds for all three species throughout the water column (Figure 20). Dissolved oxygen and salinity levels were within suitable range for all species during most of the monitoring period with a few exceptions as described below.

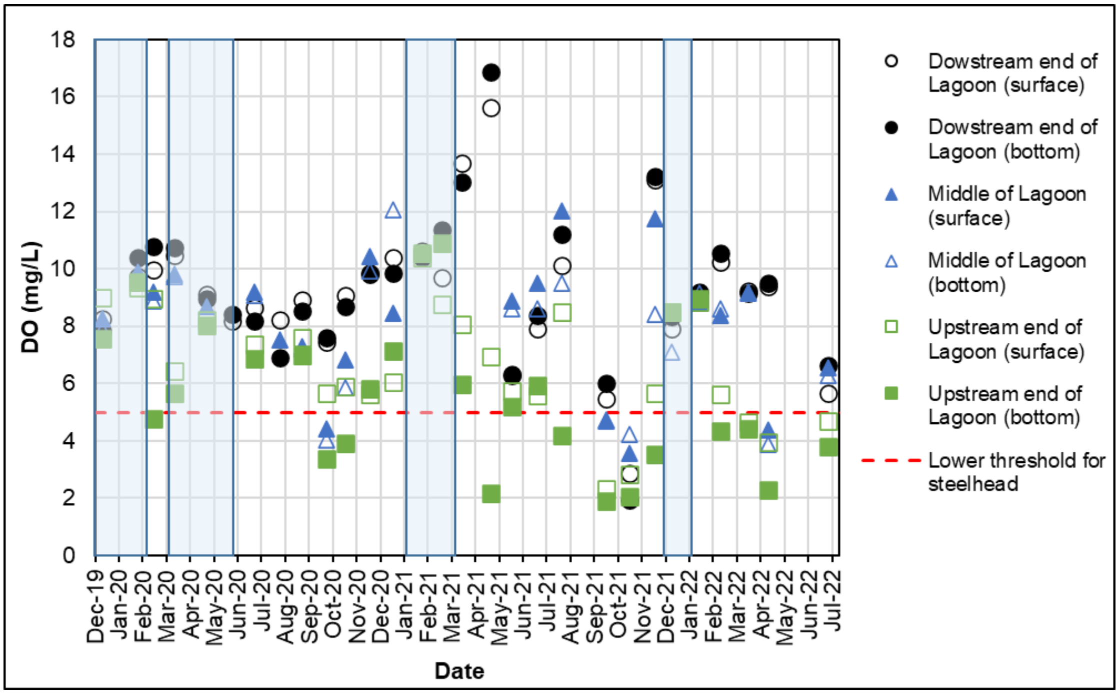
Dissolved oxygen levels were below the threshold for steelhead in at least one sample location within the lagoon a few times per year and typically during the late summer/early fall months when streamflow entering the lagoon is at its lowest (Figure 20). In nearly each event when dissolved oxygen levels dropped below the threshold for steelhead, other locations within the lagoon had higher dissolved oxygen within suitable levels for steelhead. On a single occasion in October 2021, all sample locations within the lagoon had dissolved oxygen levels below the 5.0-mg/L threshold for steelhead.

Salinity levels in San Simeon Lagoon were rarely above the threshold for any of the three species likely to occur there. The few times salinity levels did exceed the thresholds for sensitive species, it occurred during the late fall and early winter typically when the lagoon was observed to be open to the ocean (Figure 21). During each event when salinity levels were exceeded the threshold for steelhead, tidewater goby, and CRLF, other locations had lower salinity levels that were within suitable levels for these species.



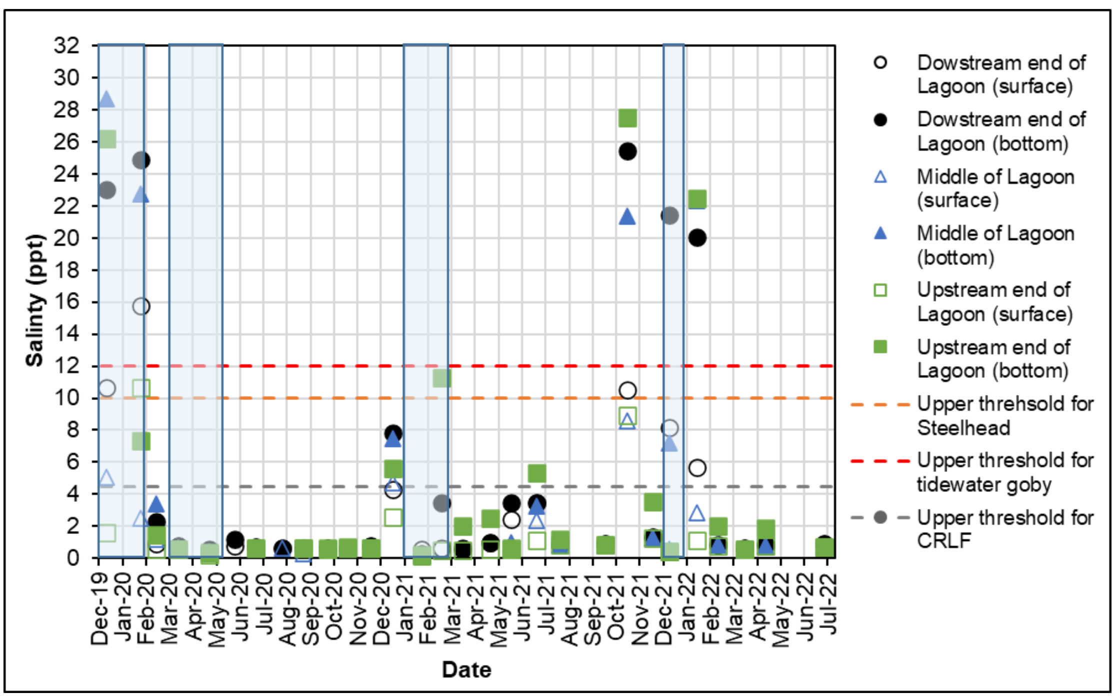
Note: Blue shading indicates periods when the lagoon was open to the ocean during sample events.

Figure 20. Monitoring results for water temperature in San Simeon Creek Lagoon from December 2019 through July 2022 with upper thresholds for steelhead, tidewater goby, and California red-legged frog.



Notes: No values reported for lower thresholds for tidewater goby, and California red-legged frog.
Blue shading indicates periods when the lagoon was open to the ocean during sample events.
DO = dissolved oxygen.

Figure 21. Monitoring results for dissolved oxygen levels in San Simeon Creek Lagoon from December 2019 through July 2022 with lower thresholds for steelhead.



Note: Blue shading indicates periods when the lagoon was open to the ocean during sample events.

Figure 22. Monitoring results for salinity in San Simeon Creek Lagoon from December 2019 through July 2022 with upper thresholds for steelhead.

4.7 Van Gordon Creek

A qualitative assessment of habitat conditions for sensitive species in Van Gordon Creek was conducted on June 5, 2023, following a late rainy season when surface flows were estimated to be around 0.2 cfs. The survey began at the mouth of Van Gordon Creek and extended upstream approximately 0.4 miles to the first road crossing (San Simeon Creek Road). The channel was generally highly incised, lacked instream woody debris, substrate was fine sand and silt, and lacked pool habitat (Figure 23). It appeared that conditions provide limited habitat for steelhead and CRLF due to lack of deep water (>1 ft) pools to support juvenile steelhead rearing and CRLF breeding, little to no habitat complexity (i.e., it is mostly shallow run habitat), and limited cover that provides refuge habitat for aquatic species and protection from predators. A few pools containing suitable habitat for juvenile rearing were observed over the approximately 0.4-mile section of Van Gordon Creek (Figure 24) but year-round rearing is not likely to be supported.

Figure 23. Representative habitat conditions in Van Gordon Creek observed on June 5, 2023.

Figure 24. Limited suitable steelhead rearing habitat with cover, and water > 1 ft deep observed in Van Gordon Creek, June 5, 2024.

CCSD's pumping near Van Gordon Creek (at Well 9P7) only occurs when the WRF is operational, which is limited to the dry season when surface flows are not present in lower San Simeon Creek or Van Gordon Creek. During periods when surface flows may be present in Van Gordon Creek, CCSD's pumping is restricted to CCSD well field approximately 0.80 mile upstream from Van Gordon Creek. Groundwater model simulations show limited fluctuations in the groundwater levels around the confluence of San Simeon and Van Gordon Creek during WRF operations, mainly because of the stabilizing effects of the lagoon and nearby recycled water percolation (Yates 2022). Based on the groundwater levels recorded near Van Gordon Creek (16D1 and 9P2) and groundwater model simulations, CCSD's groundwater pumping operations are not likely to influence surface flows or habitat conditions for steelhead and CRLF in Van Gordon Creek.

5 CONCLUSIONS

The lower reach of San Simeon Creek provides potential migratory and rearing habitat for steelhead in the winter and spring, and this habitat often becomes constrained during the late spring and disappears during the summer and fall when surface flows cease. Available stream flow data at Palmer Flats Gage (1970 to 1995) and County Gage #718 (1987 to 2003) indicate that most of lower San Simeon Creek within the Study Area (from the Palmer Flats Gage downstream to approximately the confluence with Van Gordon Creek) would naturally (i.e., without CCSD groundwater pumping) go dry for extended periods during the summer through fall of most years. While the section of San Simeon Creek within the Study Area often experiences extended periods when the channel is dry, results of the hydraulic modeling show that sufficient habitat is available for steelhead fry and juveniles even during very low-flow conditions (i.e., flows less than 0.5 cfs for fry and 1 cfs or above for juvenile).

In contrast to the assessment of the Palmer Flats Gage data, which indicates that lower San Simeon Creek likely goes dry for extended periods during most years even without CCSD's pumping, the modeling conducted by Boughton and Goslin (2006) predicated a high potential for juvenile steelhead summer rearing habitat throughout San Simeon Creek, including the lower reach within the Study Area. It is possible that Boughton and Goslin's modeled results reflects conditions that occurred more than 50 years ago, since available empirical data show that these conditions have not occurred for at least the last 50 years. Based on this analysis, the lowermost analysis points used in the EWD study (Stillwater Sciences 2014) should be relocated upstream of the groundwater basin to the confluence of Steiner Creek or adjusted to reflect the intermittent flow conditions in lower San Simeon Creek.

Based on CCSD's pumping capacity of 1.43 cfs and streamflow of 1 cfs required to provide juvenile steelhead rearing habitat, CCSD's pumping operations have the potential to reduce the amount and quality of juvenile steelhead rearing habitat within the Study Area at flows less than 2.5 cfs (i.e., at 2.43 cfs or less), depending on the rate of pumping that occurs. Whenever pumping reduces surface flows to less than 1 cfs, the presence of juvenile rearing habitat will be reduced, and if pumping occurs at the maximum rate (1.43 cfs) when flows are less than 1.5 cfs, rearing habitat could become dry, resulting in stranding and mortality of individuals. In contrast, when surface flows are greater than 2.5 cfs, or once streamflow decreases to 0.0 cfs (and the channel becomes dry), CCSD's operations are unlikely to substantially reduce steelhead rearing habitat. The same conclusions also apply to the operations of the private wells that are outside CCSD's management jurisdiction.

Migration conditions for steelhead within the Study Area are generally not impacted under CCSD's current operations. Adult steelhead passage, which requires high flows (21–60 cfs [D. W. Alley and Associates 1992]) associated with large precipitation events, are not likely to be influenced by CCSD's average pumping rates ranging from 0.41 cfs to 0.64 cfs, or even the maximum pumping rate of 1.43 cfs. Juvenile steelhead passage requires lower flows than adult passage (4–11 cfs based on D. W. Alley and Associates 1992), typical of the spring recession flows. Little influence on passage conditions were identified for the upper passage threshold (11 cfs) under the range of CCSD pumping operations (Figure 17); however, CCSD pumping may influence juvenile passage conditions at the lower passage threshold of 4 cfs if pumping exceeds the upper end of CCSD's average pumping rates (i.e., if pumping occurs at a rate above 0.64 cfs) (Figure 18). When streamflow within the Study Area is near 4 cfs CCSD pumping at rates greater than 0.64 cfs may lead to a reduced duration of the juvenile steelhead migration period. Because

4 cfs was identified as the lower threshold for juvenile steelhead migration, pumping is not expected to influence juvenile migration when streamflow drops below 4 cfs.

In addition to steelhead, the Study Area provides abundant suitable breeding habitat for CRLF because any isolated pool locations stay wet well after surface flows cease. When streamflow is less than 1.5 cfs, CCSD’s pumping operations are likely to increase the rate at which pool habitat becomes isolated and pools dry out, leading to stranded CRLF tadpoles. Additional suitable habitat for CRLF is located in San Simeon Creek Lagoon.

Based on water temperature, dissolved oxygen, and salinity levels reported throughout most of the year, habitat conditions in San Simeon Creek Lagoon are suitable for juvenile steelhead, tidewater goby, and CRLF under current conditions. During the few events when water quality thresholds are exceeded for any of these species, other locations within the lagoon were still within the suitable range.

Key conclusions of this study follow:

- CCSD’s pumping operations are not expected to influence adult steelhead migration in San Simeon Creek due to the magnitude of flow required to support adult steelhead passage.
- CCSD’s pumping operations likely have little effect on juvenile downstream passage within San Simeon Creek during the migratory period. However, if CCSD’s pumping operations were to exceed the recent average rates of 0.64 cfs, juvenile passage conditions may be affected particularly during the peak juvenile migration season (i.e., during April and May).
- CCSD’s pumping operations that occur when flows in Reach 1 are between 1 and 2.5 cfs may lead to reduced area and quality of habitat for juvenile steelhead within the Study Area, depending on the rate of pumping.
- CCSD’s pumping operations that occur after surface flows cease may affect juvenile steelhead and CRLF rearing in isolated pools by accelerating the rate at which isolated pools dry out, potentially stranding juvenile steelhead and CRLF tadpoles sooner than may otherwise occur.
- CCSD’s pumping operations are not expected to impact aquatic habitat once the channel within the Study Area goes dry, which happens for extended periods of most years during the summer and fall.
- CCSD’s pumping operations do not appear to impact habitat conditions within the lagoon.
- CCSD’s pumping operations do not appear to impact habitat conditions for tidewater goby.

6 LONG-TERM MONITORING

Long-term monitoring is proposed to provide information about the effects of CCSD’s pumping operations on sensitive aquatic species and their habitat in lower San Simeon Creek and to enable CCSD to operate in a way that minimizes impacts to these aquatic species, as detailed below.

6.1 Stream Flows

Stream flow monitoring is recommended to develop a better long-term record of streamflow within San Simeon Creek and to provide information about CCSD’s operations and adaptive management practices. Continuous monitoring of streamflow should be conducted near the San

Simeon well field and upstream of the Study Area at the Palmer Flats Gage. The collection of a validated continuous flow record that includes low flows is recommended for these sites. In general terms, four general steps are required to develop an accurate continuous flow record: (1) installation of a continuous stage measuring device in accordance with standard practice (e.g., USGS 1982); (2) collection of flow data across a range of flows to develop a stage-flow relationship in accordance with standard practice (e.g., USGS 1982, Turnipseed 2010); (3) ongoing validation of the stage-flow relationship;, and (4) development of new stage-flow relationships and/or correction of stage data if channel conditions change, as needed. The stage-flow relationship is a mathematical relationship relating flow and stage, and if hydraulic conditions significantly change at the gaging site, the relationship may need to be redeveloped or the stage data may need to be adjusted. Corrections and monitoring are typically more intense at sites that require accurate lower flows or at sites that are composed of erodible beds. Common channel changes that can impact the stage-flow relationship include cross-sectional scour or deposition, changes in the distribution of riparian vegetation, or changes in downstream hydraulic controls. Annual cross-sectional surveys to document scour and deposition at the gaging sites are also recommended to assess potential channel changes.

The County of San Luis Obispo currently operates a stream gage that continuously records water levels near the San Simeon well field. However, a stage-discharge rating curve needs to be developed and validated to apply to the stage data collected at this existing gage. A continuous stage measuring device is needed at the Palmer Flats location, and the collection of additional flow data is required to develop a continuous flow record, as described above.

6.2 Isolated Pools

Monitoring of isolated pool habitat within the Study Area is recommended to assess the risk of juvenile steelhead stranding. Monitoring should be conducted using visual observations of isolated pool habitat within the Study Area to assess relative abundance of juvenile steelhead “trapped” in isolated pools. Surveys should be conducted during the spring once surface flows cease in lower San Simeon Creek. Biologists familiar with the identification of juvenile steelhead should walk the channel within the Study Area to identify locations of isolated pool habitats and visually inspect pools from the shore to estimate the number of steelhead within each pool. All observations should be reported to the CDFW for rescue and relocation consideration.

6.3 San Simeon Creek Lagoon Conditions

Pending access approval, lagoon stage and water quality conditions (temperature, dissolved oxygen, and salinity) should be monitored at the upstream and downstream ends of the lagoon during the late spring through fall. Samples should be collected monthly near the upper, middle, and lower sections of the water column.

7 REFERENCES

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Appendices

Appendix A

Mean Daily Streamflow for San Simeon Creek Gages

Stream Gauge Station Information

Station Name -	Upper San Simeon
Station Number -	14
USGS Number -	N/A
USGS Start -	
USGS End -	
Latitude -	35° 36' 37"
Longitude -	121° 04' 30"
Drainage Area -	22.90
Location Description -	3 miles northeast of Hwy 1.
Remarks -	

What year(s) did USGS have control of this gage.

Location Format Example -
For: 120° 20' 05"
Type: 1202005

San Luis Obispo County
Flood Control and Water Conservation District

Upper San Simeon
Stream Gauge Station #14
Water Year OCT 1994 - SEP 1995

Latitude - 35° 36' 37'' **Longitude - 121° 04' 30''**

AVERAGE DAILY DISCHARGE (CFS)

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0.0	0.0	0.0	0.12	54	37	61	67	13	2.4	0.19	0.0
2	0.0	0.0	0.0	0.12	46	82	61	64	12	2.3	0.12	0.0
3	0.0	0.0	0.0	70	40	293	61	63	11	2.4	0.08	0.0
4	0.0	0.0	0.0	242	37	218	61	62	11	2.3	0.07	0.0
5	0.0	0.0	0.0	317	35	423	61	60	9.6	1.8	0.10	0.0
6	0.0	0.0	0.0	124	33	221	61	58	8.9	1.8	0.12	0.0
7	0.0	0.0	0.0	259	52	158	61	57	8.3	1.7	0.09	0.0
8	0.0	0.0	0.0	256	122	144	61	55	6.0	1.6	0.05	0.0
9	0.0	0.0	0.0	265	77	573	61	54	4.8	1.7	0.05	0.0
10	0.0	0.0	0.0	578	59	1520	61	52	4.6	1.7	0.05	0.0
11	0.0	0.0	0.0	396	52	458	61	50	4.9	1.5	0.05	0.0
12	0.0	0.0	0.0	264	48	310	60	49	4.7	1.4	0.05	0.0
13	0.0	0.0	0.0	228	195	227	60	47	4.6	1.2	0.05	0.0
14	0.0	0.0	0.0	206	261	189	60	46	4.7	1.1	0.05	0.0
15	0.0	0.0	26	193	111	161	60	43	5.7	1.2	0.04	0.0
16	0.0	0.0	5.9	188	86	141	60	41	8.6	1.5	0.01	0.0
17	0.0	0.0	0.01	177	73	129	60	40	5.7	1.6	0.01	0.0
18	0.0	0.0	0.01	168	64	121	60	39	4.9	1.5	0.01	0.0
19	0.0	0.0	0.03	159	57	116	60	37	4.2	1.4	0.01	0.0
20	0.0	0.0	0.05	163	51	168	60	35	4.0	1.4	0.01	0.0
21	0.0	0.0	0.05	162	48	195	59	34	3.9	1.3	0.01	0.0
22	0.0	0.0	0.06	179	46	394	59	33	3.5	1.2	0.01	0.0
23	0.0	0.0	0.06	328	45	328	60	26	3.4	1.1	0.01	0.0
24	0.0	0.0	0.07	745	43	196	60	22	3.1	0.91	0.01	0.0
25	0.0	0.0	6.8	534	42	134	60	21	2.7	0.80	0.01	0.0
26	0.0	0.0	0.27	441	40	106	60	20	2.8	0.68	0.01	0.0
27	0.0	0.0	0.08	373	38	88	59	19	2.9	0.57	0.01	0.0
28	0.0	0.0	0.09	307	37	74	59	17	2.9	0.55	0.01	0.0
29	0.0	0.0	0.09	238	------	66	69	17	3.0	0.48	0.0	0.0
30	0.0	0.0	0.10	130	------	62	72	15	2.9	0.35	0.0	0.0
31	0.0	------	0.10	61	------	61	------	14	------	0.24	0.0	------
TOTAL	0	0	39.77	7751.2	1892	7393	1828	1257	172.3	41.68	1.29	0
MEAN	0.00	0.00	1.28	250.04	67.57	238.48	60.93	40.55	5.74	1.34	0.04	0.00
MAX	0	0	26	745	261	1520	72	67	13	2.4	0.19	0
MIN	0	0	0	0.12	33	37	59	14	2.7	0.24	0	0
AC-FT	0.0	0.0	78.9	15374.4	3752.7	14663.8	3625.8	2493.2	341.8	82.7	2.6	0.0

TOTAL = 20376 CFS MEAN = 55.83 N/A MAX = 1520 CFS
40,416 AC-FT MIN = 0 CFS

MAX Instantaneour Flow - 1030 CFS on JAN 10 2610 CFS on MAR 9
1300 CFS on JAN 24 3410 CFS on MAR 10
1440 CFS on FEB 13 1320 CFS on MAR 22

San Luis Obispo County
Flood Control and Water Conservation District

Upper San Simeon
Stream Gauge Station #14
Water Year OCT 1993 - SEP 1994

Latitude - 35° 36' 37'' **Longitude - 121° 04' 30''**

AVERAGE DAILY DISCHARGE (CFS)

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	2.5	2.7	1.1	1.4	15	6.8	1.2	0.93	0.10	0.0	0.0	0.0
2	2.5	2.7	0.96	1.4	16	5.9	1.2	0.90	0.01	0.0	0.0	0.0
3	2.5	2.7	0.96	1.4	18	5.1	1.2	0.83	0.0	0.0	0.0	0.0
4	2.5	2.7	0.96	1.4	19	4.5	1.1	0.74	0.0	0.0	0.0	0.0
5	2.5	2.7	0.96	1.4	21	4.3	1.0	0.72	0.0	0.0	0.0	0.0
6	2.5	2.7	0.95	1.4	23	4.6	0.96	0.68	0.0	0.0	0.0	0.0
7	2.5	2.5	0.96	1.4	107	4.2	0.90	2.5	0.0	0.0	0.0	0.0
8	2.5	2.5	0.96	1.4	87	3.7	0.98	3.2	0.0	0.0	0.0	0.0
9	2.5	2.5	0.87	1.4	32	3.7	7.4	1.5	0.0	0.0	0.0	0.0
10	2.5	2.3	0.87	1.4	29	3.4	2.2	1.1	0.0	0.0	0.0	0.0
11	2.5	12	0.87	1.4	28	3.6	1.3	0.93	0.0	0.0	0.0	0.0
12	2.5	6.0	0.64	1.4	28	2.7	1.1	0.92	0.0	0.0	0.0	0.0
13	2.5	5.8	0.47	1.4	27	2.5	0.93	0.84	0.0	0.0	0.0	0.0
14	2.5	3.4	0.87	1.4	27	2.3	1.1	0.77	0.0	0.0	0.0	0.0
15	2.5	1.4	1.4	1.4	27	2.4	1.0	0.70	0.0	0.0	0.0	0.0
16	2.5	1.3	1.4	1.4	27	2.3	0.96	0.62	0.0	0.0	0.0	0.0
17	2.5	1.3	1.4	1.4	142	2.4	0.92	1.3	0.0	0.0	0.0	0.0
18	2.5	1.3	1.4	1.4	81	2.2	0.84	1.4	0.0	0.0	0.0	0.0
19	2.5	1.3	1.4	1.4	179	2.3	0.84	1.0	0.0	0.0	0.0	0.0
20	2.5	1.2	1.4	1.5	94	2.1	0.74	0.95	0.0	0.0	0.0	0.0
21	2.7	1.2	1.4	1.7	26	2.2	0.62	0.84	0.0	0.0	0.0	0.0
22	2.7	1.2	1.4	1.7	16	2.2	0.56	0.68	0.0	0.0	0.0	0.0
23	2.7	1.2	1.4	13	16	1.6	0.73	0.59	0.0	0.0	0.0	0.0
24	2.7	1.2	1.4	27	15	11	1.2	0.54	0.0	0.0	0.0	0.0
25	2.7	1.2	1.4	55	6.3	4.0	13	0.51	0.0	0.0	0.0	0.0
26	2.7	1.1	1.4	24	13	2.4	3.9	0.55	0.0	0.0	0.0	0.0
27	2.7	1.1	1.4	9.5	10	2.0	1.8	0.52	0.0	0.0	0.0	0.0
28	2.7	1.1	1.4	10	8.4	1.7	1.5	0.46	0.0	0.0	0.0	0.0
29	2.7	1.1	1.4	11	------	1.6	1.3	0.28	0.0	0.0	0.0	0.0
30	2.7	1.1	1.4	13	------	1.5	1.1	0.21	0.0	0.0	0.0	0.0
31	2.7	------	1.4	14	------	1.4	------	0.22	------	0.0	0.0	------
TOTAL	79.7	72.5	36.2	208	1137.7	102.6	53.58	27.93	0.11	0	0	0
MEAN	2.57	2.42	1.17	6.71	40.63	3.31	1.79	0.90	0.00	0.00	0.00	0.00
MAX	2.7	12	1.4	55	179	11	13	3.2	0.1	0	0	0
MIN	2.5	1.1	0.47	1.4	6.3	1.4	0.56	0.21	0	0	0	0
AC-FT	158.1	143.8	71.8	412.6	2256.6	203.5	106.3	55.4	0.2	0.0	0.0	0.0

TOTAL = 1718.3 CFS
3,408 AC-FT

MEAN = 4.71 N/A

MAX = 179 CFS
MIN = 0 CFS

MAX Instantaneour Flow - 182 CFS on JAN 24
683 CFS on FEB 17
248 CFS on FEB 7
1420 CFS on FEB 19

San Luis Obispo County
Flood Control and Water Conservation District

Upper San Simeon
Stream Gauge Station #14
Water Year OCT 1992 - SEP 1993
Latitude - 35° 36' 37" **Longitude - 121° 04' 30"**

AVERAGE DAILY DISCHARGE (CFS)

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0.0	1.4	0.0	116	16	**	**	**	0.0	0.0	0.0	0.0
2	0.0	0.08	0.0	89	14	**	**	**	0.0	0.0	0.0	0.0
3	0.0	0.02	0.0	48	11	**	**	**	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	36	8.5	**	**	**	0.0	0.0	0.0	0.0
5	0.0	0.0	0.0	30	12	**	**	**	0.0	0.0	0.0	0.0
6	0.0	0.0	58	214	7.0	**	**	**	0.0	0.0	0.0	0.0
7	0.0	0.0	96	359	44	**	**	0.01	0.0	0.0	0.0	0.0
8	0.0	0.0	16	173	295	**	**	0.01	0.0	0.0	0.0	0.0
9	0.0	0.0	32	117	173	**	**	0.01	0.0	0.0	0.0	0.0
10	0.0	0.0	49	370	72	**	**	0.01	0.0	0.0	0.0	0.0
11	0.0	0.0	192	102	58	**	**	0.01	0.0	0.0	0.0	0.0
12	0.0	0.0	42	187	41	**	**	0.01	0.0	0.0	0.0	0.0
13	0.0	0.0	23	652	31	**	**	0.01	0.0	0.0	0.0	0.0
14	0.0	0.0	16	451	26	**	**	0.01	0.0	0.0	0.0	0.0
15	0.0	0.0	12	543	22	**	**	0.01	0.0	0.0	0.0	0.0
16	0.0	0.0	8.2	282	20	**	**	0.0	0.0	0.0	0.0	0.0
17	0.0	0.0	20	422	22	**	**	0.0	0.0	0.0	0.0	0.0
18	0.0	0.0	22	239	101	**	**	0.0	0.0	0.0	0.0	0.0
19	0.0	0.0	12	125	106	**	**	0.0	0.0	0.0	0.0	0.0
20	0.0	0.0	7.5	177	106	**	**	0.0	0.0	0.0	0.0	0.0
21	0.0	0.0	6.7	217	69	**	**	0.0	0.0	0.0	0.0	0.0
22	0.0	0.0	6.0	229	280	**	**	0.0	0.0	0.0	0.0	0.0
23	0.0	0.0	5.7	109	436	**	**	0.0	0.0	0.0	0.0	0.0
24	0.0	0.0	5.5	78	119	**	**	0.0	0.0	0.0	0.0	0.0
25	0.0	0.0	4.5	60	**	**	**	0.0	0.0	0.0	0.0	0.0
26	0.0	0.0	3.7	46	**	**	**	0.0	0.0	0.0	0.0	0.0
27	0.0	0.0	3.2	38	**	**	**	0.0	0.0	0.0	0.0	0.0
28	0.0	0.0	181	32	**	**	**	0.0	0.0	0.0	0.0	0.0
29	0.0	0.0	200	28	------	**	**	0.0	0.0	0.0	0.0	0.0
30	0.0	0.0	79	24	------	**	**	0.0	0.0	0.0	0.0	0.0
31	0.0	------	46	20	------	**	------	0.0	------	0.0	0.0	------
TOTAL	0	1.5	1147	5613	2089.5	**	**	0.09	0	0	0	0
MEAN	0.00	0.05	37.00	181.06	87.06	**	**	0.00	0.00	0.00	0.00	0.00
MAX	0	1.4	200	652	436	**	**	0.01	0	0	0	0
MIN	0	0	0	20	7	**	**	0	0	0	0	0
AC-FT	0.0	3.0	2275.0	11133.2	4144.5	**	**	0.2	0.0	0.0	0.0	0.0

TOTAL** = 8851.1 CFS
17,556 AC-FT

MEAN** = 30.11 N/A

MAX = 652 CFS
MIN = 0 CFS

MAX Instantaneour Flow - 1050 CFS on DEC 28
2720 CFS on JAN 13
3420 CFS on FEB 22
1210 CFS on JAN 10
1460 CFS on JAN 14

** INCOMPLETE RECORD, MISSING DATA FOR THIS DAY

San Luis Obispo County
Flood Control and Water Conservation District

Upper San Simeon
Stream Gauge Station #14
Water Year OCT 1991 - SEP 1992

Latitude - 35° 36' 37" **Longitude - 121° 04' 30"**

AVERAGE DAILY DISCHARGE (CFS)

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0.0	0.0	0.0	8.1	5.3	30	18	3.6	0.73	0.04	0.0	0.0
2	0.0	0.0	0.0	6.1	5.9	28	18	3.3	0.99	0.0	0.0	0.0
3	0.0	0.0	0.0	5.7	6.5	29	17	3.3	0.72	0.0	0.0	0.0
4	0.0	0.0	0.0	5.3	6.8	23	15	2.9	0.73	0.0	0.0	0.0
5	0.0	0.0	0.0	129	7.0	145	14	3.2	0.37	0.0	0.0	0.0
6	0.0	0.0	0.0	47	11	183	13	2.8	0.39	0.0	0.0	0.0
7	0.0	0.0	0.0	46	13	117	12	2.9	0.33	0.0	0.0	0.0
8	0.0	0.0	0.0	28	13	78	12	2.9	0.29	0.0	0.0	0.0
9	0.0	0.0	0.0	17	27	58	11	2.8	0.24	0.0	0.0	0.0
10	0.0	0.0	0.0	13	143	48	11	2.9	0.22	0.0	0.0	0.0
11	0.0	0.0	0.0	11	123	37	11	2.3	0.27	0.0	0.0	0.0
12	0.0	0.0	0.0	9.2	248	32	11	1.9	0.26	0.22	0.0	0.0
13	0.0	0.0	0.0	7.5	255	27	13	1.9	0.26	0.10	0.0	0.0
14	0.0	0.0	0.0	6.4	181	32	10	1.9	0.20	0.0	0.0	0.0
15	0.0	0.0	0.0	5.8	283	27	8.3	2.1	0.24	0.0	0.0	0.0
16	0.0	0.0	0.0	4.7	247	22	7.4	2.4	0.31	0.0	0.0	0.0
17	0.0	0.0	0.0	4.5	201	19	7.5	2.4	0.40	0.0	0.0	0.0
18	0.0	0.0	0.0	4.1	161	18	7.2	2.3	0.35	0.0	0.0	0.0
19	0.0	0.0	0.0	3.4	146	18	6.4	2.2	0.29	0.0	0.0	0.0
20	0.0	0.0	0.0	3.3	243	22	5.6	2.1	0.23	0.0	0.0	0.0
21	0.0	0.0	0.0	2.8	158	28	5.2	1.9	0.20	0.0	0.0	0.0
22	0.0	0.0	0.0	2.4	127	75	4.7	1.8	0.10	0.0	0.0	0.0
23	0.0	0.0	0.0	2.4	105	109	4.9	1.9	0.03	0.0	0.0	0.0
24	0.0	0.0	0.0	1.9	81	55	4.7	1.6	0.0	0.0	0.0	0.0
25	0.0	0.0	0.0	1.8	61	43	4.0	1.5	0.0	0.0	0.0	0.0
26	0.0	0.0	0.0	1.5	43	36	3.8	1.4	0.0	0.0	0.0	0.0
27	0.0	0.0	0.0	1.3	29	31	3.8	1.4	0.0	0.0	0.0	0.0
28	0.0	0.0	8.8	1.8	19	27	4.1	1.4	0.0	0.0	0.0	0.0
29	0.0	0.0	114	2.8	18	24	3.6	1.3	0.0	0.0	0.0	0.0
30	0.0	0.0	70	3.4	------	23	3.6	1.2	0.32	0.0	0.0	0.0
31	0.0	------	15	4.5	------	21	------	1.2	------	0.0	0.0	------
TOTAL	0	0	207.8	391.7	2967.5	1465	270.8	68.7	8.47	0.36	0	0
MEAN	0.00	0.00	6.70	12.64	102.33	47.26	9.03	2.22	0.28	0.01	0.00	0.00
MAX	0	0	114	129	283	183	18	3.6	0.99	0.22	0	0
MIN	0	0	0	1.3	5.3	18	3.6	1.2	0	0	0	0
AC-FT	0.0	0.0	412.2	776.9	5886.0	2905.8	537.1	136.3	16.8	0.7	0.0	0.0

TOTAL = 5380.3 CFS
10,672 AC-FT

MEAN = 14.70 N/A

MAX = 283 CFS
MIN = 0 CFS

MAX Instantaneour Flow - 607 CFS on FEB 12
824 CFS on MAR 5
479 CFS on FEB 15

San Luis Obispo County
Flood Control and Water Conservation District

Upper San Simeon
Stream Gauge Station #14
Water Year OCT 1990 - SEP 1991

Latitude - 35° 36' 37'' **Longitude - 121° 04' 30''**

AVERAGE DAILY DISCHARGE (CFS)

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0.0	0.0	0.0	0.0	0.0	105	35	4.0	0.71	0.51	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	6.3	28	4.0	0.67	0.53	0.0	0.0
3	0.0	0.0	0.0	0.0	0.0	436	23	3.8	0.66	0.45	0.0	0.0
4	0.0	0.0	0.0	0.0	0.0	1530	21	3.8	0.60	0.25	0.0	0.0
5	0.0	0.0	0.0	0.0	0.0	186	18	3.8	0.59	0.29	0.0	0.0
6	0.0	0.0	0.0	0.0	0.0	49	17	3.5	0.51	0.31	0.0	0.0
7	0.0	0.0	0.0	0.0	0.0	21	14	3.5	0.54	0.18	0.0	0.0
8	0.0	0.0	0.0	0.0	0.0	14	13	3.5	0.49	0.09	0.0	0.0
9	0.0	0.0	0.0	0.0	0.0	11	11	3.4	0.49	0.06	0.0	0.0
10	0.0	0.0	0.0	0.0	0.0	12	10	3.3	0.47	0.0	0.0	0.0
11	0.0	0.0	0.0	0.0	0.0	13	9.4	3.4	0.41	0.0	0.0	0.0
12	0.0	0.0	0.0	0.0	0.0	8.9	9.0	3.2	0.49	0.0	0.0	0.0
13	0.0	0.0	0.0	0.0	0.0	24	8.8	3.1	0.45	0.0	0.0	0.0
14	0.0	0.0	0.0	0.0	0.0	16	8.4	3.0	0.49	0.0	0.0	0.0
15	0.0	0.0	0.0	0.0	0.0	12	8.3	2.6	0.21	0.0	0.0	0.0
16	0.0	0.0	0.0	0.0	0.0	8.7	7.8	2.2	0.03	0.0	0.0	0.0
17	0.0	0.0	0.0	0.0	0.0	98	7.2	1.9	0.0	0.0	0.0	0.0
18	0.0	0.0	0.0	0.0	0.0	542	6.7	1.7	0.0	0.0	0.0	0.0
19	0.0	0.0	0.0	0.0	0.0	395	6.4	1.6	0.0	0.0	0.0	0.0
20	0.0	0.0	0.0	0.0	0.0	530	8.0	1.5	0.0	0.0	0.0	0.0
21	0.0	0.0	0.0	0.0	0.0	109	8.0	1.5	0.0	0.0	0.0	0.0
22	0.0	0.0	0.0	0.0	0.0	69	6.5	1.5	0.0	0.0	0.0	0.0
23	0.0	0.0	0.0	0.0	0.0	48	6.3	1.5	0.0	0.0	0.0	0.0
24	0.0	0.0	0.0	0.0	0.0	277	6.0	1.4	0.0	0.0	0.0	0.0
25	0.0	0.0	0.0	0.0	0.0	268	5.3	1.4	0.0	0.0	0.0	0.0
26	0.0	0.0	0.0	0.0	0.0	261	4.8	1.1	0.0	0.0	0.0	0.0
27	0.0	0.0	0.0	0.0	0.0	147	4.6	0.97	0.01	0.0	0.0	0.0
28	0.0	0.0	0.0	0.0	20	93	4.4	0.97	1.6	0.0	0.0	0.0
29	0.0	0.0	0.0	0.0	------	71	4.2	0.92	2.1	0.0	0.0	0.0
30	0.0	0.0	0.0	0.0	------	55	4.0	0.87	0.71	0.0	0.0	0.0
31	0.0	------	0.0	0.0	------	43	------	0.78	------	0.0	0.0	------
TOTAL	0	0	0	0	20	5458.9	324.1	73.71	12.23	2.67	0	0
MEAN	0.00	0.00	0.00	0.00	0.71	176.09	10.80	2.38	0.41	0.09	0.00	0.00
MAX	0	0	0	0	20	1530	35	4	2.1	0.53	0	0
MIN	0	0	0	0	0	6.3	4	0.78	0	0	0	0
AC-FT	0.0	0.0	0.0	0.0	39.7	10827.6	642.8	146.2	24.3	5.3	0.0	0.0

TOTAL = 5891.6 CFS   MEAN = 16.14 N/A   MAX = 1530 CFS
11,686 AC-FT   MIN = 0 CFS

MAX Instantaneour Flow - 4460 CFS on MAR 4   1930 CFS on MAR 3
2930 CFS on MAR 18   2290 CFS on MAR 20

San Luis Obispo County
Flood Control and Water Conservation District

Upper San Simeon
Stream Gauge Station #14
Water Year OCT 1989 - SEP 1990

Latitude - 35° 36' 37'' **Longitude - 121° 04' 30''**

AVERAGE DAILY DISCHARGE (CFS)

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0.0	0.0	0.04	0.0	2.9	5.0	0.33	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.02	0.0	2.4	5.0	0.28	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	0.0	2.1	6.6	0.22	0.0	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0	23	5.7	0.13	0.0	0.0	0.0	0.0	0.0
5	0.0	0.0	0.0	0.0	6.0	5.6	0.11	0.0	0.0	0.0	0.0	0.0
6	0.0	0.0	0.0	0.0	3.5	4.6	0.09	0.0	0.0	0.0	0.0	0.0
7	0.0	0.0	0.0	0.0	3.0	4.1	0.08	0.0	0.0	0.0	0.0	0.0
8	0.0	0.0	0.0	0.0	2.5	3.9	0.08	0.0	0.0	0.0	0.0	0.0
9	0.0	0.0	0.0	0.0	2.2	3.6	0.07	0.0	0.0	0.0	0.0	0.0
10	0.0	0.0	0.0	0.0	2.1	3.5	0.06	0.0	0.0	0.0	0.0	0.0
11	0.0	0.0	0.0	0.0	2.0	4.0	0.04	0.0	0.0	0.0	0.0	0.0
12	0.0	0.0	0.0	10	1.7	3.7	0.01	0.0	0.0	0.0	0.0	0.0
13	0.0	0.0	0.0	95	1.1	3.5	0.0	0.0	0.0	0.0	0.0	0.0
14	0.0	0.0	0.0	53	1.0	3.1	0.0	0.0	0.0	0.0	0.0	0.0
15	0.0	0.0	0.0	28	0.83	2.8	0.0	0.0	0.0	0.0	0.0	0.0
16	0.0	0.0	0.0	22	79	2.7	0.0	0.0	0.0	0.0	0.0	0.0
17	0.0	0.0	0.0	15	60	2.6	0.0	0.0	0.0	0.0	0.0	0.0
18	0.0	0.0	0.0	8.2	25	2.4	0.0	0.0	0.0	0.0	0.0	0.0
19	0.0	0.0	0.0	5.7	15	2.3	0.0	0.0	0.0	0.0	0.0	0.0
20	0.0	0.0	0.0	4.1	12	2.1	0.0	0.0	0.0	0.0	0.0	0.0
21	0.0	0.0	0.0	3.2	11	2.1	0.0	0.0	0.0	0.0	0.0	0.0
22	0.0	0.0	0.0	2.8	9.1	2.0	0.0	0.0	0.0	0.0	0.0	0.0
23	0.0	0.0	0.0	2.4	7.7	1.9	0.0	0.0	0.0	0.0	0.0	0.0
24	0.0	0.0	0.0	2.1	6.6	1.5	0.0	0.0	0.0	0.0	0.0	0.0
25	0.0	0.0	0.0	2.1	5.9	1.1	0.0	0.0	0.0	0.0	0.0	0.0
26	0.0	11	0.0	1.7	5.5	1.0	0.0	0.0	0.0	0.0	0.0	0.0
27	0.0	1.6	0.0	1.7	5.5	1.1	0.0	0.0	0.0	0.0	0.0	0.0
28	0.0	0.13	0.0	1.3	5.2	0.80	0.0	0.0	0.0	0.0	0.0	0.0
29	0.0	0.07	0.0	2.1	------	0.81	0.0	0.0	0.0	0.0	0.0	0.0
30	0.0	0.05	0.0	1.9	------	0.69	0.0	0.0	0.0	0.0	0.0	0.0
31	0.0	------	0.0	2.5	------	0.46	------	0.0	------	0.0	0.0	------
TOTAL	0	12.85	0.06	264.8	303.83	90.26	1.5	0	0	0	0	0
MEAN	0.00	0.43	0.00	8.54	10.85	2.91	0.05	0.00	0.00	0.00	0.00	0.00
MAX	0	11	0.04	95	79	6.6	0.33	0	0	0	0	0
MIN	0	0	0	0	0.83	0.46	0	0	0	0	0	0
AC-FT	0.0	25.5	0.1	525.2	602.6	179.0	3.0	0.0	0.0	0.0	0.0	0.0

TOTAL = 673.3 CFS
1,335 AC-FT

MEAN = 1.84 N/A

MAX = 95 CFS
MIN = 0 CFS

MAX Instantaneour Flow - 634 CFS on FEB 16 292 CFS on JAN 13

San Luis Obispo County
Flood Control and Water Conservation District

Upper San Simeon
Stream Gauge Station #14
Water Year OCT 1988 - SEP 1989

Latitude - 35° 36' 37'' **Longitude - 121° 04' 30''**

AVERAGE DAILY DISCHARGE (CFS)

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0.0	0.0	0.0	17	3.6	2.9	12	2.1	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	11	3.4	57	10	1.9	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	9.8	3.8	24	9.7	1.4	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	8.8	21	11	8.6	0.76	0.0	0.0	0.0	0.0
5	0.0	0.0	0.0	146	12	8.4	8.0	0.64	0.0	0.0	0.0	0.0
6	0.0	0.0	0.0	49	7.4	7.3	7.6	0.51	0.0	0.0	0.0	0.0
7	0.0	0.0	0.0	31	6.0	7.1	6.7	0.67	0.0	0.0	0.0	0.0
8	0.0	0.0	0.0	22	6.8	6.4	6.2	0.82	0.0	0.0	0.0	0.0
9	0.0	0.0	0.0	18	48	5.5	5.7	1.6	0.0	0.0	0.0	0.0
10	0.0	0.0	0.0	16	21	5.5	5.5	2.1	0.0	0.0	0.0	0.0
11	0.0	0.0	0.0	13	14	13	5.2	2.2	0.0	0.0	0.0	0.0
12	0.0	0.0	0.0	11	11	9.5	4.8	2.1	0.0	0.0	0.0	0.0
13	0.0	0.0	0.0	11	9.7	7.5	4.5	2.0	0.0	0.0	0.0	0.0
14	0.0	0.0	0.0	10	8.9	6.5	4.1	1.8	0.0	0.0	0.0	0.0
15	0.0	0.0	0.0	8.5	7.8	6.1	4.0	1.8	0.0	0.0	0.0	0.0
16	0.0	0.0	0.0	7.9	7.3	15	3.9	1.5	0.0	0.0	0.0	0.0
17	0.0	0.0	6.4	7.1	6.4	12	3.7	1.1	0.0	0.0	0.0	0.0
18	0.0	0.0	1.7	6.5	6.1	8.6	3.4	0.97	0.0	0.0	0.0	0.0
19	0.0	0.0	0.0	6.3	5.8	7.7	3.1	0.53	0.0	0.0	0.0	0.0
20	0.0	0.0	23	6.1	5.3	7.2	3.1	0.20	0.0	0.0	0.0	0.0
21	0.0	0.0	36	5.2	4.9	6.1	2.9	0.08	0.0	0.0	0.0	0.0
22	0.0	0.0	118	4.1	4.4	6.2	2.8	0.05	0.0	0.0	0.0	0.0
23	0.0	0.0	43	8.3	3.9	5.7	2.8	0.04	0.0	0.0	0.0	0.0
24	0.0	0.0	461	9.5	3.6	65	3.1	0.02	0.0	0.0	0.0	0.0
25	0.0	0.0	68	6.5	3.5	106	4.2	0.01	0.0	0.0	0.0	0.0
26	0.0	0.0	30	5.5	3.3	54	3.0	0.0	0.0	0.0	0.0	0.0
27	0.0	0.0	19	4.8	3.2	30	2.8	0.0	0.0	0.0	0.0	0.0
28	0.0	0.0	14	4.8	2.8	22	2.5	0.0	0.0	0.0	0.0	0.0
29	0.0	0.0	11	4.7	------	17	2.3	0.0	0.0	0.0	0.0	0.0
30	0.0	0.0	9.4	4.3	------	15	2.2	0.0	0.0	0.0	0.0	0.0
31	0.0	------	30	4.1	------	13	------	0.0	------	0.0	0.0	------
TOTAL	0	0	870.5	477.8	244.9	568.2	148.4	26.9	0	0	0	0
MEAN	0.00	0.00	28.08	15.41	8.75	18.33	4.95	0.87	0.00	0.00	0.00	0.00
MAX	0	0	461	146	48	106	12	2.2	0	0	0	0
MIN	0	0	0	4.1	2.8	2.9	2.2	0	0	0	0	0
AC-FT	0.0	0.0	1726.6	947.7	485.8	1127.0	294.3	53.4	0.0	0.0	0.0	0.0

TOTAL = 2336.7 CFS MEAN = 6.40 N/A MAX = 461 CFS
4,635 AC-FT MIN = 0 CFS

MAX Instantaneour Flow - 2280 CFS on DEC 24 560 CFS on JAN 6
523 CFS on DEC 22

San Luis Obispo County
Flood Control and Water Conservation District

Upper San Simeon
Stream Gauge Station #14
Water Year OCT 1987 - SEP 1988

Latitude - 35° 36' 37'' **Longitude - 121° 04' 30''**

AVERAGE DAILY DISCHARGE (CFS)

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0.0	0.0		15	5.7	26	1.1	1.5	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	11	5.6	11	1.1	1.3	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	9.0	5.1	7.3	1.1	1.1	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	38	4.9	6.1	1.1	0.97	0.0	0.0	0.0	0.0
5	0.0	0.0	0.08	162	4.4	5.4	0.80	0.88	0.0	0.0	0.0	0.0
6	0.0	0.0	59	41	4.2	4.9	0.62	0.92	0.0	0.0	0.0	0.0
7	0.0	0.0	15	24	4.1	5.2	0.59	1.5	0.0	0.0	0.0	0.0
8	0.0	0.0	17	18	4.1	5.0	0.44	1.6	0.0	0.0	0.0	0.0
9	0.0	0.0	11	14	3.9	4.3	0.19	1.0	0.0	0.0	0.0	0.0
10	0.0	0.0	3.9	12	3.8	3.7	0.0	0.78	0.0	0.0	0.0	0.0
11	0.0	0.0	2.2	11	3.6	3.5	0.0	0.32	0.0	0.0	0.0	0.0
12	0.0	0.0	1.4	8.2	3.5	3.2	0.0	0.17	0.0	0.0	0.0	0.0
13	0.0	0.0	1.3	6.8	3.6	3.1	0.0	0.16	0.0	0.0	0.0	0.0
14	0.0	0.0	1.1	5.8	3.6	3.2	0.84	0.11	0.0	0.0	0.0	0.0
15	0.0	0.0	0.96	5.7	3.4	3.2	1.2	0.03	0.0	0.0	0.0	0.0
16	0.0	0.0	3.3	6.9	3.4	3.4	0.66	0.0	0.0	0.0	0.0	0.0
17	0.0	0.0	3.4	236	3.1	3.4	0.44	0.0	0.0	0.0	0.0	0.0
18	0.0	0.0	1.8	60	3.1	3.5	0.34	0.0	0.0	0.0	0.0	0.0
19	0.0	0.0	1.4	31	2.9	3.2	4.4	0.0	0.0	0.0	0.0	0.0
20	0.0	0.0	1.0	21	2.6	2.9	15	0.0	0.0	0.0	0.0	0.0
21	0.0	0.0	0.84	17	2.6	3.1	5.4	0.0	0.0	0.0	0.0	0.0
22	0.0	0.0	0.77	14	2.6	2.8	2.8	0.0	0.0	0.0	0.0	0.0
23	0.0	0.0	0.76	12	2.5	2.7	12	0.0	0.0	0.0	0.0	0.0
24	0.0	0.0	0.97	10	2.4	2.3	7.9	0.0	0.0	0.0	0.0	0.0
25	0.0	0.0	1.0	9.1	2.4	1.9	4.6	0.0	0.0	0.0	0.0	0.0
26	0.0	0.0	0.92	8.4	2.3	1.8	3.6	0.0	0.0	0.0	0.0	0.0
27	0.0	0.0	0.99	7.8	3.3	1.7	2.9	0.0	0.0	0.0	0.0	0.0
28	0.0	0.0	40	7.1	7.1	1.3	2.6	0.0	0.0	0.0	0.0	0.0
29	0.0	0.0	103	6.7	52	1.4	2.0	0.0	0.0	0.0	0.0	0.0
30	0.0	0.0	52	6.6	------	1.5	1.7	0.0	0.0	0.0	0.0	0.0
31	0.0	------	23	6.4	------	1.2	------	0.0	------	0.0	0.0	-----
TOTAL	0	0	348.09	841.5	155.8	133.2	75.42	12.34	0	0	0	0
MEAN	0.00	0.00	11.60	27.15	5.37	4.30	2.51	0.40	0.00	0.00	0.00	0.00
MAX	0	0	103	236	52	26	15	1.6	0	0	0	0
MIN	0	0	0	5.7	2.3	1.2	0	0	0	0	0	0
AC-FT	0.0	0.0	690.4	1669.1	309.0	264.2	149.6	24.5	0.0	0.0	0.0	0.0

TOTAL = 1566.4 CFS
3,107 AC-FT

MEAN = 4.29 N/A

MAX = 236 CFS
MIN = 0 CFS

MAX Instantaneour Flow - 666 CFS on JAN 17   259 CFS on DEC 29
523 CFS on JAN 4   323 CFS on DEC 6

San Luis Obispo County
Flood Control and Water Conservation District

Upper San Simeon
Stream Gauge Station #14
Water Year OCT 1986 - SEP 1987

Latitude - 35° 36' 37'' **Longitude - 121° 04' 30''**

AVERAGE DAILY DISCHARGE (CFS)

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0.0	0.0	0.0	0.0	1.1	4.4	4.8	2.5	0.38	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.89	4.2	4.4	1.8	0.07	0.0	0.0	0.0
3	0.0	0.0	0.0	0.0	1.4	4.1	4.3	1.7	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	14	1.1	4.1	4.1	1.4	0.0	0.0	0.0	0.0
5	0.0	0.0	0.0	1.6	0.79	264	4.2	1.1	0.0	0.0	0.0	0.0
6	0.0	0.0	0.0	1.0	0.60	284	4.0	0.95	0.0	0.0	0.0	0.0
7	0.0	0.0	0.0	4.9	0.31	116	3.6	0.98	0.0	0.0	0.0	0.0
8	0.0	0.0	0.0	3.2	0.28	67	3.3	1.1	0.0	0.0	0.0	0.0
9	0.0	0.0	0.0	1.8	1.7	49	3.2	1.2	0.0	0.0	0.0	0.0
10	0.0	0.0	0.0	1.2	41	40	2.8	1.2	0.0	0.0	0.0	0.0
11	0.0	0.0	0.0	0.97	24	37	2.5	1.2	0.0	0.0	0.0	0.0
12	0.0	0.0	0.0	0.83	12	35	2.6	1.3	0.0	0.0	0.0	0.0
13	0.0	0.0	0.0	0.62	935	61	2.4	1.2	0.0	0.0	0.0	0.0
14	0.0	0.0	0.0	0.60	376	43	2.2	1.2	0.0	0.0	0.0	0.0
15	0.0	0.0	0.0	0.62	303	43	2.1	1.2	0.0	0.0	0.0	0.0
16	0.0	0.0	0.0	0.49	252	30	2.1	1.4	0.0	0.0	0.0	0.0
17	0.0	0.0	0.0	0.33	222	21	1.9	1.4	0.0	0.0	0.0	0.0
18	0.0	0.0	0.0	0.35	205	12	1.7	1.4	0.0	0.0	0.0	0.0
19	0.0	0.0	0.0	0.37	189	9.9	1.6	1.5	0.0	0.0	0.0	0.0
20	0.0	0.0	0.0	0.28	180	9.1	1.5	1.4	0.0	0.0	0.0	0.0
21	0.0	0.0	0.0	0.14	15	26	1.4	1.5	0.0	0.0	0.0	0.0
22	0.0	0.0	0.0	0.01	8.5	16	1.3	1.4	0.0	0.0	0.0	0.0
23	0.0	0.0	0.0	0.25	7.4	13	1.5	1.4	0.0	0.0	0.0	0.0
24	0.0	0.0	0.0	0.38	7.1	11	1.7	1.3	0.0	0.0	0.0	0.0
25	0.0	0.0	0.0	0.13	6.5	9.4	1.7	1.2	0.0	0.0	0.0	0.0
26	0.0	0.0	0.0	0.0	6.1	7.9	1.6	1.2	0.0	0.0	0.0	0.0
27	0.0	0.0	0.0	0.0	5.3	7.1	1.5	1.2	0.0	0.0	0.0	0.0
28	0.0	0.0	0.0	1.9	5.1	6.6	1.6	1.1	0.0	0.0	0.0	0.0
29	0.0	0.0	0.0	1.2	------	5.8	1.5	0.90	0.0	0.0	0.0	0.0
30	0.0	0.0	0.0	1.3	------	5.3	3.7	0.78	0.0	0.0	0.0	0.0
31	0.0	------	0.0	1.3	------	4.8	------	0.61	------	0.0	0.0	------
TOTAL	0	0	0	39.77	2808.2	1250.7	76.8	39.72	0.45	0	0	0
MEAN	0.00	0.00	0.00	1.28	100.29	40.35	2.56	1.28	0.02	0.00	0.00	0.00
MAX	0	0	0	14	935	284	4.8	2.5	0.38	0	0	0
MIN	0	0	0	0	0.28	4.1	1.3	0.61	0	0	0	0
AC-FT	0.0	0.0	0.0	78.9	5569.9	2480.7	152.3	78.8	0.9	0.0	0.0	0.0

TOTAL = 4215.6 CFS MEAN = 11.55 N/A MAX = 935 CFS
8,362 AC-FT MIN = 0 CFS

MAX Instantaneour Flow - 2110 CFS on FEB 13 608 CFS on MAR 5

San Luis Obispo County
Flood Control and Water Conservation District

Upper San Simeon
Stream Gauge Station #14
Water Year OCT 1985 - SEP 1986

Latitude - 35° 36' 37" **Longitude - 121° 04' 30"**

AVERAGE DAILY DISCHARGE (CFS)

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0.0	0.0	1.0	0.91	34	31	19	5.7	1.7	0.83	0.0	0.0
2	0.0	0.0	208	0.66	63	29	17	5.7	1.7	0.74	0.0	0.0
3	0.0	0.0	74	0.66	49	27	16	5.7	1.7	0.74	0.0	0.0
4	0.0	0.0	13	407	43	24	15	5.7	1.7	0.66	0.0	0.0
5	0.0	0.0	6.3	477	32	22	16	5.7	1.7	0.57	0.0	0.0
6	0.0	0.0	3.6	96	27	20	18	5.7	1.7	0.49	0.0	0.0
7	0.0	0.0	2.7	41	24	24	16	5.7	1.7	0.46	0.0	0.0
8	0.0	0.0	2.3	25	22	543	14	5.1	1.7	0.46	0.0	0.0
9	0.0	0.0	1.9	17	20	222	13	5.1	1.7	0.44	0.0	0.0
10	0.0	0.0	1.3	13	17	530	12	5.1	1.3	0.41	0.0	0.0
11	0.0	0.0	1.1	11	17	209	11	5.1	1.3	0.39	0.0	0.0
12	0.0	0.0	0.91	9.6	991	322	10	5.1	1.3	0.36	0.0	0.0
13	0.0	0.0	0.83	8.7	1106	239	9.6	5.1	1.3	0.33	0.0	0.0
14	0.0	0.0	0.66	10	833	160	9.6	5.1	1.3	0.31	0.0	0.0
15	0.0	0.0	0.57	13	357	707	9.6	5.1	1.3	0.28	0.0	0.0
16	0.0	0.0	0.57	8.7	241	409	9.1	5.1	1.2	0.26	0.0	0.0
17	0.0	0.0	0.57	7.2	530	214	8.7	5.1	1.1	0.23	0.0	0.0
18	0.0	0.0	0.57	7.2	940	155	8.2	5.1	1.0	0.22	0.0	0.0
19	0.0	0.0	0.66	6.7	574	110	7.7	5.1	1.1	0.21	0.0	0.0
20	0.0	0.0	0.66	6.3	214	96	8.2	4.5	1.1	0.20	0.0	0.0
21	0.0	0.0	0.66	5.4	140	70	6.7	3.9	1.0	0.19	0.0	0.0
22	0.0	0.0	0.57	5.1	104	58	6.7	3.6	1.0	0.17	0.0	0.0
23	0.0	0.0	0.57	5.1	80	49	6.7	3.3	1.0	0.0	0.0	0.0
24	0.0	0.0	0.46	4.5	65	43	6.7	3.3	1.0	0.0	0.0	0.0
25	0.0	2.0	0.44	4.5	52	35	6.3	3.3	1.0	0.0	0.0	0.0
26	0.0	0.14	0.41	4.2	48	33	6.0	3.3	1.0	0.0	0.0	0.0
27	0.0	0.0	0.39	3.9	38	29	6.0	2.7	0.91	0.0	0.0	0.0
28	0.0	0.0	0.39	3.9	34	27	6.0	2.5	0.91	0.0	0.0	0.0
29	0.0	27	0.41	3.6	-----	25	6.0	2.1	0.83	0.0	0.0	0.0
30	0.0	4.2	1.3	9.6	-----	23	6.0	1.9	0.91	0.0	0.0	0.0
31	0.0	-----	1.5	83	-----	22	-----	1.9	-----	0.0	0.0	-----
TOTAL	0	33.34	328.3	1299.4	6695	4507	310.8	137.4	38.16	8.95	0	0
MEAN	0.00	1.11	10.59	41.92	239.11	145.39	10.36	4.43	1.27	0.29	0.00	0.00
MAX	0	27	208	477	1106	707	19	5.7	1.7	0.83	0	0
MIN	0	0	0.39	0.66	17	20	6	1.9	0.83	0	0	0
AC-FT	0.0	66.1	651.2	2577.4	13279.3	8939.5	616.5	272.5	75.7	17.8	0.0	0.0

TOTAL = 13358 CFS
26,496 AC-FT

MEAN = 36.60 N/A

MAX = 1106 CFS
MIN = 0 CFS

MAX Instantaneour Flow -
3186 CFS on FEB 12
2850 CFS on FEB 14
1576 CFS on FEB 19
3515 CFS on FEB 13
1864 CFS on FEB 17
3178 CFS on MAR 15

San Luis Obispo County
Flood Control and Water Conservation District

Upper San Simeon
Stream Gauge Station #14
Water Year OCT 1984 - SEP 1985

Latitude - 35° 36' 37" **Longitude - 121° 04' 30"**

AVERAGE DAILY DISCHARGE (CFS)

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0.0	0.0	9.1	5.7	1.9	5.1	21	3.6	0.49	0.0	0.0	0.0
2	0.0	0.0	9.1	5.1	3.6	5.1	18	3.3	0.57	0.0	0.0	0.0
3	0.0	0.0	7.7	4.5	2.5	4.8	16	3.1	0.66	0.0	0.0	0.0
4	0.0	0.0	5.7	3.9	2.1	4.5	15	2.7	0.49	0.0	0.0	0.0
5	0.0	0.0	6.0	3.9	1.7	4.8	13	2.3	0.44	0.0	0.0	0.0
6	0.0	0.0	7.2	3.6	1.7	8.2	13	1.9	0.39	0.0	0.0	0.0
7	0.0	0.0	7.2	4.8	2.3	33	11	1.9	0.31	0.0	0.0	0.0
8	0.0	0.0	7.2	14	628	11	10	2.1	0.23	0.0	0.0	0.0
9	0.0	0.0	7.2	7.2	145	7.7	9.6	1.9	0.19	0.0	0.0	0.0
10	0.0	0.0	48	5.4	56	9.6	9.1	1.9	0.14	0.0	0.0	0.0
11	0.0	0.0	25	4.8	36	24	8.2	1.7	0.12	0.0	0.0	0.0
12	0.0	0.0	13	4.5	23	28	7.2	1.7	0.10	0.0	0.0	0.0
13	0.0	7.5	11	3.9	21	16	6.3	1.5	0.09	0.0	0.0	0.0
14	0.0	0.13	213	3.6	17	12	6.0	1.3	0.06	0.0	0.0	0.0
15	0.0	0.12	82	3.3	15	10	6.0	1.1	0.03	0.0	0.0	0.0
16	0.0	0.39	30	3.1	13	9.6	6.0	1.1	0.01	0.0	0.0	0.0
17	0.0	10	52	2.9	12	8.2	6.0	1.1	0.0	0.0	0.0	0.0
18	0.0	2.9	86	2.9	10	11	6.0	1.0	0.0	0.0	0.0	0.0
19	0.0	0.41	72	2.9	10	9.6	5.4	1.0	0.0	0.0	0.0	0.0
20	0.0	0.14	36	2.7	9.6	8.2	5.1	1.0	0.0	0.0	0.0	0.0
21	0.0	0.12	24	2.5	8.2	7.2	6.3	0.83	0.0	0.0	0.0	0.0
22	0.0	0.09	18	2.3	7.2	6.3	5.4	0.49	0.0	0.0	0.0	0.0
23	0.0	0.06	15	2.1	6.7	6.0	5.1	0.66	0.0	0.0	0.0	0.0
24	0.0	32	12	2.1	6.3	5.4	4.8	0.66	0.0	0.0	0.0	0.0
25	0.0	13	12	2.1	6.0	5.1	4.5	0.66	0.0	0.0	0.0	0.0
26	0.0	10	11	1.9	5.7	19	4.2	0.66	0.0	0.0	0.0	0.0
27	0.0	103	9.1	1.7	5.4	226	3.9	0.74	0.0	0.0	0.0	0.0
28	0.0	125	7.7	2.5	5.1	114	3.6	0.66	0.0	0.0	0.0	0.0
29	0.0	28	6.7	2.7	-----	51	3.6	0.57	0.0	0.0	0.0	0.0
30	0.0	14	6.7	2.1	-----	35	3.6	0.57	0.0	0.0	0.0	0.0
31	0.0	-----	6.0	1.7	-----	28	-----	0.57	-----	0.0	0.0	-----
TOTAL	0	346.86	862.6	116.4	1062	733.4	242.9	44.27	4.32	0	0	0
MEAN	0.00	11.56	27.83	3.75	37.93	23.66	8.10	1.43	0.14	0.00	0.00	0.00
MAX	0	125	213	14	628	226	21	3.6	0.66	0	0	0
MIN	0	0	5.7	1.7	1.7	4.5	3.6	0.49	0	0	0	0
AC-FT	0.0	688.0	1710.9	230.9	2106.4	1454.7	481.8	87.8	8.6	0.0	0.0	0.0

TOTAL = 3412.8 CFS
6,769 AC-FT

MEAN = 9.35 N/A

MAX = 628 CFS
MIN = 0 CFS

MAX Instantaneour Flow - 1024 CFS on NOV 27 1480 CFS on DEC 14
2970 CFS on FEB 8

San Luis Obispo County
Flood Control and Water Conservation District

Upper San Simeon
Stream Gauge Station #14
Water Year OCT 1983 - SEP 1984
Latitude - 35° 36' 37'' **Longitude - 121° 04' 30''**

AVERAGE DAILY DISCHARGE (CFS)

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	5.1	0.41	19	142	**	**	**	**	0.0	0.0	0.0	0.0
2	0.49	0.26	16	41	**	**	**	**	0.0	0.0	0.0	0.0
3	0.28	0.21	142	36	**	**	**	**	0.0	0.0	0.0	0.0
4	0.22	0.19	60	**	**	**	**	**	0.0	0.0	0.0	0.0
5	0.22	0.15	36	**	**	**	**	**	0.0	0.0	0.0	0.0
6	0.22	0.13	30	**	**	**	**	**	0.0	0.0	0.0	0.0
7	0.21	0.06	25	**	**	**	**	**	0.0	0.0	0.0	0.0
8	0.21	0.01	22	**	**	**	**	**	0.0	0.0	0.0	0.0
9	0.21	0.06	208	**	**	**	**	**	0.0	0.0	0.0	0.0
10	0.20	32	78	**	**	**	**	**	0.0	0.0	0.0	0.0
11	0.15	196	192	**	**	**	**	**	0.0	0.0	0.0	0.0
12	0.14	43	96	**	**	**	**	**	0.0	0.0	0.0	0.0
13	0.13	44	63	**	**	**	**	**	0.0	0.0	0.0	0.0
14	0.13	28	53	**	**	**	**	**	0.0	0.0	0.0	0.0
15	0.13	11	47	**	**	**	**	**	0.0	0.0	0.0	0.0
16	0.13	8.7	39	**	**	**	**	**	0.0	0.0	0.0	0.0
17	0.13	202	35	**	**	**	**	**	0.0	0.0	0.0	0.0
18	0.12	80	32	**	**	**	**	**	0.0	0.0	0.0	0.0
19	0.07	43	27	**	**	**	**	**	0.0	0.0	0.0	0.0
20	0.06	130	25	**	**	**	**	**	0.0	0.0	0.0	0.0
21	0.07	58	22	**	**	**	**	**	0.0	0.0	0.0	0.0
22	0.0	34	20	**	**	**	**	**	0.0	0.0	0.0	0.0
23	0.0	27	**	**	**	**	**	**	0.0	0.0	0.0	0.0
24	0.0	679	**	**	**	**	**	**	0.0	0.0	0.0	0.0
25	0.0	142	**	**	**	**	**	**	0.0	0.0	0.0	0.0
26	0.0	65	**	**	**	**	**	**	0.0	0.0	0.0	0.0
27	0.0	43	**	**	**	**	**	**	0.0	0.0	0.0	0.0
28	0.0	32	36	**	**	**	**	**	0.0	0.0	0.0	0.0
29	0.0	26	80	**	**	**	**	**	0.0	0.0	0.0	0.0
30	0.0	22	63	**	-----	**	**	**	0.0	0.0	0.0	0.0
31	0.26	-----	55	**	-----	**	-----	**	-----	0.0	0.0	-----
TOTAL	8.88	1947.2	1521	219	**	**	**	**	0	0	0	0
MEAN	0.29	64.91	58.50	73.00	**	**	**	**	0.00	0.00	0.00	0.00
MAX	5.1	679	208	142	**	**	**	**	0	0	0	0
MIN	0	0.01	16	36	**	**	**	**	0	0	0	0
AC-FT	17.6	3862.2	3016.9	434.4	**	**	**	**	0.0	0.0	0.0	0.0

TOTAL** = 3696.1 CFS MEAN** = 17.43 N/A MAX = 679 CFS
7,331 AC-FT MIN = 0 CFS

MAX Instantaneour Flow - 830 CFS on NOV 11 865 CFS on NOV 17
232 CFS on NOV 19 2497 CFS on NOV 24
594 CFS on DEC 3 800 CFS on DEC 9
570 CFS on DEC 11

** INCOMPLETE RECORD, MISSING DATA FOR THIS DAY

San Luis Obispo County
Flood Control and Water Conservation District

Upper San Simeon
Stream Gauge Station #14
Water Year OCT 1982 - SEP 1983

Latitude - 35° 36' 37'' **Longitude - 121° 04' 30''**

AVERAGE DAILY DISCHARGE (CFS)

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0.0	0.0	104	17	27	492	86	**	**	21	20	0.0
2	0.0	0.0	40	17	27	897	78	**	**	20	20	0.0
3	0.0	0.0	22	15	16	377	68	**	**	20	20	0.0
4	0.0	0.0	15	15	12	313	63	**	**	20	20	0.0
5	0.0	0.0	11	14	10	262	58	**	**	20	20	0.0
6	0.0	0.0	8.7	13	364	217	53	**	**	20	20	0.0
7	0.0	0.0	7.7	11	573	241	49	**	**	20	20	0.0
8	0.0	0.0	5.7	10	309	174	47	**	11	20	20	0.0
9	0.0	6.1	4.5	10	44	142	44	**	11	20	20	0.0
10	0.0	2.7	3.9	9.6	43	118	41	**	12	20	20	0.0
11	0.0	0.74	3.1	8.7	24	104	40	**	13	20	20	0.0
12	0.0	0.20	2.9	8.2	421	92	39	**	13	20	20	0.0
13	0.0	0.0	2.7	7.7	155	480	36	**	11	20	20	0.0
14	0.0	0.0	2.1	6.7	168	196	33	**	16	20	**	0.0
15	0.0	0.0	5.1	6.3	122	140	32	**	15	20	**	0.0
16	0.0	0.0	4.8	6.3	25	343	20	**	16	20	**	0.0
17	0.0	0.0	5.4	6.3	17	196	29	**	17	20	**	0.0
18	0.0	0.0	4.8	51	36	226	78	**	15	19	**	0.0
19	0.0	0.0	4.2	58	15	158	80	**	17	19	**	0.0
20	0.0	0.0	4.2	14	10	244	167	**	18	19	**	0.0
21	0.0	0.0	53	11	8.2	241	193	**	18	19	**	0.0
22	0.0	0.0	920	621	6.0	355	88	**	19	19	**	0.0
23	0.0	0.0	14	202	6.0	300	108	**	19	19	**	0.0
24	0.0	3.9	76	521	5.4	319	147	**	20	19	**	0.0
25	0.0	3.9	48	122	174	226	**	**	20	19	**	0.0
26	0.0	2.9	34	297	118	179	**	**	20	19	**	0.0
27	0.0	2.7	27	538	353	182	**	**	20	19	**	0.0
28	0.0	20	22	142	299	152	**	**	20	19	**	0.0
29	0.0	387	17	163	-----	125	**	**	20	19	**	0.0
30	15	730	16	84	-----	112	**	**	19	19	**	18
31	0.83	-----	13	53	-----	98	-----	**	-----	19	0.0	-----
TOTAL	15.83	1160.1	1501.8	3058.8	3387.6	7701	1677	**	380	607	260	18
MEAN	0.51	38.67	48.45	98.67	120.99	248.42	69.88	**	16.52	19.58	18.57	0.60
MAX	15	730	920	621	573	897	193	**	20	21	20	18
MIN	0	0	2.1	6.3	5.4	92	20	**	11	19	0	0
AC-FT	31.4	2301.1	2978.8	6067.0	6719.2	15274.7	3326.3	**	753.7	1204.0	515.7	35.7

TOTAL** = 19767 CFS
39,208 AC-FT

MEAN** = 65.02 N/A

MAX = 920 CFS
MIN = 0 CFS

MAX Instantaneour Flow -
2467 CFS on NOV 30
1927 CFS on JAN 22
2152 CFS on JAN 26
1754 CFS on FEB 27
1857 CFS on DEC 22
1983 CFS on JAN 24
2280 CFS on FEB 7
2557 CFS on MAR 2

** INCOMPLETE RECORD, MISSING DATA FOR THIS DAY

San Luis Obispo County
Flood Control and Water Conservation District

Upper San Simeon
Stream Gauge Station #14
Water Year OCT 1981 - SEP 1982

Latitude - 35° 36' 37" **Longitude - 121° 04' 30"**

AVERAGE DAILY DISCHARGE (CFS)

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0.0	0.0	5.7	270	21	196	229	19	5.1	1.5	0.0	0.0
2	0.0	0.0	4.5	153	18	264	135	17	5.1	1.3	0.0	0.0
3	0.0	0.0	3.6	73	16	94	228	16	4.8	1.3	0.0	0.0
4	0.0	0.0	2.9	381	14	61	150	15	4.5	1.2	0.0	0.0
5	0.0	0.0	2.5	594	11	48	100	14	4.2	1.0	0.0	0.0
6	0.0	0.0	2.1	142	9.7	39	82	14	3.9	0.91	0.0	0.0
7	0.0	0.0	1.7	76	8.7	36	65	13	3.6	0.83	0.0	0.0
8	0.0	0.0	1.3	52	8.2	35	54	13	3.4	0.83	0.0	0.0
9	0.0	0.0	1.2	38	7.3	27	48	11	3.4	0.66	0.0	0.0
10	0.0	0.0	1.3	29	11	25	517	11	3.4	0.49	0.0	0.0
11	0.0	0.0	1.2	23	7.7	53	1164	9.7	3.4	0.46	0.0	0.0
12	0.0	0.0	1.1	19	6.3	38	329	9.7	3.1	0.46	0.0	0.0
13	0.0	0.0	1.3	15	6.0	28	191	9.2	2.9	0.44	0.0	0.0
14	0.0	215	1.0	13	6.8	47	137	8.7	2.9	0.41	0.0	0.0
15	0.0	24	1.0	12	78	39	104	8.2	2.7	0.39	0.0	0.0
16	0.0	24	0.91	5.1	415	116	69	7.7	2.7	0.31	0.0	0.0
17	0.0	96	0.74	4.5	88	158	51	7.3	2.7	0.23	0.0	0.0
18	0.0	26	0.66	3.6	50	147	46	7.3	2.7	0.20	0.0	0.0
19	0.0	9.7	0.66	3.6	37	92	44	6.8	2.7	0.15	0.0	0.0
20	0.0	5.1	137	76	29	71	42	6.3	2.5	0.12	0.0	0.0
21	0.0	3.1	62	69	24	58	39	6.3	2.5	0.07	0.0	0.0
22	0.0	2.3	21	31	20	48	38	6.3	2.5	0.03	0.0	0.0
23	0.0	1.5	14	20	16	44	37	6.0	2.3	0.0	0.0	0.0
24	0.0	2.3	9.7	16	15	39	31	6.0	2.1	0.0	0.0	0.0
25	0.0	1.5	7.7	13	13	36	29	6.0	1.9	0.0	0.0	0.0
26	0.0	1.5	6.8	61	12	62	27	6.0	1.7	0.0	0.0	0.0
27	0.0	30	5.7	43	11	65	24	6.0	1.5	0.0	0.0	0.0
28	0.0	55	5.4	84	9.7	75	22	5.7	1.3	0.0	0.0	0.0
29	0.0	16	318	46	-----	138	20	6.0	1.5	0.0	0.0	0.0
30	0.0	8.7	227	32	-----	104	19	5.7	1.5	0.0	0.0	0.0
31	0.0	-----	198	26	-----	472	-----	5.7	-----	0.0	0.0	-----
TOTAL	0	521.7	1047.7	2423.8	969.4	2755	4071	289.6	88.5	13.29	0	0
MEAN	0.00	17.39	33.80	78.19	34.62	88.87	135.70	9.34	2.95	0.43	0.00	0.00
MAX	0	215	318	594	415	472	1164	19	5.1	1.5	0	0
MIN	0	0	0.66	3.6	6	25	19	5.7	1.3	0	0	0
AC-FT	0.0	1034.8	2078.0	4807.5	1922.8	5464.5	8074.7	574.4	175.5	26.4	0.0	0.0

TOTAL = 12180 CFS
24,159 AC-FT

MEAN = 33.37 N/A

MAX = 1164 CFS
MIN = 0 CFS

MAX Instantaneour Flow - 870 CFS on DEC 31 — 115 CFS on JAN 20
158 CFS on JAN 26 — 183 CFS on JAN 28
830 CFS on MAR 1 — 403 CFS on MAR 29
1330 CFS on 1800 — 345 CFS on APR 3

San Luis Obispo County
Flood Control and Water Conservation District

Upper San Simeon
Stream Gauge Station #14
Water Year OCT 1980 - SEP 1981

Latitude - 35° 36' 37'' **Longitude - 121° 04' 30''**

AVERAGE DAILY DISCHARGE (CFS)

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0.0	0.0	0.0	0.0	14	50	19	4.2	1.1	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	10	29	17	3.9	1.0	0.0	0.0	0.0
3	0.0	0.0	0.0	0.0	7.7	16	16	3.9	1.0	0.0	0.0	0.0
4	0.0	0.0	1.2	0.0	6.0	93	14	3.4	0.83	0.0	0.0	0.0
5	0.0	0.0	0.03	0.0	5.1	116	12	3.4	0.74	0.0	0.0	0.0
6	0.0	0.0	0.0	0.0	4.5	52	12	3.4	0.66	0.0	0.0	0.0
7	0.0	0.0	0.0	0.0	3.9	36	11	3.4	0.66	0.0	0.0	0.0
8	0.0	0.0	0.0	0.0	5.1	27	10	3.1	0.49	0.0	0.0	0.0
9	0.0	0.0	0.0	0.0	115	21	9.7	2.9	0.41	0.0	0.0	0.0
10	0.0	0.0	0.0	0.0	42	18	9.2	2.9	0.36	0.0	0.0	0.0
11	0.0	0.0	0.0	0.0	25	16	8.7	2.7	0.33	0.0	0.0	0.0
12	0.0	0.0	0.0	0.0	18	14	8.2	2.7	0.28	0.0	0.0	0.0
13	0.0	0.0	0.0	0.0	14	14	7.7	2.7	0.21	0.0	0.0	0.0
14	0.0	0.0	0.0	0.0	11	12	7.3	2.7	0.16	0.0	0.0	0.0
15	0.0	0.0	0.0	0.0	9.7	11	6.8	2.5	0.01	0.0	0.0	0.0
16	0.0	0.0	0.0	0.0	8.7	11	6.8	2.3	0.0	0.0	0.0	0.0
17	0.0	0.0	0.0	0.0	7.3	9.2	6.3	1.9	0.0	0.0	0.0	0.0
18	0.0	0.0	0.0	0.0	5.7	15	7.3	1.9	0.0	0.0	0.0	0.0
19	0.0	0.0	0.0	0.0	5.4	369	9.7	1.9	0.0	0.0	0.0	0.0
20	0.0	0.0	0.0	0.0	4.8	106	7.3	1.7	0.0	0.0	0.0	0.0
21	0.0	0.0	0.0	0.0	3.9	502	6.3	1.5	0.0	0.0	0.0	0.0
22	0.0	0.0	0.0	0.02	3.9	142	6.0	1.5	0.0	0.0	0.0	0.0
23	0.0	0.0	0.0	20	3.6	78	5.4	1.3	0.0	0.0	0.0	0.0
24	0.0	0.0	0.0	1.9	3.9	55	5.4	1.3	0.0	0.0	0.0	0.0
25	0.0	0.0	0.0	0.74	5.1	47	5.4	1.3	0.0	0.0	0.0	0.0
26	0.0	0.0	0.0	0.14	4.8	47	4.8	1.3	0.0	0.0	0.0	0.0
27	0.0	0.0	0.0	136	3.6	38	4.8	1.3	0.0	0.0	0.0	0.0
28	0.0	0.0	0.0	76	6.3	30	4.2	1.3	0.0	0.0	0.0	0.0
29	0.0	0.0	0.0	207	-----	27	4.2	1.2	0.0	0.0	0.0	0.0
30	0.0	0.0	0.0	54	-----	23	3.9	1.1	0.0	0.0	0.0	0.0
31	0.0	-----	0.0	25	-----	20	-----	1.1	-----	0.0	0.0	-----
TOTAL	0	0	1.23	520.8	358	2044.2	256.4	71.7	8.24	0	0	0
MEAN	0.00	0.00	0.04	16.80	12.79	65.94	8.55	2.31	0.27	0.00	0.00	0.00
MAX	0	0	1.2	207	115	502	19	4.2	1.1	0	0	0
MIN	0	0	0	0	3.6	9.2	3.9	1.1	0	0	0	0
AC-FT	0.0	0.0	2.4	1033.0	710.1	4054.6	508.6	142.2	16.3	0.0	0.0	0.0

TOTAL = 3260.6 CFS MEAN = 8.93 N/A MAX = 502 CFS
6,467 AC-FT MIN = 0 CFS

MAX Instantaneour Flow - 925 CFS on JAN 27 765 CFS on JAN 29
1180 CFS on MAR 19 1350 CFS on MAR 21

San Luis Obispo County
Flood Control and Water Conservation District

Upper San Simeon
Stream Gauge Station #14
Water Year OCT 1979 - SEP 1980

Latitude - 35° 36' 37'' **Longitude - 121° 04' 30''**

AVERAGE DAILY DISCHARGE (CFS)

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0.0	0.0	0.0	73	**	69	13	5.7	1.9	0.46	0.0	0.0
2	0.0	0.0	0.0	22	**	123	12	5.1	1.9	0.49	0.0	0.0
3	0.0	0.0	0.0	12	**	317	12	4.8	1.9	0.66	0.0	0.0
4	0.0	0.0	0.0	8.2	**	135	11	4.5	1.7	0.46	0.0	0.0
5	0.0	0.0	0.0	6.0	**	296	29	4.5	1.5	0.39	0.0	0.0
6	0.0	0.0	0.0	4.8	**	235	19	4.2	1.3	0.36	0.0	0.0
7	0.0	0.0	0.0	4.2	**	137	13	3.9	1.3	0.33	0.0	0.0
8	0.0	0.0	0.0	3.6	**	114	11	3.6	1.2	0.33	0.0	0.0
9	0.0	0.0	0.0	8.2	**	94	11	4.5	1.2	0.31	0.0	0.0
10	0.0	0.0	0.0	88	**	82	9.7	8.7	1.1	0.28	0.0	0.0
11	0.0	0.0	0.0	839	**	71	9.2	5.1	1.0	0.26	0.0	0.0
12	0.0	0.0	0.0	1156	**	61	8.2	4.5	0.91	0.22	0.0	0.0
13	0.0	0.0	0.0	667	**	55	7.7	4.5	0.91	0.21	0.0	0.0
14	0.0	0.0	0.0	775	**	51	7.7	4.2	0.83	0.22	0.0	0.0
15	0.0	0.0	0.0	**	82	48	6.8	3.9	0.83	0.22	0.0	0.0
16	0.0	0.0	0.0	**	553	44	6.0	3.6	0.74	0.20	0.0	0.0
17	0.0	0.0	0.0	**	724	42	6.0	3.4	0.74	0.17	0.0	0.0
18	0.0	0.0	0.0	**	478	39	6.0	3.1	0.74	0.15	0.0	0.0
19	0.0	0.0	0.0	**	523	36	6.0	3.1	0.74	0.13	0.0	0.0
20	0.0	0.0	0.0	**	412	34	6.0	3.1	0.74	0.13	0.0	0.0
21	0.0	0.0	0.0	**	474	31	6.0	3.1	0.66	0.12	0.0	0.0
22	0.0	0.0	0.0	**	263	29	6.0	3.1	0.57	0.07	0.0	0.0
23	0.0	0.0	0.0	**	183	26	6.0	2.9	0.46	0.0	0.0	0.0
24	0.0	0.0	107	**	135	24	5.7	2.7	0.46	0.0	0.0	0.0
25	0.0	0.0	37	**	108	22	5.4	2.7	0.44	0.0	0.0	0.0
26	0.0	0.0	5.7	**	88	20	5.1	2.5	0.44	0.0	0.0	0.0
27	0.0	0.0	2.5	**	110	18	5.1	2.5	0.39	0.0	0.0	0.0
28	0.0	0.0	1.2	**	112	17	6.3	2.3	0.39	0.0	0.0	0.0
29	0.0	0.0	0.83	**	82	16	6.0	2.1	0.41	0.0	0.0	0.0
30	0.0	0.0	92	**	-----	16	5.7	2.1	0.44	0.0	0.0	0.0
31	0.0	-----	160	**	-----	14	-----	2.1	-----	0.0	0.0	-----
TOTAL	0	0	406.23	3667	4327	2316	267.63	116.1	27.85	6.17	0	0
MEAN	0.00	0.00	13.10	261.93	288.47	74.71	8.92	3.75	0.93	0.20	0.00	0.00
MAX	0	0	160	1156	724	317	29	8.7	1.9	0.66	0	0
MIN	0	0	0	3.6	82	14	5.1	2.1	0.39	0	0	0
AC-FT	0.0	0.0	805.7	7273.4	8582.5	4593.7	530.8	230.3	55.2	12.2	0.0	0.0

TOTAL** = 11134 CFS
22,084 AC-FT

MEAN** = 33.24 N/A

MAX = 1156 CFS
MIN = 0 CFS

MAX Instantaneour Flow - 2040 CFS on JAN 11; 2110 CFS on JAN 12
3020 CFS on JAN 14; 2850 CFS on FEB 16
2480 CFS on FEB 17

** INCOMPLETE RECORD, MISSING DATA FOR THIS DAY

San Luis Obispo County
Flood Control and Water Conservation District

Upper San Simeon
Stream Gauge Station #14
Water Year OCT 1978 - SEP 1979
Latitude - 35° 36' 37" **Longitude - 121° 04' 30"**

AVERAGE DAILY DISCHARGE (CFS)

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	**	**	**	**	158	**	**	9.2	2.9	0.28	0.0	0.0
2	**	**	**	**	121	**	**	8.7	2.9	0.31	0.0	0.0
3	**	**	**	**	92	**	**	9.2	2.7	0.33	0.0	0.0
4	**	**	**	**	**	**	**	8.7	2.7	0.28	0.0	0.0
5	**	**	**	**	**	**	**	8.2	2.7	0.26	0.0	0.0
6	**	**	**	**	**	**	28	8.2	2.7	0.26	0.0	0.0
7	**	**	**	**	**	**	26	**	2.5	0.22	0.0	0.0
8	**	**	**	58	**	**	24	**	2.5	0.20	0.0	0.0
9	**	**	**	102	**	**	22	**	2.3	0.17	0.0	0.0
10	**	**	**	22	**	**	20	**	1.9	0.16	0.0	0.0
11	**	**	**	20	**	**	18	**	1.5	0.14	0.0	0.0
12	**	**	**	19	**	**	16	**	1.5	0.13	0.0	0.0
13	**	**	**	18	252	**	16	**	1.5	0.07	0.0	0.0
14	**	**	**	386	269	**	15	**	1.2	0.06	0.0	0.0
15	**	**	**	372	110	**	14	**	1.0	0.10	0.0	0.0
16	**	**	**	112	119	**	13	**	1.0	0.07	0.0	0.0
17	**	**	**	78	**	**	14	5.1	0.91	0.04	0.0	0.0
18	**	**	35	80	**	**	12	5.1	0.91	0.0	0.0	0.0
19	**	**	30	**	**	**	12	5.1	0.83	0.0	0.0	0.0
20	**	**	**	**	320	**	11	5.1	0.74	0.0	0.0	0.0
21	**	**	11	**	321	**	11	5.1	0.66	0.0	0.0	0.0
22	**	**	**	**	205	**	2.9	4.8	0.49	0.0	0.0	0.0
23	**	**	**	**	185	**	10	4.5	0.49	0.0	0.0	0.0
24	**	**	**	**	**	**	10	3.9	0.23	0.0	0.0	0.0
25	**	**	**	**	**	**	10	3.6	0.23	0.0	0.0	0.0
26	**	**	**	**	**	159	13	3.6	0.41	0.0	0.0	0.0
27	**	**	**	**	**	315	16	3.6	0.39	0.0	0.0	0.0
28	**	**	**	**	**	410	11	3.4	0.36	0.0	0.0	0.0
29	**	**	**	**	-----	338	10	3.1	0.31	0.0	0.0	0.0
30	**	**	**	110	-----	123	9.7	2.9	0.28		0.0	0.0
31	**	-----	**	331	-----	**	-----	2.7	-----	0.0	0.0	-----
TOTAL	**	**	76	1708	2152	1345	364.6	113.8	40.74	3.08	0	0
MEAN	**	**	25.33	131.38	195.64	269.00	14.58	5.42	1.36	0.10	0.00	0.00
MAX	**	**	35	386	321	410	28	9.2	2.9	0.33	0	0
MIN	**	**	11	18	92	123	2.9	2.7	0.23	0	0	0
AC-FT	**	**	150.7	3387.8	4268.4	2667.8	723.2	225.7	80.8	6.1	0.0	0.0

TOTAL** = 5803.2 CFS MEAN** = 29.16 N/A MAX = 410 CFS
11,511 AC-FT MIN = 0 CFS

MAX Instantaneour Flow - 1706 CFS on JAN 14 1057 CFS on JAN 31
2046 CFS on FEB 20 930 CFS on MAR 28
1132 CFS on MAR 28 1029 CFS on MAR 29

** INCOMPLETE RECORD, MISSING DATA FOR THIS DAY

San Luis Obispo County
Flood Control and Water Conservation District

Upper San Simeon
Stream Gauge Station #14
Water Year OCT 1977 - SEP 1978

Latitude - 35° 36' 37" **Longitude - 121° 04' 30"**

AVERAGE DAILY DISCHARGE (CFS)

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0.0	0.0	0.0	43	32	41	50	23	6.0	2.3	1.2	0.83
2	0.0	0.0	0.0	93	30	142	39	21	6.0	2.1	1.2	0.91
3	0.0	0.0	0.0	145	29	256	32	20	5.7	2.1	1.2	1.1
4	0.0	0.0	0.0	188	27	532	104	19	5.7	2.1	1.1	1.9
5	0.0	0.0	0.0	543	75	338	47	16	5.4	1.9	1.1	4.5
6	0.0	0.0	0.0	291	72	174	63	16	5.1	1.9	1.1	3.1
7	0.0	0.0	0.0	117	496	121	69	15	4.8	1.9	1.0	2.7
8	0.0	0.0	0.0	76	637	96	50	14	4.5	1.9	0.91	2.5
9	0.0	0.0	0.0	404	947	150	37	13	4.2	1.9	0.91	2.3
10	0.0	0.0	0.0	271	573	108	31	13	4.2	1.9	0.91	2.1
11	0.0	0.0	0.0	130	285	86	28	12	4.2	1.7	0.91	2.1
12	0.0	0.0	0.0	92	605	73	25	12	3.9	1.7	0.0	1.9
13	0.0	0.0	0.0	211	400	61	22	11	3.9	1.7	0.91	1.9
14	0.0	0.0	0.0	982	250	55	20	11	3.9	1.5	0.91	1.7
15	0.0	0.0	0.0	549	183	48	149	11	3.6	1.5	0.91	1.7
16	0.0	0.0	0.0	1056	140	43	106	11	3.6	1.3	0.91	1.5
17	0.0	0.0	253	375	110	39	58	10	3.6	1.3	0.91	1.5
18	0.0	0.0	56	244	86	36	44	10	3.4	1.3	0.91	1.3
19	0.0	0.0	6.8	351	69	34	39	10	3.4	1.3	0.83	1.3
20	0.0	0.0	3.4	197	58	32	36	9.7	3.1	1.3	0.83	1.3
21	0.0	0.0	2.9	145	48	37	32	9.7	3.1	1.3	0.83	1.3
22	0.0	0.0	27	114	44	264	29	9.7	2.9	1.3	0.83	1.2
23	0.0	0.0	693	88	39	86	26	9.2	2.9	1.3	0.74	1.2
24	0.0	0.0	52	69	36	61	26	8.7	2.7	1.3	0.74	1.1
25	0.0	0.0	7.7	57	34	51	96	8.2	2.7	1.2	0.74	1.1
26	0.0	0.0	5.1	52	31	46	46	7.7	2.5	1.2	0.74	1.0
27	0.0	0.0	684	47	29	41	36	7.3	2.5	1.2	0.74	1.0
28	0.0	0.0	308	43	30	38	35	6.8	2.5	1.2	0.74	0.91
29	0.0	0.0	194	41	-----	38	26	6.8	2.5	1.2	0.74	0.91
30	0.0	0.0	90	38	-----	41	25	6.3	2.3	1.2	0.74	0.83
31	0.0	-----	55	36	-----	74	-----	6.0	-----	1.2	0.83	-----
TOTAL	0	0	2437.9	7088	5395	3242	1426	364.1	114.8	48.2	27.07	48.69
MEAN	0.00	0.00	78.64	228.65	192.68	104.58	47.53	11.75	3.83	1.55	0.87	1.62
MAX	0	0	693	1056	947	532	149	23	6	2.3	1.2	4.5
MIN	0	0	0	36	27	32	20	6	2.3	1.2	0	0.83
AC-FT	0.0	0.0	4835.5	14058.8	10700.8	6430.4	2828.4	722.2	227.7	95.6	53.7	96.6

TOTAL = 20192 CFS
40,050 AC-FT

MEAN = 55.32 N/A

MAX = 1056 CFS
MIN = 0 CFS

MAX Instantaneour Flow - 2302 CFS on DEC 23
2081 CFS on JAN 5
4550 CFS on JAN 16
2167 CFS on DEC 27
2647 CFS on JAN 14
2520 CFS on FEB 7

San Luis Obispo County
Flood Control and Water Conservation District

Upper San Simeon
Stream Gauge Station #14
Water Year OCT 1976 - SEP 1977

Latitude - 35° 36' 37'' **Longitude - 121° 04' 30''**

AVERAGE DAILY DISCHARGE (CFS)

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0.0	0.0	0.0	3.6	0.28	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	88	0.22	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	47	0.10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	8.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	0.0	0.0	0.0	7.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	0.0	0.0	0.0	47	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	0.0	0.0	0.0	37	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	0.0	0.0	0.0	16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	0.0	0.0	0.0	8.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	0.0	0.0	0.0	5.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	0.0	0.0	0.0	3.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	0.0	0.0	0.0	3.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	0.0	0.0	0.0	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	0.0	0.0	0.0	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	0.0	0.0	0.0	1.3	0.0	7.2	0.0	0.0	0.0	0.0	0.0	0.0
17	0.0	0.0	0.0	1.0	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0
18	0.0	0.0	0.0	0.91	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0
19	0.0	0.0	0.0	0.83	0.0	0.91	0.0	0.0	0.0	0.0	0.0	0.0
20	0.0	0.0	0.0	0.74	0.0	0.49	0.0	0.0	0.0	0.0	0.0	0.0
21	0.0	0.0	0.0	0.66	0.0	0.39	0.0	0.0	0.0	0.0	0.0	0.0
22	0.0	0.0	0.0	0.57	0.0	0.03	0.0	0.0	0.0	0.0	0.0	0.0
23	0.0	0.0	0.0	0.49	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	0.0	0.0	0.0	0.49	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	0.0	0.0	0.0	0.46	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	0.0	0.0	0.0	0.44	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	0.0	0.0	0.0	0.41	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28	0.0	0.0	0.0	0.39	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	0.0	0.0	0.0	0.36	-----	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	0.0	0.0	0.0	0.33	-----	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31	0.0	-----	16	0.31	-----	0.0	-----	0.0	-----	0.0	0.0	-----
TOTAL	0	0	16	291.29	0.6	12.72	0	0	0	0	0	0
MEAN	0.00	0.00	0.52	9.40	0.02	0.41	0.00	0.00	0.00	0.00	0.00	0.00
MAX	0	0	16	88	0.28	7.2	0	0	0	0	0	0
MIN	0	0	0	0.31	0	0	0	0	0	0	0	0
AC-FT	0.0	0.0	31.7	577.8	1.2	25.2	0.0	0.0	0.0	0.0	0.0	0.0

TOTAL = 320.61 CFS MEAN = 0.88 N/A MAX = 88 CFS
636 AC-FT MIN = 0 CFS

MAX Instantaneour Flow - 444 CFS on JAN 2 90 CFS on JAN 6

San Luis Obispo County
Flood Control and Water Conservation District

Upper San Simeon
Stream Gauge Station #14
Water Year OCT 1975 - SEP 1976

Latitude - 35° 36' 37'' **Longitude - 121° 04' 30''**

AVERAGE DAILY DISCHARGE (CFS)

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0.0	0.0	0.0	0.0	0.0	48	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	64	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	0.0	0.0	41	0.0	0.0	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0	0.0	12	0.10	0.0	0.0	0.0	0.0	0.0
5	0.0	0.0	0.0	0.0	0.0	6.0	0.66	0.0	0.0	0.0	0.0	0.0
6	0.0	0.0	0.0	0.0	0.0	3.6	0.49	0.0	0.0	0.0	0.0	0.0
7	0.0	0.0	0.0	0.0	0.0	2.7	0.41	0.0	0.0	0.0	0.0	0.0
8	0.0	0.0	0.0	0.0	3.2	2.3	0.36	0.0	0.0	0.0	0.0	0.0
9	0.0	0.0	0.0	0.0	1.0	1.9	0.23	0.0	0.0	0.0	0.0	0.0
10	0.0	0.0	0.0	0.0	1.5	1.5	0.21	0.0	0.0	0.0	0.0	0.0
11	0.36	0.0	0.0	0.0	0.33	1.3	0.26	0.0	0.0	0.0	0.0	0.0
12	0.0	0.0	0.0	0.0	0.01	1.3	0.23	0.0	0.0	0.0	0.0	0.0
13	0.0	0.0	0.0	0.0	0.0	1.2	0.26	0.0	0.0	0.0	0.0	0.0
14	0.0	0.0	0.0	0.0	0.0	1.1	0.26	0.0	0.0	0.0	0.0	0.0
15	0.0	0.0	0.0	0.0	0.0	1.0	0.23	0.0	0.0	0.0	0.0	0.0
16	0.0	0.0	0.0	0.0	0.0	1.0	0.22	0.0	0.0	0.0	0.0	0.0
17	0.0	0.0	0.0	0.0	0.0	0.91	0.20	0.0	0.0	0.0	0.0	0.0
18	0.0	0.0	0.0	0.0	0.0	0.83	0.12	0.0	0.0	0.0	0.0	0.0
19	0.0	0.0	0.0	0.0	0.0	0.83	0.01	0.0	0.0	0.0	0.0	0.0
20	0.0	0.0	0.0	0.0	0.0	0.74	0.0	0.0	0.0	0.0	0.0	0.0
21	0.0	0.0	0.0	0.0	0.0	0.74	0.0	0.0	0.0	0.0	0.0	0.0
22	0.0	0.0	0.0	0.0	0.0	0.66	0.0	0.0	0.0	0.0	0.0	0.0
23	0.0	0.0	0.0	0.0	0.0	0.66	0.0	0.0	0.0	0.0	0.0	0.0
24	0.0	0.0	0.0	0.0	0.0	0.57	0.0	0.0	0.0	0.0	0.0	0.0
25	0.0	0.0	0.0	0.0	0.0	0.46	0.0	0.0	0.0	0.0	0.0	0.0
26	0.0	0.0	0.0	0.0	0.0	0.33	0.0	0.0	0.0	0.0	0.0	0.0
27	0.0	0.0	0.0	0.0	0.0	0.16	0.0	0.0	0.0	0.0	0.0	0.0
28	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	0.0	0.0	0.0	0.0	31	0.0	0.0	0.0	0.0	0.0	0.0	1.4
30	0.0	0.0	0.0	0.0	-----	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31	0.0	-----	0.0	0.0	-----	0.0	-----	0.0	-----	0.0	0.0	-----
TOTAL	0.36	0	0	0	37.04	196.79	4.25	0	0	0	0	1.4
MEAN	0.01	0.00	0.00	0.00	1.28	6.35	0.14	0.00	0.00	0.00	0.00	0.05
MAX	0.36	0	0	0	31	64	0.66	0	0	0	0	1.4
MIN	0	0	0	0	0	0	0	0	0	0	0	0
AC-FT	0.7	0.0	0.0	0.0	73.5	390.3	8.4	0.0	0.0	0.0	0.0	2.8

TOTAL = 239.84 CFS
476 AC-FT

MEAN = 0.66 N/A

MAX = 64 CFS
MIN = 0 CFS

MAX Instantaneour Flow - 275 CFS on FEB 29 254 CFS on MAR 1
188 CFS on MAR 76

San Luis Obispo County
Flood Control and Water Conservation District

Upper San Simeon

Stream Gauge Station #14

Water Year OCT 1974 - SEP 1975

Latitude - 35° 36' 37" **Longitude - 121° 04' 30"**

AVERAGE DAILY DISCHARGE (CFS)

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0.0	0.0	0.0	5.7	146	14	20	9.7	3.4	1.0	0.0	0.0
2	0.0	0.0	0.0	5.1	555	13	17	9.2	3.4	0.91	0.0	0.0
3	0.0	0.0	175	4.2	122	12	16	8.7	3.1	0.91	0.0	0.0
4	0.0	0.0	106	3.9	188	12	16	8.2	3.1	0.83	0.0	0.0
5	0.0	0.0	11	3.4	74	16	56	8.2	3.1	0.74	0.0	0.0
6	0.0	0.0	4.5	3.4	30	51	31	7.7	2.9	0.66	0.0	0.0
7	0.0	0.0	2.9	3.4	19	423	23	7.7	2.9	0.57	0.0	0.0
8	0.0	0.0	2.1	4.5	154	243	20	7.7	2.7	0.46	0.0	0.0
9	0.0	0.0	1.7	3.6	412	100	16	7.7	2.7	0.41	0.0	0.0
10	0.0	0.0	1.3	2.9	309	138	14	7.3	2.5	0.36	0.0	0.0
11	0.0	0.0	1.2	2.7	140	84	14	6.8	2.5	0.31	0.0	0.0
12	0.0	0.0	1.2	2.5	84	48	12	6.3	2.5	0.28	0.0	0.0
13	0.0	0.0	1.1	2.3	194	72	12	6.3	2.3	0.33	0.0	0.0
14	0.0	0.0	1.0	2.1	121	64	11	6.0	2.3	0.39	0.0	0.0
15	0.0	0.0	1.0	1.9	76	38	11	5.7	2.3	0.44	0.0	0.0
16	0.0	0.0	1.0	1.9	59	91	15	5.7	2.3	0.44	0.0	0.0
17	0.0	0.0	0.91	1.9	47	42	11	5.4	2.3	0.39	0.0	0.0
18	0.0	0.0	0.91	1.7	41	31	11	5.4	2.3	0.36	0.0	0.0
19	0.0	0.0	0.91	1.7	36	24	9.7	5.4	2.1	0.28	0.0	0.0
20	0.0	0.0	0.83	1.5	32	20	9.2	5.1	2.1	0.23	0.0	0.0
21	0.0	0.0	0.83	1.5	27	100	8.7	4.8	1.9	0.17	0.0	0.0
22	0.0	0.0	0.91	1.5	24	267	8.2	4.5	1.9	0.12	0.0	0.0
23	0.0	0.0	1.0	1.5	23	82	7.7	4.2	1.9	0.03	0.0	0.0
24	0.0	0.0	1.0	1.5	21	57	19	4.2	1.7	0.0	0.0	0.0
25	0.0	0.0	1.0	1.5	19	69	34	3.9	1.5	0.0	0.0	0.0
26	0.0	0.0	1.0	1.5	18	46	16	3.9	1.5	0.0	0.0	0.0
27	0.0	0.0	2.6	1.5	16	36	12	3.9	1.3	0.0	0.0	0.0
28	0.0	0.0	110	1.5	16	30	11	3.6	1.3	0.0	0.0	0.0
29	0.0	0.0	37	1.5	-----	27	11	3.6	1.2	0.0	0.0	0.0
30	0.0	0.0	15	1.5	-----	23	9.7	3.6	1.1	0.0	0.0	0.0
31	0.0	-----	8.2	2.3	-----	21	-----	3.4	-----	0.0	0.0	-----
TOTAL	0	0	493.1	77.6	3003	2294	482.2	183.8	68.1	10.62	0	0
MEAN	0.00	0.00	15.91	2.50	107.25	74.00	16.07	5.93	2.27	0.34	0.00	0.00
MAX	0	0	175	5.7	555	423	56	9.7	3.4	1	0	0
MIN	0	0	0	1.5	16	12	7.7	3.4	1.1	0	0	0
AC-FT	0.0	0.0	978.0	153.9	5956.4	4550.1	956.4	364.6	135.1	21.1	0.0	0.0

TOTAL = 6612.4 CFS MEAN = 18.12 N/A MAX = 555 CFS

13,116 AC-FT MIN = 0 CFS

MAX Instantaneour Flow -					
795	CFS on	DEC 3	1934	CFS on	FEB 2
660	CFS on	FEB 8	705	CFS on	FEB 8
795	CFS on	FEB 10	407	CFS on	FEB 13
1222	CFS on	MAR 7	945	CFS on	MAR 22

San Luis Obispo County
Flood Control and Water Conservation District

Upper San Simeon
Stream Gauge Station #14
Water Year OCT 1973 - SEP 1974

Latitude - 35° 36' 37'' **Longitude - 121° 04' 30''**

AVERAGE DAILY DISCHARGE (CFS)

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0.0	0.0	340	35	9.9	1195	585	3.1	1.2	0.13	0.0	0.0
2	0.0	0.0	24	23	9.5	483	263	3.1	1.1	0.11	0.0	0.0
3	0.0	0.0	14	96	9.0	161	67	3.0	1.0	0.09	0.0	0.0
4	0.0	0.0	11	798	9.0	52	34	2.9	0.99	0.08	0.0	0.0
5	0.0	0.0	9.0	265	9.0	27	23	2.9	0.93	0.06	0.0	0.0
6	0.0	0.0	8.7	1124	8.7	19	16	2.7	0.87	0.04	0.0	0.0
7	0.0	0.0	8.1	1592	8.1	210	12	2.7	0.81	0.02	0.0	0.0
8	0.0	0.0	7.4	382	7.8	86	9.5	2.6	0.75	0.0	0.0	0.0
9	0.0	0.0	7.4	95	7.8	29	9.5	2.6	0.71	0.0	0.0	0.0
10	0.0	0.0	7.1	43	7.4	21	7.8	2.5	0.68	0.0	0.0	0.0
11	0.0	0.0	6.8	29	6.8	17	7.4	2.3	0.64	0.0	0.0	0.0
12	0.0	9.9	6.8	38	5.9	14	6.8	2.2	0.60	0.0	0.0	0.0
13	0.0	6.5	8.1	26	5.9	12	6.8	2.1	0.57	0.0	0.0	0.0
14	0.0	4.4	8.1	18	5.9	9.5	6.5	2.0	0.53	0.0	0.0	0.0
15	0.0	3.0	7.4	16	5.9	8.4	6.2	1.9	0.49	0.0	0.0	0.0
16	0.0	46	7.1	194	5.9	7.8	5.9	1.9	0.45	0.0	0.0	0.0
17	0.0	200	7.1	682	5.9	6.5	5.7	1.8	0.42	0.0	0.0	0.0
18	0.0	60	7.1	138	5.9	6.5	5.5	1.8	0.38	0.0	0.0	0.0
19	0.0	17	7.1	78	6.2	6.5	5.5	1.7	0.36	0.0	0.0	0.0
20	0.0	16	7.1	55	5.7	6.2	5.3	1.7	0.34	0.0	0.0	0.0
21	0.0	16	224	36	5.5	5.7	5.1	1.6	0.32	0.0	0.0	0.0
22	0.0	68	145	26	5.5	5.7	4.6	1.6	0.30	0.0	0.0	0.0
23	0.0	27	23	22	5.3	5.5	4.2	1.5	0.28	0.0	0.0	0.0
24	0.0	15	20	18	5.3	5.3	4.0	1.5	0.27	0.0	0.0	0.0
25	0.0	16	19	16	5.3	5.5	3.8	1.4	0.25	0.0	0.0	0.0
26	0.0	13	19	15	5.3	7.1	3.7	1.4	0.23	0.0	0.0	0.0
27	0.0	13	255	13	5.3	23	3.4	1.3	0.21	0.0	0.0	0.0
28	0.0	12	56	12	5.3	691	3.4	1.3	0.19	0.0	0.0	0.0
29	0.0	12	29	11	-----	49	3.3	1.2	0.17	0.0	0.0	0.0
30	0.0	12	24	11	-----	405	3.3	1.2	0.15	0.0	0.0	0.0
31	0.0	-----	31	10	-----	55	-----	1.2	-----	0.0	0.0	-----
TOTAL	0	566.8	1354.4	5917	189	3635.2	1127.2	62.7	16.19	0.53	0	0
MEAN	0.00	18.89	43.69	190.87	6.75	117.26	37.57	2.02	0.54	0.02	0.00	0.00
MAX	0	200	340	1592	9.9	1195	585	3.1	1.2	0.13	0	0
MIN	0	0	6.8	10	5.3	5.3	3.3	1.2	0.15	0	0	0
AC-FT	0.0	1124.2	2686.4	11736.2	374.9	7210.3	2235.8	124.4	32.1	1.1	0.0	0.0

TOTAL = 12869 CFS
25,525 AC-FT

MEAN = 35.26 N/A

MAX = 1592 CFS
MIN = 0 CFS

MAX Instantaneour Flow - 2110 CFS on JAN 6
2602 CFS on JAN 6
2595 CFS on JAN 7
2182 CFS on JAN 7

3414 CFS on MAR 1
3207 CFS on MAR 1
3071 CFS on MAR 28

San Luis Obispo County
Flood Control and Water Conservation District

Upper San Simeon
Stream Gauge Station #14
Water Year OCT 1972 - SEP 1973

Latitude - 35° 36' 37'' **Longitude - 121° 04' 30''**

AVERAGE DAILY DISCHARGE (CFS)

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0.0	0.0	9.0	9.0	26	170	23	7.0	8.6	7.6	0.0	0.0
2	0.0	0.0	9.0	9.0	20	98	22	8.8	8.6	7.4	0.0	0.0
3	0.0	0.0	9.8	9.0	18	82	20	8.8	8.6	7.4	0.0	0.0
4	0.0	0.55	24	8.8	16	82	19	8.8	8.6	7.4	0.0	0.0
5	0.0	0.01	12	8.8	20	61	17	8.8	8.4	7.4	0.0	0.0
6	0.0	0.0	12	8.6	641	205	17	8.8	8.4	7.4	0.0	0.0
7	0.0	0.0	17	8.6	555	69	16	8.8	8.4	7.2	0.0	0.0
8	0.0	0.0	18	20	118	127	15	8.6	8.4	7.2	0.0	0.0
9	0.0	0.0	13	375	69	64	15	8.6	8.4	7.2	0.0	0.0
10	0.0	0.0	12	95	416	49	14	8.6	8.4	7.2	0.0	0.0
11	0.0	44	11	35	728	157	13	8.6	8.2	7.0	0.0	0.0
12	0.0	12	11	26	566	64	18	8.6	8.2	7.0	0.0	0.0
13	0.0	81	11	22	340	52	12	8.4	8.2	7.0	0.0	0.0
14	0.0	832	10	19	218	43	12	8.4	8.2	7.0	0.0	0.0
15	0.0	667	9.8	17	105	35	12	8.4	8.2	7.0	0.0	0.0
16	0.0	391	9.8	918	265	31	11	8.4	8.2	7.0	0.0	0.0
17	13	179	9.8	121	189	28	11	8.4	8.2	7.0	0.0	0.0
18	2.5	49	9.4	1437	49	26	11	8.4	8.2	7.0	0.0	0.0
19	0.0	31	9.4	121	41	95	11	8.4	8.2	7.0	0.0	0.0
20	0.0	22	9.4	49	33	234	10	8.4	8.0	7.0	0.0	0.0
21	0.0	19	9.0	32	30	244	10	8.2	8.0	7.0	0.0	0.0
22	0.0	16	9.8	23	28	103	9.8	8.2	8.0	7.0	0.0	0.0
23	0.0	15	9.4	19	26	69	9.8	8.2	7.8	6.8	0.0	0.0
24	0.0	13	9.0	16	46	53	9.4	8.8	7.8	0.0	0.0	0.0
25	0.0	12	9.0	15	30	45	9.4	8.8	7.8	0.0	0.0	0.0
26	0.0	12	9.0	13	290	39	9.4	8.8	7.8	0.0	0.0	0.0
27	0.0	11	9.0	13	933	35	9.4	8.8	7.6	0.0	0.0	0.0
28	0.0	11	9.0	12	536	31	9.0	8.8	7.6	0.0	0.0	0.0
29	0.0	9.8	9.0	54	-----	28	9.0	8.8	7.6	0.0	0.0	0.0
30	0.0	9.4	9.0	163	-----	26	9.0	8.8	7.6	0.0	0.0	0.0
31	0.0	-----	9.4	41	-----	25	-----	8.8	-----	0.0	0.0	-----
TOTAL	15.5	2436.8	337	3717.8	6352	2470	393.2	265	244.2	164.2	0	0
MEAN	0.50	81.23	10.87	119.93	226.86	79.68	13.11	8.55	8.14	5.30	0.00	0.00
MAX	13	832	24	1437	933	244	23	8.8	8.6	7.6	0	0
MIN	0	0	9	8.6	16	25	9	7	7.6	0	0	0
AC-FT	30.7	4833.2	668.4	7374.1	12599.0	4899.2	779.9	525.6	484.4	325.7	0.0	0.0

TOTAL = 16396 CFS MEAN = 44.92 N/A MAX = 1437 CFS
32,520 AC-FT MIN = 0 CFS

MAX Instantaneour Flow - 3644 CFS on JAN 16 1720 CFS on FEB 12
4600 CFS on JAN 18 2346 CFS on FEB 27
2086 CFS on NOV 14 1076 CFS on JAN 30 1225 CFS on MAR 6
2190 CFS on NOV 15 1206 CFS on FEB 6 1225 CFS on MAR 19
960 CFS on JAN 9 2269 CFS on FEB 11 1225 CFS on MAR 21

San Luis Obispo County
Flood Control and Water Conservation District

Upper San Simeon
Stream Gauge Station #14
Water Year OCT 1971 - SEP 1972

Latitude - 35° 36' 37'' **Longitude - 121° 04' 30''**

AVERAGE DAILY DISCHARGE (CFS)

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0.0	0.0	0.0	20	12	12	8.2	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	18	12	12	8.2	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	16	12	12	7.9	0.0	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	16	12	12	7.9	0.0	0.0	0.0	0.0	0.0
5	0.0	0.0	0.0	15	185	12	7.6	0.0	0.0	0.0	0.0	0.0
6	0.0	0.0	0.0	14	75	11	7.6	0.0	0.0	0.0	0.0	0.0
7	0.0	0.0	0.0	14	33	11	7.0	0.0	0.0	0.0	0.0	0.0
8	0.0	0.0	0.0	13	25	11	7.0	0.0	0.0	0.0	0.0	0.0
9	0.0	0.0	0.0	13	22	11	7.0	0.0	0.0	0.0	0.0	0.0
10	0.0	0.0	0.0	13	19	11	6.2	0.0	0.0	0.0	0.0	0.0
11	0.0	0.0	0.0	12	17	11	8.4	0.0	0.0	0.0	0.0	0.0
12	0.0	0.0	0.0	12	16	11	8.9	0.0	0.0	0.0	0.0	0.0
13	0.0	0.0	0.0	12	16	12	9.1	0.0	0.0	0.0	0.0	0.0
14	0.0	0.0	0.0	12	15	9.6	8.6	0.0	0.0	0.0	0.0	0.0
15	0.0	0.0	0.0	12	15	9.3	8.2	0.0	0.0	0.0	0.0	0.0
16	0.0	0.0	0.0	12	16	9.3	7.9	0.0	0.0	0.0	0.0	0.0
17	0.0	0.0	0.0	12	16	9.3	7.6	0.0	0.0	0.0	0.0	0.0
18	0.0	0.0	0.0	12	14	9.3	7.3	0.0	0.0	0.0	0.0	0.0
19	0.0	0.0	0.0	11	14	9.1	7.0	0.0	0.0	0.0	0.0	0.0
20	0.0	0.0	0.0	11	13	9.1	6.4	0.0	0.0	0.0	0.0	0.0
21	0.0	0.0	0.0	11	13	8.9	6.2	0.0	0.0	0.0	0.0	0.0
22	0.0	0.0	114	11	13	8.9	5.8	0.0	0.0	0.0	0.0	0.0
23	0.0	0.0	158	11	13	8.9	3.1	0.0	0.0	0.0	0.0	0.0
24	0.0	0.0	249	11	13	8.9	3.4	0.0	0.0	0.0	0.0	0.0
25	0.0	0.0	394	12	13	8.9	2.8	0.0	0.0	0.0	0.0	0.0
26	0.0	0.0	272	12	12	8.9	0.0	0.0	0.0	0.0	0.0	0.0
27	0.0	0.0	432	12	12	8.6	0.0	0.0	0.0	0.0	0.0	0.0
28	0.0	0.0	139	15	12	8.6	0.0	0.0	0.0	0.0	0.0	0.0
29	0.0	0.0	45	14	12	8.6	0.0	0.0	0.0	0.0	0.0	0.0
30	0.0	0.0	30	13	-----	8.6	0.0	0.0	0.0	0.0	0.0	0.0
31	0.0	-----	24	13	-----	8.6	-----	0.0	-----	0.0	0.0	-----
TOTAL	0	0	1855.6	404.7	671.6	310.4	175.3	0	0	0	0	0
MEAN	0.00	0.00	59.86	13.05	23.16	10.01	5.84	0.00	0.00	0.00	0.00	0.00
MAX	0	0	432	20.4	185	12	9.1	0	0	0	0	0
MIN	0	0	0	11	12	8.6	0	0	0	0	0	0
AC-FT	0.0	0.0	3680.5	802.7	1332.1	615.7	347.7	0.0	0.0	0.0	0.0	0.0

TOTAL = 3417.6 CFS MEAN = 9.34 N/A MAX = 432 CFS
6,779 AC-FT MIN = 0 CFS

MAX Instantaneour Flow - 1370 CFS on DEC 25 1000 CFS on DEC 26

San Luis Obispo County
Flood Control and Water Conservation District

Upper San Simeon
Stream Gauge Station #14
Water Year OCT 1970 - SEP 1971

Latitude - 35° 36' 37" **Longitude - 121° 04' 30"**

AVERAGE DAILY DISCHARGE (CFS)

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0.0	0.0	726	24	15	11	11	9.1	7.3	0.0	0.0	0.0
2	0.0	0.0	485	22	15	11	11	9.6	7.3	0.0	0.0	0.0
3	0.0	0.0	129	20	15	12	11	9.3	7.0	0.0	0.0	0.0
4	0.0	0.0	61	19	14	12	11	8.9	7.0	0.0	0.0	0.0
5	0.0	0.0	46	19	14	11	10	8.9	7.0	0.0	0.0	0.0
6	0.0	0.0	38	18	14	11	10	8.9	6.8	0.0	0.0	0.0
7	0.0	0.0	33	17	14	11	10	8.9	6.8	0.0	0.0	0.0
8	0.0	0.0	54	16	14	11	10	8.9	6.8	0.0	0.0	0.0
9	0.0	0.0	38	16	13	11	9.9	8.6	6.6	0.0	0.0	0.0
10	0.0	0.0	30	16	13	11	9.9	8.6	6.6	0.0	0.0	0.0
11	0.0	0.0	28	71	13	11	9.6	8.4	6.6	0.0	0.0	0.0
12	0.0	0.0	26	108	13	21	9.6	8.4	6.6	0.0	0.0	0.0
13	0.0	0.0	24	76	13	24	9.6	8.4	6.6	0.0	0.0	0.0
14	0.0	0.0	24	51	13	12	15	8.4	6.4	0.0	0.0	0.0
15	0.0	0.0	22	38	13	12	11	8.2	6.2	0.0	0.0	0.0
16	0.0	0.0	93	33	12	11	10	7.9	6.0	0.0	0.0	0.0
17	0.0	0.0	63	30	13	11	11	7.6	5.8	0.0	0.0	0.0
18	0.0	0.0	495	27	12	11	10	7.6	5.8	0.0	0.0	0.0
19	0.0	0.0	298	25	12	11	9.9	7.6	5.4	0.0	0.0	0.0
20	0.0	0.0	286	24	12	11	9.6	7.6	5.2	0.0	0.0	0.0
21	0.0	0.0	655	22	12	11	9.6	7.6	5.0	0.0	0.0	0.0
22	0.0	0.0	157	20	12	11	9.3	7.3	4.6	0.0	0.0	0.0
23	0.0	0.0	75	20	12	11	9.3	7.3	4.6	0.0	0.0	0.0
24	0.0	6.0	56	19	12	11	9.3	7.3	3.8	0.0	0.0	0.0
25	0.0	42	45	19	12	11	9.3	7.3	3.6	0.0	0.0	0.0
26	0.0	65	41	17	11	62	9.1	7.0	0.90	0.0	0.0	0.0
27	0.0	14	38	17	11	28	9.1	7.0	0.20	0.0	0.0	0.0
28	0.0	648	34	16	11	15	9.1	8.6	0.20	0.0	0.0	0.0
29	0.0	710	30	16	-----	13	9.1	8.2	0.10	0.0	0.0	0.0
30	0.0	188	27	16	-----	12	9.1	7.6	0.10	0.0	0.0	0.0
31	0.0	-----	25	16	-----	12	-----	7.6	-----	0.0	0.0	-----
TOTAL	0	1673.1	4180.7	867.3	361.4	445.9	301.4	252.6	152.9	0	0	0
MEAN	0.00	55.77	134.86	27.98	12.91	14.38	10.05	8.15	5.10	0.00	0.00	0.00
MAX	0	710	726	108	15.2	62	15	9.6	7.3	0	0	0
MIN	0	0	22.3	15.6	11	11	9.1	7	0.1	0	0	0
AC-FT	0.0	3318.5	8292.3	1720.3	716.8	884.4	597.8	501.0	303.3	0.0	0.0	0.0

TOTAL = 8235.3 CFS
16,334 AC-FT

MEAN = 22.56 N/A

MAX = 726 CFS
MIN = 0 CFS

MAX Instantaneour Flow - 1900 CFS on NOV 28
1837 CFS on DEC 1
2346 CFS on DEC 21
2230 CFS on NOV 29
1303 CFS on DEC 18

Stream Gauge Station Information

Station Name -	Lower San Simeon
Station Number -	22
USGS Number -	11142300
USGS Start -	1987
USGS End -	1989
Latitude -	35° 35' 59"
Longitude -	121° 06' 47"
Drainage Area -	26.30
Location Description -	Near Cambria, California.
Remarks -	

What year(s) did USGS have control of this gage.

Location Format Example -
For: 120° 20' 05"
Type: 1202005

San Luis Obispo County
Flood Control and Water Conservation District

Lower San Simeon
Stream Gauge Station #22
Water Year OCT 2002 - SEP 2003
Latitude - 35° 35' 59" **Longitude - 121° 06' 47"**

AVERAGE DAILY DISCHARGE (CFS)

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0.0	0.0	23	212	50	**	**	**	**	**	**	**
2	0.0	0.0	16	108	49	**	**	**	**	**	**	**
3	0.0	0.0	11	75	49	**	**	**	**	**	**	**
4	0.0	0.0	11	59	48	**	**	**	**	**	**	**
5	0.0	0.0	4.0	50	47	**	**	**	**	**	**	**
6	0.0	0.0	2.3	47	46	**	**	**	**	**	**	**
7	0.0	0.0	0.38	77	44	**	**	**	**	**	**	**
8	0.0	0.0	0.17	329	43	**	**	**	**	**	**	**
9	0.0	0.0	0.04	175	42	**	**	**	**	**	**	**
10	0.0	0.0	0.01	114	42	**	**	**	**	**	**	**
11	0.0	0.0	0.02	102	42	**	**	**	**	**	**	**
12	0.0	0.0	0.03	71	42	**	**	**	**	**	**	**
13	0.0	0.0	0.05	58	43	**	**	**	**	**	**	**
14	0.0	0.0	0.03	48	47	**	**	**	**	**	**	**
15	0.0	0.0	0.02	43	49	**	**	**	**	**	**	**
16	0.0	572	0.01	40	51	**	**	**	**	**	**	**
17	0.0	269	0.0	40	50	**	**	**	**	**	**	**
18	0.0	60	0.0	37	50	**	**	**	**	**	**	**
19	0.0	40	0.0	30	49	**	**	**	**	**	**	**
20	0.0	36	0.0	371	49	**	**	**	**	**	**	**
21	0.0	32	0.0	160	48	**	**	**	**	**	**	**
22	0.0	31	0.0	106	49	**	**	**	**	**	**	**
23	0.0	30	0.0	93	52	**	**	**	**	**	**	**
24	0.0	29	0.0	87	54	**	**	**	**	**	**	**
25	0.0	31	7.6	69	57	**	**	**	**	**	**	**
26	0.0	28	490	57	60	**	**	**	**	**	**	**
27	0.0	26	512	56	62	**	**	**	**	**	**	**
28	0.0	28	139	57	**	**	**	**	**	**	**	**
29	0.0	30	76	55	------	**	**	**	**	**	**	**
30	0.0	26	249	54	------	**	**	**	**	**	**	**
31	0.0	------	205	52	------	**	------	**	------	**	**	------
TOTAL	0	1268	1746.7	2932	1314	**	**	**	**	**	**	**
MEAN	0.00	42.27	56.34	94.58	48.67	**	**	**	**	**	**	**
MAX	0	572	512	371	62	**	**	**	**	**	**	**
MIN	0	0	0	30	42	**	**	**	**	**	**	**
AC-FT	0.0	2515.0	3464.4	5815.5	2606.3	**	**	**	**	**	**	**

TOTAL** = 7260.7 CFS MEAN** = 48.40 N/A MAX = 572 CFS
14,401 AC-FT MIN = 0 CFS

MAX Instantaneour Flow - 2540 CFS on NOV 16 4900 CFS on DEC 26

MIN Instantaneous Flow - 2040 CFS on JAN 20

** INCOMPLETE RECORD, MISSING DATA FOR THIS DAY

San Luis Obispo County
Flood Control and Water Conservation District

Lower San Simeon
Stream Gauge Station #22
Water Year OCT 2001 - SEP 2002
Latitude - 35° 35' 59'' **Longitude - 121° 06' 47''**

AVERAGE DAILY DISCHARGE (CFS)

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0.0	0.0	155	507	0.32	0.76	14	8.8	0.22	0.0	0.0	0.0
2	0.0	0.0	30	588	0.34	0.66	14	8.5	0.0	0.0	0.0	0.0
3	0.0	0.0	21	143	0.27	0.84	13	7.4	0.0	0.0	0.0	0.0
4	0.0	0.0	18	98	0.24	1.2	11	6.5	0.0	0.0	0.0	0.0
5	0.0	0.0	15	71	0.18	1.8	11	5.6	0.0	0.0	0.0	0.0
6	0.0	0.0	14	53	0.14	12	9.3	4.3	0.0	0.0	0.0	0.0
7	0.0	0.0	13	45	0.34	62	7.9	5.5	0.0	0.0	0.0	0.0
8	0.0	0.0	12	31	0.27	23	6.2	5.8	0.0	0.0	0.0	0.0
9	0.0	0.0	11	23	0.26	15	6.6	6.1	0.0	0.0	0.0	0.0
10	0.0	0.0	10	20	0.23	11	7.3	6.0	0.0	0.0	0.0	0.0
11	0.0	0.0	10	17	0.24	10	8.0	5.4	0.0	0.0	0.0	0.0
12	0.0	0.0	32	16	0.24	11	8.0	5.6	0.0	0.0	0.0	0.0
13	0.0	93	15	14	0.24	11	8.3	5.6	0.0	0.0	0.0	0.0
14	0.0	0.04	13	12	0.25	11	8.3	5.7	0.0	0.0	0.0	0.0
15	0.0	0.0	13	11	0.75	11	8.5	5.4	0.0	0.0	0.0	0.0
16	0.0	0.0	15	8.3	6.5	12	8.4	4.4	0.0	0.0	0.0	0.0
17	0.0	0.0	13	7.3	1.2	12	8.4	3.2	0.0	0.0	0.0	0.0
18	0.0	0.0	16	7.1	0.75	15	8.5	1.6	0.0	0.0	0.0	0.0
19	0.0	0.0	130	6.9	0.77	25	8.2	0.70	0.0	0.0	0.0	0.0
20	0.0	0.0	68	5.8	1.0	16	7.5	2.1	0.0	0.0	0.0	0.0
21	0.0	0.0	76	4.8	0.95	14	6.4	6.9	0.0	0.0	0.0	0.0
22	0.0	0.0	51	4.1	0.77	12	5.3	6.3	0.0	0.0	0.0	0.0
23	0.0	0.0	37	1.6	0.81	11	5.2	6.4	0.0	0.0	0.0	0.0
24	0.0	0.02	30	0.90	1.0	31	5.8	6.5	0.0	0.0	0.0	0.0
25	0.0	111	28	0.80	1.6	21	6.5	5.8	0.0	0.0	0.0	0.0
26	0.0	8.1	24	0.57	0.78	14	7.5	4.8	0.0	0.0	0.0	0.0
27	0.0	3.9	25	0.87	0.79	13	8.6	4.0	0.0	0.0	0.0	0.0
28	0.0	94	102	0.70	1.1	12	8.9	2.5	0.0	0.0	0.0	0.0
29	0.0	24	160	0.53	------	13	8.6	1.5	0.0	0.0	0.0	0.0
30	0.0	236	160	0.37	------	13	9.0	1.2	0.0	0.0	0.0	0.0
31	0.0	------	89	0.33	------	13	------	0.54	------	0.0	0.0	------
TOTAL	0	570.06	1406	1700	22.33	429.26	254.2	150.64	0.22	0	0	0
MEAN	0.00	19.00	45.35	54.84	0.80	13.85	8.47	4.86	0.01	0.00	0.00	0.00
MAX	0	236	160	588	6.5	62	14	8.8	0.22	0	0	0
MIN	0	0	10	0.33	0.14	0.66	5.2	0.54	0	0	0	0
AC-FT	0.0	1130.7	2788.8	3371.8	44.3	851.4	504.2	298.8	0.4	0.0	0.0	0.0

TOTAL = 4532.7 CFS MEAN = 12.42 N/A MAX = 588 CFS
8,990 AC-FT MIN = 0 CFS

MAX Instantaneour Flow - 3000 CFS on JAN 2

San Luis Obispo County
Flood Control and Water Conservation District

Lower San Simeon
Stream Gauge Station #22
Water Year OCT 2000 - SEP 2001
Latitude - 35° 35' 59'' **Longitude - 121° 06' 47''**

AVERAGE DAILY DISCHARGE (CFS)

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0.0	0.0	0.0	0.0	9.2	29	11	6.3	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	8.1	26	11	5.4	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	0.0	6.9	23	10	3.4	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0	6.2	616	9.6	1.2	0.0	0.0	0.0	0.0
5	0.0	0.0	0.0	0.0	6.4	299	9.3	0.67	0.0	0.0	0.0	0.0
6	0.0	0.0	0.0	0.0	5.8	321	10	0.43	0.0	0.0	0.0	0.0
7	0.0	0.0	0.0	0.0	5.3	154	44	0.34	0.0	0.0	0.0	0.0
8	0.0	0.0	0.0	0.0	4.0	96	16	0.29	0.0	0.0	0.0	0.0
9	0.0	0.0	0.0	0.0	12	74	12	0.24	0.0	0.0	0.0	0.0
10	0.0	0.0	0.0	0.0	47	58	11	0.20	0.0	0.0	0.0	0.0
11	0.0	0.0	0.0	193	318	47	10	0.15	0.0	0.0	0.0	0.0
12	0.0	0.0	0.0	109	99	41	9.9	0.10	0.0	0.0	0.0	0.0
13	0.0	0.0	0.0	25	86	35	9.7	0.08	0.0	0.0	0.0	0.0
14	0.0	0.0	0.0	12	60	31	9.3	0.02	0.0	0.0	0.0	0.0
15	0.0	0.0	0.0	4.9	49	29	9.7	0.0	0.0	0.0	0.0	0.0
16	0.0	0.0	0.0	1.5	43	27	9.5	0.0	0.0	0.0	0.0	0.0
17	0.0	0.0	0.0	0.92	40	24	8.8	0.0	0.0	0.0	0.0	0.0
18	0.0	0.0	0.0	0.96	47	23	8.2	0.0	0.0	0.0	0.0	0.0
19	0.0	0.0	0.0	1.1	262	21	9.0	0.0	0.0	0.0	0.0	0.0
20	0.0	0.0	0.0	1.3	122	19	9.4	0.0	0.0	0.0	0.0	0.0
21	0.0	0.0	0.0	1.5	79	17	17	0.0	0.0	0.0	0.0	0.0
22	0.0	0.0	0.0	2.2	75	16	11	0.0	0.0	0.0	0.0	0.0
23	0.0	0.0	0.0	116	83	15	9.4	0.0	0.0	0.0	0.0	0.0
24	0.0	0.0	0.0	43	687	14	8.6	0.0	0.0	0.0	0.0	0.0
25	0.0	0.0	0.0	118	398	14	8.1	0.0	0.0	0.0	0.0	0.0
26	0.0	0.0	0.0	45	139	13	7.5	0.0	0.0	0.0	0.0	0.0
27	0.0	0.0	0.0	29	71	12	7.5	0.0	0.0	0.0	0.0	0.0
28	0.0	0.0	0.0	21	42	12	7.6	0.0	0.0	0.0	0.0	0.0
29	0.0	0.0	0.0	15	------	12	7.3	0.0	0.0	0.0	0.0	0.0
30	0.0	0.0	0.0	13	------	11	6.8	0.0	0.0	0.0	0.0	0.0
31	0.0	------	0.0	11	------	11	------	0.0	------	0.0	0.0	------
TOTAL	0	0	0	764.38	2810.9	2140	328.2	18.82	0	0	0	0
MEAN	0.00	0.00	0.00	24.66	100.39	69.03	10.94	0.61	0.00	0.00	0.00	0.00
MAX	0	0	0	193	687	616	44	6.3	0	0	0	0
MIN	0	0	0	0	4	11	6.8	0	0	0	0	0
AC-FT	0.0	0.0	0.0	1516.1	5575.3	4244.6	651.0	37.3	0.0	0.0	0.0	0.0

TOTAL = 6062.3 CFS
12,024 AC-FT

MEAN = 16.61 N/A

MAX = 687 CFS
MIN = 0 CFS

MAX Instantaneour Flow - 582 CFS on JAN 11
2180 CFS on FEB 24
2600 CFS on MAR 4

San Luis Obispo County
Flood Control and Water Conservation District

Lower San Simeon
Stream Gauge Station #22
Water Year OCT 1999 - SEP 2000

Latitude - 35° 35' 59" **Longitude - 121° 06' 47"**

AVERAGE DAILY DISCHARGE (CFS)

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0.0	0.0	0.0	0.0	**	108	6.8	6.6	0.65	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	**	94	5.9	6.2	0.43	0.0	0.0	0.0
3	0.0	0.0	0.0	0.0	**	85	5.5	6.1	0.51	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0	**	77	5.2	5.9	0.46	0.0	0.0	0.0
5	0.0	0.0	0.0	0.0	**	111	4.2	5.4	0.45	0.0	0.0	0.0
6	0.0	0.0	0.0	0.0	**	83	3.2	5.2	0.39	0.0	0.0	0.0
7	0.0	0.0	0.0	0.0	77	80	3.0	5.8	0.38	0.0	0.0	0.0
8	0.0	0.0	0.0	0.0	66	246	2.3	6.3	0.45	0.0	0.0	0.0
9	0.0	0.0	0.0	0.0	62	151	1.7	6.6	0.50	0.0	0.0	0.0
10	0.0	0.0	0.0	0.0	486	109	1.8	6.3	0.48	0.0	0.0	0.0
11	0.0	0.0	0.0	0.0	568	87	1.2	6.1	0.47	0.0	0.0	0.0
12	0.0	0.0	0.0	0.0	627	81	0.70	6.0	0.48	0.0	0.0	0.0
13	0.0	0.0	0.0	0.0	2590	69	5.3	5.6	0.54	0.0	0.0	0.0
14	0.0	0.0	0.0	0.0	1220	62	8.0	5.3	0.48	0.0	0.0	0.0
15	0.0	0.0	0.0	0.0	302	57	7.4	6.3	0.22	0.0	0.0	0.0
16	0.0	0.0	0.0	0.0	322	48	6.8	5.4	0.15	0.0	0.0	0.0
17	0.0	0.0	0.0	0.0	168	47	90	4.5	0.19	0.0	0.0	0.0
18	0.0	0.0	0.0	138	113	53	33	3.1	0.21	0.0	0.0	0.0
19	0.0	0.0	0.0	44	89	52	18	2.3	0.16	0.0	0.0	0.0
20	0.0	0.0	0.0	46	174	50	15	1.8	0.02	0.0	0.0	0.0
21	0.0	0.0	0.0	36	324	42	13	1.6	0.0	0.0	0.0	0.0
22	0.0	0.0	0.0	16	166	48	11	1.2		0.0	0.0	0.0
23	0.0	0.0	0.0	408	487	30	12	1.0	0.0	0.0	0.0	0.0
24	0.0	0.0	0.0	282	160	18	10	1.3	0.0	0.0	0.0	0.0
25	0.0	0.0	0.0	**	116	18	9.9	2.3	0.0	0.0	0.0	0.0
26	0.0	0.0	0.0	**	93	16	10	2.2	0.0	0.0	0.0	0.0
27	0.0	0.0	0.0	**	416	14	9.1	2.0	0.0	0.0	0.0	0.0
28	0.0	0.0	0.0	**	146	12	8.5	2.1	0.0	0.0	0.0	0.0
29	0.0	0.0	0.0	**	135	10	7.6	1.7	0.0	0.0	0.0	0.0
30	0.0	0.0	0.0	**	------	9.2	7.2	0.96	0.0	0.0	0.0	0.0
31	0.0	------	0.0	**	------	7.9	------	1.0	------	0.0	0.0	------
TOTAL	0	0	0	970	8907	1975.1	323.3	124.16	7.62	0	0	0
MEAN	0.00	0.00	0.00	40.42	387.26	63.71	10.78	4.01	0.26	0.00	0.00	0.00
MAX	0	0	0	408	2590	246	90	6.6	0.65	0	0	0
MIN	0	0	0	0	62	7.9	0.7	0.96	0	0	0	0
AC-FT	0.0	0.0	0.0	1924.0	17666.8	3917.6	641.3	246.3	15.1	0.0	0.0	0.0

TOTAL** = 12307 CFS MEAN** = 34.96 N/A MAX = 2590 CFS
24,411 AC-FT MIN = 0 CFS

MAX Instantaneour Flow -				
1270 CFS on	JAN 23		5490 CFS on	FEB 13
594 CFS on	FEB 21		863 CFS on	MAR 8
1120 CFS on	FEB 10		1220 CFS on	FEB 23
1760 CFS on	FEB 23		230 CFS on	APR 17

** INCOMPLETE RECORD, MISSING DATA FOR THIS DAY

San Luis Obispo County
Flood Control and Water Conservation District

Lower San Simeon
Stream Gauge Station #22
Water Year OCT 1998 - SEP 1999
Latitude - 35° 35' 59" **Longitude - 121° 06' 47"**

AVERAGE DAILY DISCHARGE (CFS)

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0.0	0.0	11	0.0	45	13	23	13	2.4	0.01	0.0	0.0
2	0.0	0.0	0.79	0.0	29	12	19	13	3.2	0.0	0.0	0.0
3	0.0	0.0	0.26	0.0	24	13	17	12	4.3	0.0	0.0	0.0
4	0.0	0.0	0.28	0.0	18	12	16	12	3.5	0.0	0.0	0.0
5	0.0	0.0	0.21	0.0	15	12	24	11	4.0		0.0	0.0
6	0.0	0.0	5.5	0.0	12	13	38	11	5.0	0.0	0.0	0.0
7	0.0	0.0	0.90	0.0	497	12	22	8.5	4.4	0.0	0.0	0.0
8	0.0	0.0	0.40	0.0	335	12	23	7.5	2.6	0.0	0.0	0.0
9	0.0	0.0	0.36	0.0	600	36	20	7.3	1.9	0.0	0.0	0.0
10	0.0	0.0	0.33	0.0	158	24	18	7.6	1.6	0.0	0.0	0.0
11	0.0	0.0	0.31	0.0	93	27	286	7.3	1.4	0.0	0.0	0.0
12	0.0	0.0	0.29	0.0	67	22	90	6.8	1.1	0.0	0.0	0.0
13	0.0	0.0	0.27	0.0	51	20	55	6.3	0.95	0.0	0.0	0.0
14	0.0	0.0	0.25	0.0	40	20	46	5.8	0.76	0.0	0.0	0.0
15	0.0	0.0	0.25	0.0	31	60	35	5.5	0.68	0.0	0.0	0.0
16	0.0	0.0	0.24	0.0	26	44	30	4.6	0.75	0.0	0.0	0.0
17	0.0	0.0	0.25	0.0	23	34	28	3.5	0.83	0.0	0.0	0.0
18	0.0	0.0	0.26	0.0	19	28	24	2.9	0.86	0.0	0.0	0.0
19	0.0	0.0	0.26	50	18	157	23	2.5	1.1	0.0	0.0	0.0
20	0.0	0.0	0.26	705	17	178	21	2.8	1.3	0.0	0.0	0.0
21	0.0	0.0	0.26	85	18	292	19	2.9	1.9	0.0	0.0	0.0
22	0.0	0.0	0.29	37	16	105	16	3.9	1.1	0.0	0.0	0.0
23	0.0	0.0	0.29	79	16	150	15	4.0	0.62	0.0	0.0	0.0
24	0.0	0.0	0.27	59	16	80	15	4.9	0.50	0.0	0.0	0.0
25	0.0	0.0	0.26	35	20	436	16	5.8	0.48	0.0	0.0	0.0
26	0.0	0.0	0.27	70	17	104	16	5.5	0.37	0.0	0.0	0.0
27	0.0	0.0	0.26	53	16	65	17	5.0	0.34	0.0	0.0	0.0
28	0.0	0.0	0.23	32	14	47	16	4.5	0.30	0.0	0.0	0.0
29	0.0	0.0	0.08	25	------	40	17	4.0	0.14	0.0	0.0	0.0
30	0.0	4.5	0.03	20	------	33	14	2.4	0.08	0.0	0.0	0.0
31	0.0	----	0.0	128	------	31	------	2.3	------	0.0	0.0	------
TOTAL	0	4.5	24.91	1378	2251	2132	1019	196.1	48.46	0.01	0	0
MEAN	0.00	0.15	0.80	44.45	80.39	68.77	33.97	6.33	1.62	0.00	0.00	0.00
MAX	0	4.5	11	705	600	436	286	13	5	0.01	0	0
MIN	0	0	0	0	12	12	14	2.3	0.08	0	0	0
AC-FT	0.0	8.9	49.4	2733.2	4464.8	4228.8	2021.2	389.0	96.1	0.0	0.0	0.0

TOTAL = 7054 CFS
13,991 AC-FT

MEAN = 19.38 N/A

MAX = 705 CFS
MIN = 0 CFS

MAX Instantaneour Flow - 2920 CFS on JAN 20
1140 CFS on FEB 7
1200 CFS on FEB 9
609 CFS on MAR 21
1510 CFS on MAR 25
853 CFS on APR 11

San Luis Obispo County
Flood Control and Water Conservation District

Lower San Simeon
Stream Gauge Station #22
Water Year OCT 1997 - SEP 1998

Latitude - 35° 35' 59'' **Longitude - 121° 06' 47''**

AVERAGE DAILY DISCHARGE (CFS)

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	**	**	**	7.4	996	87	109	37	5.3	2.9	0.24	0.0
2	**	**	**	49	932	73	110	39	5.5	2.7	0.20	0.0
3	**	**	**	34	1150	66	111	36	4.2	2.7	0.16	0.0
4	**	**	**	64	389	59	113	38	1.4	2.4	0.0	0.0
5	**	**	**	40	177	63	99	215	1.2	2.8	0.0	0.0
6	**	**	**	27	524	78	78	63	1.1	2.6	0.0	0.0
7	**	**	**	23	1090	55	64	43	0.96	3.5	0.0	0.0
8	**	**	**	21	626	47	60	37	1.1	2.8	0.0	0.0
9	**	**	**	148	415	45	59	33	1.4	2.4	0.0	0.0
10	**	**	**	205	265	44	57	29	1.8	2.5	0.0	0.0
11	**	**	**	84	209	42	54	26	2.4	2.4	0.0	0.0
12	**	**	**	367	172	40	52	23	1.8	2.8	0.0	0.0
13	**	**	**	163	150	39	50	21	2.2	2.8	0.0	0.0
14	**	**	**	107	749	35	49	18	3.9	3.6	0.0	0.0
15	**	**	**	1000	290	32	47	16	5.1	3.0	0.0	0.0
16	**	**	**	263	777	31	45	14	6.0	1.6	0.0	0.0
17	**	**	**	135	440	29	43	12	5.3	1.0	0.0	0.0
18	**	**	**	101	222	27	41	10	5.2	0.84	0.0	0.0
19	**	**	**	**	565	26	40	7.8	5.7	0.51	0.0	0.0
20	**	**	**	**	238	25	39	6.2	6.0	0.43	0.0	0.0
21	**	**	**	**	552	25	37	4.1	5.5	0.37	0.0	0.0
22	**	**	15	**	395	24	35	2.1	5.2	0.56	0.0	0.0
23	**	**	12	**	355	24	34	1.4	4.6	0.63	0.0	0.0
24	**	**	11	**	222	148	35	1.2	4.8	0.47	0.0	0.0
25	**	**	9.9	**	162	52	35	1.0	3.7	0.52	0.0	0.0
26	**	**	9.1	**	129	68	36	0.92	2.5	0.39	0.0	0.0
27	**	**	8.3	**	108	74	36	0.80	2.2	0.46	0.0	0.0
28	**	**	7.9	**	97	545	37	2.4	2.4	0.34	0.0	0.0
29	**	**	7.8	**	------	45	37	4.5	2.2	0.31	0.0	0.0
30	**	**	7.6	**	------	49	37	5.0	2.6	0.31	0.0	0.0
31	**	-------	7.4	**	------	78	------	5.0	------	0.27	0.0	------
TOTAL	**	**	96	2838.4	12396	2075	1679	752.42	103.26	50.91	0.6	0
MEAN	**	**	9.60	157.69	442.71	66.94	55.97	24.27	3.44	1.64	0.02	0.00
MAX	**	**	15	1000	1150	545	113	215	6	3.6	0.24	0
MIN	**	**	7.4	7.4	97	24	34	0.8	0.96	0.27	0	0
AC-FT	**	**	190.4	5629.9	24587.1	4115.7	3330.2	1492.4	204.8	101.0	1.2	0.0

TOTAL** = 19992 CFS MEAN** = 74.04 N/A MAX = 1150 CFS
39,653 AC-FT MIN = 0 CFS

MAX Instantaneour Flow -	1090	CFS on JAN 12	4660	CFS on	FEB 3
	4400	CFS on FEB 16	979	CFS on	MAR 24
	3290	CFS on JAN 15	4150	CFS on	FEB 7
	2860	CFS on FEB 19	1050	CFS on	MAR 28

** INCOMPLETE RECORD, MISSING DATA FOR THIS DAY

San Luis Obispo County
Flood Control and Water Conservation District

Lower San Simeon
Stream Gauge Station #22
Water Year OCT 1996 - SEP 1997

Latitude - 35° 35' 59" **Longitude - 121° 06' 47"**

AVERAGE DAILY DISCHARGE (CFS)

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0.0	0.0	25	**	28	**	**	0.78	0.0	0.0	0.0	0.0
2	0.0	0.0	23	**	24	**	**	0.74	0.0	0.0	0.0	0.0
3	0.0	0.0	22	**	**	**	**	0.68	0.0	0.0	0.0	0.0
4	0.0	0.0	21	**	**	**	**	0.34	0.0	0.0	0.0	0.0
5	0.0	0.0	45	**	**	**	**	0.25	0.0	0.0	0.0	0.0
6	0.0	0.0	35	**	**	**	**		0.0	0.0	0.0	0.0
7	0.0	0.0	26	**	**	**	**	0.0	0.0	0.0	0.0	0.0
8	0.0	0.0	26	**	**	**	**	0.0	0.0	0.0	0.0	0.0
9	0.0	0.0	593	**	**	**	**	0.0	0.0	0.0	0.0	0.0
10	0.0	0.0	1020	**	**	**	**	0.0	0.0	0.0	0.0	0.0
11	0.0	0.0	874	**	**	**	**	0.0	0.0	0.0	0.0	0.0
12	0.0	0.0	609	**	**	**	**	0.0	0.0	0.0	0.0	0.0
13	0.0	0.0	213	83	**	**	**	0.0	0.0	0.0	0.0	0.0
14	0.0	0.0	145	83	**	**	**	0.0	0.0	0.0	0.0	0.0
15	0.0	0.0	114	278	**	**	5.0	0.0	0.0	0.0	0.0	0.0
16	0.0	0.36	100	126	**	**	3.2	0.0	0.0	0.0	0.0	0.0
17	0.0	1200	103	115	**	**	2.1	0.0	0.0	0.0	0.0	0.0
18	0.0	161	93	104	**	**	2.1	0.0	0.0	0.0	0.0	0.0
19	0.0	81	82	93	**	**	4.5	0.0	0.0	0.0	0.0	0.0
20	0.0	129	**	131	**	**	4.7	0.0	0.0	0.0	0.0	0.0
21	0.0	400	**	476	**	**	3.0	0.0	0.0	0.0	0.0	0.0
22	0.0	232	**	485	**	**	3.7	0.0	0.0	0.0	0.0	0.0
23	0.0	109	**	401	**	**	2.7	0.0	0.0	0.0	0.0	0.0
24	0.0	81	**	121	**	**	1.6	0.0	0.0	0.0	0.0	0.0
25	0.0	62	**	965	**	**	2.0	0.0	0.0	0.0	0.0	0.0
26	0.0	50	**	617	**	**	0.71	0.0	0.0	0.0	0.0	0.0
27	0.0	43	**	227	**	**	0.87	0.0	0.0	0.0	0.0	0.0
28	0.0	41	**	95	**	**	1.4	0.0	0.0	0.0	0.0	0.0
29	**	39	**	59	------	**	1.8	0.0	0.0	0.0	0.0	0.0
30	**	38	**	43	------	**	1.3	0.0	0.0	0.0	0.0	0.0
31	**	------	**	36	------	**	------	0.0	------	0.0	0.0	------

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
TOTAL	0	2666.4	4169	4538	52	**	40.68	2.79	0	0	0	0
MEAN	0.00	88.88	219.42	238.84	26.00	**	2.54	0.09	0.00	0.00	0.00	0.00
MAX	0	1200	1020	965	28	**	5	0.78	0	0	0	0
MIN	0	0	21	36	24	**	0.71	0	0	0	0	0
AC-FT	0.0	5288.6	8269.1	9001.0	103.1	**	80.7	5.5	0.0	0.0	0.0	0.0

TOTAL** = 11469 CFS MEAN** = 43.12 N/A MAX = 1200 CFS
22,748 AC-FT MIN = 0 CFS

MAX Instantaneour Flow - 2140 CFS on NOV 17 2560 CFS on DEC 10
965 CFS on JAN 25 1080 CFS on NOV 21
1950 CFS on DEC 11 1720 CFS on DEC 9
1110 CFS on DEC 12

** INCOMPLETE RECORD, MISSING DATA FOR THIS DAY

San Luis Obispo County
Flood Control and Water Conservation District

Lower San Simeon
Stream Gauge Station #22
Water Year OCT 1995 - SEP 1996

Latitude - 35° 35' 59" **Longitude - 121° 06' 47"**

AVERAGE DAILY DISCHARGE (CFS)

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0.0	0.0	0.0	0.0	214	220	46	**	1.4	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	105	118	44	**	1.0	0.0	0.0	0.0
3	0.0	0.0	0.0	0.0	158	91	40	**	0.76	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0	916	298	39	**	0.74	0.0	0.0	0.0
5	0.0	0.0	0.0	0.0	1030	297	39	**	0.39	0.0	0.0	0.0
6	0.0	0.0	0.0	0.0	163	127	37	**	0.41	0.0	0.0	0.0
7	0.0	0.0	0.0	0.0	119	**	36	4.8	0.50	0.0	0.0	0.0
8	0.0	0.0	0.0	0.0	95	**	37	5.6	0.63	0.0	0.0	0.0
9	0.0	0.0	0.0	0.0	77	**	37	5.0	0.41	0.0	0.0	0.0
10	0.0	0.0	0.0	0.0	63	**	36	4.7	0.19	0.0	0.0	0.0
11	0.0	0.0	0.0	0.0	53	**	35	4.9	0.12	0.0	0.0	0.0
12	0.0	0.0	0.23	0.0	46	**	34	5.0	0.28	0.0	0.0	0.0
13	0.0	0.0	0.0	0.0	39	**	34	4.7	0.34	0.0	0.0	0.0
14	0.0	0.0	0.0	0.0	33	**	33	5.0	0.37	0.0	0.0	0.0
15	0.0	0.0	0.0	0.0	28	**	33	5.3	0.27	0.0	0.0	0.0
16	0.0	0.0	0.0	132	28	**	49	8.8	0.23	0.0	0.0	0.0
17	0.0	0.0	0.0	30	25	**	49	6.5	0.25	0.0	0.0	0.0
18	0.0	0.0	0.0	43	21	**	62	5.7	0.21	0.0	0.0	0.0
19	0.0	0.0	0.0	132	1190	**	46	5.3	0.11	0.0	0.0	0.0
20	0.0	0.0	0.0	54	862	46	42	4.6	0.03	0.0	0.0	0.0
21	0.0	0.0	0.0	33	460	45	40	4.4	0.01	0.0	0.0	0.0
22	0.0	0.0	0.0	23	265	44	38	5.0	0.0	0.0	0.0	0.0
23	0.0	0.0	0.0	13	160	43	38	5.1	0.0	0.0	0.0	0.0
24	0.0	0.0	0.0	9.2	120	42	38	4.8	0.0	0.0	0.0	0.0
25	0.0	0.0	0.0	474	90	41	**	3.8		0.0	0.0	0.0
26	0.0	0.0	0.0	50	72	40	**	3.3	0.0	0.0	0.0	0.0
27	0.0	0.0	0.0	266	106	39	**	3.3	0.0	0.0	0.0	0.0
28	0.0	0.0	0.0	128	115	40	**	3.1	0.0	0.0	0.0	0.0
29	0.0	0.0	0.0	70	427	39	**	2.4	0.0	0.0	0.0	0.0
30	0.0	0.0	0.0	58	------	39	**	2.2	0.0	0.0	0.0	0.0
31	0.0	------	0.0	1210	------	39	------	1.6	------	0.0	0.0	------
TOTAL	0	0	0.23	2725.2	7080	1648	962	114.9	8.65	0	0	0
MEAN	0.00	0.00	0.01	87.91	244.14	91.56	40.08	4.60	0.30	0.00	0.00	0.00
MAX	0	0	0.23	1210	1190	298	62	8.8	1.4	0	0	0
MIN	0	0	0	0	21	39	33	1.6	0	0	0	0
AC-FT	0.0	0.0	0.5	5405.4	14043.0	3268.8	1908.1	227.9	17.2	0.0	0.0	0.0

TOTAL** = 12539 CFS   MEAN** = 36.88 N/A   MAX = 1210 CFS
24,871 AC-FT   MIN = 0 CFS

MAX Instantaneour Flow - 2440 CFS on JAN 25   2240 CFS on FEB 5
1120 CFS on JAN 16   1230 CFS on JAN 27   3310 CFS on FEB 19
433 CFS on JAN 18   1210 CFS on JAN 31   1830 CFS on FEB 20
376 CFS on JAN 19   4780 CFS on FEB 4   1070 CFS on FEB 21

** INCOMPLETE RECORD, MISSING DATA FOR THIS DAY

San Luis Obispo County
Flood Control and Water Conservation District

Lower San Simeon
Stream Gauge Station #22
Water Year OCT 1994 - SEP 1995

Latitude - 35° 35' 59" **Longitude - 121° 06' 47"**

AVERAGE DAILY DISCHARGE (CFS)

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0.0	0.0	0.0	0.0	61	31	60	33	5.2	2.1	0.0	0.0
2	0.0	0.0	0.0	0.0	53	74	55	32	5.1	1.4	0.0	0.0
3	0.0	0.0	0.0	0.0	48	335	51	22	5.2	1.1	0.0	0.0
4	0.0	0.0	0.0	355	45	242	49	18	3.6	2.0	0.0	0.0
5	0.0	0.0	0.0	267	41	549	46	17	4.1	1.3	0.0	0.0
6	0.0	0.0	0.0	49	37	193	45	16	3.4	0.88	0.0	0.0
7	0.0	0.0	0.0	212	57	126	42	15	3.2	0.69	0.0	0.0
8	0.0	0.0	0.0	194	129	107	39	13	3.1	0.72	0.0	0.0
9	0.0	0.0	0.0	135	84	1050	37	13	3.3	0.54	0.0	0.0
10	0.0	0.0	0.0	915	61	4270	36	12	4.2	0.32	0.0	0.0
11	0.0	0.0	0.0	443	54	704	33	12	4.5	0.31	0.0	0.0
12	0.0	0.0	0.0	408	49	294	31	11	2.5	0.28	0.0	0.0
13	0.0	0.0	0.0	279	402	172	29	13	3.5	0.30	0.0	0.0
14	0.0	0.0	0.0	886	451	142	28	11	2.5	0.23	0.0	0.0
15	0.0	0.0	0.0	629	116	123	26	11	4.6	0.09	0.0	0.0
16	0.0	0.0	0.0	220	93	104	26	11	7.0	0.0	0.0	0.0
17	0.0	0.0	0.0	136	81	90	24	9.6	6.5	0.0	0.0	0.0
18	0.0	0.0	0.0	97	68	78	23	9.2	5.6	0.0	0.0	0.0
19	0.0	0.0	0.0	71	60	72	21	9.0	6.0	0.0	0.0	0.0
20	0.0	0.0	0.0	71	52	124	21	8.9	5.9	0.0	0.0	0.0
21	0.0	0.0	0.0	82	48	140	19	8.7	4.9	0.0	0.0	0.0
22	0.0	0.0	0.0	81	44	708	18	8.2	4.4	0.0	0.0	0.0
23	0.0	0.0	0.0	254	42	381	16	8.3	4.0	0.0	0.0	0.0
24	0.0	0.0	0.0	1220	41	179	15	8.2	2.7	0.0	0.0	0.0
25	0.0	0.0	0.0	372	39	131	14	7.6	3.5	0.0	0.0	0.0
26	0.0	0.0	0.0	168	37	107	14	7.4	3.6	0.0	0.0	0.0
27	0.0	0.0	0.0	165	35	96	13	7.0	4.5	0.0	0.0	0.0
28	0.0	0.0	0.0	151	33	87	15	6.0	4.8	0.0	0.0	0.0
29	0.0	0.0	0.0	118	------	80	41	5.5	4.8	0.0	0.0	0.0
30	0.0	0.0	0.0	92	------	72	49	4.8	3.6	0.0	0.0	0.0
31	0.0	------	0.0	71	------	65	------	4.1	------	0.0	0.0	------
TOTAL	0	0	0	8141	2361	10926	936	372.5	129.8	12.26	0	0
MEAN	0.00	0.00	0.00	262.61	84.32	352.45	31.20	12.02	4.33	0.40	0.00	0.00
MAX	0	0	0	1220	451	4270	60	33	7	2.1	0	0
MIN	0	0	0	0	33	31	13	4.1	2.5	0	0	0
AC-FT	0.0	0.0	0.0	16147.4	4683.0	21671.4	1856.5	738.8	257.5	24.3	0.0	0.0

TOTAL = 22879 CFS
45,379 AC-FT

MEAN = 62.68 N/A

MAX = 4270 CFS
MIN = 0 CFS

MAX Instantaneour Flow -				
1080 CFS on	JAN 4		965 CFS on	JAN 7
1770 CFS on	JAN 10		1040 CFS on	JAN 11
2090 CFS on	JAN 14		1420 CFS on	JAN 15
2750 CFS on	JAN 24		3730 CFS on	FEB 13
3060 CFS on	FEB 14		870 CFS on	MAR 3

San Luis Obispo County
Flood Control and Water Conservation District

Lower San Simeon
Stream Gauge Station #22
Water Year OCT 1993 - SEP 1994

Latitude - 35° 35' 59" **Longitude - 121° 06' 47"**

AVERAGE DAILY DISCHARGE (CFS)

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0.0	0.0	0.0	0.0	3.4	12	0.89	0.50	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	2.4	11	0.77	0.45	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	0.0	1.9	9.7	0.71	0.41	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0	2.5	8.9	0.74	0.41	0.0	0.0	0.0	0.0
5	0.0	0.0	0.0	0.0	2.6	8.5	0.61	0.40	0.0	0.0	0.0	0.0
6	0.0	0.0	0.0	0.0	2.2	8.9	0.62	0.38	0.0	0.0	0.0	0.0
7	0.0	0.0	0.0	0.0	103	8.2	0.54	0.78	0.0	0.0	0.0	0.0
8	0.0	0.0	0.0	0.0	112	7.7	0.61	2.1	0.0	0.0	0.0	0.0
9	0.0	0.0	0.0	0.0	45	7.5	5.3	0.83	0.0	0.0	0.0	0.0
10	0.0	0.0	0.0	0.0	34	7.0	2.8	0.55	0.0	0.0	0.0	0.0
11	0.0	0.0	0.0	0.0	28	6.5	1.1	0.44	0.0	0.0	0.0	0.0
12	0.0	0.0	0.0	0.0	25	6.0	0.67	0.41	0.0	0.0	0.0	0.0
13	0.0	0.0	0.0	0.0	23	5.6	0.55	0.40	0.0	0.0	0.0	0.0
14	0.0	0.0	0.0	0.0	23	5.4	0.50	0.38	0.0	0.0	0.0	0.0
15	0.0	0.0	0.0	0.0	22	5.1	0.45	0.36	0.0	0.0	0.0	0.0
16	0.0	0.0	0.0	0.0	22	5.2	0.42	0.33	0.0	0.0	0.0	0.0
17	0.0	0.0	0.0	0.0	241	5.3	0.40	0.34	0.0	0.0	0.0	0.0
18	0.0	0.0	0.0	0.0	106	4.8	0.39	0.41	0.0	0.0	0.0	0.0
19	0.0	0.0	0.0	0.0	336	3.5	0.38	0.41	0.0	0.0	0.0	0.0
20	0.0	0.0	0.0	0.0	271	2.1	0.37	0.42	0.0	0.0	0.0	0.0
21	0.0	0.0	0.0	0.0	81	1.8	0.37	0.41	0.0	0.0	0.0	0.0
22	0.0	0.0	0.0	0.02	49	2.2	0.36	0.36	0.0	0.0	0.0	0.0
23	0.0	0.0	0.0	8.7	34	1.6	0.35	0.33	0.0	0.0	0.0	0.0
24	0.0	0.0	0.0	85	26	4.2	0.38	0.32	0.0	0.0	0.0	0.0
25	0.0	0.0	0.0	56	20	8.3	7.3	0.28	0.0	0.0	0.0	0.0
26	0.0	0.0	0.0	34	17	4.3	5.1	0.24	0.0	0.0	0.0	0.0
27	0.0	0.0	0.0	16	15	2.5	1.8	0.15	0.0	0.0	0.0	0.0
28	0.0	0.0	0.0	10	13	2.1	0.90	0.04	0.0	0.0	0.0	0.0
29	0.0	0.0	0.0	7.5	------	1.6	0.66	0.0	0.0	0.0	0.0	0.0
30	0.0	0.0	0.0	6.2	------	1.5	0.58	0.0	0.0	0.0	0.0	0.0
31	0.0	------	0.0	5.4	------	1.2	------	0.0	------	0.0	0.0	------
TOTAL	0	0	0	228.82	1661	170.2	36.62	12.84	0	0	0	0
MEAN	0.00	0.00	0.00	7.38	59.32	5.49	1.22	0.41	0.00	0.00	0.00	0.00
MAX	0	0	0	85	336	12	7.3	2.1	0	0	0	0
MIN	0	0	0	0	1.9	1.2	0.35	0	0	0	0	0
AC-FT	0.0	0.0	0.0	453.9	3294.5	337.6	72.6	25.5	0.0	0.0	0.0	0.0

TOTAL = 2109.5 CFS
4,184 AC-FT

MEAN = 5.78 N/A

MAX = 336 CFS
MIN = 0 CFS

MAX Instantaneour Flow - 35 CFS on JAN 23; 297 CFS on JAN 24
89 CFS on JAN 25; 312 CFS on FEB 7
883 CFS on FEB 17; 1860 CFS on FEB 19

San Luis Obispo County
Flood Control and Water Conservation District

Lower San Simeon
Stream Gauge Station #22
Water Year OCT 1992 - SEP 1993

Latitude - 35° 35' 59'' **Longitude - 121° 06' 47''**

AVERAGE DAILY DISCHARGE (CFS)

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0.0	0.0	0.0	148	40	75	50	10	1.2	0.0	0.0	0.0
2	0.0	0.0	0.0	124	38	76	44	10	0.71	0.0	0.0	0.0
3	0.0	0.0	0.0	76	37	67	41	10	0.81	0.0	0.0	0.0
4	0.0	0.0	0.0	62	35	59	37	12	1.9	0.0	0.0	0.0
5	0.0	0.0	0.0	56	35	52	33	9.0	6.1	0.0	0.0	0.0
6	0.0	0.0	4.5	394	32	47	32	6.0	2.8	0.0	0.0	0.0
7	0.0	0.0	32	649	31	44	29	6.1	1.8	0.0	0.0	0.0
8	0.0	0.0	33	261	192	40	26	5.7	1.3	0.0	0.0	0.0
9	0.0	0.0	47	188	294	38	24	5.1	1.1	0.0	0.0	0.0
10	0.0	0.0	44	702	133	36	21	4.4	0.64	0.0	0.0	0.0
11	0.0	0.0	333	153	106	34	21	5.2	0.46	0.0	0.0	0.0
12	0.0	0.0	77	311	82	32	19	4.2	0.50	0.0	0.0	0.0
13	0.0	0.0	49	1480	66	29	16	2.9	0.51	0.0	0.0	0.0
14	0.0	0.0	40	784	58	26	14	2.2	0.30	0.0	0.0	0.0
15	0.0	0.0	33	1120	52	24	14	1.4	0.18	0.0	0.0	0.0
16	0.0	0.0	28	517	48	24	14	0.93	0.22	0.0	0.0	0.0
17	0.0	0.0	35	830	55	27	20	1.1	0.18	0.0	0.0	0.0
18	0.0	0.0	41	455	166	25	22	1.2	0.08	0.0	0.0	0.0
19	0.0	0.0	28	228	175	22	15	1.1	0.10	0.0	0.0	0.0
20	0.0	0.0	24	279	194	22	14	1.3	0.10	0.0	0.0	0.0
21	0.0	0.0	20	411	142	21	13	1.4	0.09	0.0	0.0	0.0
22	0.0	0.0	18	410	664	18	12	1.4	0.09	0.0	0.0	0.0
23	0.0	0.0	16	174	1070	15	12	1.3	0.04	0.0	0.0	0.0
24	0.0	0.0	16	117	247	19	11	2.8	0.01	0.0	0.0	0.0
25	0.0	0.0	13	93	192	218	11	6.6	0.0	0.0	0.0	0.0
26	0.0	0.0	12	78	362	317	11	4.8	0.0	0.0	0.0	0.0
27	0.0	0.0	11	66	139	208	9.3	4.6	0.0	0.0	0.0	0.0
28	0.0	0.0	304	59	95	257	9.4	3.6	0.0	0.0	0.0	0.0
29	37	0.0	257	52	------	96	10	2.3	0.0	0.0	0.0	0.0
30	51	0.0	90	48	------	67	11	2.0	0.0	0.0	0.0	0.0
31	0.0	------	57	43	------	55	------	1.4	------	0.0	0.0	------
TOTAL	88	0	1662.5	10368	4780	2090	615.7	132.03	21.22	0	0	0
MEAN	2.84	0.00	53.63	334.45	170.71	67.42	20.52	4.26	0.71	0.00	0.00	0.00
MAX	51	0	333	1480	1070	317	50	12	6.1	0	0	0
MIN	0	0	0	43	31	15	9.3	0.93	0	0	0	0
AC-FT	174.5	0.0	3297.5	20564.6	9481.0	4145.5	1221.2	261.9	42.1	0.0	0.0	0.0

TOTAL = 19757 CFS MEAN = 54.13 N/A MAX = 1480 CFS
39,188 AC-FT MIN = 0 CFS

MAX Instantaneour Flow -	1300	CFS on DEC 11	1970	CFS on	JAN 7
	2850	CFS on JAN 14	1610	CFS on	JAN 17
	1970	CFS on DEC 28	2470	CFS on	JAN 10
	2040	CFS on JAN 15	5800	CFS on	FEB 22
	1980	CFS on JAN 6	5590	CFS on	JAN 13

San Luis Obispo County
Flood Control and Water Conservation District

Lower San Simeon
Stream Gauge Station #22
Water Year OCT 1991 - SEP 1992

Latitude - 35° 35' 59'' **Longitude - 121° 06' 47''**

AVERAGE DAILY DISCHARGE (CFS)

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0.0	0.0	0.0	0.0	1.7	32	27	1.7	0.06	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	2.0	33	24	1.5	0.06	0.0	0.0	0.0
3	0.0	0.0	0.0	0.0	2.5	36	22	1.9	0.02	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0	2.9	31	19	1.7	0.0	0.0	0.0	0.0
5	0.0	0.0	0.0	223	3.8	194	17	7.7	0.0	0.0	0.0	0.0
6	0.0	0.0	0.0	49	8.9	373	15	1.2	0.0	0.0	0.0	0.0
7	0.0	0.0	0.0	48	12	125	13	1.1	0.0	0.0	0.0	0.0
8	0.0	0.0	0.0	33	15	88	12	1.1	0.0	0.0	0.0	0.0
9	0.0	0.0	0.0	16	36	75	12	1.1	0.0	0.0	0.0	0.0
10	0.0	0.0	0.0	10	262	57	10	0.98	0.0	0.0	0.0	0.0
11	0.0	0.0	0.0	5.5	192	47	9.6	0.78	0.0	0.0	0.0	0.0
12	0.0	0.0	0.0	3.1	683	41	13	0.82	0.0	0.0	0.0	0.0
13	0.0	0.05	0.0	2.8	567	36	11	0.82	0.0	0.0	0.0	0.0
14	0.0	0.49	0.0	2.1	203	37	8.8	0.69	0.0	0.0	0.0	0.0
15	0.0	0.0	0.0	1.6	610	33	7.9	0.65	0.0	0.0	0.0	0.0
16	0.0	0.0	0.0	1.5	365	23	6.9	0.55	0.0	0.0	0.0	0.0
17	0.0	40	0.0	1.4	194	19	6.5	0.57	0.0	0.0	0.0	0.0
18	0.0	0.0	0.0	1.3	107	18	5.5	0.64	0.0	0.0	0.0	0.0
19	0.0	0.0	0.0	0.99	82	17	4.7	0.56	0.0	0.0	0.0	0.0
20	0.0	0.0	0.0	0.89	326	25	4.5	0.54	0.0	0.0	0.0	0.0
21	0.0	0.0	0.0	0.90	103	35	4.1	0.27	0.0	0.0	0.0	0.0
22	0.0	0.0	0.0	0.86	75	93	3.7	0.11	0.0	0.0	0.0	0.0
23	0.0	0.0	0.0	0.83	61	86	3.1	0.01	0.0	0.0	0.0	0.0
24	0.0	0.0	0.0	0.80	46	61	2.9	0.0	0.0	0.0	0.0	0.0
25	0.0	0.0	0.0	0.71	35	51	2.2	0.0	0.0	0.0	0.0	0.0
26	0.0	0.0	0.0	0.67	31	46	1.8	0.01	0.0	0.0	0.0	0.0
27	0.0	0.0	0.0	0.48	23	42	1.8	0.04	0.0	0.0	0.0	0.0
28	0.0	0.0	0.0	0.38	19	38	1.8	0.20	0.0	0.0	0.0	0.0
29	0.0	0.0	181	0.31	19	36	1.7	0.32	0.0	0.0	0.0	0.0
30	0.0	0.0	64	0.32	------	34	1.8	0.33	0.0	0.0	0.0	0.0
31	0.0	------	1.8	0.94	------	31	------	0.07	------	0.0	0.0	------
TOTAL	0	40.54	246.8	407.38	4087.8	1893	274.3	27.96	0.14	0	0	0
MEAN	0.00	1.35	7.96	13.14	140.96	61.06	9.14	0.90	0.00	0.00	0.00	0.00
MAX	0	40	181	223	683	373	27	7.7	0.06	0	0	0
MIN	0	0	0	0	1.7	17	1.7	0	0	0	0	0
AC-FT	0.0	80.4	489.5	808.0	8108.0	3754.7	544.1	55.5	0.3	0.0	0.0	0.0

TOTAL = 6977.9 CFS
13,841 AC-FT

MEAN = 19.07 N/A

MAX = 683 CFS
MIN = 0 CFS

MAX Instantaneour Flow -
783 CFS on JAN 5
1300 CFS on FEB 14
2360 CFS on MAR 5
2020 CFS on FEB 12
1610 CFS on FEB 15
1230 CFS on FEB 13
752 CFS on FEB 20

San Luis Obispo County
Flood Control and Water Conservation District

Lower San Simeon
Stream Gauge Station #22
Water Year OCT 1990 - SEP 1991

Latitude - 35° 35' 59" **Longitude - 121° 06' 47"**

AVERAGE DAILY DISCHARGE (CFS)

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0.0	0.0	0.0	0.0	0.0	**	**	2.0	0.69	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	**	**	3.7	0.56	0.0	0.0	0.0
3	0.0	0.0	0.0	0.0	0.0	**	**	4.7	0.17	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0	0.0	**	**	5.1	0.38	0.0	0.0	0.0
5	0.0	0.0	0.0	0.0	0.0	**	**	4.9	0.09	0.0	0.0	0.0
6	0.0	0.0	0.0	0.0	0.0	**	**	2.4	0.06	0.0	0.0	0.0
7	0.0	0.0	0.0	0.0	0.0	26	**	2.0	0.03	0.0	0.0	0.0
8	0.0	0.0	0.0	0.0	0.0	18	**	1.6	0.0	0.0	0.0	0.0
9	0.0	0.0	0.0	0.0	0.0	14	**	2.4	0.0	0.0	0.0	0.0
10	0.0	0.0	0.0	0.0	0.0	14	**	2.6	0.0	0.0	0.0	0.0
11	0.0	0.0	0.0	0.0	0.0	17	**	1.4	0.0	0.0	0.0	0.0
12	0.0	0.0	0.0	0.0	0.0	13	**	2.0	0.0	0.0	0.0	0.0
13	0.0	0.0	0.0	0.0	0.0	24	**	1.9	0.0	0.0	0.0	0.0
14	0.0	0.0	0.0	0.0	0.0	18	**	1.4	0.0	0.0	0.0	0.0
15	0.0	0.0	0.0	0.0	0.0	15	**	1.7	0.0	0.0	0.0	0.0
16	0.0	0.0	0.0	0.0	0.0	13	**	1.3	0.0	0.0	0.0	0.0
17	0.0	0.0	0.0	0.0	0.0	83	**	0.98	0.0	0.0	0.0	0.0
18	0.0	0.0	0.0	0.0	0.0	636	**	0.42	0.0	0.0	0.0	0.0
19	0.0	0.0	0.0	0.0	0.0	468	**	0.46	0.0	0.0	0.0	0.0
20	0.0	0.0	0.0	0.0	0.0	725	**	0.44	0.0	0.0	0.0	0.0
21	0.0	0.0	0.0	0.0	0.0	152	**	0.25	0.0	0.0	0.0	0.0
22	0.0	0.0	0.0	0.0	0.0	98	**	0.35	0.0	0.0	0.0	0.0
23	0.0	0.0	0.0	0.0	0.0	65	**	0.48	0.0	0.0	0.0	0.0
24	0.0	0.0	0.0	0.0	0.0	359	**	0.41	0.0	0.0	0.0	0.0
25	0.0	0.0	0.0	0.0	0.0	336	**	0.33	0.0	0.0	0.0	0.0
26	0.0	0.0	0.0	0.0	0.0	325	**	0.29	0.0	0.0	0.0	0.0
27	0.0	0.0	0.0	0.0	0.0	167	**	0.14	0.0	0.0	0.0	0.0
28	0.0	0.0	0.0	0.0	**	100	**	0.07	0.0	0.0	0.0	0.0
29	0.0	0.0	0.0	0.0	------	65	**	0.43	0.0	0.0	0.0	0.0
30	0.0	0.0	0.0	0.0	------	51	**	1.5	0.0	0.0	0.0	0.0
31	0.0	------	0.0	0.0	------	40	------	0.77	------	0.0	0.0	------
TOTAL	0	0	0	0	0	3842	**	48.42	1.98	0	0	0
MEAN	0.00	0.00	0.00	0.00	0.00	153.68	**	1.56	0.07	0.00	0.00	0.00
MAX	0	0	0	0	0	725	**	5.1	0.69	0	0	0
MIN	0	0	0	0	0	13	**	0.07	0	0	0	0
AC-FT	0.0	0.0	0.0	0.0	0.0	7620.5	**	96.0	3.9	0.0	0.0	0.0

TOTAL** = 3892.4 CFS MEAN** = 11.87 N/A MAX = 725 CFS
7,720 AC-FT MIN = 0 CFS

MAX Instantaneour Flow - 3360 CFS on MAR 18 2690 CFS on MAR 20
1590 CFS on MAR 24

** INCOMPLETE RECORD, MISSING DATA FOR THIS DAY

San Luis Obispo County
Flood Control and Water Conservation District

Lower San Simeon
Stream Gauge Station #22
Water Year OCT 1989 - SEP 1990

Latitude - 35° 35' 59" **Longitude - 121° 06' 47"**

AVERAGE DAILY DISCHARGE (CFS)

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0.0	0.0	0.0	0.0	1.5	4.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	1.4	3.7	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	0.0	1.2	4.4	0.0	0.0	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0	19	4.0	0.0	0.0	0.0	0.0	0.0	0.0
5	0.0	0.0	0.0	0.0	6.3	3.9	0.0	0.0	0.0	0.0	0.0	0.0
6	0.0	0.0	0.0	0.0	4.2	3.1	0.0	0.0	0.0	0.0	0.0	0.0
7	0.0	0.0	0.0	0.0	3.4	2.9	0.0	0.0	0.0	0.0	0.0	0.0
8	0.0	0.0	0.0	0.0	3.1	2.6	0.0	0.0	0.0	0.0	0.0	0.0
9	0.0	0.0	0.0	0.0	2.4	2.4	0.0	0.0	0.0	0.0	0.0	0.0
10	0.0	0.0	0.0	0.0	2.2	2.0	0.0	0.0	0.0	0.0	0.0	0.0
11	0.0	0.0	0.0	0.0	2.1	2.3	0.0	0.0	0.0	0.0	0.0	0.0
12	0.0	0.0	0.0	0.51	1.9	2.0	0.0	0.0	0.0	0.0	0.0	0.0
13	0.0	0.0	0.0	85	1.6	2.1	0.0	0.0	0.0	0.0	0.0	0.0
14	0.0	0.0	0.0	41	1.4	1.6	0.0	0.0	0.0	0.0	0.0	0.0
15	0.0	0.0	0.0	22	1.3	1.7	0.0	0.0	0.0	0.0	0.0	0.0
16	0.0	0.0	0.0	21	95	1.4	0.0	0.0	0.0	0.0	0.0	0.0
17	0.0	0.0	0.0	16	75	1.0	0.0	0.0	0.0	0.0	0.0	0.0
18	0.0	0.0	0.0	9.3	27	0.68	0.0	0.0	0.0	0.0	0.0	0.0
19	0.0	0.0	0.0	6.4	16	0.69	0.0	0.0	0.0	0.0	0.0	0.0
20	0.0	0.0	0.0	4.6	12	0.44	0.0	0.0	0.0	0.0	0.0	0.0
21	0.0	0.0	0.0	3.4	9.9	0.15	0.0	0.0	0.0	0.0	0.0	0.0
22	0.0	0.0	0.0	2.8	8.3	0.06	0.0	0.0	0.0	0.0	0.0	0.0
23	0.0	0.0	0.0	2.2	6.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	0.0	0.0	0.0	1.5	5.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	0.0	0.0	0.0	1.1	4.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	0.0	0.0	0.0	0.92	4.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	0.0	0.0	0.0	0.58	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28	0.0	0.0	0.0	0.39	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	0.0	0.0	0.0	0.53	------	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	0.0	0.0	0.0	0.90	------	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31	0.0	------	0.0	1.3	------	0.0	------	0.0	------	0.0	0.0	------
TOTAL	0	0	0	221.43	326.7	47.12	0	0	0	0	0	0
MEAN	0.00	0.00	0.00	7.14	11.67	1.52	0.00	0.00	0.00	0.00	0.00	0.00
MAX	0	0	0	85	95	4.4	0	0	0	0	0	0
MIN	0	0	0	0	1.2	0	0	0	0	0	0	0
AC-FT	0.0	0.0	0.0	439.2	648.0	93.5	0.0	0.0	0.0	0.0	0.0	0.0

TOTAL = 595.25 CFS
1,181 AC-FT

MEAN = 1.63 N/A

MAX = 95 CFS
MIN = 0 CFS

MAX Instantaneour Flow - 1000 CFS on FEB 16
183 CFS on JAN 16

306 CFS on JAN 13

San Luis Obispo County
Flood Control and Water Conservation District

Lower San Simeon
Stream Gauge Station #22
Water Year OCT 1988 - SEP 1989

Latitude - 35° 35' 59'' **Longitude - 121° 06' 47''**

AVERAGE DAILY DISCHARGE (CFS)

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0.0	0.0	0.0	18	2.4	2.4	8.8	1.2	0.0	0.0	**	**
2	0.0	0.0	0.0	11	2.1	48	7.8	1.1	0.0	0.0	**	**
3	0.0	0.0	0.0	8.9	2.2	23	7.0	0.89	0.0	0.0	**	**
4	0.0	0.0	0.0	7.5	13	11	6.1	0.37	0.0	0.0	**	**
5	0.0	0.0	0.0	141	9.4	8.2	5.4	0.18	0.0	0.0	**	**
6	0.0	0.0	0.0	43	5.5	7.2	4.7	0.05	0.0	0.0	**	**
7	0.0	0.0	0.0	24	4.4	6.7	4.1	0.0	0.0	0.0	**	**
8	0.0	0.0	0.0	17	4.5	6.0	3.7	0.0	0.0	0.0	**	**
9	0.0	0.0	0.0	14	36	5.4	3.1	0.0	0.0	0.0	**	**
10	0.0	0.0	0.0	12	17	5.1	3.1	0.0	0.0	0.0	**	**
11	0.0	0.0	0.0	10	11	11	3.0	0.0	0.0	0.0	**	**
12	0.0	0.0	0.0	8.2	8.9	9.4	2.8	0.0	0.0	**	**	**
13	0.0	0.0	0.0	7.2	7.8	6.7	2.5	0.0	0.0	**	**	**
14	0.0	0.0	0.0	6.8	6.7	6.0	2.6	0.0	0.0	**	**	**
15	0.0	0.0	0.0	6.2	5.9	5.7	2.2	0.0	0.0	**	**	**
16	0.0	0.0	0.0	5.7	5.5	11	2.1	0.0	0.0	**	**	**
17	0.0	0.0	0.0	5.1	5.0	12	2.1	0.0	0.0	**	**	**
18	0.0	0.0	0.0	4.7	4.8	8.3	2.3	0.0	0.0	**	**	**
19	0.0	0.0	0.0	4.5	4.7	7.2	2.4	0.0	0.0	**	**	**
20	0.0	0.0	0.0	4.0	4.3	6.6	2.3	0.0	0.0	**	**	**
21	0.0	0.0	0.51	3.4	3.9	5.8	2.1	0.0	0.0	**	**	**
22	0.0	0.0	124	2.7	3.7	5.4	1.9	0.0	0.0	**	**	**
23	0.0	0.0	38	5.5	3.4	5.2	1.8	0.0	0.0	**	**	**
24	0.0	0.0	784	6.5	3.3	58	2.0	0.0	0.0	**	**	**
25	0.0	0.0	76	4.2	3.2	104	3.1	0.0	0.0	**	**	**
26	0.0	0.0	30	3.7	2.9	48	2.5	0.0	0.0	**	**	**
27	0.0	0.0	19	3.2	2.9	24	2.0	0.0	0.0	**	**	**
28	0.0	0.0	16	2.9	2.7	18	1.7	0.0	0.0	**	**	**
29	0.0	0.0	12	2.8	-----	14	1.3	0.0	0.0	**	**	**
30	0.0	0.0	11	2.6	-----	12	1.2	0.0	0.0	**	**	**
31	0.0	-----	26	2.5	-----	10	-----	0.0	-----	**	**	-----
TOTAL	0	0	1136.5	398.8	187.1	511.3	97.7	3.79	0	0	**	**
MEAN	0.00	0.00	36.66	12.86	6.68	16.49	3.26	0.12	0.00	0.00	**	**
MAX	0	0	784	141	36	104	8.8	1.2	0	0	**	**
MIN	0	0	0	2.5	2.1	2.4	1.2	0	0	0	**	**
AC-FT	0.0	0.0	2254.2	791.0	371.1	1014.1	193.8	7.5	0.0	0.0	**	**

TOTAL** = 2335.2 CFS MEAN** = 8.22 N/A MAX = 784 CFS
4,632 AC-FT MIN = 0 CFS

** INCOMPLETE RECORD, MISSING DATA FOR THIS DAY

San Luis Obispo County
Flood Control and Water Conservation District

Lower San Simeon
Stream Gauge Station #22
Water Year OCT 1987 - SEP 1988

Latitude - 35° 35' 59" **Longitude - 121° 06' 47"**

AVERAGE DAILY DISCHARGE (CFS)

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0.0	0.0	0.0	9.1	6.1	37	0.0	0.20	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	6.2	5.5	16	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	4.7	4.7	9.1	0.0	0.0	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	5.9	4.4	6.6	0.0	0.0	0.0	0.0	0.0	0.0
5	0.0	0.0	0.0	215	4.2	5.3	0.0	0.0	0.0	0.0	0.0	0.0
6	0.0	0.0	75	43	3.9	4.6	0.0	0.0	0.0	0.0	0.0	0.0
7	0.0	0.0	21	26	3.5	4.0	0.0	0.0	0.0	0.0	0.0	0.0
8	0.0	0.0	13	19	3.2	3.2	0.0	0.0	0.0	0.0	0.0	0.0
9	0.0	0.0	13	15	2.7	2.8	0.0	0.0	0.0	0.0	0.0	0.0
10	0.0	0.0	0.34	13	2.6	2.7	0.0	0.0	0.0	0.0	0.0	0.0
11	0.0	0.0	0.0	11	2.2	2.1	0.0	0.0	0.0	0.0	0.0	0.0
12	0.0	0.0	0.0	9.4	1.8	1.6	0.0	0.0	0.0	0.0	0.0	0.0
13	0.0	0.0	0.0	7.9	1.6	1.4	0.0	0.0	0.0	0.0	0.0	0.0
14	0.0	0.0	0.0	6.9	1.4	1.3	0.0	0.0	0.0	0.0	0.0	0.0
15	0.0	0.0	0.0	6.8	1.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0
16	0.0	0.0	0.17	7.3	1.1	1.1	0.0	0.0	0.0	0.0	0.0	0.0
17	0.0	0.0	1.3	420	0.55	0.88	0.0	0.0	0.0	0.0	0.0	0.0
18	0.0	0.0	0.45	113	0.63	0.75	0.0	0.0	0.0	0.0	0.0	0.0
19	0.0	0.0	0.34	54	0.44	0.65	0.50	0.0	0.0	0.0	0.0	0.0
20	0.0	0.0	0.21	39	0.46	0.48	6.8	0.0	0.0	0.0	0.0	0.0
21	0.0	0.0	0.24	32	0.47	0.36	4.5	0.0	0.0	0.0	0.0	0.0
22	0.0	0.0	0.30	25	0.61	0.35	1.6	0.0	0.0	0.0	0.0	0.0
23	0.0	0.0	0.24	20	0.49	0.30	6.5	0.0	0.0	0.0	0.0	0.0
24	0.0	0.0	0.18	16	0.40	0.24	6.6	0.0	0.0	0.0	0.0	0.0
25	0.0	0.0	0.13	12	0.57	0.14	3.3	0.0	0.0	0.0	0.0	0.0
26	0.0	0.0	0.04	11	0.60	0.0	2.3	0.0	0.0	0.0	0.0	0.0
27	0.0	0.0	0.02	9.3	1.5	0.0	1.5	0.0	0.0	0.0	0.0	0.0
28	0.0	0.0	37	8.4	6.1	0.0	1.1	0.0	0.0	0.0	0.0	0.0
29	0.0	0.0	101	7.7	65	0.0	0.69	0.0	0.0	0.0	0.0	0.0
30	0.0	0.0	40	7.1	-----	0.0	0.43	0.0	0.0	0.0	0.0	0.0
31	0.0	-----	15	6.3	-----	0.0	-----	0.0	-----	0.0	0.0	-----
TOTAL	0	0	318.96	1187	127.72	104.25	35.82	0.2	0	0	0	0
MEAN	0.00	0.00	10.29	38.29	4.40	3.36	1.19	0.01	0.00	0.00	0.00	0.00
MAX	0	0	101	420	65	37	6.8	0.2	0	0	0	0
MIN	0	0	0	4.7	0.4	0	0	0	0	0	0	0
AC-FT	0.0	0.0	632.6	2354.4	253.3	206.8	71.0	0.4	0.0	0.0	0.0	0.0

TOTAL = 1774 CFS MEAN = 4.85 N/A MAX = 420 CFS
3,519 AC-FT MIN = 0 CFS

Appendix B

Simulated Effects of Water Reclamation Facility Operation

TODD GROUNDWATER

March 22, 2022

MEMORANDUM

To: Ray Dienzo, Cambria Community Services District
Melissa Bland, Cambria Community Services District

From: Gus Yates, Senior Hydrologist

Re: Simulated Effects of Water Reclamation Facility Operation

BACKGROUND

The Water Reclamation Facility (WRF) purifies brackish groundwater extracted from the coastal part of the San Simeon Creek groundwater basin and processes it through microfiltration and reverse osmosis. After treatment, the water is injected back into the basin at a well farther up the San Simeon Creek Valley, where it augments groundwater available to three municipal wells that comprise the primary water supply for the community of Cambria. Cambria Community Services District (CCSD) constructed the WRF in 2014 under severe drought conditions, pursuant to an expedited emergency permitting procedure. At that time, the facility was called the Emergency Water Facility or Sustainable Water Facility. The locations of the WRF, extraction well, injection well, municipal wells and other hydrologic features are shown in **Figure 1**.

The WRF operated intermittently for 4 months in early 2015, 4 months at the end of 2015, and briefly at the end of 2016, injecting a total of approximately 89 AF of purified water into the basin. Health regulations required that the subsurface travel time from the injection wells to the nearest municipal supply well be at least two months. Groundwater modeling was done to identify an injection well location and injection rate that would meet that requirement.

The WRF has been idle since 2016, but CCSD is seeking to convert the emergency permit to a regular Coastal Development Permit. Although lagoon impact issues were discussed in previous environmental compliance documents (CCSD, 2016; CDM Smith, 2015), some regulatory agencies have lingering concerns that WRF operation could adversely impact habitat for several sensitive species that inhabit the lagoon and perennial pools along San Simeon Creek upstream of the lagoon (California Coastal Commission, 2016; California Department of Fish and Wildlife, 2016).

CCSD plans to operate the WRF in drought years. The 2020 urban water management plan (WSC, 2021) includes a water shortage contingency plan that defines six stages of increasing drought severity and describes associated management actions that would be taken to reduce demand and augment supply. Assuming the District obtains the regular permit to operate outside of emergencies, WRF operation is contemplated for the three most severe water shortage stages (Stages 4, 5 and 6).

The San Simeon Creek groundwater basin extends along San Simeon Creek valley from the Pacific Ocean about 5 miles upstream to Palmer Flats. The width of the alluvial deposits that comprise the basin is generally 800-1,500 feet, and the depth to bedrock along the center of the valley decreases from slightly over 100 feet at the coast to about 80 feet at Palmer Flats (Yates and Van Konynenburg, 1998). A thick sequence of fine-grained estuarine deposits separates the basin fill into upper and lower aquifers downstream of Van Gordon Creek, which enters the San Simeon Creek valley about 0.5 mile upstream of the ocean.

San Simeon Creek drains a watershed of 26 square miles. In normal years, base flow is continuously present during the winter wet season, gradually receding to zero in late spring or early summer. The dry season is defined as starting on the day flow at the upstream end of the basin (Palmer Flats) recedes to 0 cfs, and it continues until stream flow resumes the following winter (typically around December). Because percolation from San Simeon Creek supplies most of the recharge to the basin, water shortage conditions can result from an unusually long dry season or from a winter with so little stream flow that the basin is not completely refilled prior to the next dry season. Both of these conditions were incorporated into the scenario simulations.

MODEL ACTIVATION AND VERIFICATION

In 2014, CDM Smith developed a numerical groundwater flow model of the San Simeon Creek groundwater basin for the purpose of simulating subsurface travel time of water from the WRF injection well to the nearest potable supply well (CDM Smith, 2014). The investigators modified an existing model for that purpose, decreasing the grid spacing and increasing the number of layers from three to eighteen. The model was recalibrated to measured water levels for 2002-2003. A groundwater tracer study was subsequently completed (CDM Smith, 2017). It confirmed the accuracy of the modeling and recommended a maximum injection rate of 400 gallons per minute (gpm). The modeling study presented some results related to simulated lagoon water levels and ocean boundary outflow, but the primary focus was on subsurface travel time.

For the present effort, the model was shifted from one proprietary modeling software platform (GMS) to another (Groundwater Vistas). Model layering was modified slightly, and inputs were changed to simulate March 2013 through December 2014 using semi-monthly stress periods. That two-year period was a drought and was selected to ensure that the model was calibrated to be accurate for dry-year scenarios, which are the focus of CCSD water supply planning. Model calibration involved adjustments to several variables. Layer thicknesses were adjusted to prevent excessive numbers of cells from going dry during the simulations. The CDM Smith model had eighteen 5-foot-thick layers, and the upper layers tend to become unsaturated when simulated water levels decline. The MODFLOW-NWT solver simulates unsaturated flow but becomes unstable if large numbers of cells convert from saturated to unsaturated. This was particularly problematic near the upper end of the basin, which experiences large fluctuations in water levels as groundwater drains down-valley during the dry season then refills as soon as stream flow resumes. Most of the basin thickness in that region was assigned to model layer 1 to minimize unsaturation. Other variables adjusted during calibration included hydraulic conductivity, storativity and stream bed elevations.

Figure 2 shows hydrographs comparing measured and simulated groundwater levels at nine wells used for calibration. The figure also shows a hydrograph of the simulated groundwater gradient between well SS-4 and well 9P2. The generally good fit between the simulated and measured hydrographs at the nine wells was confirmed by statistical analysis of pairs of simulated and measured data points. **Figure 3** shows a scatterplot of measured versus simulated water levels for the 362 available water level measurements. The plot is clustered tightly around the 1:1 line, which represents a perfect match. The scaled root-mean-squared error was 3.6 percent, which is low and indicates acceptable model calibration.

WRF OPERATIONAL SCENARIOS

The primary objective of the modeling was to determine whether WRF operation would substantially diminish surface or groundwater inflow to the lagoon and/or lower reach of San Simeon Creek, which might have adverse biological impacts. A secondary objective was to identify the amounts of WRF operation needed under various drought conditions to meet water supply needs.

The overall WRF-groundwater system is complex, with many variables that interact. The diagram in **Figure 4** shows the components of the system. These include well 9P7 (the WRF supply well), the microfiltration component of the WRF, a lagoon discharge to San Simeon Creek that occurs while 9P7 is pumping, percolation of microfiltration backflush water at the percolation ponds, treatment of the remaining microfiltration water by reverse osmosis followed by injection at well RIW1, pumping of groundwater at CCSD’s municipal wells (SS-1, SS-2 and SS-3), and percolation of treated wastewater at the ponds. Within the natural part of the system, seepage can occur in either direction between San Simeon Creek and groundwater and between the lagoon and groundwater. During the dry season, lagoon water seeps through the beach berm to reach the ocean. The basin extends offshore, and deeper layers are presumed to be in hydraulic connection with the ocean at some unknown offshore distance. Consequently, groundwater flow at the coastline can be seaward or landward, depending on the difference between onshore and offshore water levels. A change in any of the flows in this system affects all other flows.

The WRF is expensive to operate and would only be turned on in dry years when the supply of native groundwater might not be sufficient to meet CCSD water demand. CCSD plans to operate the WRF in water shortage Stages 5 and 6 and possibly in Stage 4. Those are the three most severe water shortage stages. To represent hydrologic conditions likely to be associated with those stages, the two years of the simulation period for scenario analysis represented two types of drought: a long dry season and a winter with incomplete basin recharge. These were implemented by adjusting the amount of San Simeon Creek inflow at the upstream end of the basin. **Figure 5** shows the assumed semi-monthly inflows for normal, Stage 4 and Stage 6 scenarios.

Some aspects of the model were held constant for all scenarios. These global assumptions included:

- Annual CCSD water demand in normal years is 700 AFY.
- Water shortage stages are associated with increasing amounts of water conservation. For Stage 4, conservation is assumed to decrease annual water demand by 40 percent, and for Stage 6 by 50 percent, per the water shortage contingency plan documented in the District's 2020 urban water management plan (WSC, 2021).
- The monthly distribution of water demand follows the average for 2013-2019. Monthly amounts range from 6.8 percent of the annual total in February to 10 percent in July. This reflects customer water use behavior during a drought.
- Pumping from the Santa Rosa Creek basin (located south of the San Simeon Creek basin) equals 20 percent of the CCSD water demand (after conservation) on an annual basis. The Santa Rosa pumping quota is distributed uniformly during June through October.
- Municipal wastewater percolation equals 92 percent of total CCSD water use on an annual basis and is uniform throughout the year. This was the percentage during 2014-2015, and it reflects customer water use patterns under drought conditions.
- All wastewater percolation is at Pond A (the most westerly pond).
- All water produced by WRF supply well 9P7 is processed through microfiltration.
- Microfiltration is 94.1 percent efficient. That is, 5.9 percent of the inflow is used to backflush the filters and is sent to the wastewater ponds for percolation.
- A constant flow of microfiltration product water is discharged to San Simeon Creek just upstream of the lagoon whenever well 9P7 is actively pumping. This flow could be adjusted independently of the reverse osmosis and RIW1 injection rates to prevent lagoon elevations and inflow from declining while the WRF is operating. Rates of 100-140 gpm were used in the simulations. These were assumed to be constant for each simulation, although in practice the lagoon discharge could be adjusted monthly as needed.
- Well 9P7 is assumed to have a pumping rate of 581 gpm, which was the measured discharge rate. Because the volume of WRF product water injected at well RIW1 varies by month and by scenario, the monthly hours of operation of well 9P7 also vary, and hence so does the monthly volume of lagoon discharge.

- Water produced by well 9P7 that is not used for backflushing the microfiltration filters or for lagoon discharge is processed through reverse osmosis. The reverse osmosis process has an efficiency of 92.1 percent (the remaining 7.9 percent is a brine that is trucked out of the basin for disposal). The reverse osmosis and advanced oxidation product water is injected at well RIW1.
- For a target amount of injection at well RIW1 in any semi-monthly stress period, the fraction of total time that 9P7 is pumping is imputed based on the recovery efficiencies of microfiltration and reverse osmosis. This is also the fraction of time the lagoon discharge is occurring. It is calculated based on the capacity of well 9P7 and the instantaneous lagoon discharge according to the following formula:
- $X = \frac{\left\{\frac{RIW}{RO\text{eff} \cdot MF\text{eff}}\right\}}{\left\{9P7\text{cap} - \left(\frac{Lag}{MF\text{eff}}\right)\right\}}$
- Where,
- X is the fraction of time 9P7 and the discharge are occurring
- RIW is the target WRF product water injection volume for the stress period (AF)
- RO_{eff} is the recovery efficiency of the reverse osmosis process (fraction)
- MF_{eff} is the recovery efficiency of the microfiltration process (fraction)
- $9P7_{cap}$ is the pumping capacity of well 9P7 if it operated continuously for the entire stress period (AF)
- Lag is the volume of lagoon discharge that would result if the discharge occurred continuously for the entire stress period (AF)
- Given a pumping capacity of 581 gpm for well 9P7, a lagoon discharge rate of 100 gpm, and the aforementioned efficiencies, the equation can be solved for X. The actual stress period volumes of 9P7 and lagoon discharge water equal their stress period capacities multiplied by X.
- 60 percent of water injected at RIW1 is available for extraction by municipal wells SS-1 and SS-2, and pumping of native groundwater is decreased by that amount. The remaining 40 percent of injected water flows joins native groundwater and flows west toward well 9P7 and the percolation pond area. This proportion was determined by prior modeling (CDM Smith, 2014).
- The lagoon discharge is to San Simeon Creek at the next-to-last stream cell before entering the lagoon (about 80 feet upstream of the lagoon).
- The lagoon has a fixed footprint.
- The “equivalent freshwater head” model assigns a constant head of 3.33 feet above the NAVD88 datum for all offshore cells in model layer 1. Lower model layers are assigned higher constant heads reflecting the greater density of seawater relative to fresh groundwater. Cells along the offshore end of the model grid in layers 10-12 are assigned a head of 3.84 feet, and cells along the offshore end of layers 14-18 are assigned a head of 5.40 feet. The density difference between seawater and fresh water can cause seawater to intrude a short distance into the onshore part of the aquifer, although in practice low onshore water levels due to pumping typically have a much larger effect.

- The principal management variable in the scenarios is the timing and amount of WRF operation. Other flexible input variables that were tested over a range of values were year type (water shortage stage) and the amounts of groundwater pumping for irrigation by neighboring well owners Pedotti and Warren. **Table 1** shows the combinations of assumptions regarding these variables for each of the scenarios.

SIMULATED EFFECTS OF WRF OPERATION

Hydrologic Conditions for Two Successive Dry Years

Each simulation covered a period of 22 months using semi-monthly stress periods. The simulations start in March with a full basin condition and continued through December of the following year. For model calibration, this period corresponded to March 2013-December 2014. Thus, the simulations covered two dry seasons. To simulate operational scenarios, different drought conditions were assumed for each dry season. The first one was long, with stream flow at Palmer Flats ceasing April 1 (for Stage 4 water shortage scenarios) or March 1 (for Stage 6) and not resuming until mid-January of the following year (see **Figure 5**). The second dry season was only moderately long (April 1 through December 15), but groundwater levels did not fully recover during the wet season between the two dry seasons. By trial and error, it was found that four semi-monthly stress periods with 5 cfs of San Simeon Creek inflow at Palmer Flats achieved partial basin refilling. These low flows mostly percolated out of the creek at the upstream end of the basin, with little surface flow reaching as far as the municipal well field. Water levels at the upstream end of the basin (represented by well 11B1) completely refilled for 2 weeks in late March before beginning the usual dry-season decline. Refilling decreased to about 40 percent of normal (based on water levels) at irrigation well 10M2, to about 35 percent of normal at the well field and roughly 10 percent of normal at well 9P7.

Operational Constraints

Constraints on WRF operation include infrastructure capacity, conditions in permits, and environmental impacts. None of the scenarios exceeded the capacity of well 9P7 or the microfiltration and reverse osmosis units. All of those operated less than full time in the scenarios. The dry season and annual groundwater production limits in CCSD's water rights permit were never exceeded. The limitation that most commonly constrained operation was the water-level gradient between well SS-4 and well 9P2 (see locations in **Figure 1**). To prevent the subsurface flow of percolated wastewater toward the well field, the water level in SS-4 should always be higher than the water level in 9P2. The existing permit for operating the percolation ponds allows temporary excursions to a reverse gradient, with SS-4 as much as -0.79 foot below 9P2. In practice, CCSD operates the system to avoid a water level difference less than +0.75 foot, and this was the criterion used in the scenarios.

The Coastal Commission has expressed concern regarding potential impacts of decreased inflow to the lagoon, although no quantitative threshold of significance has been defined.

The lagoon receives surface and subsurface inflow during the dry season. For the scenario analysis, the sum of the two inflows was tabulated for each stress period, and the minimum inflow during each dry season was identified. Lagoon inflow is affected by several variables including drought severity, irrigation pumping, municipal pumping and WRF operation. With regard to WRF operation, the effects of pumping at well 9P7 are partially or entirely offset by the lagoon discharge, a slight increase in percolation at the ponds, and injection at well RIW1.

Seawater intrusion is another potential constraint on system operation. If pumping and drought conditions cause groundwater levels near the coast to drop below 3.33 ft NAVD88 in upper model layers or 5.40 ft NAVD88 in lower model layers, groundwater flow across the coastline will shift from seaward to landward. The salinity of groundwater in the offshore part of the basin is not known, but eventually saline groundwater would begin arriving at onshore parts of the basin. Small amounts of landward groundwater flow during the dry season are not necessarily a concern if the water is flushed by large amounts of seaward flow during the wet season. Accordingly, scenario results were evaluated based on the ratio of seaward to landward flow on an annual basis and on the occurrence of relatively high amounts of landward flow.

Simulation of Normal Year Conditions

Under normal year conditions, CCSD water use was assumed to equal the full 700 AFY of demand, with no reduction by conservation. The dry season for San Simeon Creek flow was from June 1 to December 15 in both years of the simulation, and the basin refilled completely over the intervening wet season. The WRF was assumed not to operate.

This scenario was acceptable with respect to lagoon inflow and seawater intrusion but not with respect to the SS-4/9P2 gradient. Simulated water levels at key wells are shown in **Figure 6**, where they are compared with measured and simulated historical water levels for 2013-2014. The simulated CCSD water demand was greater than the demand during 2013-2014, but water levels declined more gradually during the start of the dry seasons due to generally wetter conditions. By December, however, the SS-4/9P2 gradient had dropped below the minimum target of +0.75 foot, reaching +0.17 foot in both years. The basin refilled abruptly when stream flow resumed and remained full throughout the wet season.

The brief downward spike in the the SS-4/9P2 gradient visible in December 2014 is present in the results for all scenarios. It is an artifact of model gridding, which causes the rapid rise in water levels at the onset of the winter flow season to reach well 9P7 before well SS-4 in the first time step of the final semi-weekly stress period. It is not meaningful from a water management standpoint.

Hydrographs of simulated lagoon water levels are shown in **Figure 7**, where they are compared with the results for other scenarios. For the normal year scenario, simulated lagoon levels were about 0.2-0.3 ft higher than for any other scenario during the first dry season. During the second dry season normal year water levels were very similar to those during the first dry season and 0.4-1.4 ft higher than those under the other scenarios. The other scenarios all included incomplete basin recharge over the winter, which lowers lagoon water levels substantially during the following dry season.

Water budgets for the scenarios were tabulated for two periods: March of year 1 through March of year 2, and April through December of year 2. The 13-month period for the first dry season was necessary because low stream recharge during winter caused water levels and gradients to continue declining through March of the second year. In other words, the winter months were functionally an extension of the year 1 dry season. The second budget analysis period covers a more normal April-December dry season for year 2. Key water budget inputs and results for all scenarios are listed in **Table 2**, with results for the first dry season shown in the upper table and results for the second dry season in the lower table. Scenarios may be compared within each dry season. Because of their different durations, results for the first dry season may not be directly comparable to results for the second dry season.

The minimum simulated lagoon inflow during the first and second dry seasons is shown in **Figure 8**, along with results for other scenarios. Minimum inflow during the first dry season under normal year conditions was slightly less than for historical 2013-2014 conditions, probably because the greater amount of CCSD pumping in the normal year scenario more than balanced the drier hydrologic conditions during 2013-2014. The opposite was true during the second year, when the larger amount of stream flow under normal year conditions more than offset the higher pumping.

Annual groundwater flow across the coastline is shown for all scenarios in **Figure 9**. All of the scenarios show a small amount of groundwater flow from offshore to onshore. This small, constant amount is probably an artifact of the equivalent freshwater head boundary condition in the model, which tends to create some vertical "short-circuiting" of groundwater flow from deep layers (where constant head = 5.40 ft) to shallow layers (where constant head = 3.33 ft). This effect could affect water levels and flow as far inland as the coastline. In any case, groundwater outflow in normal years exceeded groundwater inflow across the coastline by a factor of 24 to 29 in the two dry seasons, indicating an absence of significant intrusion.

Simulation of Stage 4 Water Shortage Conditions

Stage 4 water shortage conditions were simulated with and without WRF operation to test the specific effects of the WRF. Annual CCSD water demand was assumed to be reduced by 10 percent through conservation efforts. Simulated water levels at key wells with and without WRF operation are shown in **Figure 10**. Water levels under the stage 4 scenario without WRF operation were similar to historical 2013-2014 water levels during the first dry season but much lower during the second year due to the assumption of incomplete basin recovery in winter. The effect of WRF operation was to raise water levels from well 10M2 down to well 9P2 by 0.5-1 foot from the summer of year 1 through the end of year 2. The effect on the SS-4/9P2 gradient was more pronounced. WRF operation raises water levels at both wells, but it raises them more at SS-4, which is near injection well RIW1. The gradient responds immediately to WRF operation. In this scenario, operation at 10 acre-feet per month (AF/mo) increased the gradient by about 0.5 ft as long as the WRF was operating. Conversely, the gradient quickly drops by the same amount when the WRF is turned off.

Without WRF operation, the gradient declined below the minimum target in both years (to -0.60 and -0.45 ft, respectively). As described earlier, the brief downward spike in the gradient in December of year 2 is an artifact of modeling and not meaningful for water management. With WRF operation at 10-30 AF/mo, the minimums were close to the target in both years (+0.70 and +0.60 ft, respectively). Larger amounts of WRF operation would have increased the gradient even further. Because of the speed at which the gradient responds to WRF operation, WRF operation can be adjusted in real time to prevent the gradient from falling below the target.

An instantaneous lagoon discharge rate of 140 gpm was found to be necessary to prevent reductions in the minimum dry-season lagoon elevation and inflow. For example, with a discharge rate of 100 gpm, the minimum dry-season elevation was 0.01 to 0.05 ft lower than without WRF operation, and the minimum dry-season inflow was 0.05 to 0.09 AF/mo lower. With the 140 gpm discharge rate, minimum elevations were only 0.03 ft lower and minimum inflows were 0.02-0.03 cfs higher than without WRF operation (see **Figures 7 and 8**). The effect of WRF operation on the lagoon can be controlled by adjusting the lagoon discharge rate. The discharge has a larger effect on lagoon inflow than lagoon elevation. In practice, the width of the beach berm at the ocean end of the lagoon generally exerts the greatest influence on lagoon elevation.

Groundwater flow across the coastline under Stage 4 conditions was essentially the same with and without WRF operation. In both cases, the ratio of groundwater outflow to groundwater inflow was slightly smaller than in normal years, but the ratios remained above 20 (see **Figure 9**). Thus, seawater intrusion was not a concern for either scenario.

Simulation of Stage 6 Water Shortage Conditions

The difference between Stage 4 and Stage 6 hydrologic conditions is most apparent at the start of year 1, when San Simeon Creek inflow ceased a month earlier under Stage 6. This can be seen in the hydrographs for wells 10M2 and SS-2 in **Figure 11**. For both water shortage stages, stream flows in winter 2014 were assumed to be identical and insufficient to completely replenish groundwater storage. Thus, the simulations were very similar during year 2.

The amount of WRF operation was adjusted for the Stage 6 scenario so that the SS-4/9P2 gradient remained almost continuously above the target minimum of +0.75 foot. To avoid excessive WRF operation, the amounts of water injected at RIW1 were varied from month to month, as they could be under real-time operation. By trial and error, it was found that WRF operation at 15-30 AF/mo was needed from August of year 1 through April of year 2, with the highest rates occurring in December-January. WRF operation at 15-40 AF/mo was also needed in year 2, with the highest rates occurring in November-December. Over the course of the two years, WRF injection for Stage 6 was less than 10 percent greater than for

Stage 4 because of greater assumed water conservation and because the principal hydrologic difference was one additional month of dry season in year 1.

Stage 6 drought conditions were slightly worse than Stage 4 conditions with respect to the lagoon and ocean boundary flow. Assuming WRF operation in both cases, the minimum simulated lagoon elevation was 0.05-0.06 ft lower for Stage 6 (see **Table 2**). The minimum simulated lagoon inflow was 0.04-0.06 cfs lower and annual groundwater outflow across the coastline was 10-102 AF (2-10 percent) lower. However, simulated groundwater inflow was the same.

Simulations of Increased Irrigation Pumping

Two farming operations use groundwater from the San Simeon Creek basin, and in both cases potential future groundwater use is greater than recent historical use. Jon Pedotti farms numerous fields along the basin from just upstream of the well field to Palmer Flats. His supply wells include several of the wells used for water level monitoring: 11B1, 10A1, 10M2 and others (see **Figure 1** for locations). In the late 1980s, all of his fields were planted every year and were irrigated primarily by sprinkler or furrow methods, resulting in estimated groundwater pumping of 264 AFY (Yates and Van Konynenburg, 1998). Irrigation was converted almost entirely to drip by the early 2000s, and Mr. Pedotti presently plants only about half of his total acreage each year (Pedotti, 2021). His annual groundwater pumping in recent years is estimated to be approximately 130 AFY. At full production, it would be about 260 AFY.

Clyde Warren irrigates land in and near Van Gordon Creek from well 9P4, which is located 86 feet north of well 9P7 in the percolation pond area. Pumping from well 9P4 is metered and recorded by CCSD. His cropping has been small in recent years, and pumping averaged only 14.5 AFY during 2012-2018. However, pursuant to an agreement with CCSD reached in 2006, he is entitled to pump 183.5 AFY.

Because of the well locations, increased groundwater pumping by the two farming operations was expected to have different effects on water levels, the SS-4/9P7 gradient, lagoon inflow and ocean boundary flow. Accordingly, increased pumping was simulated separately for each farming operation.

Increased Pedotti Pumping

For this scenario, the Stage 4 + WRF scenario was modified by increasing Pedotti pumping from 130 to 260 AFY in year 1 and year 2. The irrigation season was assumed to remain the same (June through October). The timing of irrigation pumping does not substantially affect simulation results as long as it all occurs during the dry season. WRF operation was adjusted iteratively to maintain the SS-4/9P2 gradient above +0.75 foot.

Simulated water levels at key wells are shown in **Figure 12**, where they are compared with the earlier Stage 4 + WRF scenario results. The largest effect shown is at well 10M2, which is a Pedotti irrigation well. Water levels were 4-5 ft lower due to the increased irrigation pumping. The effect extended all the way down the basin but decreased in magnitude to about 1 foot at well 16D1 near the lagoon. WRF operation had to be increased substantially above the amount needed for the Stage 4 + WRF scenario to prevent the SS-4/9P2 gradient from dropping below +0.75. WRF operation was required continuously from April of year 1 through December of year 2 at rates 5-15 AF/mo greater than the rates for corresponding months of the Stage 4 + WRF scenario. Over the course of the two years, WRF production was 1.4 times greater than for the Stage 4 + WRF scenario without the increased Pedotti pumping (see **Table 2**).

This simulation included a lagoon discharge of 100 gpm, and the minimum simulated lagoon elevations were 0.13-0.17 foot lower than for the scenario without increased Pedotti pumping (see **Figure 7**). Minimum simulated lagoon inflow was reduced by 0.08-0.16 cfs. A higher rate of lagoon discharge could potentially eliminate the decreased inflow but might not fully offset the decrease in lagoon elevation. Seaward flow of groundwater across the ocean boundary in year 1 was similar to the flows for the Stage 4 + WRF and Stage 6 + WRF scenarios, but outflow was lower in inflow was higher in year 2 (see **Figure 9** and **Table 2**). Groundwater outflow was 12-17 times greater than inflow, compared to 18-29 times greater for the earlier scenarios. Seawater intrusion is a potential concern with increased Pedotti pumping.

Increased Warren Pumping

To simulate increased irrigation pumping by Clyde Warren, the Stage 4 + WRF scenario was modified to increase irrigation pumping at well 9P4 from 15 AFY to 183.5 AFY during both dry seasons. The timing of irrigation pumping was assumed to remain the same. This scenario was simulated with and without WRF operation, to determine the extent to which WRF operation compounds or counteracts the effects of Warren pumping. The assumed lagoon discharge rate was 100 gpm whenever 9P7 was operating. WRF operation was increased only as much as was needed to maintain the SS-4/9P2 gradient at or above the target minimum of +0.75 foot. Total WRF injection over the two years was similar to the total for the Stage 4 + WRF scenario.

Simulated groundwater levels for increased Warren pumping with and without WRF operation are shown in **Figure 13**. WRF operation was able to increase the minimum SS-4/9P2 gradient from +0.09 to +0.62 foot in year 1 and from +0.12 to +0.88 foot in year 2. Additional WRF operation could have achieved even larger increases. Simulated lagoon levels were the lowest of any of the simulations, continuously 0.5-1.0 ft below the Stage 4 + WRF and Stage 6 + WRF levels (see **Figure 7**). The lower lagoon elevations were caused by the large amount of irrigation pumping at well 9P4 and its location relatively close to the lagoon. In this pair of simulations, adding WRF operation did not change the minimum lagoon water level during year 1 but lowered it by 0.04 ft in year 2. This could be largely or completely offset by increasing the rate of lagoon discharge during August-September of year 2.

With Warren pumping, the minimum lagoon elevations and inflows occurred in August of both years, during the peak of the irrigation season. Minimum lagoon inflow in year 1 (with or without WRF operation) was about the same as for the Stage 4 + WRF scenario. In year 2, however, it was only about half as much (again, with or without WRF operation). The potential for seawater intrusion was also the highest of any of the scenarios. Without WRF operation, groundwater outflow at the coastline was only about 16 times greater than groundwater inflow in year 1 and about 10 times greater in year 2. The ratios were slightly smaller with WRF operation (see **Table 2** and **Figure 9**).

Figure 14 compares water levels and groundwater flow directions in shallow and deep parts of the basin in November of year 2 with WRF operation and maximum Warren irrigation pumping. The upper plot shows contours of groundwater elevation in model layer 1 (top layer) using a contour interval of 0.2 foot. The pumping depression around wells 9P2 and 9P7 due to Warren and WRF pumping is visible as closed contours. The water table mound beneath Pond A also appears as a closed contour, about midway between the wells and the lagoon. The contours bend toward the lagoon and lower end of San Simeon Creek, indicating groundwater discharge into those water bodies even at the end of the dry season in year 2. Note that the base map in the figure overstates the length of the lagoon; it does not extend above the road crossing. Farther upstream, injection at well RIW1 produces a water-level plateau in the upstream direction (toward the municipal wells) and a steep gradient in the downstream direction, toward well 9P7.

In contrast, the water level gradient in model layer 16 near the bottom of the basin is landward from the offshore ocean boundary (lower plot in **Figure 14**). Groundwater elevation decreases from 5.0 ft NAVD88 offshore (the freshwater equivalent of sea level) to 4.6 ft at well 9P7, which is the low point for water levels in that model layer. The landward gradient is very small, but it produces the small increase in landward groundwater flow evident in the water balance.

WRF is capable of achieving an acceptable SS-4/9P7 gradient in the presence of maximum Warren pumping, but it cannot prevent lagoon impacts and increased risk of seawater intrusion associated with that pumping.

CONCLUSIONS

Conclusions that can be drawn from model calibration and the scenario simulations include the following:

- The reactivated model is calibrated to measured water levels during 2013-2014 with reasonable accuracy.
- Eight weeks of 5 cfs of San Simeon Creek inflow at Palmer Flats during the wet season only partially refills the basin. Increasing 2-4 of those weeks to 10 cfs refills it.
- The occurrence of two successive years as dry as the two years in the simulation is very unlikely. Although the two dry seasons were intended to be evaluated independently, the limited stream recharge between them had the effect of

prolonging some effects of the first dry season until March of year 2. Thus, the simulations represent extreme drought conditions with respect to stream flow.

- The amount of WRF injection can be adjusted to exactly meet the target minimum SS-4/9P7 gradient. The gradient responds very quickly to starting or stopping WRF operation. This would allow the amount of WRF injection to be adjusted in real time during a dry season to keep the gradient above the minimum.
- The lagoon discharge can similarly be adjusted independently of the reverse osmosis and RIW1 injection volumes to achieve target lagoon elevations and inflows. Simulation results demonstrated that a lagoon discharge rate of 100 gpm proved to be too small to prevent slight declines in minimum dry season lagoon elevation and inflow for the Stage 4 and Stage 6 simulations, relative to the corresponding simulations without WRF operation. This is probably because the original estimate of 100 gpm assumed a continuous discharge at that rate, whereas the simulations indicated that the WRF supply well (9P7) would need to operate much less than full time to supply the necessary injection at well RIW1. When the simulations were repeated with lagoon discharge rates of 120-140 gpm, simulated minimum dry-season lagoon levels and inflow were approximately the same as in the simulations without WRF operation. The discharge has a stronger effect on lagoon inflow than lagoon elevation.
- WRF operation can compensate for failure to achieve water conservation goals at each water shortage stage. It would supply the needed make-up water and keep groundwater conditions within constraints related to the SS-4/9P2 gradient, lagoon inflow and seawater intrusion. This could offer CCSD customers a choice between cutting back even further on water use or paying for expensive WRF water.
- In the Stage 4 + WRF and Stage 6 + WRF scenarios, it was possible to meet all three criteria for acceptability by adjusting the WRF injection volumes and lagoon discharge volumes on a semi-monthly basis. The SS-4/9P2 gradient remained above +0.75 foot almost continuously, lagoon levels and inflow were not reduced, and seawater intrusion did not occur.
- Groundwater flow in upper model layers near the coast was consistently toward the lagoon and ocean in all scenarios, even at the end of the dry season. In scenarios with maximum irrigation pumping (Pedotti or Warren), groundwater flow in deep model layers became landward in the summer of year 1 and remained landward until December of year 2. The gradients were small, but the condition persisted for 16 months. That condition could potentially cause seawater intrusion.
- The amounts of WRF injection required to prevent the SS-4/9P2 gradient from dropping below +0.75 ft ranged from 145 to 220 AF for the first dry season, and 145 to 235 AF for the second dry season, depending on the scenario. The highest amounts were in the scenario with increased Pedotti irrigation pumping.

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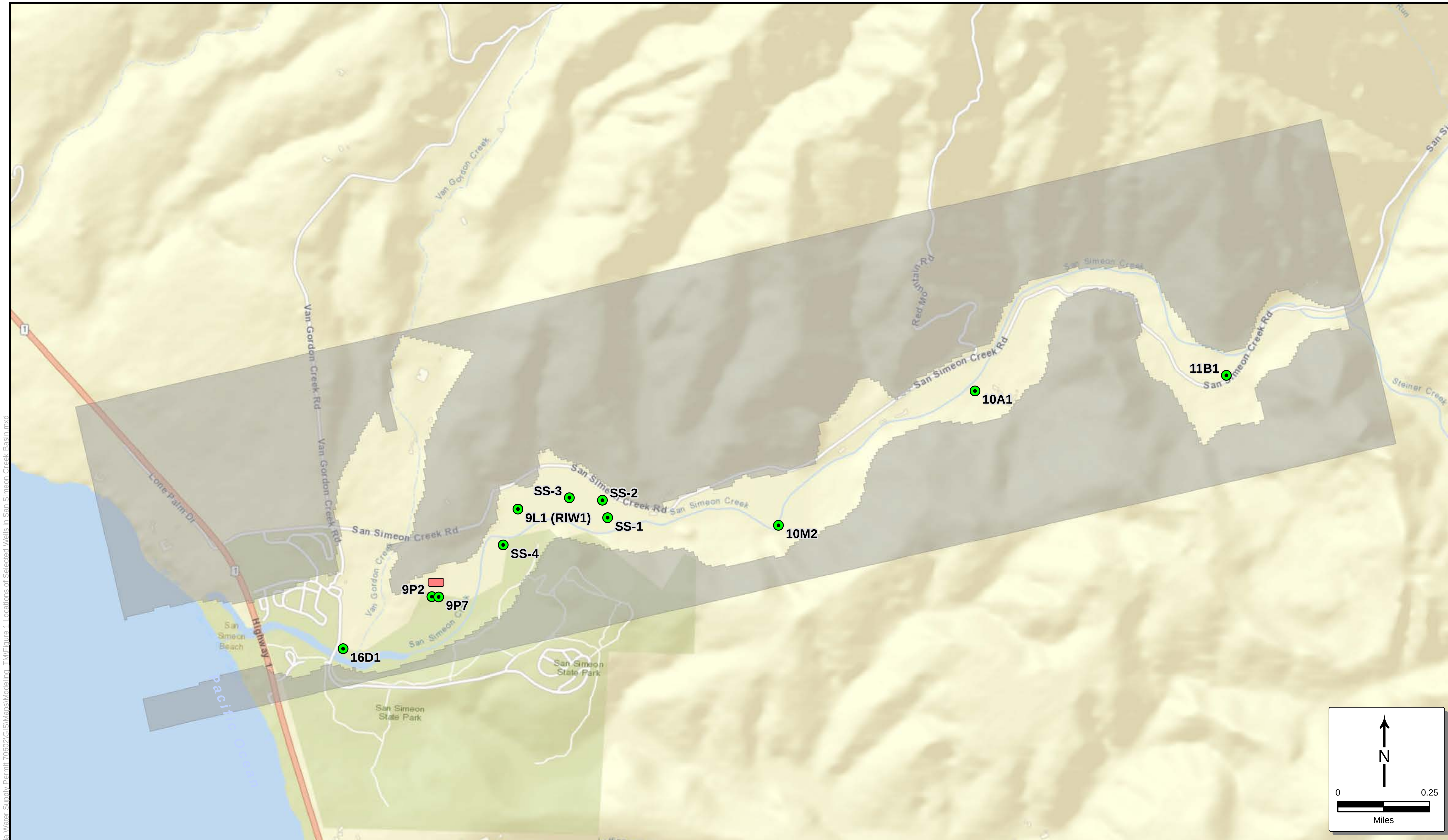
Table 1. Summary of Scenario Input Values

Scenario Description	Water Shortage Stage	WRF Activated	Pedotti Irrigation	Warren Irrigation	Mitigation Discharge (gpm)
Normal Year	None		Recent historical	Recent historical	0
Stage 4	4		Recent historical	Recent historical	0
Stage 4 + WRF	4	✓	Recent historical	Recent historical	120
Stage 6 + WRF	6	✓	Recent historical	Recent historical	120
Stage 4 + WRF + Full Pedotti Irrigation	4	✓	Full	Recent historical	100
Stage 4 + Maximum Warren Irrigation	4		Recent historical	Maximum	0
Stage 4 + WRF + Maximum Warren Irrigation	4	✓	Recent historical	Maximum	100

Table 2. Water Balance Results for Scenarios

Scenario Description	Year Type	March of Year 1 through March of Year 2																			
		CCSD Water Demand after Conservation (AFY)	Date Flow Ceases at Palmer Flats	Date Flow Resumes at Palmer Flats	San Simeon Well Field Groundwater Pumping (AF)	Pond Percolation (AF)		WRF Supply Well 9P7 Pumping (AF)	RIW1 Injection (AF)	Lagoon Discharge (AF)	Pedotti Irrigation Pumping (AF)	Warren Irrigation Pumping (AF)	Minimum SS-4 to 9P2 Water Level Difference (feet)	Minimum Lagoon Elevation		Minimum Dry-Season Inflow to Lagoon (cfs)				Groundwater Flow Across Coastline (AF)	
						Municipal Wastewater	Microfiltra-tion Backflush							Month	Elevation (feet NAVD88)	Month	Creek	Ground-water	Total	To Offshore	From Offshore
Historical 2013-2014	2013-2014	753	May 29	Feb 28	740	563	0	0	0	0	99	15	+0.23	OCT 2013	4.35	MAR 2014	0.58	0.34	0.92	1,157	48
Normal	Normal	753	Jun 1	Dec 16	613	697	0	0	0	0	130	15	+0.17	DEC 2013	4.6	DEC 2013	0.45	0.38	0.83	1,497	51
Stage 4, no WRF	Stage 4	678	Apr 1	Jan 1	552	628	0	0	0	0	130	15	-0.60	MAR 2014	4.17	FEB 2014	0.21	0.29	0.50	1,040	47
Stage 4 + WRF	Stage 4	678	Apr 1	Jan 1	552	628	14	229	150	52	130	15	+.79	MAR 2014	4.14	MAR 2014	0.31	0.22	0.53	1,023	51
Stage 6 + WRF	Stage 6	602	Mar 1	Jan 16	490	558	17	276	188	56	130	15	+0.81	MAR 2014	4.08	FEB 2014	0.27	0.22	0.49	921	51
Stage 4 + WRF + Pedotti	Stage 4	678	Apr 1	Jan 1	552	628	18	312	220	55	260	15	+0.72	MAR 2014	4.01	FEB 2014	0.25	0.2	0.45	942	55
Stage 4 + Warren	Stage 4	678	Apr 1	Jan 1	552	628	0	0	0	0	130	183	-0.68	AUG 2013	4.12	AUG 2013	0.17	0.35	0.52	855	52
Stage 4 + WRF + Warren	Stage 4	678	Apr 1	Jan 1	552	628	12	206	145	36	130	183	+0.63	AUG 2013	4.12	AUG 2013	0.17	0.35	0.52	845	58

Scenario Description	Year Type	April 2014 through December of Year 2																			
		CCSD Water Demand after Conservation (AFY)	Date Flow Ceases at Palmer Flats	Date Flow Resumes at Palmer Flats	San Simeon Well Field Groundwater Pumping (AF)	Pond Percolation (AF)		WRF Supply Well 9P7 Pumping (AF)	RIW1 Injection (AF)	Lagoon Discharge (AF)	Pedotti Irrigation Pumping (AF)	Warren Irrigation Pumping (AF)	Minimum SS-4 to 9P2 Water Level Difference (feet)	Minimum Lagoon Elevation		Minimum Dry-Season Inflow to Lagoon (cfs)				Groundwater Flow Across Coastline (AF)	
						Municipal Wastewater	Microfiltra-tion Backflush							Month	Elevation (feet NAVD88)	Month	Creek	Ground-water	Total	To Offshore	From Offshore
Historical 2013-2014	2013-2014	543	April 27	Dec 5	541	317	0	0	0	0	112	27	+0.52	NOV 2014	4.43	SEP 2014	0.3	0.4	0.7	838	36
Normal	Normal	543	Jun 1	Dec 16	403	483	0	0	0	0	130	15	+0.17	DEC 2014	4.64	DEC 2014	0.44	0.38	0.82	947	40
Stage 4, no WRF	Stage 4	489	Apr 1	Dec 16	363	435	0	0	0	0	130	15	-0.45	DEC 2014	4.26	DEC 2014	0.21	0.36	0.57	522	21
Stage 4 + WRF	Stage 4	489	Apr 1	Dec 16	363	435	15	252	165	58	130	15	+0.93	DEC 2014	4.23	DEC 2014	0.33	0.26	0.59	511	24
Stage 6 + WRF	Stage 6	435	Apr 1	Dec 16	323	386	12	214	145	44	130	15	+0.61	DEC 2014	4.18	DEC 2014	0.32	0.21	0.53	491	25
Stage 4 + WRF + Pedotti	Stage 4	489	Apr 1	Dec 16	363	435	20	336	235	59	260	15	+0.81	DEC 2014	4.06	DEC 2014	0.25	0.18	0.43	421	34
Stage 4 + Warren	Stage 4	489	Apr 1	Dec 16	363	435	0	0	0	0	130	183	-0.62	SEP 2014	3.86	AUG 2014	0.05	0.23	0.28	380	40
Stage 4 + WRF + Warren	Stage 4	489	Apr 1	Dec 16	363	435	14	241	170	43	130	183	+0.92	SEP 2014	3.82	AUG 2014	0.10	0.19	0.29	361	46



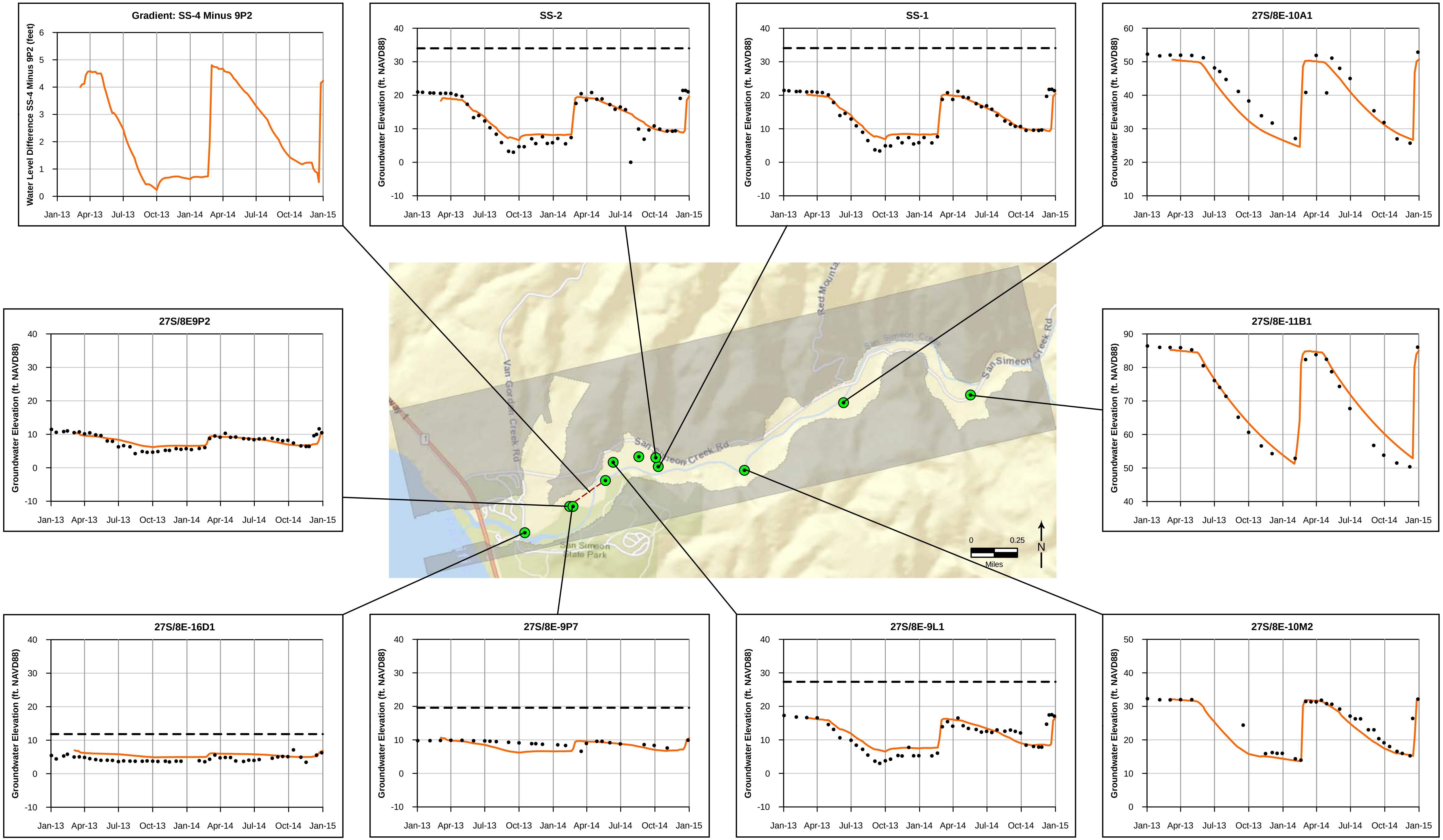
Hydrograph Wells
Water Reclamation Facility
Inactive Flow Cells

March 2022

TODD GROUNDWATER

Figure 1
Locations of Selected Wells in San Simeon Creek Basin

Path: T:\Projects\Cambria Water Supply Permit 70602\GIS\Maps\Modeling_TM\Figure 1 Locations of Selected Wells in San Simeon Creek Basin.mxd



Hydrograph Wells

Inactive Flow Cells

Ground Surface

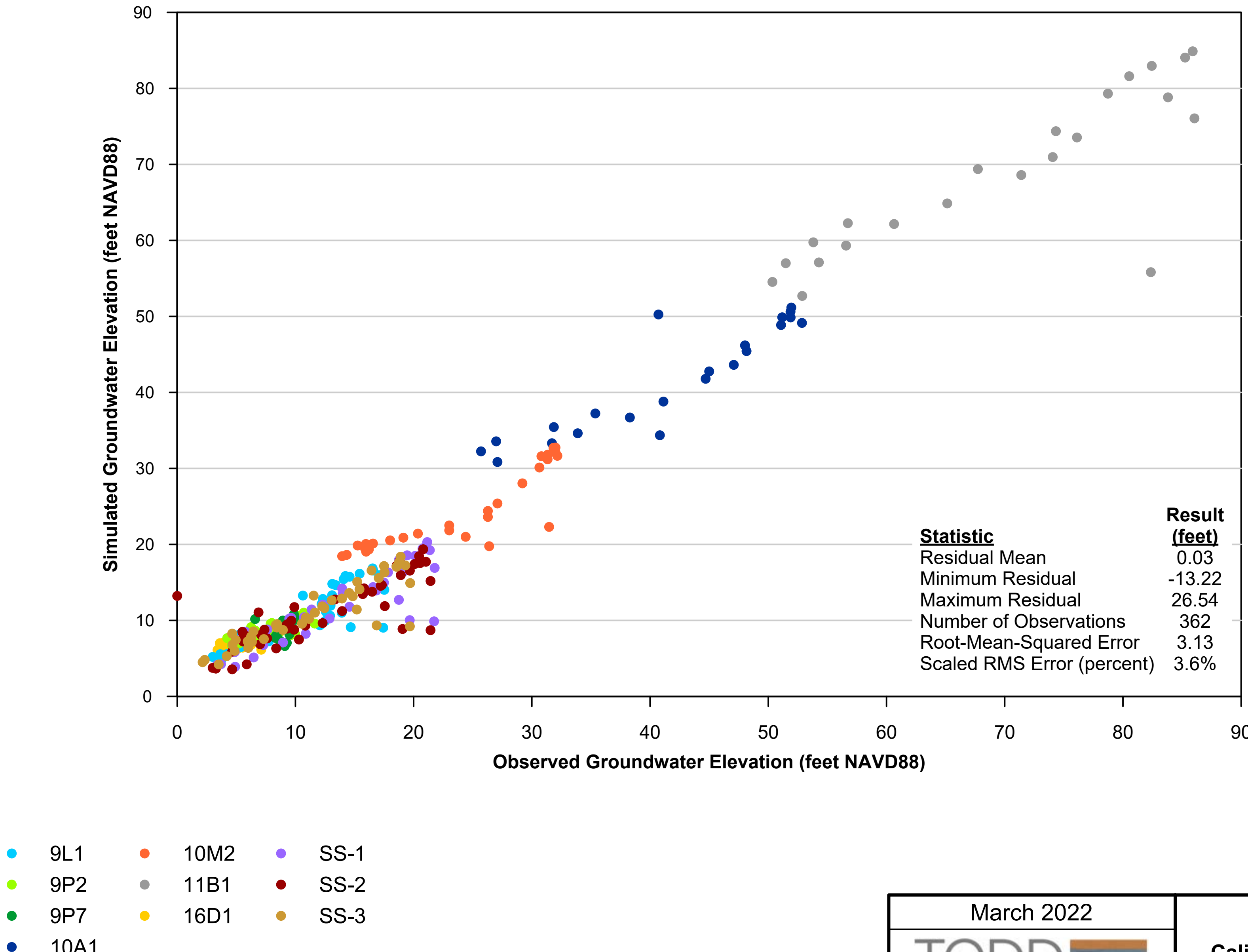
Measured

Simulated

March 2022

TODD GROUNDWATER

Figure 2
Simulated and Measured Water Levels 2013-2014



Statistic	Result (feet)
Residual Mean	0.03
Minimum Residual	-13.22
Maximum Residual	26.54
Number of Observations	362
Root-Mean-Squared Error	3.13
Scaled RMS Error (percent)	3.6%

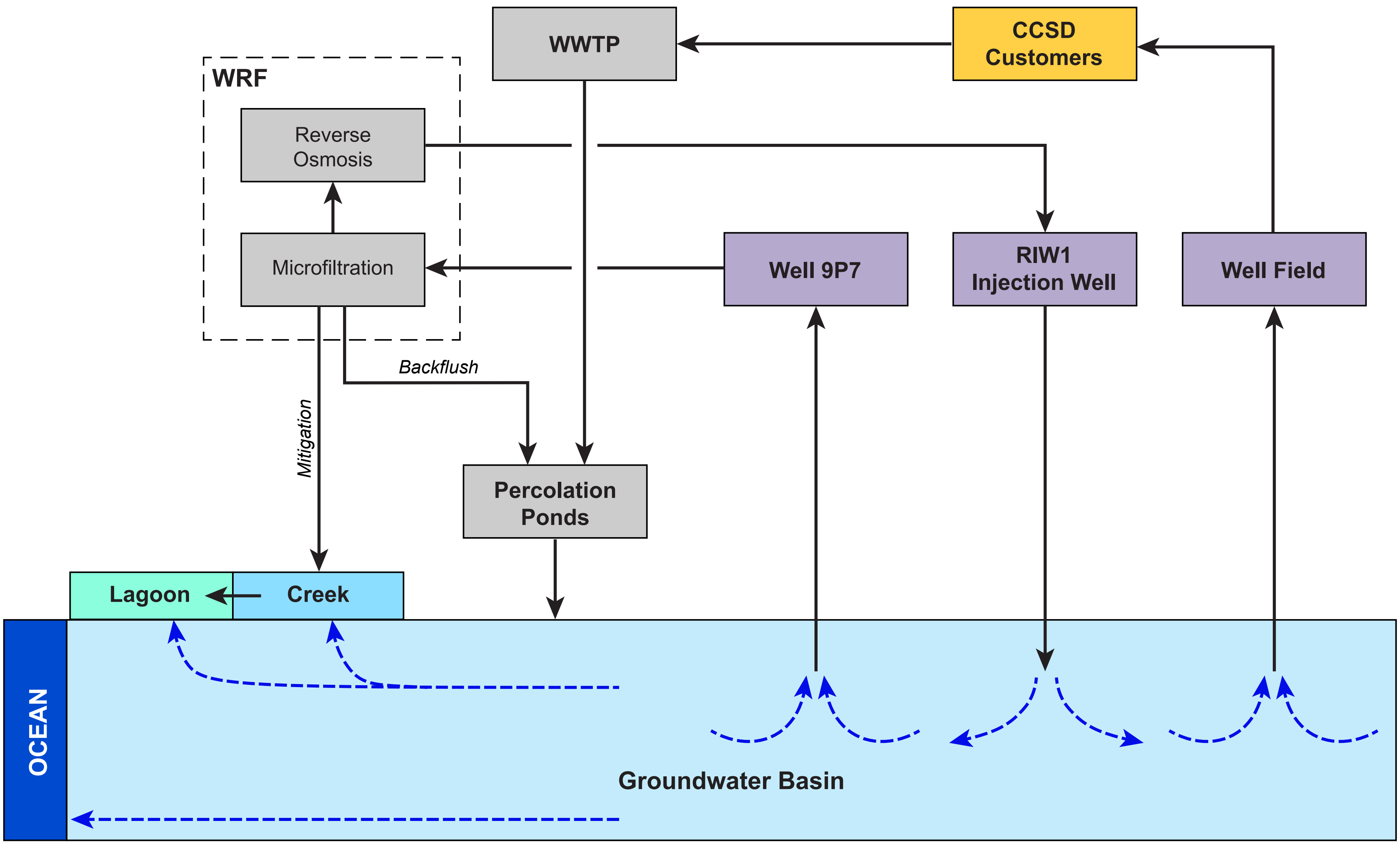
Data Source: T:\Projects\Cambria Water Supply Permit 70602\Model\Water_Levels\Target_results_Run017.xlsx Target_results_Run017

Path: T:\Projects\Cambria Water Supply Permit 70602\GRAPHICS\Figure 3 Calibration Residuals Plot and Statistics.gpj

March 2022

TODD GROUNDWATER

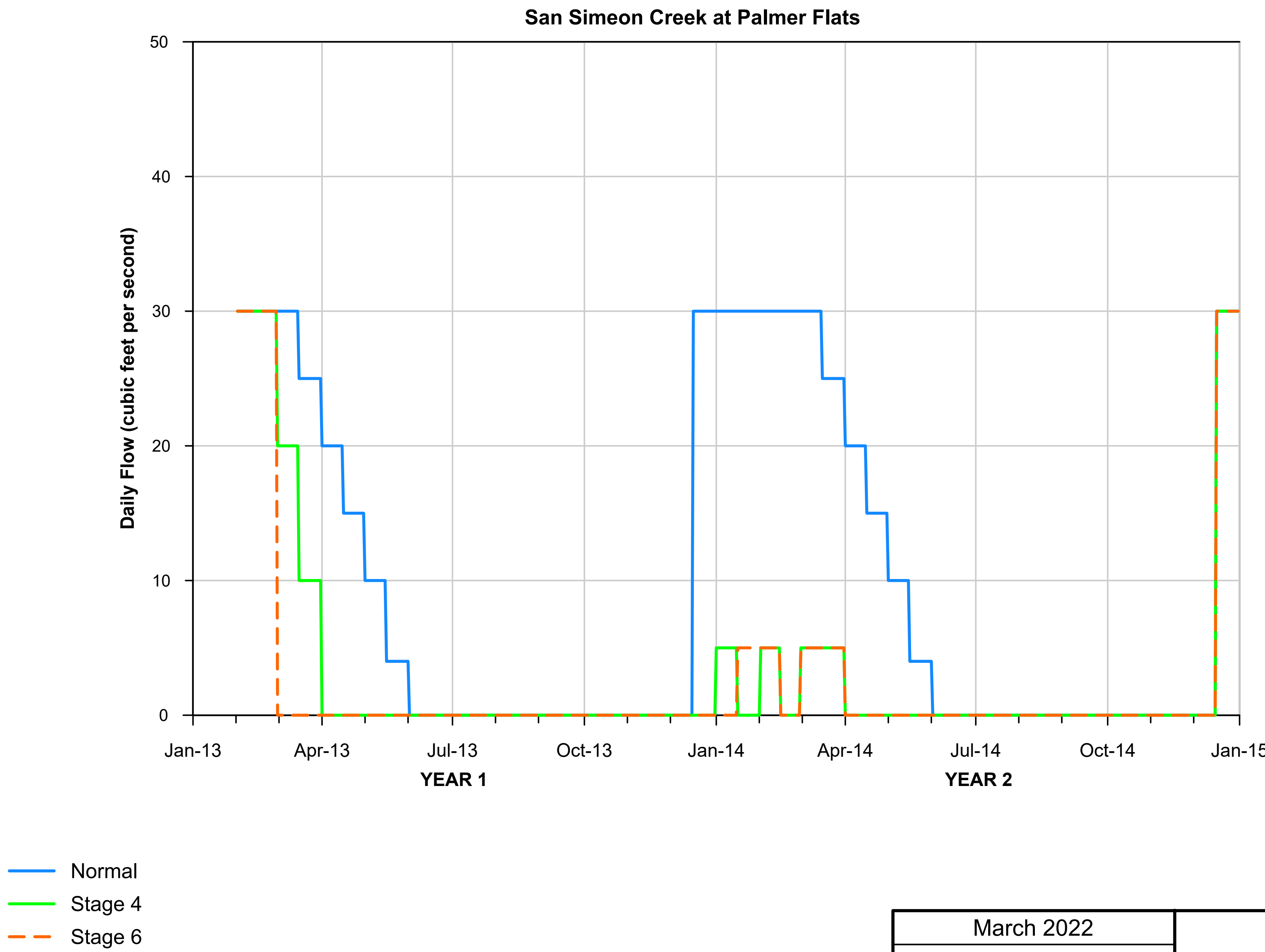
Figure 3
Calibration Residuals Plot and Statistics



March 2022

TODD GROUNDWATER

Figure 4
Diagram of WRF and Groundwater System

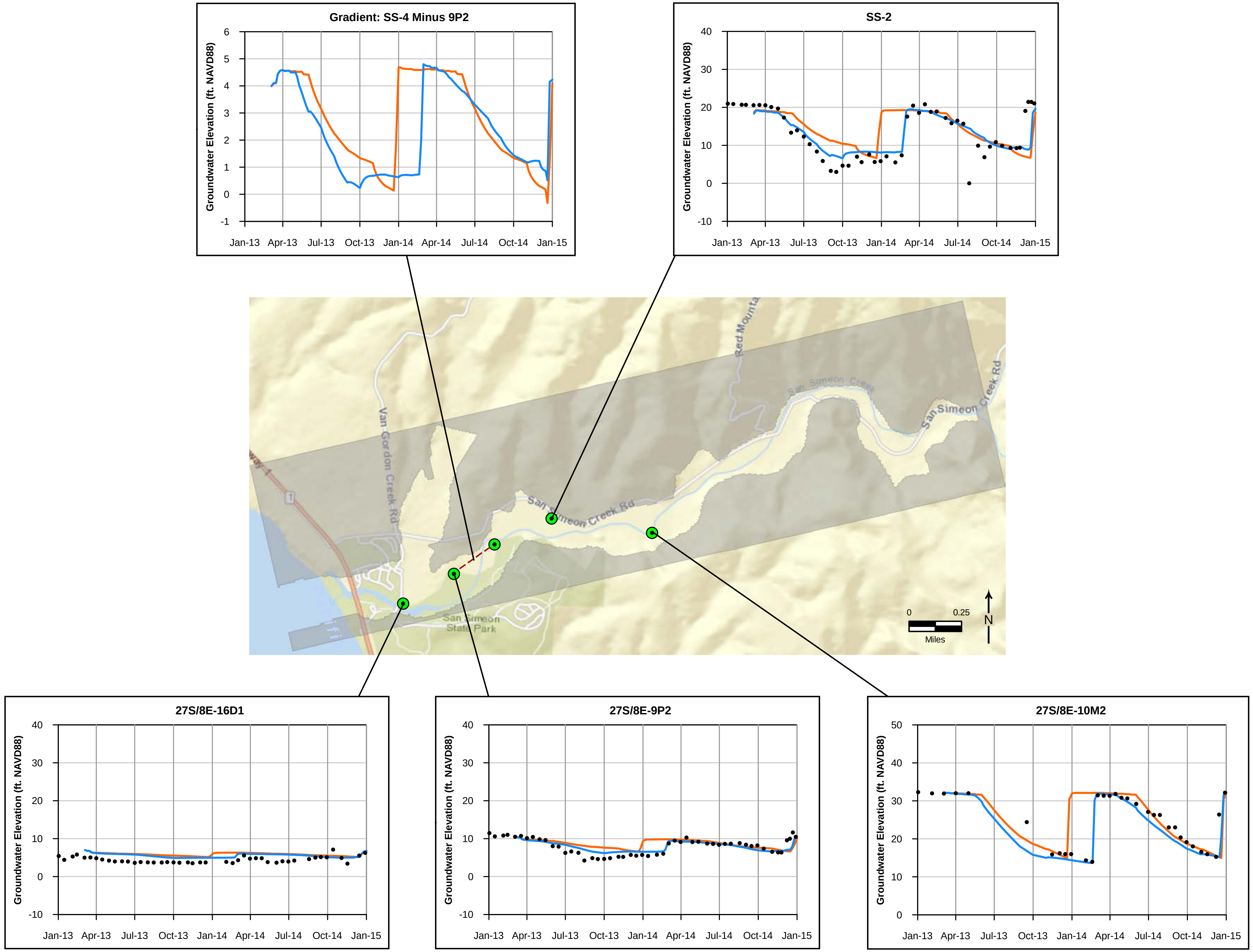


Data Source: T:\Projects\Cambria Water Supply Permit 70602\Model\SFR2\SFRprepIn_flow.xlsx SFRprepIn_flow

March 2022

TODD GROUNDWATER

Figure 5
San Simeon Creek Inflow for Scenarios



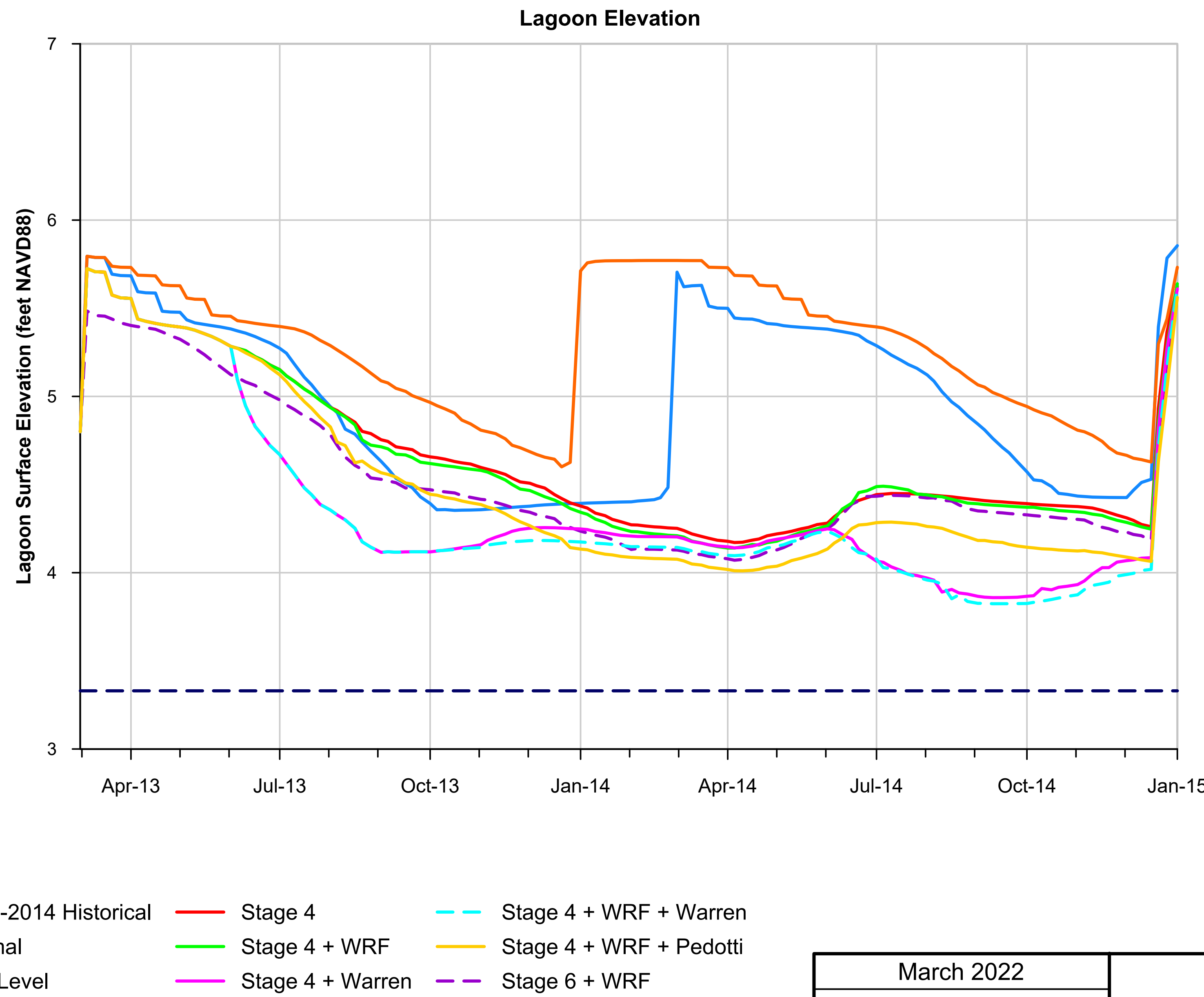
Hydrograph Wells
Inactive Flow Cells

Measured 2013-2014
Simulated 2013-2014
Normal Year

March 2022

TODD GROUNDWATER

Figure 6
Simulated Well Hydrographs - Historical and Normal Year



Data Source: T:\Projects\Cambria Water Supply Permit 70602\Model\GWV\SSCR2_gage_lak.xlsx Graph - all

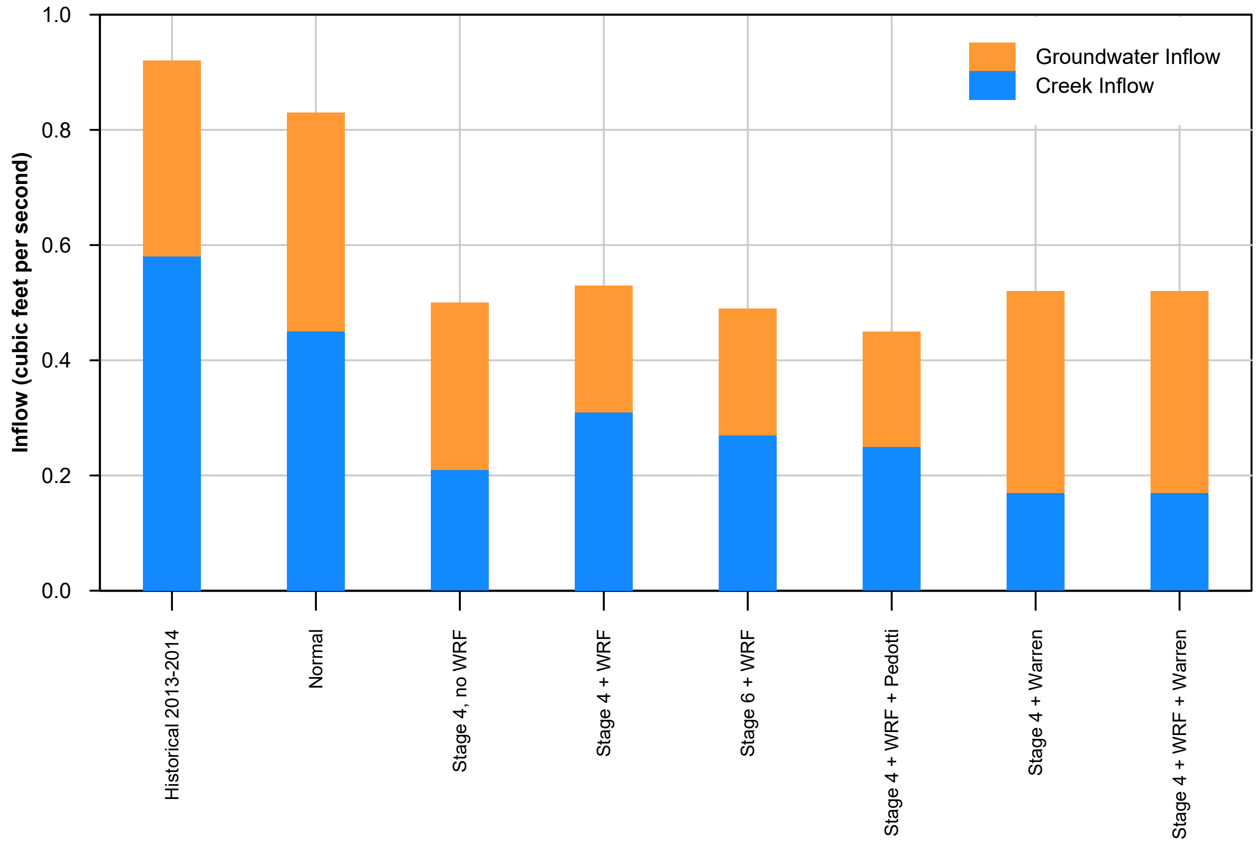
Path: T:\Projects\Cambria Water Supply Permit 70602\GRAPHICS\Figure 7 Simulated Lagoon Elevation.gpj

March 2022

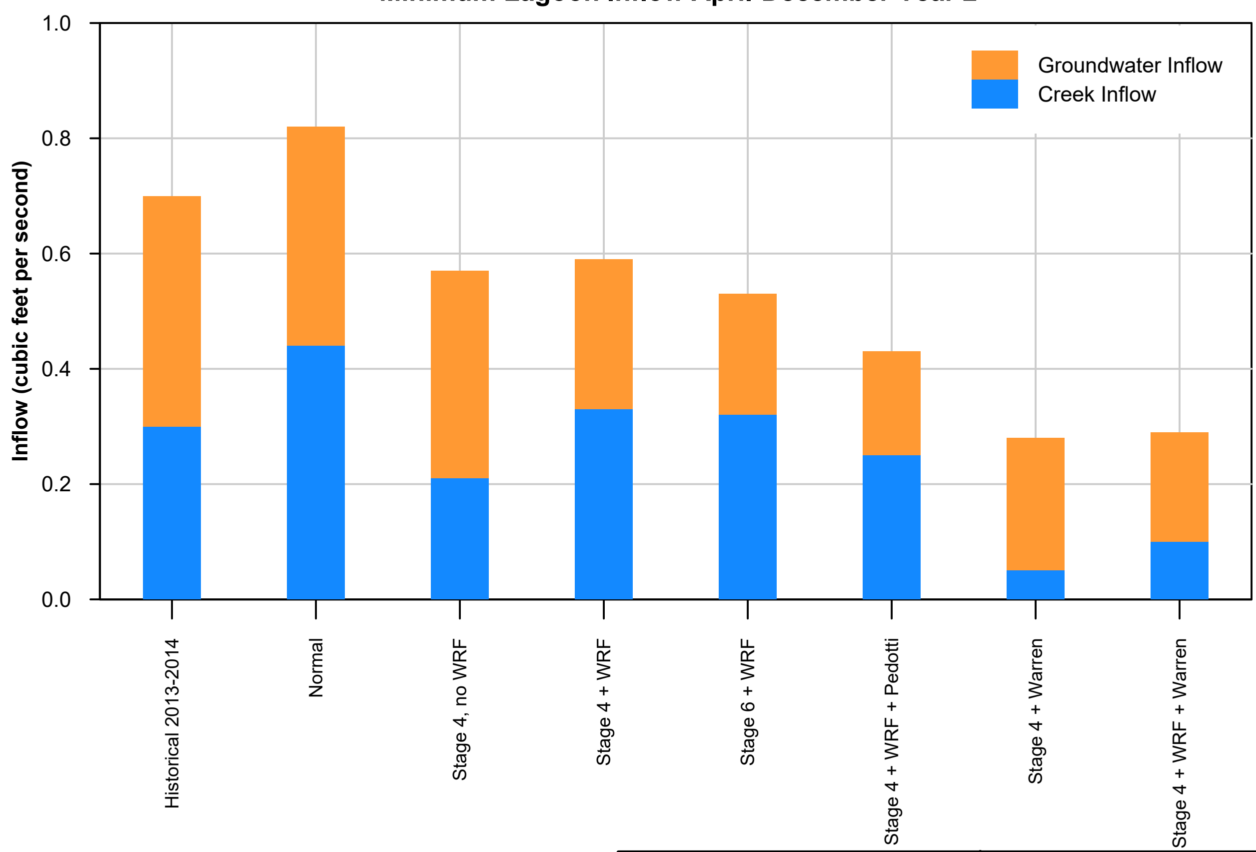
TODD GROUNDWATER

Figure 7
Simulated Lagoon Elevation

Minimum Lagoon Inflow March Year 1 through March Year 2



Minimum Lagoon Inflow April-December Year 2



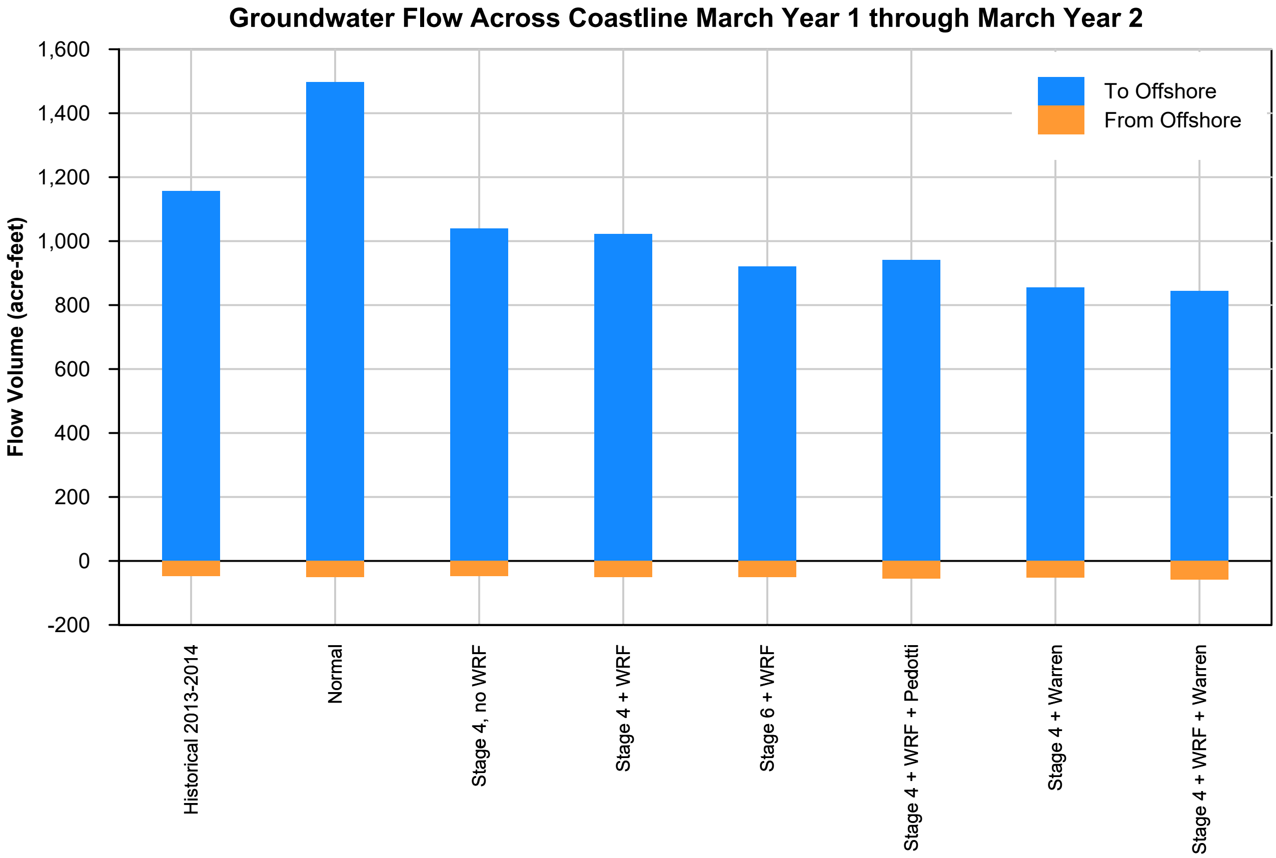
Data:
T:\Projects\Cambria Water Supply Permit 70602\Model_Modeling_log_CCSD.xlsx Scenarios

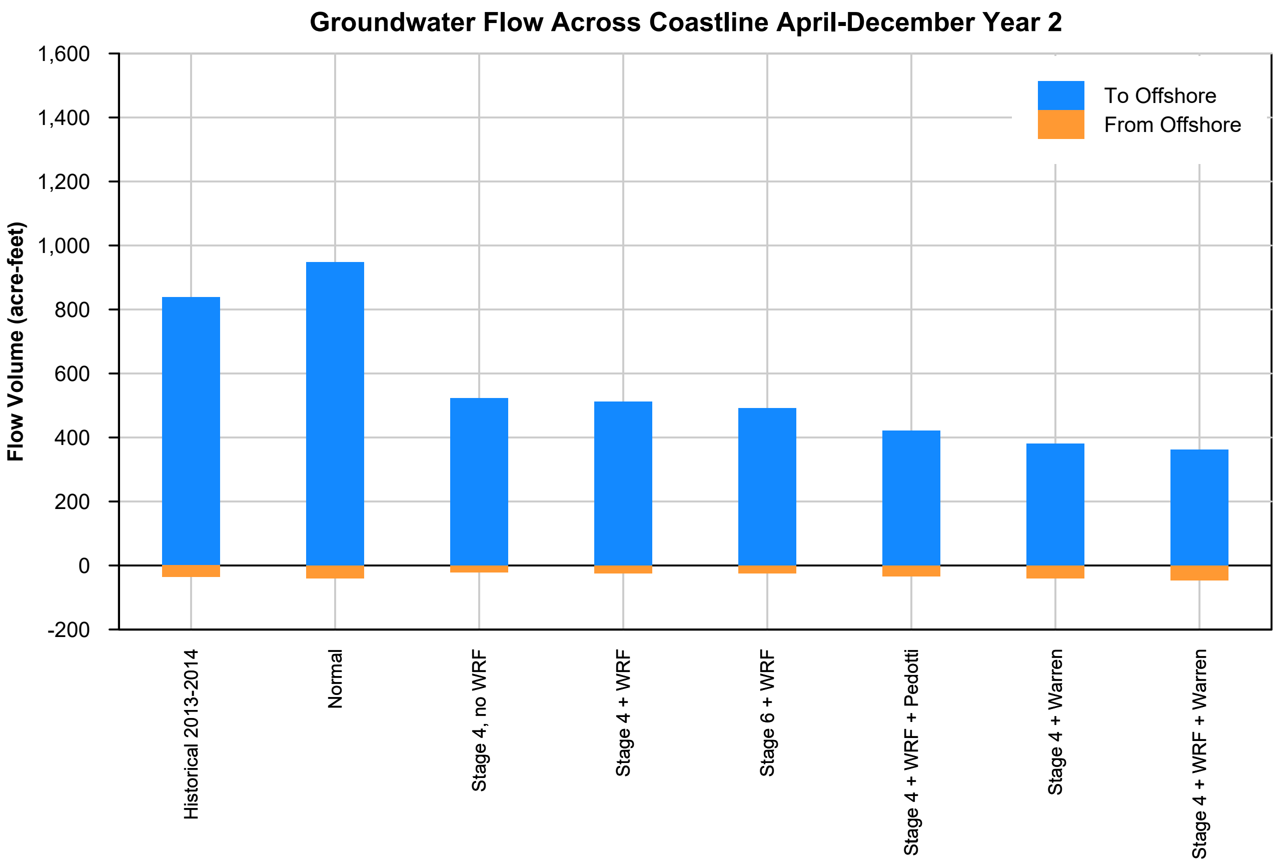
March 2022

TODD GROUNDWATER

Figure 8
Minimum Dry Season Lagoon Inflow

Path: T:\Projects\Cambria Water Supply Permit 70602\GRAPHICS\Figure 8 Minimum Dry Season Lagoon Inflow.gpj



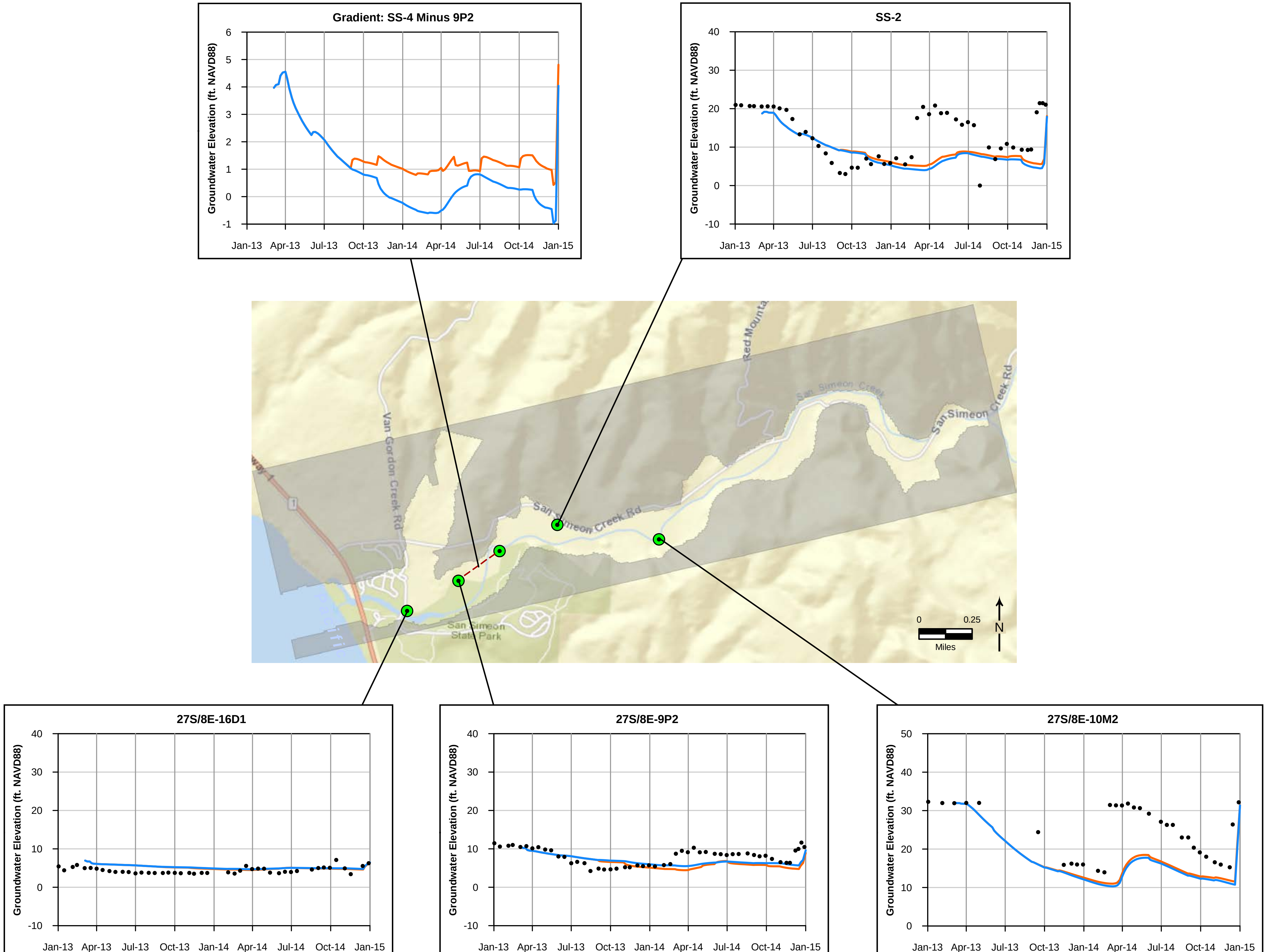


Data:
T:\Projects\Cambria Water Supply Permit 70602\Model_Modeling_log_CCSD.xlsx Scenarios

March 2022

TODD GROUNDWATER

Figure 9
Groundwater Flow Across Coastline



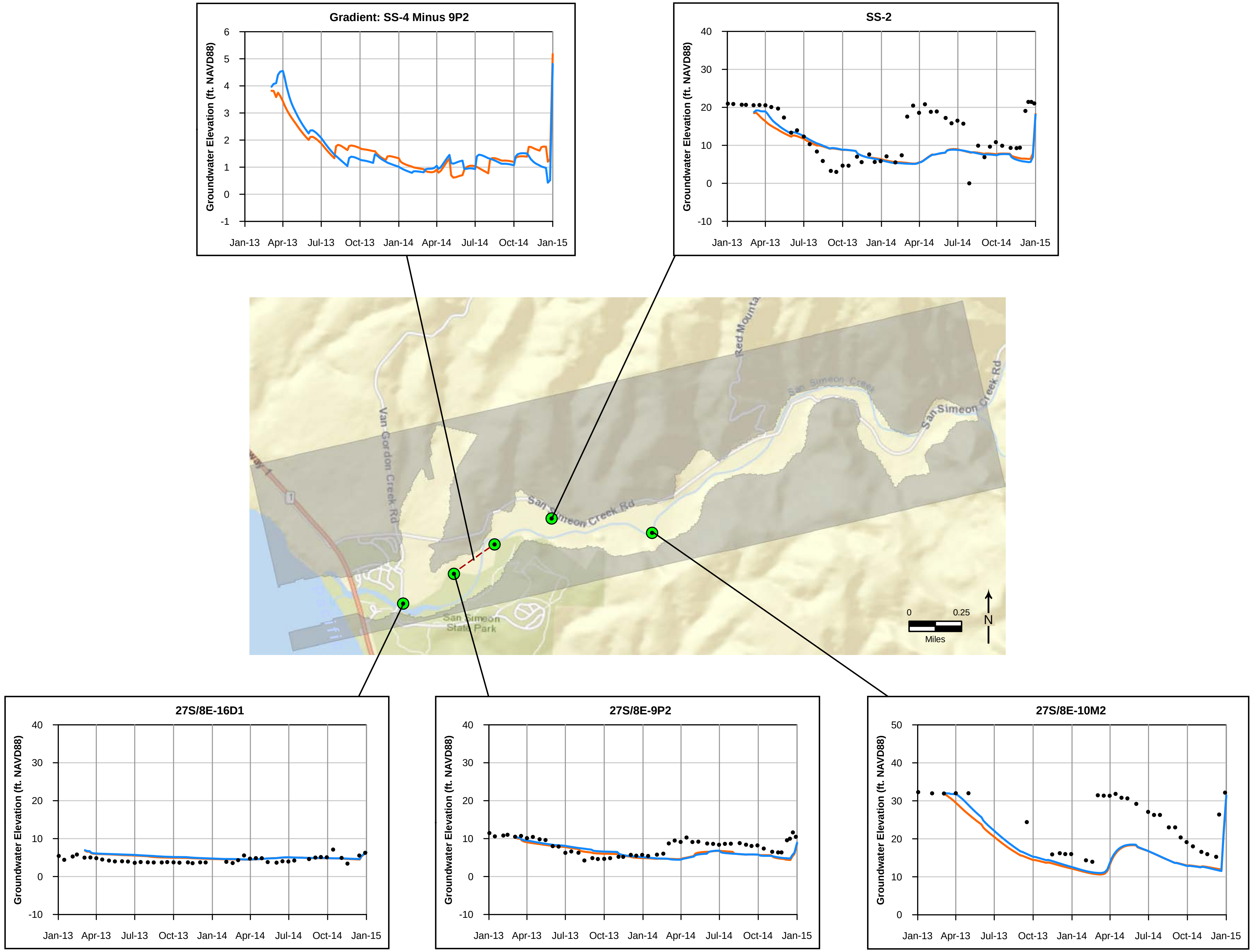
Hydrograph Wells
Inactive Flow Cells

Measured 2013-2014
Stage 4
Stage 4 + WRF

March 2022

TODD GROUNDWATER

Figure 10
Simulated Well Hydrographs - Stage 4 With and Without WRF



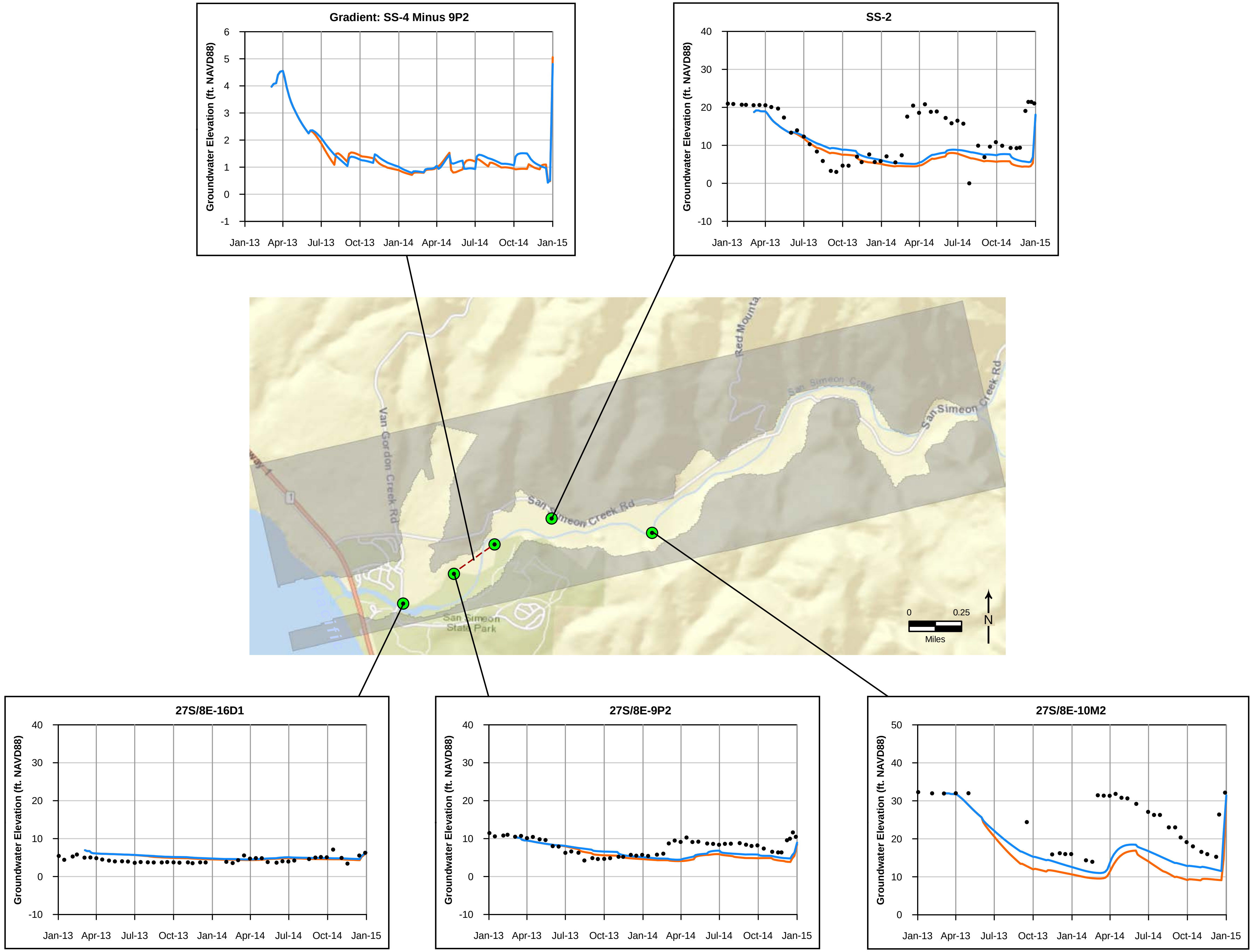
Hydrograph Wells
Inactive Flow Cells

• Measured 2013-2014
Stage 4 + WRF
Stage 6 + WRF

March 2022

TODD GROUNDWATER

Figure 11
Simulated Well Hydrographs - Stage 6 and Stage 4 with WRF



Hydrograph Wells

Inactive Flow Cells

• Measured 2013-2014

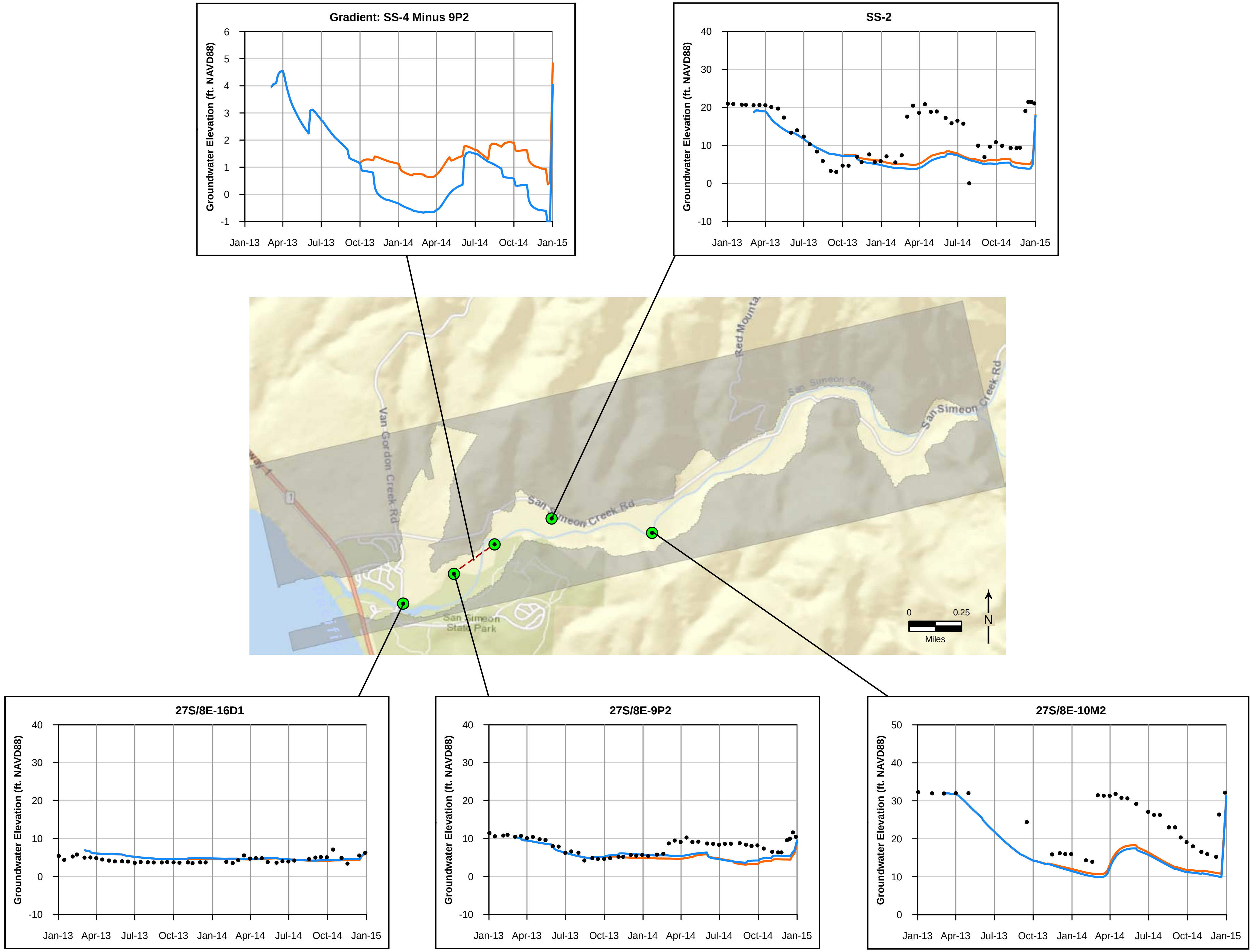
Stage 4 + WRF

Stage 4 + WRF + Pedotti

March 2022

TODD GROUNDWATER

Figure 12
Simulated Well Hydrographs - Stage 4 with Increased Pedotti Pumping



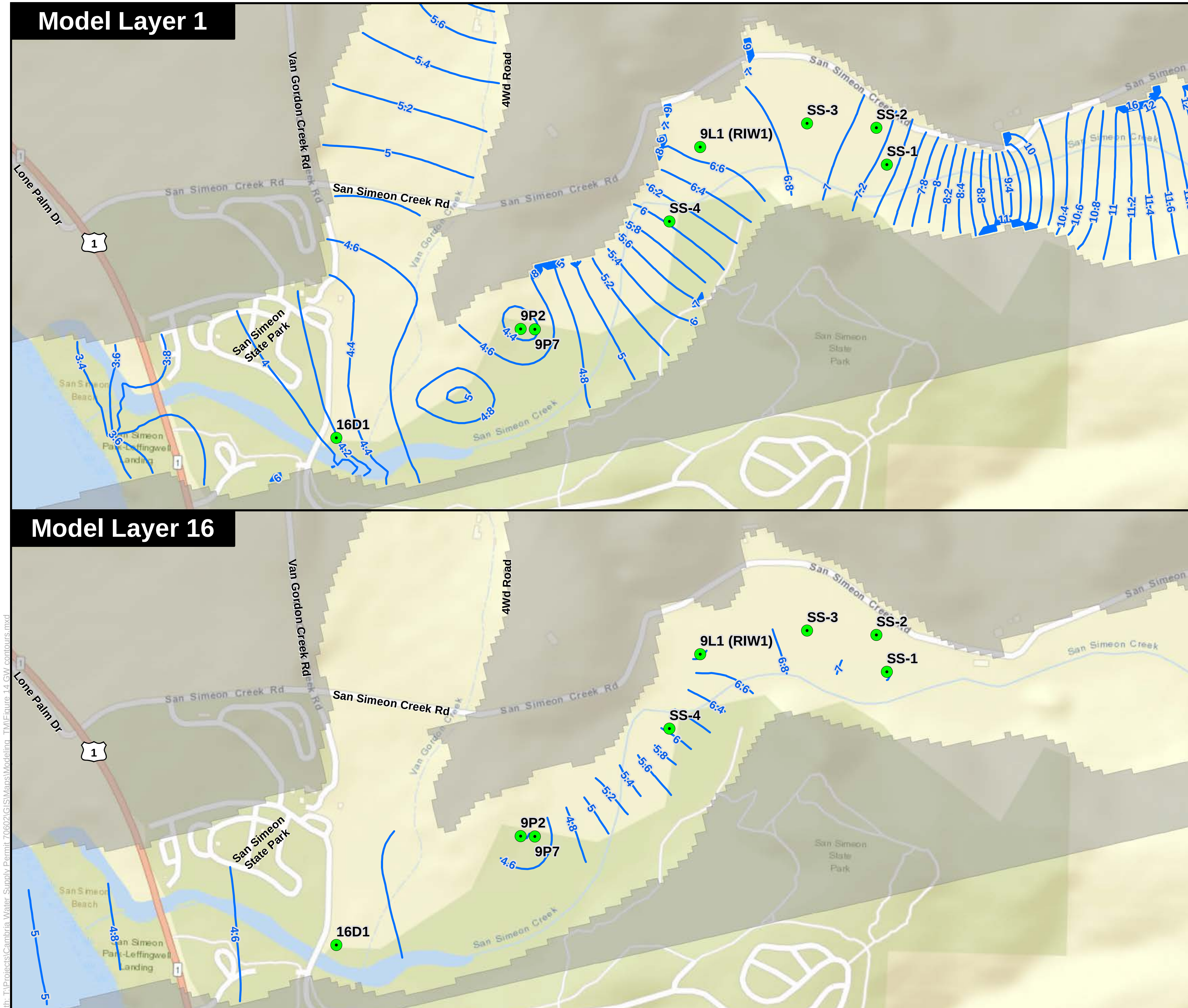
Hydrograph Wells
Inactive Flow Cells

• Measured 2013-2014
Stage 4 + Warren
Stage 4 + WRF + Warren

March 2022

TODD GROUNDWATER

Figure 13
Simulated Well Hydrographs - Stage 4 with Increased Warren Pumping



Scenario: Stage 4 + WRF + Warren
November of Year 2

Hydrograph Wells
Groundwater Elevation (feet NAVD88)
Inactive Flow Cells

N

0 500
Feet

March 2022

TODD GROUNDWATER

Figure 14
Simulated Groundwater Elevations in Shallow and Deep Layers

Appendix C

Habitat Suitability Criteria

Table C-1. Habitat suitability criteria for steelhead fry (<6 cm) developed for the Big Sur River (Holmes et al. 2014).

Depth (ft)	Suitability	Velocity (ft/s)	Suitability	Depth (ft)	Suitability	Velocity (ft/s)	Suitability
0.00	0.00	0.00	0.89	1.48	0.31	1.41	0.17
0.04	0.00	0.04	0.92	1.52	0.30	1.44	0.15
0.08	0.69	0.07	0.95	1.56	0.28	1.48	0.14
0.11	0.74	0.11	0.97	1.60	0.26	1.52	0.13
0.15	0.78	0.14	0.99	1.63	0.24	1.55	0.12
0.19	0.83	0.18	1.00	1.67	0.23	1.59	0.11
0.23	0.86	0.22	1.00	1.71	0.21	1.62	0.10
0.27	0.90	0.25	1.00	1.75	0.20	1.66	0.09
0.30	0.93	0.29	0.99	1.79	0.18	1.70	0.09
0.34	0.95	0.32	0.98	1.82	0.17	1.73	0.08
0.38	0.97	0.36	0.96	1.86	0.16	1.77	0.07
0.42	0.99	0.40	0.94	1.90	0.15	1.80	0.07
0.46	1.00	0.43	0.91	1.94	0.14	1.84	0.06
0.49	1.00	0.47	0.88	1.98	0.13	1.88	0.05
0.53	1.00	0.51	0.85	2.01	0.12	1.91	0.05
0.57	0.99	0.54	0.82	2.05	0.11	1.95	0.05
0.61	0.98	0.58	0.78	2.09	0.10	1.99	0.04
0.65	0.96	0.61	0.74	2.13	0.09	2.02	0.04
0.68	0.94	0.65	0.71	2.17	0.09	2.06	0.03
0.72	0.91	0.69	0.67	2.20	0.08	2.09	0.03
0.76	0.88	0.72	0.63	2.24	0.07	2.13	0.03
0.80	0.85	0.76	0.60	2.28	0.07	2.17	0.02
0.84	0.82	0.79	0.56	2.32	0.06	2.20	0.02
0.87	0.79	0.83	0.52	2.36	0.06	2.24	0.02
0.91	0.75	0.87	0.49	2.39	0.05	2.27	0.02
0.95	0.72	0.90	0.46	2.43	0.05	2.31	0.02
0.99	0.68	0.94	0.43	2.47	0.04	2.35	0.01
1.03	0.65	0.97	0.40	2.51	0.04	2.38	0.01
1.06	0.61	1.01	0.37	2.55	0.04	2.42	0.01
1.10	0.58	1.05	0.35	2.58	0.03	2.45	0.01
1.14	0.55	1.08	0.32	2.62	0.03	2.49	0.01
1.18	0.51	1.12	0.30	2.66	0.03	2.53	0.01
1.22	0.49	1.16	0.28	2.70	0.03	2.56	0.01
1.25	0.46	1.19	0.26	2.74	0.02	2.60	0.01
1.29	0.43	1.23	0.24	2.77	0.02	2.64	0.01
1.33	0.40	1.26	0.22	2.81	0.02	2.67	0.01
1.37	0.38	1.30	0.21	2.85	0.02	2.71	0.00
1.41	0.36	1.34	0.19	2.89	0.02	2.74	0.00
1.44	0.34	1.37	0.18	2.93	0.02	2.78	0.00

Depth (ft)	Suitability	Velocity (ft/s)	Suitability
2.96	0.02	2.82	0.00
3.00	0.01	2.85	0.00
3.04	0.01	2.89	0.00
3.08	0.01	2.92	0.00
3.12	0.01	2.96	0.00
3.15	0.01	3.00	0.00
3.19	0.01	3.03	0.00
3.23	0.01	3.07	0.00
3.27	0.01	3.10	0.00
3.31	0.01	3.14	0.00
3.34	0.01	3.18	0.00
3.38	0.01	3.21	0.00
3.42	0.01	3.25	0.00
3.46	0.01	3.29	0.00
3.50	0.01	3.32	0.00
3.53	0.01	3.36	0.00
3.57	0.01	3.39	0.00
3.61	0.01	3.43	0.00
3.65	0.01	3.47	0.00
3.69	0.01	3.50	0.00
3.72	0.01	3.54	0.00
3.76	0.01	3.57	0.00
3.80	0.01	3.61	0.00
3.81	0.00		

Table C-2. Habitat suitability criteria for steelhead juveniles (6–9 cm and 10–15 cm) developed for the Big Sur River (Holmes et al. 2014).

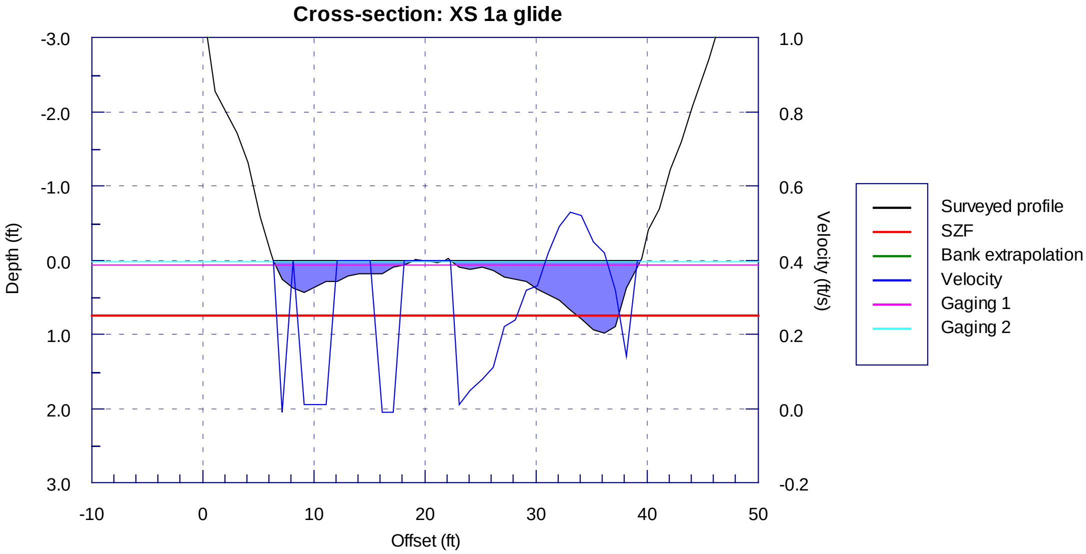
Steelhead Juvenile 6–9 cm				Steelhead Juvenile 10–15 cm			
Depth (ft)	Suitability	Velocity (ft/s)	Suitability	Depth (ft)	Suitability	Velocity (ft/s)	Suitability
0.00	0.00	0.00	0.48	0.00	0.00	0.00	0.48
0.05	0.00	0.05	0.53	0.05	0.00	0.05	0.53
0.10	0.00	0.11	0.57	0.10	0.00	0.11	0.57
0.14	0.00	0.16	0.61	0.15	0.00	0.16	0.61
0.19	0.00	0.21	0.65	0.20	0.00	0.21	0.65
0.24	0.00	0.27	0.70	0.24	0.00	0.27	0.70
0.29	0.00	0.32	0.74	0.29	0.00	0.32	0.74
0.33	0.38	0.38	0.77	0.34	0.00	0.38	0.77
0.38	0.43	0.43	0.81	0.39	0.00	0.43	0.81
0.43	0.47	0.48	0.84	0.44	0.00	0.48	0.84
0.47	0.52	0.54	0.88	0.49	0.00	0.54	0.88
0.52	0.56	0.59	0.90	0.54	0.00	0.59	0.90
0.57	0.61	0.64	0.93	0.59	0.40	0.64	0.93
0.62	0.65	0.70	0.95	0.62	0.46	0.70	0.95
0.67	0.70	0.75	0.97	0.67	0.51	0.75	0.97
0.71	0.74	0.80	0.98	0.71	0.55	0.80	0.98
0.76	0.78	0.86	0.99	0.76	0.60	0.86	0.99
0.81	0.82	0.91	1.00	0.81	0.64	0.91	1.00
0.85	0.86	0.96	1.00	0.85	0.68	0.96	1.00
0.90	0.89	1.00	1.00	0.90	0.73	1.00	1.00
0.95	0.92	1.05	1.00	0.95	0.77	1.05	1.00
1.00	0.94	1.10	1.00	1.00	0.80	1.10	1.00
1.04	0.96	1.15	1.00	1.04	0.84	1.15	1.00
1.09	0.98	1.21	1.00	1.09	0.87	1.21	1.00
1.14	0.99	1.26	1.00	1.14	0.90	1.26	1.00
1.19	1.00	1.31	1.00	1.19	0.93	1.31	1.00
1.24	1.00	1.36	1.00	1.24	0.95	1.36	1.00
1.25	1.00	1.41	1.00	1.28	0.97	1.41	1.00
1.29	1.00	1.47	1.00	1.33	0.98	1.47	1.00
1.33	1.00	1.52	0.99	1.38	0.99	1.52	0.99
1.38	1.00	1.57	0.98	1.43	1.00	1.57	0.98
1.42	1.00	1.62	0.97	1.47	1.00	1.62	0.97
1.46	1.00	1.68	0.95	1.52	1.00	1.68	0.95
1.50	1.00	1.73	0.94	1.57	1.00	1.73	0.94
1.55	0.99	1.78	0.92	1.62	1.00	1.78	0.92
1.59	0.99	1.83	0.89	1.67	1.00	1.83	0.89
1.63	0.98	1.89	0.87	1.72	0.99	1.89	0.87
1.68	0.96	1.94	0.84	1.76	0.98	1.94	0.84

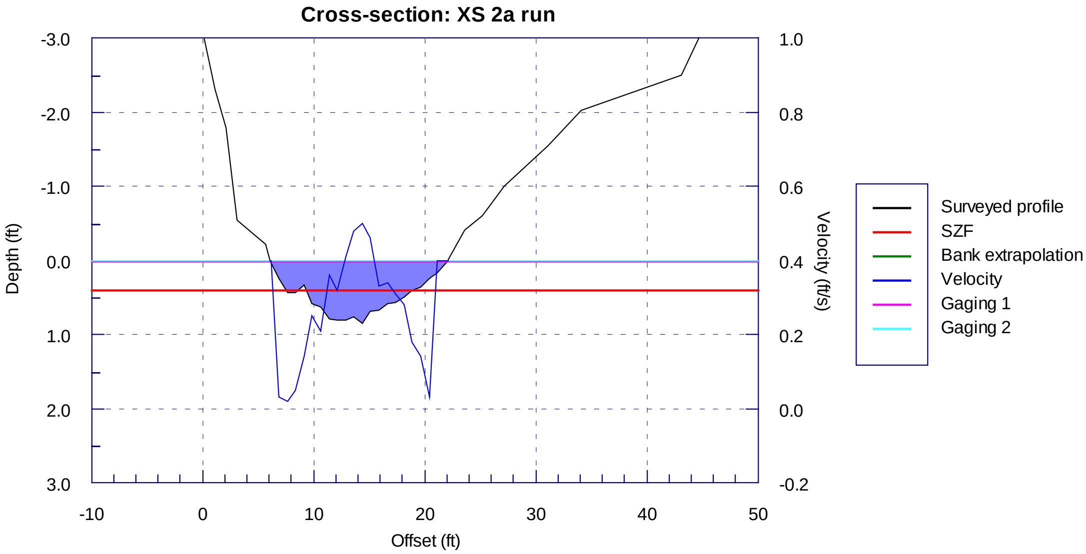
Steelhead Juvenile 6–9 cm				Steelhead Juvenile 10–15 cm			
Depth (ft)	**Suitability**	**Velocity (ft/s)**	**Suitability**	**Depth (ft)**	**Suitability**	**Velocity (ft/s)**	**Suitability**
1.72	0.94	1.99	0.81	1.81	0.97	1.99	0.81
1.76	0.92	2.04	0.78	1.86	0.95	2.04	0.78
1.81	0.90	2.10	0.74	1.91	0.93	2.10	0.74
1.85	0.88	2.15	0.71	1.96	0.91	2.15	0.71
1.89	0.85	2.20	0.68	2.01	0.89	2.20	0.68
1.93	0.82	2.25	0.64	2.06	0.86	2.25	0.64
1.98	0.79	2.31	0.61	2.11	0.83	2.31	0.61
2.02	0.76	2.36	0.57	2.16	0.80	2.36	0.57
2.06	0.72	2.41	0.54	2.21	0.77	2.41	0.54
2.11	0.69	2.46	0.50	2.25	0.74	2.46	0.50
2.15	0.66	2.52	0.47	2.30	0.71	2.52	0.47
2.19	0.63	2.57	0.44	2.35	0.68	2.57	0.44
2.24	0.60	2.62	0.41	2.40	0.65	2.62	0.41
2.28	0.57	2.67	0.38	2.45	0.62	2.67	0.38
2.32	0.54	2.72	0.35	2.50	0.58	2.72	0.35
2.36	0.51	2.78	0.32	2.55	0.55	2.78	0.32
2.41	0.48	2.83	0.30	2.60	0.52	2.83	0.30
2.45	0.46	2.88	0.27	2.65	0.50	2.88	0.27
2.49	0.43	2.93	0.25	2.70	0.47	2.93	0.25
2.54	0.41	2.99	0.23	2.74	0.44	2.99	0.23
2.58	0.39	3.04	0.21	2.79	0.42	3.04	0.21
2.62	0.37	3.09	0.19	2.84	0.39	3.09	0.19
2.67	0.36	3.14	0.17	2.89	0.37	3.14	0.17
2.71	0.34	3.20	0.16	2.94	0.35	3.20	0.16
2.75	0.33	3.25	0.14	2.99	0.33	3.25	0.14
2.79	0.32	3.30	0.13	3.04	0.31	3.30	0.13
2.84	0.31	3.35	0.12	3.09	0.30	3.35	0.12
2.88	0.30	3.41	0.11	3.14	0.28	3.41	0.11
2.92	0.29	3.46	0.10	3.19	0.27	3.46	0.10
2.97	0.28	3.51	0.09	3.23	0.25	3.51	0.09
3.01	0.27	3.56	0.08	3.28	0.24	3.56	0.08
3.05	0.26	3.62	0.07	3.33	0.23	3.62	0.07
3.10	0.26	3.67	0.06	3.38	0.21	3.67	0.06
3.14	0.25	3.72	0.06	3.43	0.20	3.72	0.06
3.18	0.25	3.77	0.05	3.48	0.19	3.77	0.05
3.22	0.24	3.83	0.05	3.53	0.18	3.83	0.05
3.27	0.23	3.88	0.04	3.58	0.17	3.88	0.04
3.31	0.23	3.93	0.04	3.63	0.16	3.93	0.04
3.35	0.22	3.98	0.03	3.68	0.15	3.98	0.03
3.40	0.22	4.03	0.03	3.72	0.14	4.03	0.03

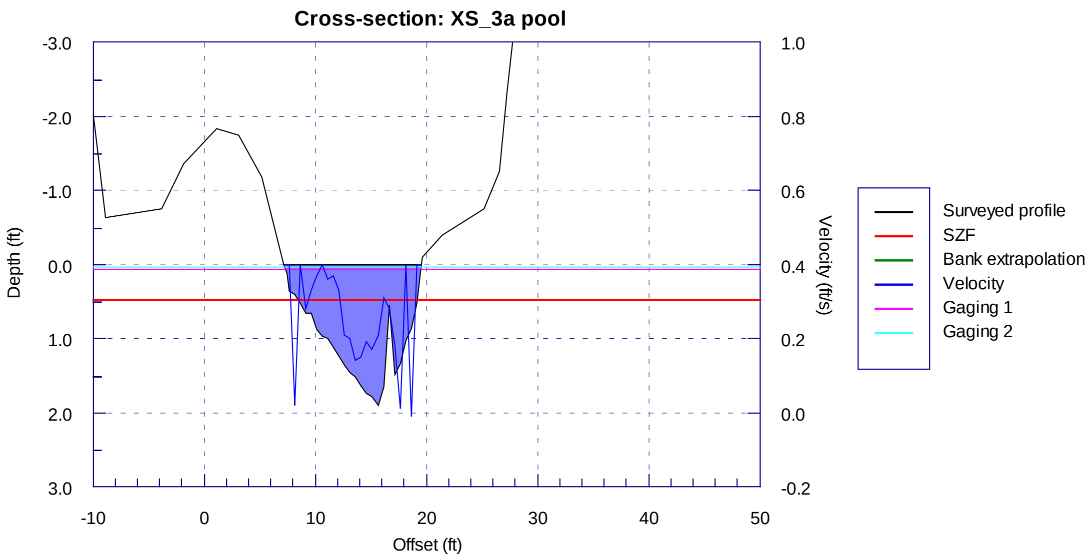
Steelhead Juvenile 6–9 cm				Steelhead Juvenile 10–15 cm			
Depth (ft)	**Suitability**	**Velocity (ft/s)**	**Suitability**	**Depth (ft)**	**Suitability**	**Velocity (ft/s)**	**Suitability**
3.44	0.21	4.09	0.03	3.77	0.13	4.09	0.03
3.48	0.21	4.14	0.02	3.82	0.13	4.14	0.02
3.53	0.21	4.19	0.02	3.87	0.12	4.19	0.02
3.57	0.20	4.24	0.02	3.92	0.11	4.24	0.02
3.61	0.20	4.30	0.02	3.97	0.10	4.30	0.02
3.65	0.19	4.35	0.02	4.02	0.10	4.35	0.02
3.70	0.18	4.40	0.02	4.07	0.09	4.40	0.02
3.74	0.18	4.45	0.01	4.12	0.08	4.45	0.01
3.78	0.17	4.51	0.01	4.17	0.08	4.51	0.01
3.83	0.17	4.56	0.01	4.21	0.07	4.56	0.01
3.87	0.16	4.61	0.01	4.26	0.06	4.61	0.01
3.91	0.15	4.66	0.01	4.31	0.06	4.66	0.01
3.96	0.15	4.72	0.01	4.36	0.05	4.72	0.01
4.00	0.14	4.77	0.01	4.41	0.05	4.77	0.01
4.04	0.13	4.82	0.01	4.46	0.05	4.82	0.01
4.08	0.13	4.87	0.01	4.51	0.04	4.87	0.01
4.13	0.12	4.93	0.01	4.56	0.04	4.93	0.01
4.17	0.11	4.98	0.01	4.61	0.03	4.98	0.01
4.21	0.11	5.03	0.01	4.66	0.03	5.03	0.01
4.26	0.10	5.08	0.01	4.70	0.03	5.08	0.01
4.30	0.09	5.14	0.01	4.75	0.02	5.14	0.01
		5.19	0.01	4.80	0.02	5.19	0.01
		5.24	0.01	4.85	0.02	5.24	0.01
		5.25	0.00	4.90	0.02	5.25	0.00

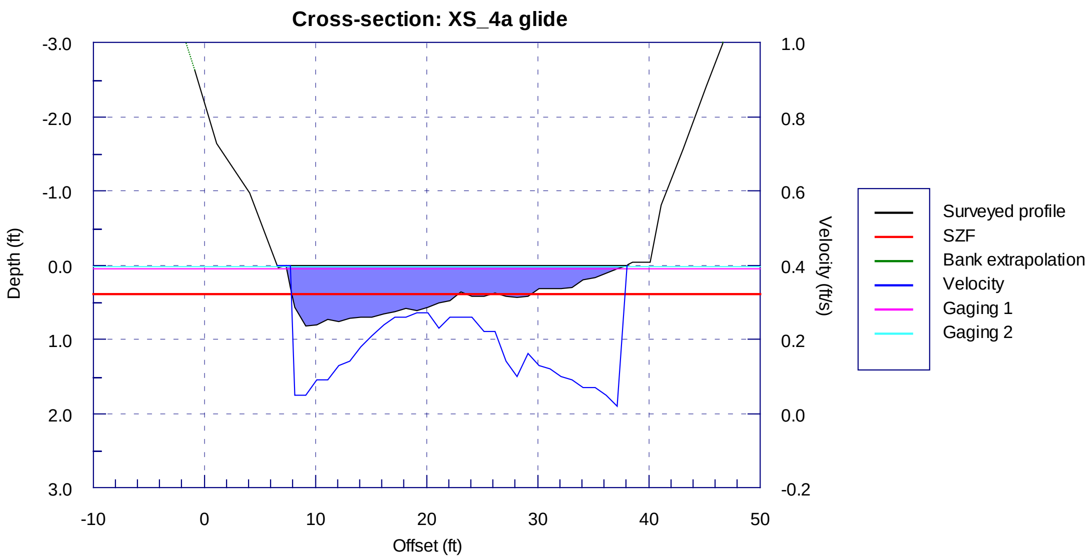
Appendix D

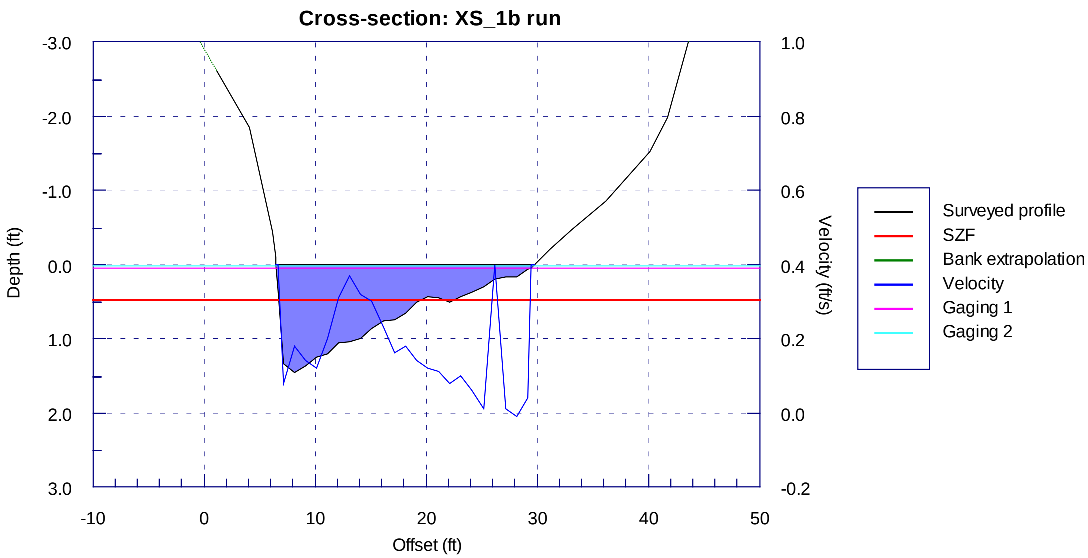
Transect Profiles Showing Calibration Flows

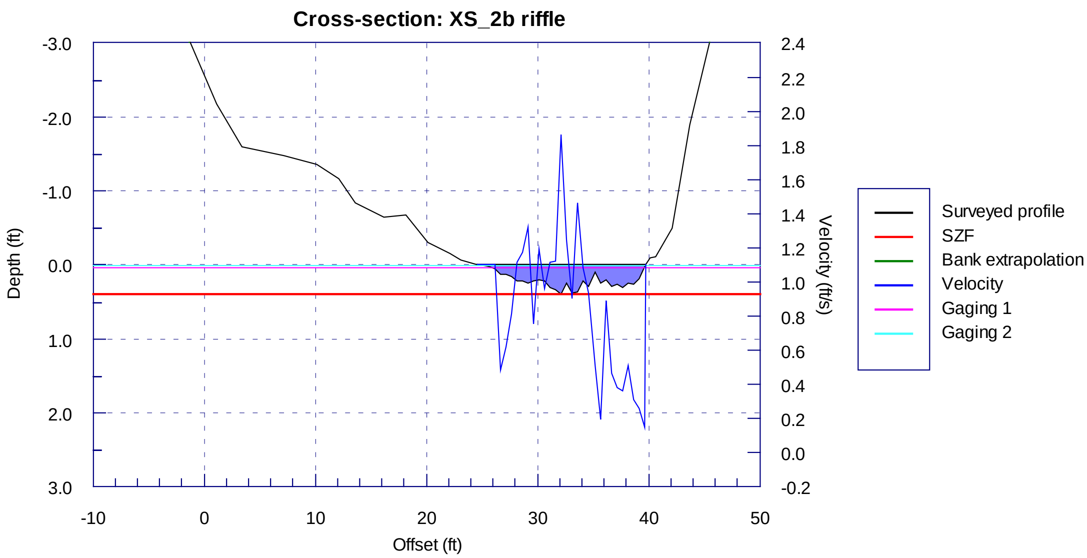

Cross-section: XS 1a glide
Depth (ft)
Velocity (ft/s)
Offset (ft)
-3.0
-2.0
-1.0
0.0
1.0
2.0
3.0
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
-10
0
10
20
30
40
50
Surveyed profile
SZF
Bank extrapolation
Velocity
Gaging 1
Gaging 2

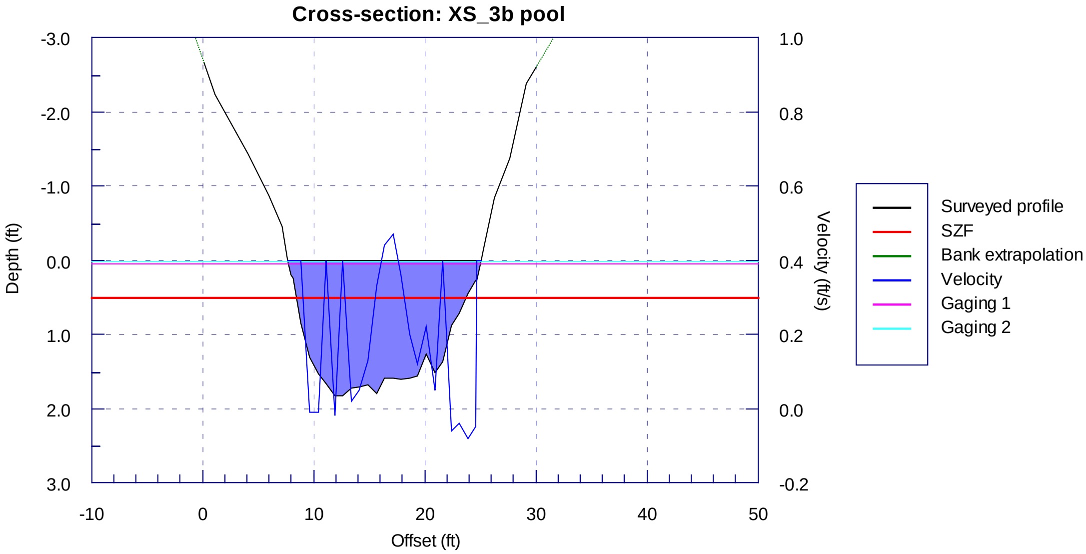

Cross-section: XS 2a run
Depth (ft)
Velocity (ft/s)
Offset (ft)
-3.0
-2.0
-1.0
0.0
1.0
2.0
3.0
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
-10
0
10
20
30
40
50
Surveyed profile
SZF
Bank extrapolation
Velocity
Gaging 1
Gaging 2

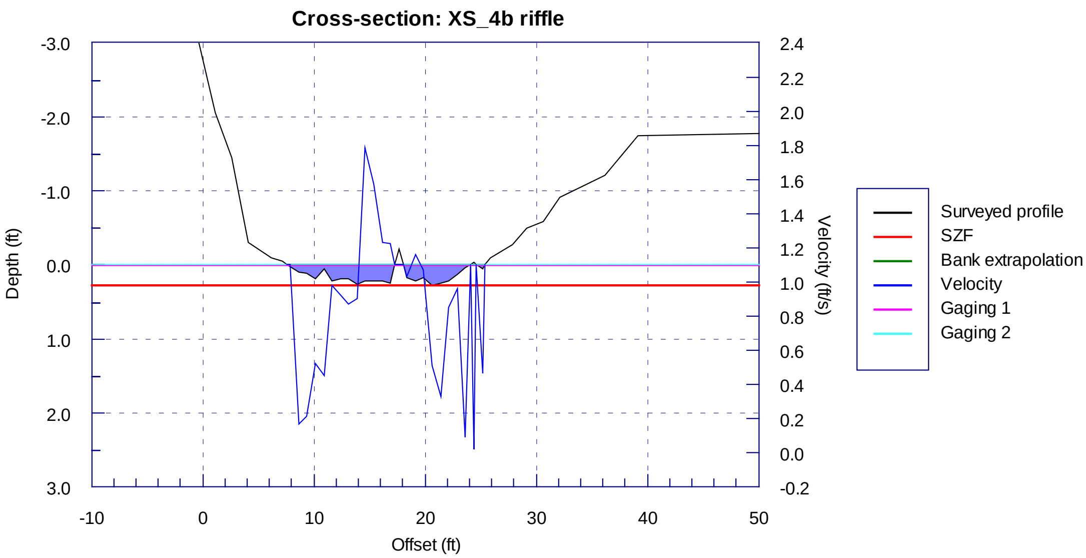

Cross-section: XS_3a pool
Depth (ft)
Velocity (ft/s)
Offset (ft)
-3.0
-2.0
-1.0
0.0
1.0
2.0
3.0
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
-10
0
10
20
30
40
50
Surveyed profile
SZF
Bank extrapolation
Velocity
Gaging 1
Gaging 2

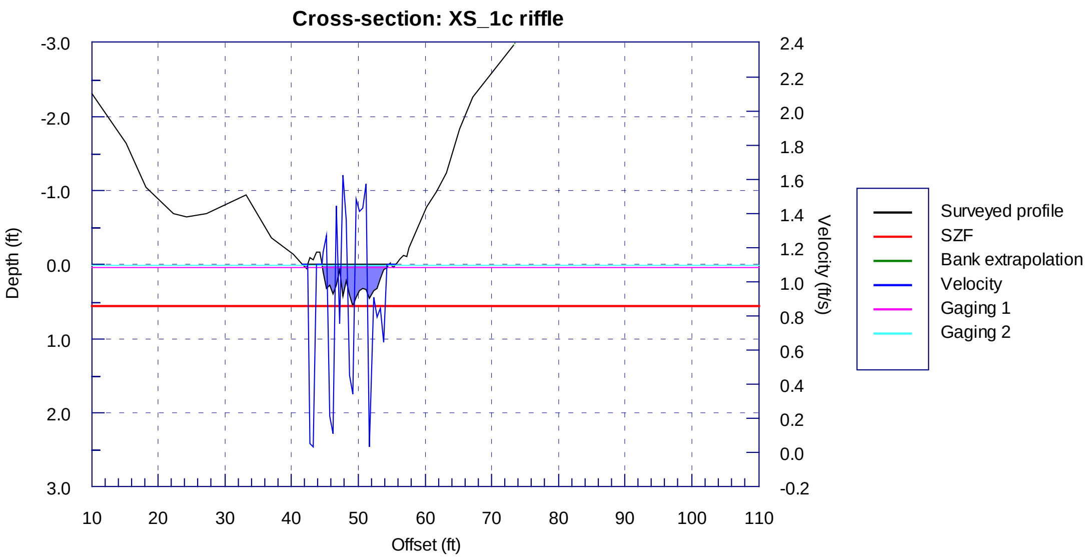

Cross-section: XS_4a glide
Depth (ft)
Velocity (ft/s)
Offset (ft)
-3.0
-2.0
-1.0
0.0
1.0
2.0
3.0
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
-10
0
10
20
30
40
50
Surveyed profile
SZF
Bank extrapolation
Velocity
Gaging 1
Gaging 2

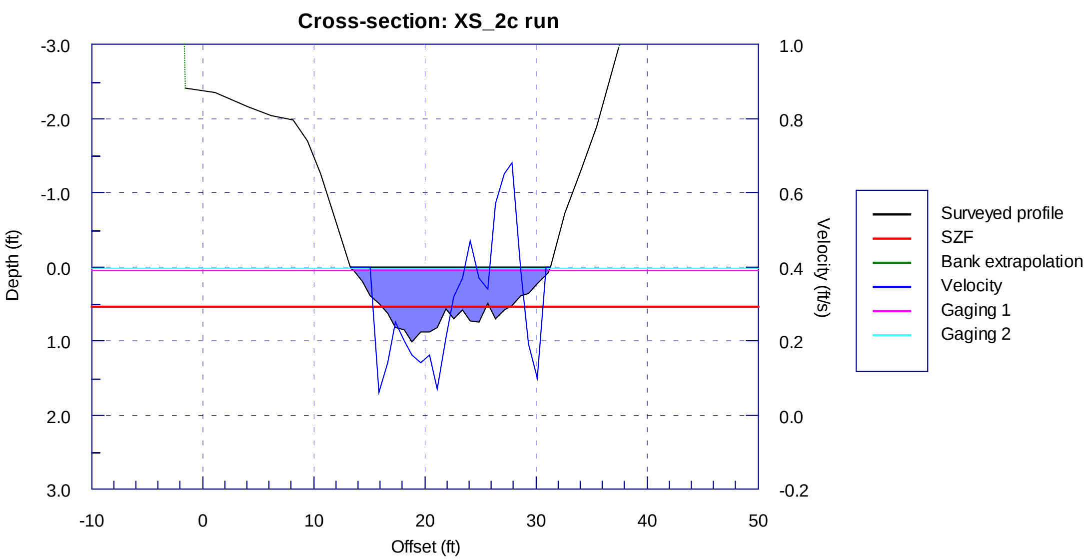

Cross-section: XS_1b run
Depth (ft)
Velocity (ft/s)
Offset (ft)
-3.0
-2.0
-1.0
0.0
1.0
2.0
3.0
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
-10
0
10
20
30
40
50
Surveyed profile
SZF
Bank extrapolation
Velocity
Gaging 1
Gaging 2

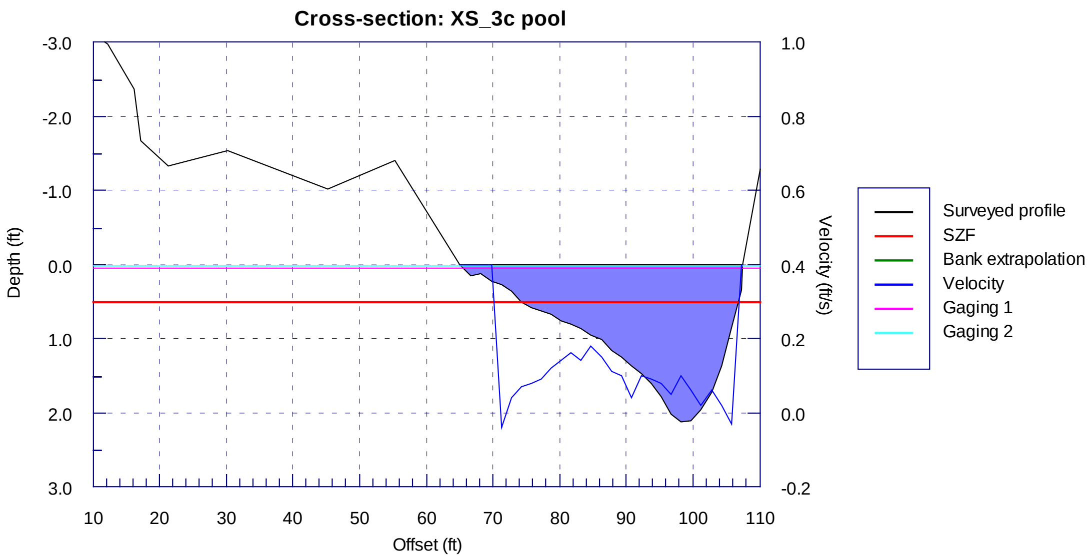

Cross-section: XS_2b riffle
Depth (ft)
Velocity (ft/s)
Offset (ft)
-3.0
-2.0
-1.0
0.0
1.0
2.0
3.0
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
-10
0
10
20
30
40
50
Surveyed profile
SZF
Bank extrapolation
Velocity
Gaging 1
Gaging 2


Cross-section: XS_3b pool
Depth (ft)
Velocity (ft/s)
Offset (ft)
-3.0
-2.0
-1.0
0.0
1.0
2.0
3.0
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
-10
0
10
20
30
40
50
Surveyed profile
SZF
Bank extrapolation
Velocity
Gaging 1
Gaging 2


Cross-section: XS_4b riffle
Depth (ft)
Velocity (ft/s)
Offset (ft)
-3.0
-2.0
-1.0
0.0
1.0
2.0
3.0
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
-10
0
10
20
30
40
50
Surveyed profile
SZF
Bank extrapolation
Velocity
Gaging 1
Gaging 2

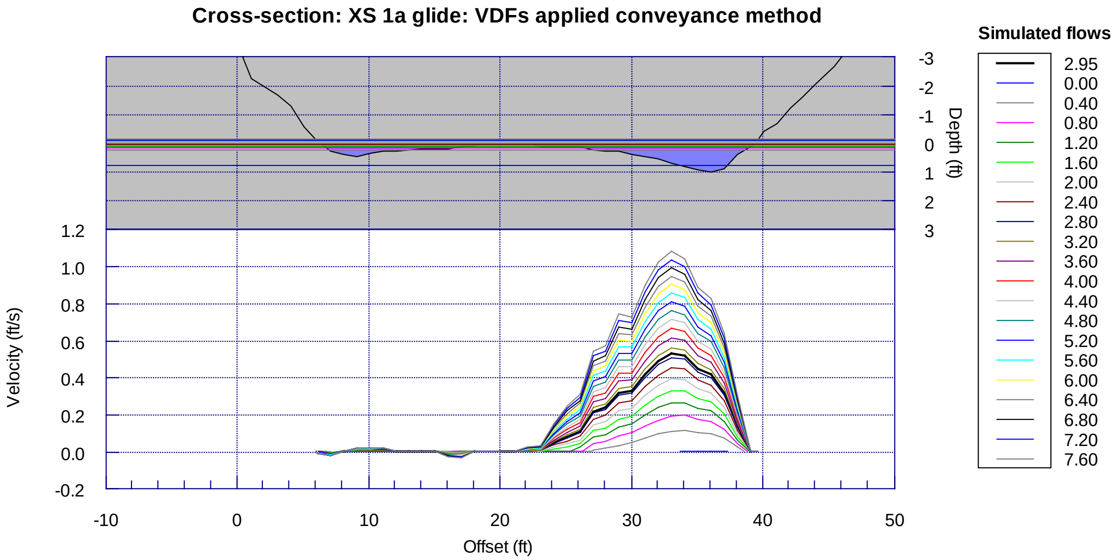

Cross-section: XS_1c riffle
Depth (ft)
-3.0
-2.0
-1.0
0.0
1.0
2.0
3.0
Velocity (ft/s)
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
10
20
30
40
50
60
70
80
90
100
110
Offset (ft)
Surveyed profile
SZF
Bank extrapolation
Velocity
Gaging 1
Gaging 2

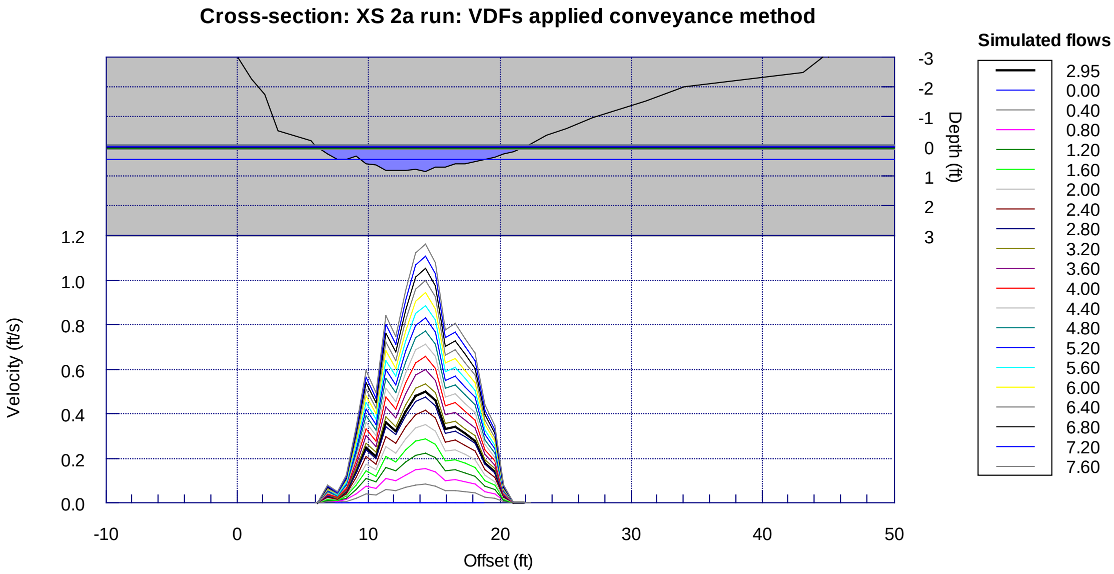

Cross-section: XS_2c run
Depth (ft)
-3.0
-2.0
-1.0
0.0
1.0
2.0
3.0
Velocity (ft/s)
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
-10
0
10
20
30
40
50
Offset (ft)
Surveyed profile
SZF
Bank extrapolation
Velocity
Gaging 1
Gaging 2


Cross-section: XS_3c pool
Depth (ft)
-3.0
-2.0
-1.0
0.0
1.0
2.0
3.0
Velocity (ft/s)
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
10
20
30
40
50
60
70
80
90
100
110
Offset (ft)
Surveyed profile
SZF
Bank extrapolation
Velocity
Gaging 1
Gaging 2

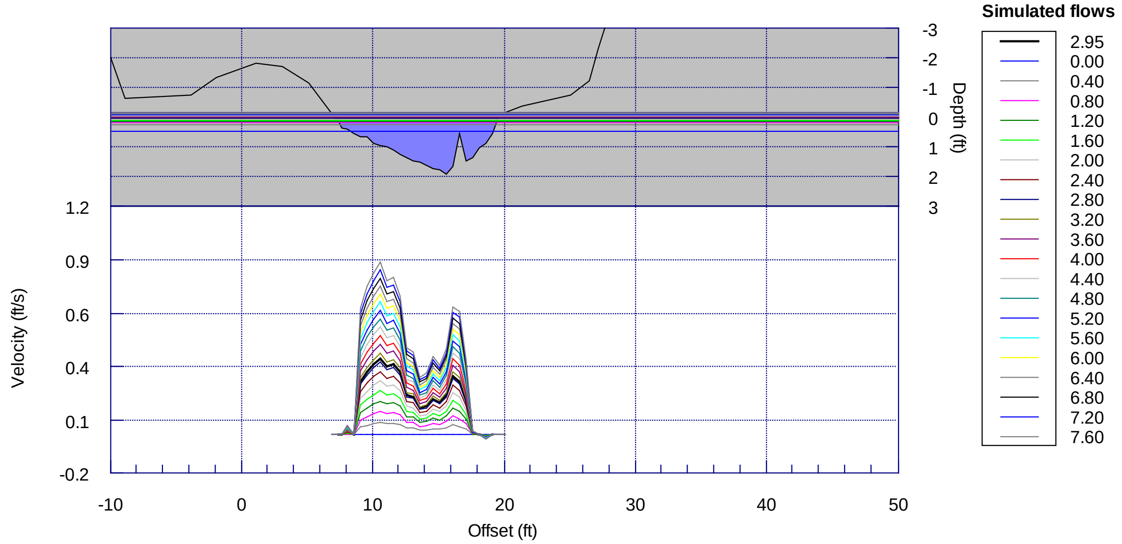
Appendix E

Transect Velocity Distributions

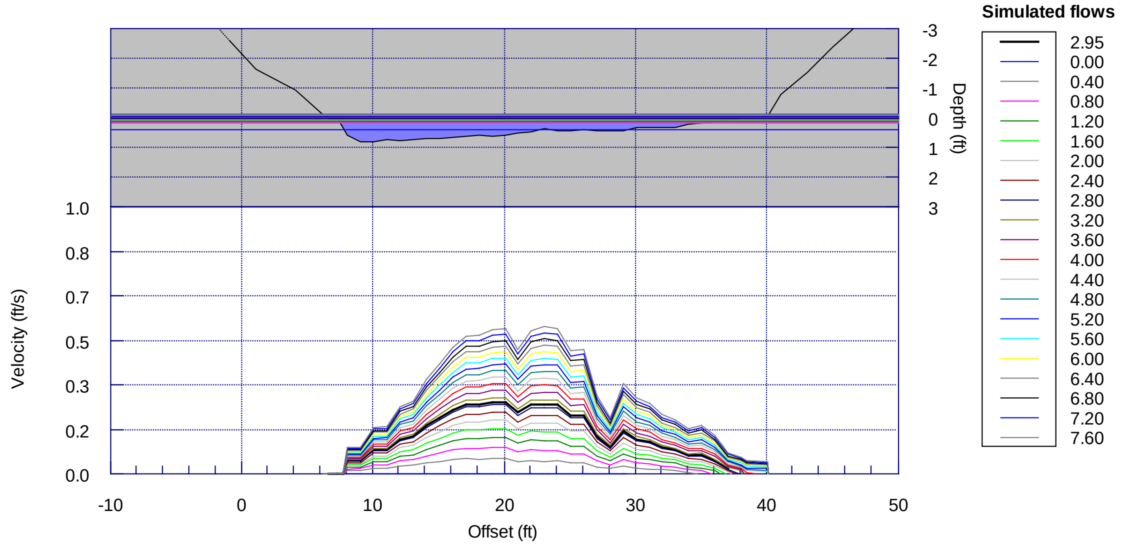

Cross-section: XS 1a glide: VDFs applied conveyance method
Simulated flows
2.95
0.00
0.40
0.80
1.20
1.60
2.00
2.40
2.80
3.20
3.60
4.00
4.40
4.80
5.20
5.60
6.00
6.40
6.80
7.20
7.60
Depth (ft)
Velocity (ft/s)
Offset (ft)

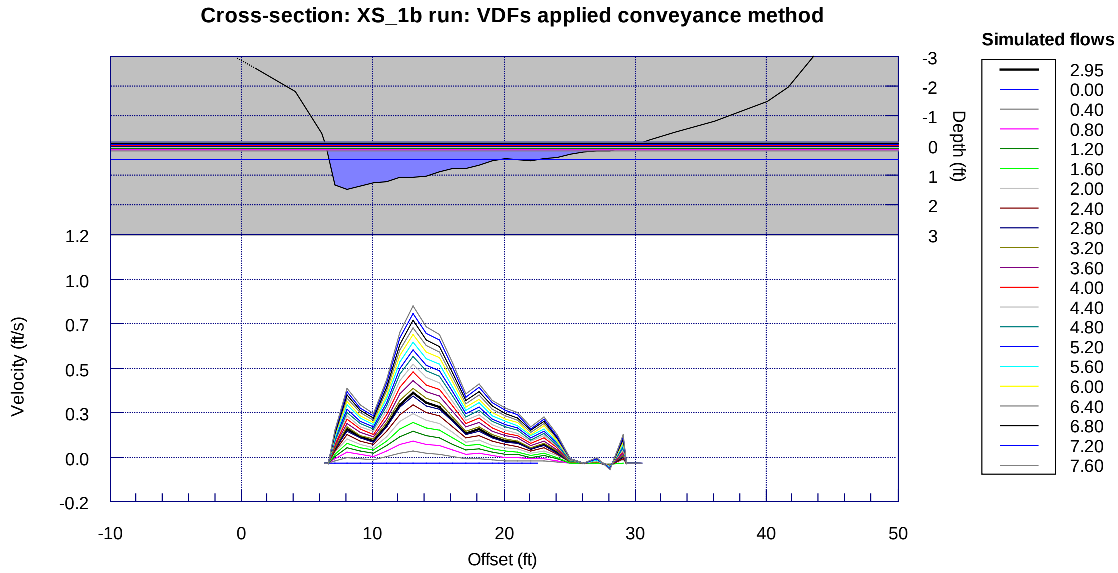

Cross-section: XS 2a run: VDFs applied conveyance method
Simulated flows
2.95
0.00
0.40
0.80
1.20
1.60
2.00
2.40
2.80
3.20
3.60
4.00
4.40
4.80
5.20
5.60
6.00
6.40
6.80
7.20
7.60
Depth (ft)
Velocity (ft/s)
Offset (ft)

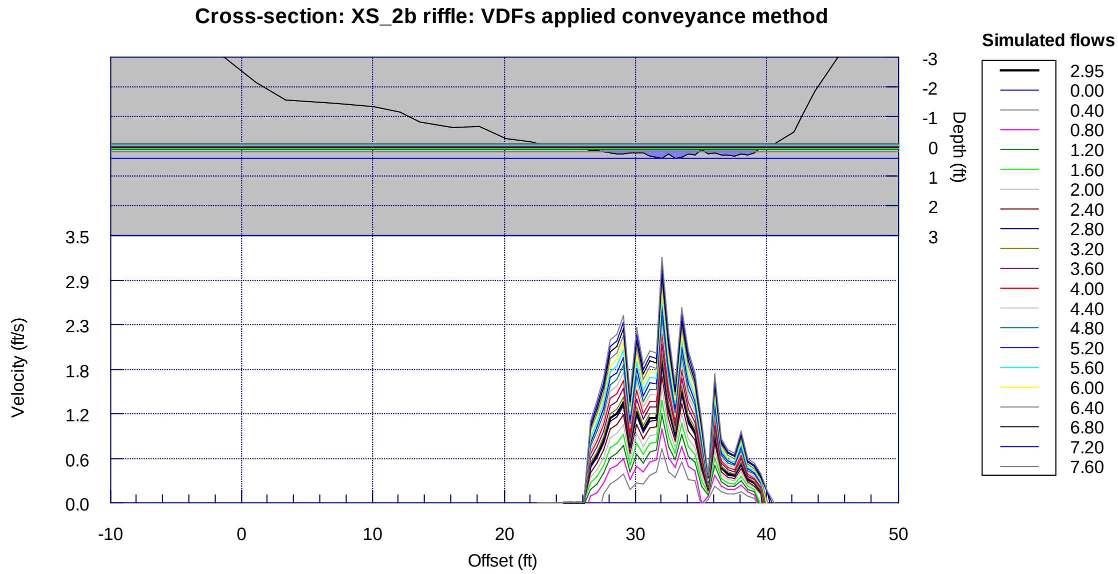
Cross-section: XS_3a pool: VDFs applied conveyance method

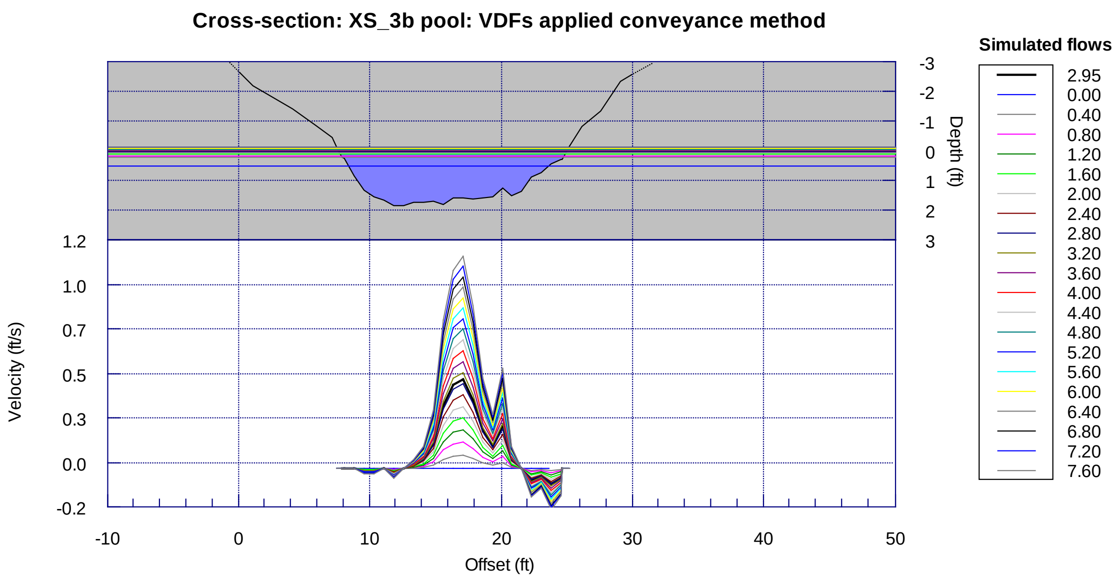


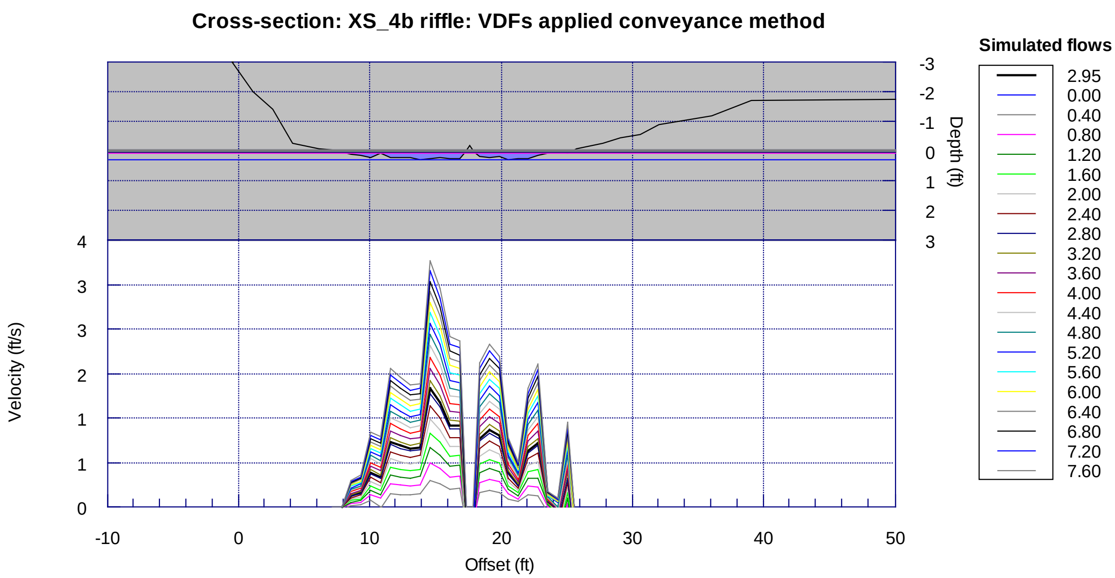
Cross-section: XS_4a glide: VDFs applied conveyance method

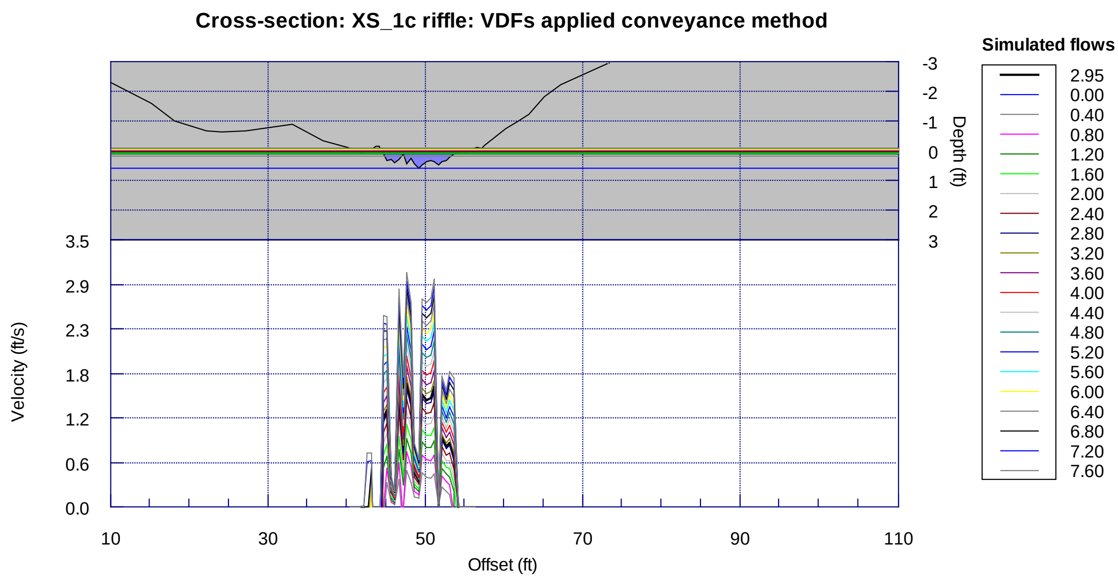


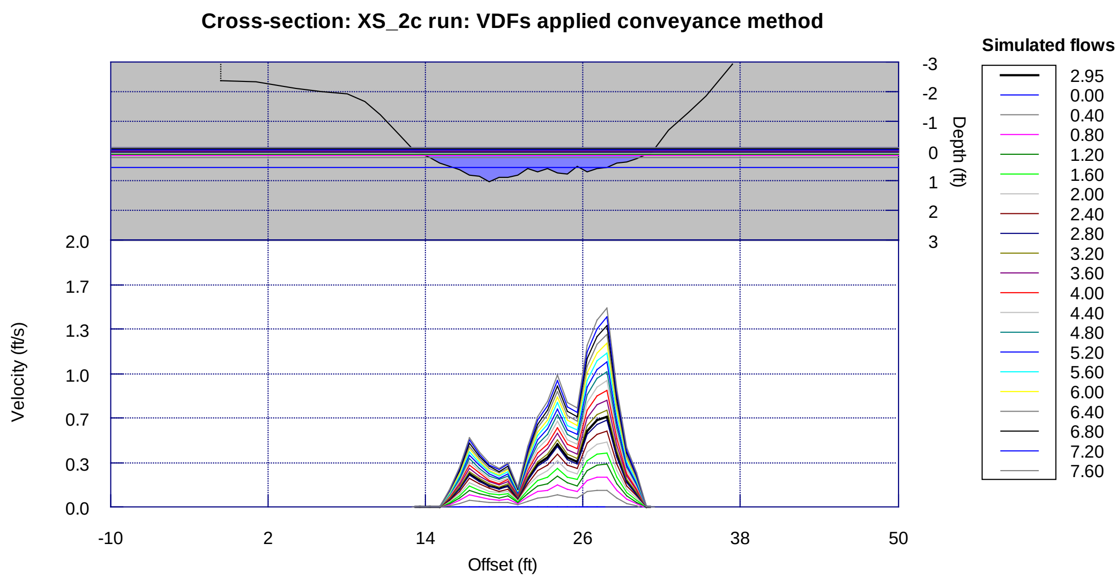

Cross-section: XS_1b run: VDFs applied conveyance method
Simulated flows
2.95
0.00
0.40
0.80
1.20
1.60
2.00
2.40
2.80
3.20
3.60
4.00
4.40
4.80
5.20
5.60
6.00
6.40
6.80
7.20
7.60
Depth (ft)
Velocity (ft/s)
Offset (ft)

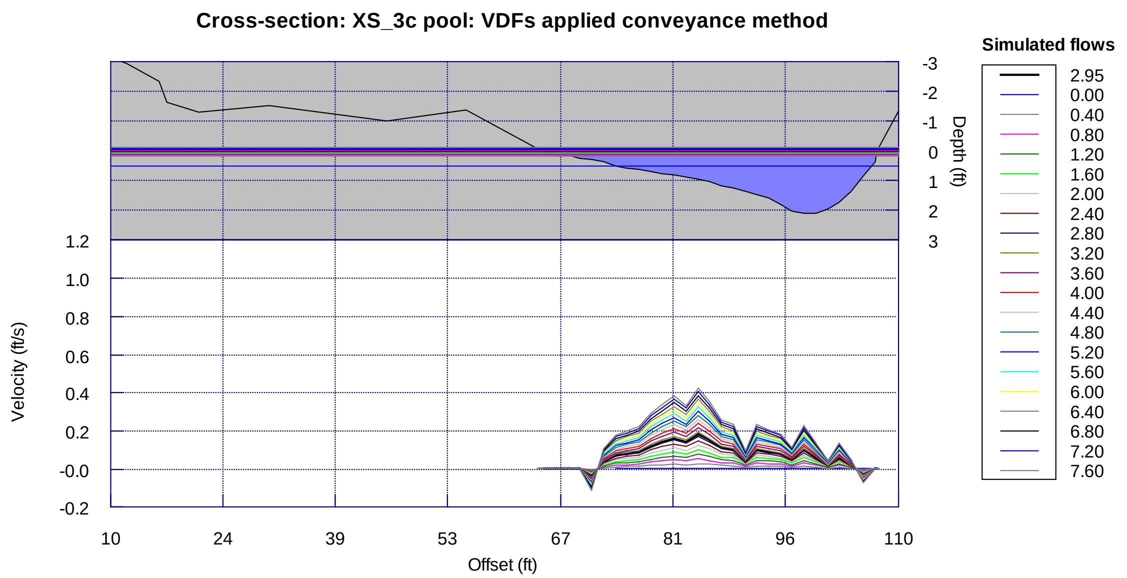

Cross-section: XS_2b riffle: VDFs applied conveyance method
Simulated flows
2.95
0.00
0.40
0.80
1.20
1.60
2.00
2.40
2.80
3.20
3.60
4.00
4.40
4.80
5.20
5.60
6.00
6.40
6.80
7.20
7.60
Depth (ft)
Velocity (ft/s)
Offset (ft)


Cross-section: XS_3b pool: VDFs applied conveyance method
Simulated flows
2.95
0.00
0.40
0.80
1.20
1.60
2.00
2.40
2.80
3.20
3.60
4.00
4.40
4.80
5.20
5.60
6.00
6.40
6.80
7.20
7.60
Depth (ft)
-3
-2
-1
0
1
2
3
Velocity (ft/s)
1.2
1.0
0.7
0.5
0.3
0.0
-0.2
-10
0
10
20
30
40
50
Offset (ft)


Cross-section: XS_4b riffle: VDFs applied conveyance method
Simulated flows
2.95
0.00
0.40
0.80
1.20
1.60
2.00
2.40
2.80
3.20
3.60
4.00
4.40
4.80
5.20
5.60
6.00
6.40
6.80
7.20
7.60
Depth (ft)
-3
-2
-1
0
1
2
3
Velocity (ft/s)
4
3
3
2
1
1
0
-10
0
10
20
30
40
50
Offset (ft)


Cross-section: XS_1c riffle: VDFs applied conveyance method
Simulated flows
2.95
0.00
0.40
0.80
1.20
1.60
2.00
2.40
2.80
3.20
3.60
4.00
4.40
4.80
5.20
5.60
6.00
6.40
6.80
7.20
7.60
Depth (ft)
Velocity (ft/s)
Offset (ft)


Cross-section: XS_2c run: VDFs applied conveyance method
Simulated flows
2.95
0.00
0.40
0.80
1.20
1.60
2.00
2.40
2.80
3.20
3.60
4.00
4.40
4.80
5.20
5.60
6.00
6.40
6.80
7.20
7.60
Depth (ft)
Velocity (ft/s)
Offset (ft)


Cross-section: XS_3c pool: VDFs applied conveyance method
Simulated flows
2.95
0.00
0.40
0.80
1.20
1.60
2.00
2.40
2.80
3.20
3.60
4.00
4.40
4.80
5.20
5.60
6.00
6.40
6.80
7.20
7.60
Depth (ft)
-3
-2
-1
0
1
2
3
Velocity (ft/s)
1.2
1.0
0.8
0.6
0.4
0.2
-0.0
-0.2
10
24
39
53
67
81
96
110
Offset (ft)

Appendix F

Transect Photographs

Figure F-1. Transect 1A looking upstream at 2.95 cfs (a), 1.46 cfs (b), 0.52 cfs (c), and < 0.10 cfs (d).

Figure F-2. Transect 2A looking upstream at 2.95 cfs (a), 1.46 cfs (b), 0.52 cfs (c), and 0.00 cfs (d).

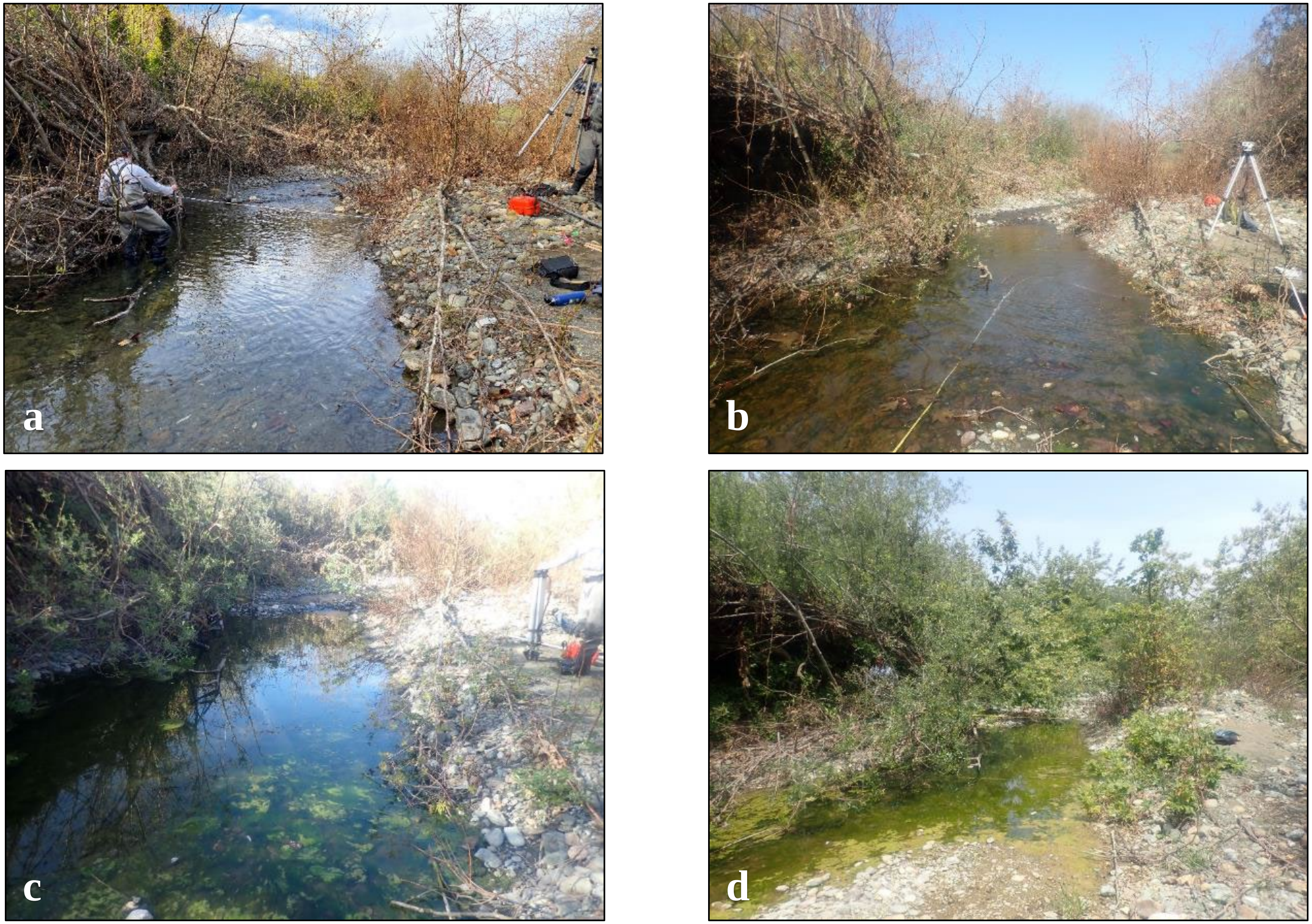


Figure F-3. Transect 3A looking upstream at 2.95 cfs (a), 1.46 cfs (b), 0.52 cfs (c), and < 0.10 cfs (d).

Figure F-4. Transect 4A looking upstream at 2.95 cfs (a), 1.46 cfs (b), 0.52 cfs (c), and 0.00 cfs (d).

Figure F-5. Transect 1B looking upstream at 2.95 cfs (a), 1.46 cfs (b), 0.52 cfs (c), and 0.00 cfs (d).

Figure F-6. Transect 2B looking upstream at 2.95 cfs (a), 1.46 cfs (b), 0.52 cfs (c), and 0.00 cfs (d).

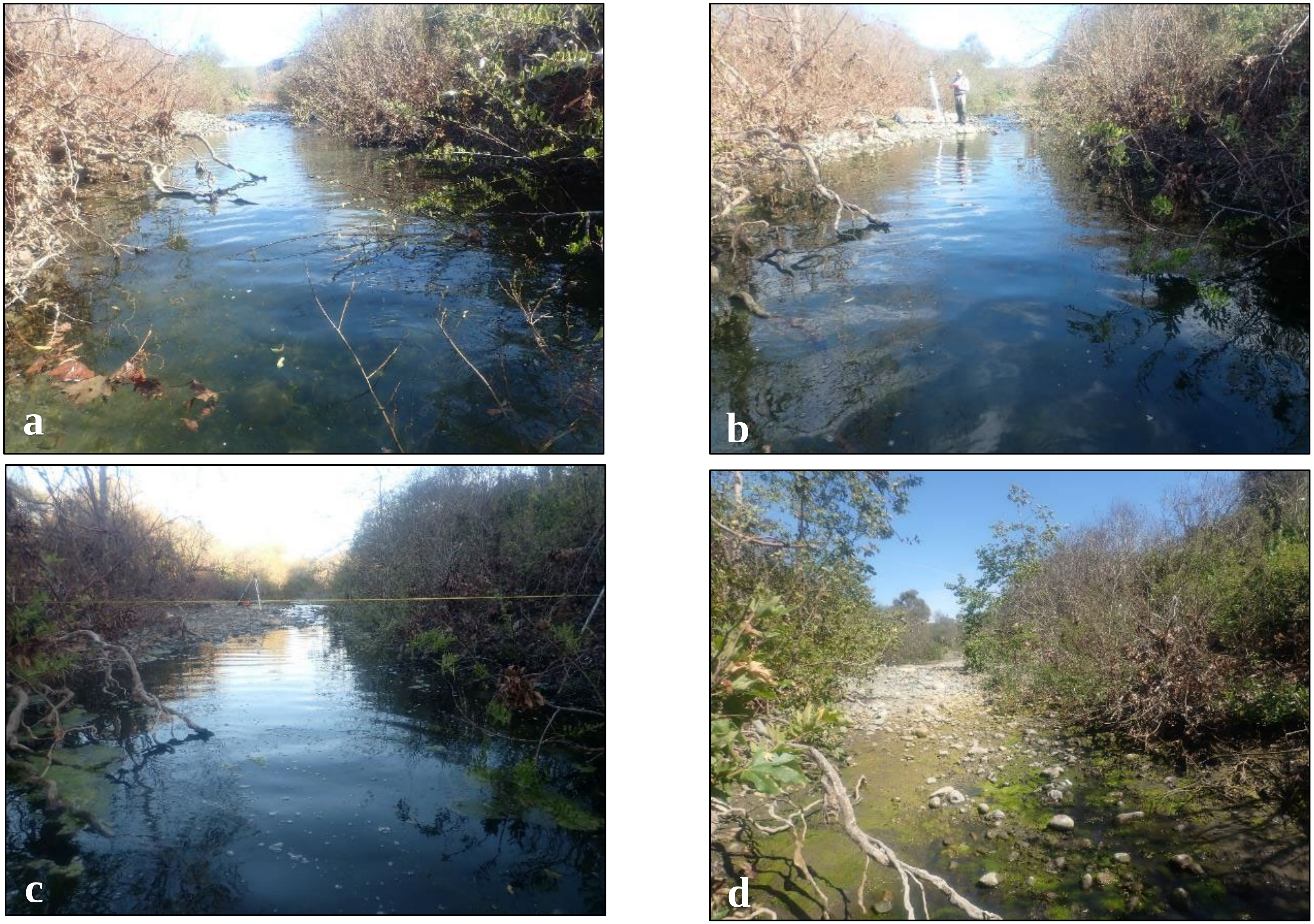


Figure F-7. Transect 3B looking upstream at 2.95 cfs (a), 1.46 cfs (b), 0.52 cfs (c), and 0.00 cfs (d).

Figure F-8. Transect 4B looking upstream at 2.95 cfs (a), 1.46 cfs (b), 0.52 cfs (c), and 0.00 cfs (d).

Figure F-9. Transect 1C looking upstream at 2.95 cfs (a), 1.46 cfs (b), 0.52 cfs (c), and 0.00 cfs (d).

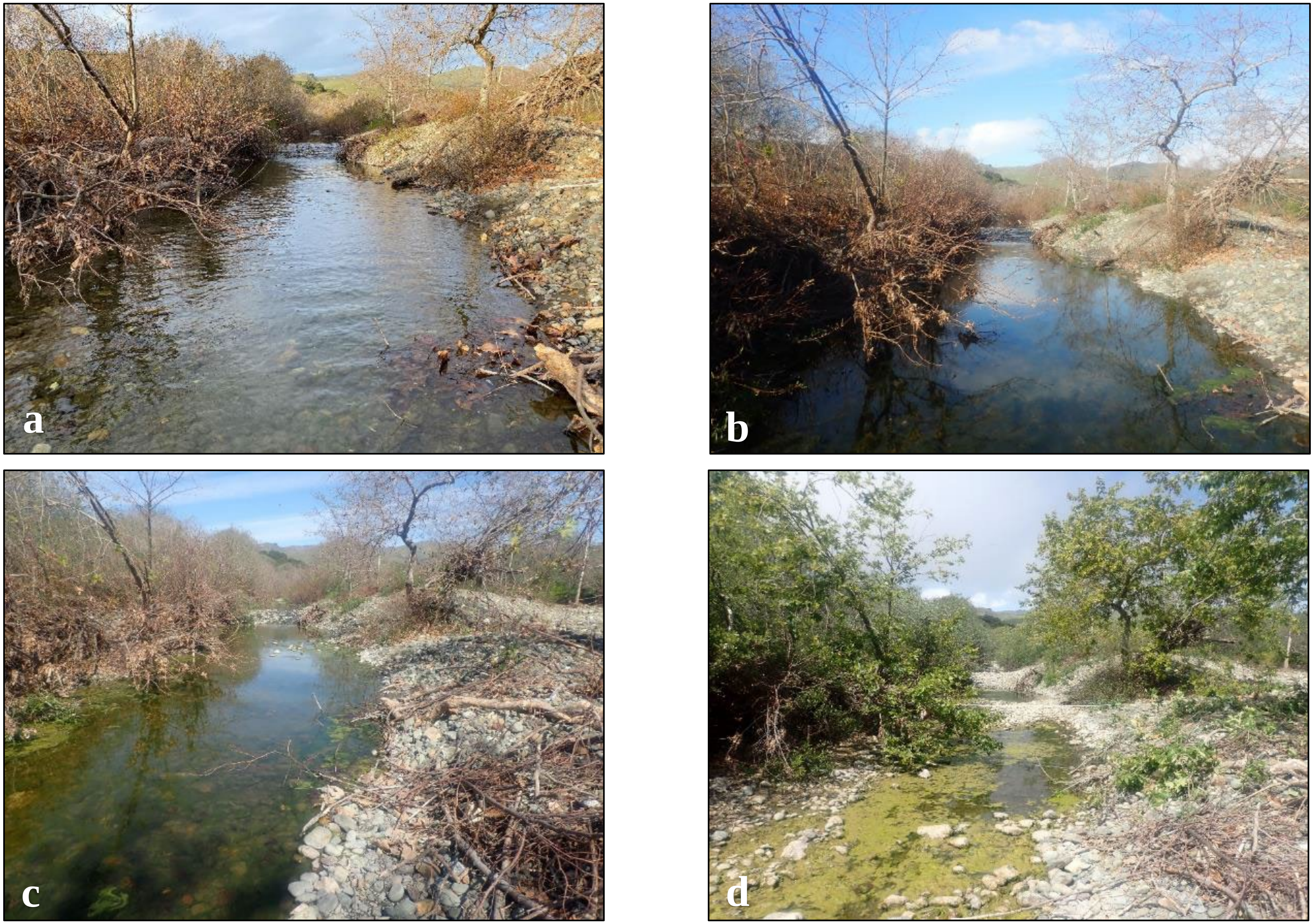


Figure F-10. Transect 2C looking upstream at 2.95 cfs (a), 1.46 cfs (b), 0.52 cfs (c), and 0.00 cfs (d).

Figure F-11. Transect 3C looking upstream at 2.95 cfs (a), 1.46 cfs (b), 0.52 cfs (c), and < 0.10 cfs (d).

Figure F-12. Transect 4C looking upstream at 2.95 cfs (a), 1.46 cfs (b) and 0.52 cfs (c).

Attachment 1

Recommendations Memo

Stillwater Sciences
895 Napa Ave., Suite B-3, Morro Bay, CA 93442
phone 805-570-7499

TECHNICAL MEMORANDUM

DATE:	August 21, 2024
TO:	James Green Cambria, Community Services District
FROM:	Stillwater Sciences
SUBJECT:	Recommendations for the Cambria Community Services District's Operations in the San Simeon Creek Basin

1 INTRODUCTION

The Cambria Community Services District (CCSD) contracted with Stillwater Sciences to conduct an instream flow study of lower San Simeon Creek (Task 1; Stillwater Sciences 2024) and Todd Groundwater to conduct groundwater modeling of the same area assessed for the instream flow study (Task 2; Todd Groundwater 2022). The goal of the instream flow study was to determine the amount of surface flow needed to support aquatic species, while the goal of the groundwater modeling study was to assess the influence of operating the Water Reclamation Facility (WRF) on groundwater conditions and effects on riparian and wetland habitat or surrounding agricultural activities under a range of scenarios. Results from both studies will be used to inform CCSD operations in the San Simeon Creek basin and to inform the Adaptive Management Plan for San Simeon Creek. This technical memorandum focuses on the analysis of surface flow conditions as they relate to special-status aquatic species and provides recommendations for CCSD's operations to be protective of sensitive species, including monitoring to help refine operational conditions and implementing measures to protect aquatic species. Recommendations for operation of the WRF and associated monitoring are provided in a separate guidance manual for use of Cambria Community Services District's water reclamation facility memorandum (Todd Groundwater 2023) because the WRF operates only when surface flows have ceased, so it does not influence surface flows that provide habitat for aquatic species.

Habitat conditions in lower San Simeon Creek—the lower 2.9 miles where the creek flow over the groundwater basin and streamflow is most likely to be influenced by CCSD's groundwater pumping—were assessed for their suitability for special-status aquatic species. Three sensitive species are known to occur in lower San Simeon Creek: steelhead (*Oncorhynchus mykiss*), tidewater goby (*Eucyclogobius newberryi*), and California Red-legged frog (CRLF; *Rana draytoni*). The Instream Flow Assessment used multiple methods to evaluate the potential influence of CCSD operations on sensitive aquatic species in lower San Simeon Creek as summarized in the following sections. Results from the Instream Flow Assessment were used to develop recommendations for CCSD operations to be protective of sensitive aquatic species in lower San Simeon Creek. Additional monitoring is also recommended to continue to direct CCSD operations to be protective of sensitive aquatic species.

2 ONE-DIMENSIONAL MODELING OF LOWER SAN SIMEON CREEK

The Incremental Flow Instream Flow Methodology (IFIM) was used to develop a 1D model to determine the relationship between streamflow and steelhead habitat in lower San Simeon Creek, while habitat conditions for CRLF and tidewater goby were assessed using qualitative habitat evaluations, as described in Section 4.

The 1D model simulated habitat conditions for steelhead at flows ranging from 0 cubic feet per second (cfs) to 7.6 cfs. Habitat conditions for flows greater than 7.6 cfs were not included in model simulations because flows of this magnitude are not expected to be influenced by (1) CCSD's groundwater pumping operations (which have a maximum rate of 1.43 cfs) and (2) flows greater than 7.6 result from heavy precipitation events that occur when water demand is low and groundwater pumping is limited. Results from 1D modeling indicate that during a streamflow of 1.0 cfs and greater, habitat conditions support juvenile steelhead rearing. Reductions in flow when streamflow is at 1.0 cfs or less leads to a reduction in the quantity and quality of habitat for juvenile steelhead in lower San Simeon Creek. Streamflow of 1.0 cfs and greater is also expected to support CRLF breeding and rearing habitat conditions.

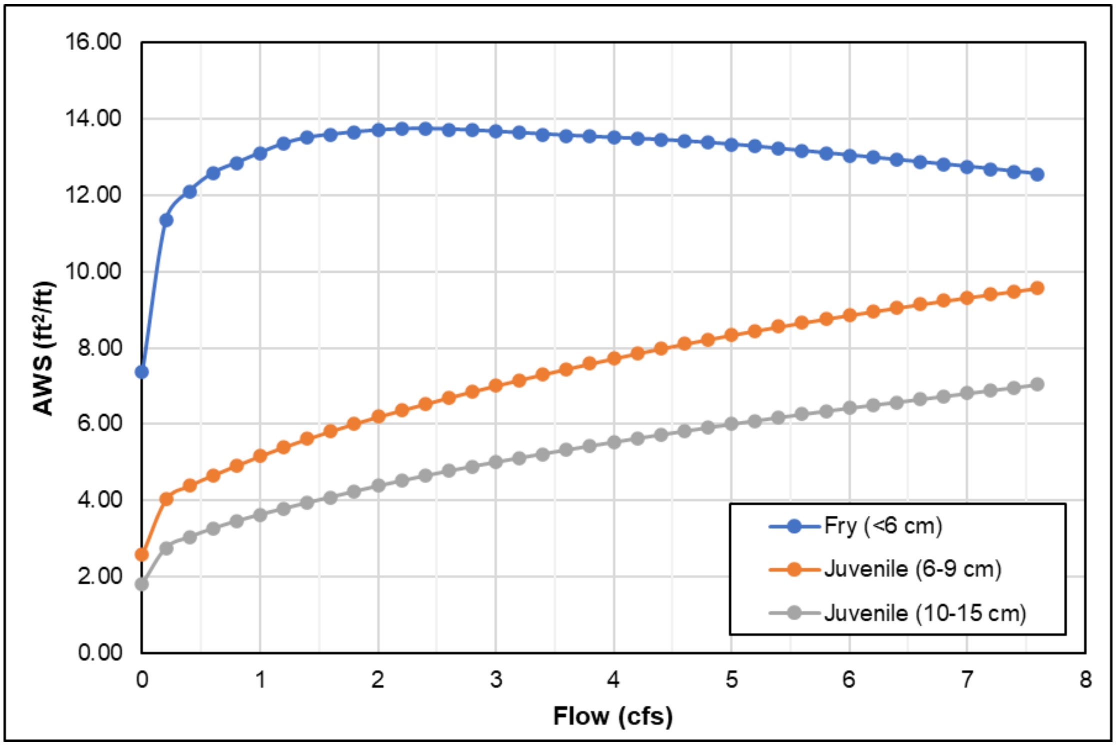


Figure 1. Flow habitat relationships (area weighted suitability) for fry and juvenile steelhead rearing in lower San Simeon Creek.

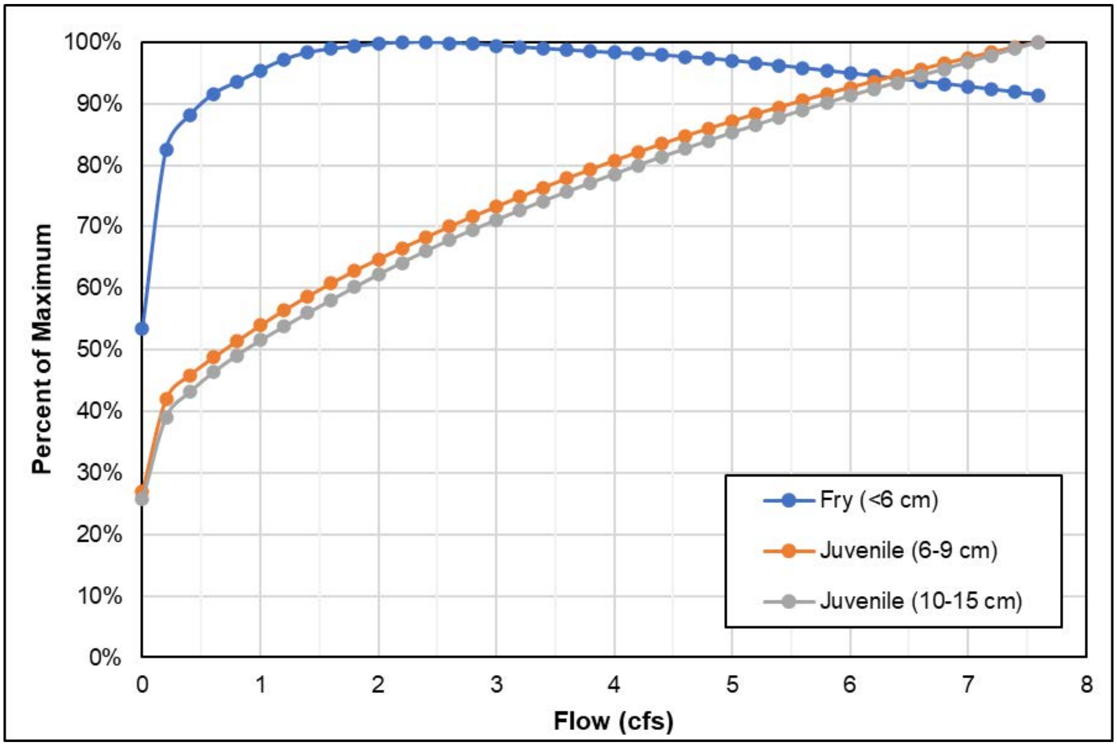
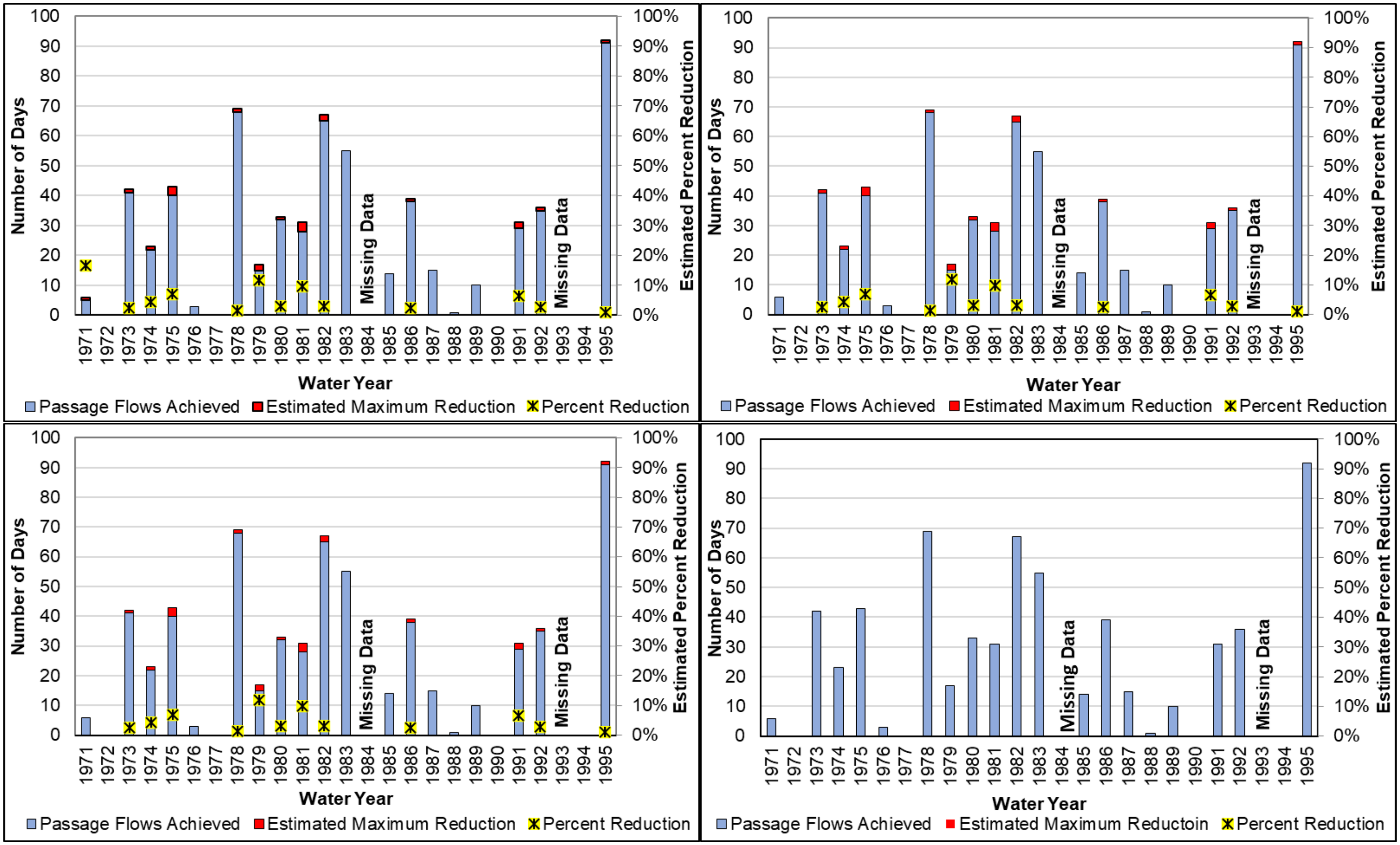


Figure 2. Percent of maximum area weighted suitability for fry and juvenile steelhead rearing in lower San Simeon Creek.

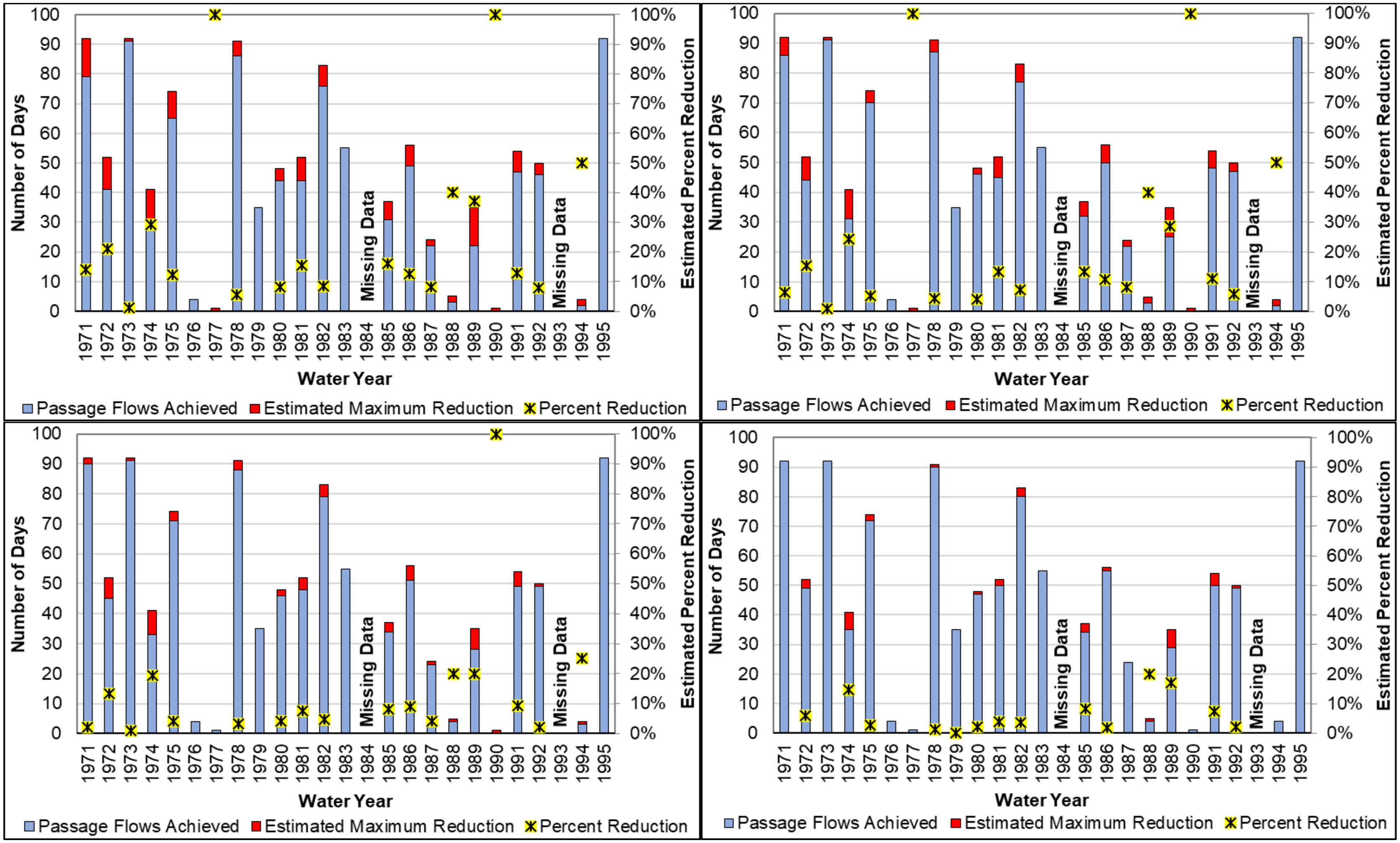
3 STEELHEAD PASSAGE ASSESSMENT

Steelhead passage conditions in lower San Simeon Creek were assessed based on review of previous studies that identified passage flows, available streamflow data, and CCSD's pumping information. Adult steelhead passage requires high flows, ranging from 21 to 60 cfs (D. W. Alley and Associates 1992). These high flows are associated with large precipitation events and are not likely to be influenced by CCSD's maximum pumping rate of 1.43 cfs. Juvenile steelhead passage requires lower flows than adult passage and ranges from 4 to 11 cfs (D. W. Alley and Associates 1992). These lower flows are typical of the spring recession flows in San Simeon Creek. Migration conditions for steelhead in lower San Simeon Creek are generally supported under CCSD's current operations; however, if CCSD's pumping rate were to exceed 0.64 cfs (which is CCSD's current average rate for spring), CCSD's operations have the potential to reduce juvenile steelhead migration during the lower juvenile passage flow threshold of 4 cfs (Figure 3 and Figure 4).



Notes: CCSD = Cambria Community Services District; cfs = cubic feet per second

Figure 3. Number of days streamflow supported the 11-cfs passage threshold and the estimated maximum reduction in passage days for juvenile steelhead based on daily average flows recorded at the Palmer Flats Gage (1971–1995) during the peak juvenile steelhead migration season (March–May) under the following pumping scenarios: (A) maximum CCSD and private well pumping of 1.85 cfs, (B) maximum CCSD pumping of 1.43 cfs, (C) average CCSD pumping and maximum private well pumping of 1.02 cfs, and (D) average CCSD pumping of 0.64 cfs.



Notes: CCSD = Cambria Community Services District; cfs = cubic feet per second

Figure 4. Number of days streamflow supported the 4-cfs passage threshold and the estimated maximum reduction in passage days for juvenile steelhead based on daily average flows recorded at the Palmer Flats Gage (1971–1995) during the peak juvenile steelhead migration season (March–May) and the following pumping scenarios: (A) maximum CCSD and private well pumping of 1.85 cfs, (B) maximum CCSD pumping of 1.43 cfs, (C) average CCSD pumping and maximum private well pumping of 1.02 cfs, and (D) average CCSD pumping of 0.64 cfs.

4 CALIFORNIA-RED LEGGED FROG AND LAGOON HABITAT

Habitat suitable for CRLF breeding was identified throughout lower San Simeon Creek and surveyed over a range streamflow conditions to determine flows that would maintain breeding habitat. Suitable CRLF breeding habitat was generally found in pools that continued to provide such habitat even as flows decreased to almost 0 cfs. However, once streamflow ceases, CRLF habitat becomes limited to a few isolated pools in lower San Simeon Creek and in San Simeon Creek Lagoon. When streamflow is low (less than about 1.0 cfs), CCSD's pumping is likely to increase the rate at which pool habitat becomes isolated and the rate at which pools dry out, leading to stranded CRLF tadpoles. Additional suitable habitat for CRLF is located in San Simeon Creek Lagoon.

5 LAGOON HABITAT FOR SENSITIVE SPECIES

Existing monthly water quality and stage elevation data for San SimeonCreek Lagoon (collected by the California State Parks) for the period from December 2019 through July 2022 were evaluated to assess the relationship between surface flow and aquatic habitat conditions in the lagoon. Data collected from San Simeon Creek Lagoon were compared to water quality criteria (e.g., temperature, dissolved oxygen, and salinity) reported to be suitable for steelhead, tidewater goby, and CRLF to assess habitat conditions for special-status aquatic species. Habitat conditions in San Simeon Creek Lagoon are suitable for juvenile steelhead, tidewater goby, and CRLF under current conditions based on water temperature, dissolved oxygen, and salinity levels reported for most of the year. During the few instances when water quality thresholds were exceeded for any of these species, other locations in the lagoon were still within the suitable range.

6 RECOMMENDATIONS

The following actions are recommended to protect aquatic resources and inform CCSD's ongoing and future operations in lower San Simeon Creek.

6.1 Operations Management

To be protective of aquatic resources in lower San Simeon Creek, Stillwater Sciences recommends that CCSD adjust groundwater pumping operations during sensitive streamflow levels identified in the instream flow study. Sensitive streamflow levels that support rearing habitat for steelhead range from greater than 0.0 cfs up to 1.0 cfs, and streamflow of 4.0 cfs are sensitive for juvenile steelhead passage. Flows that support adult steelhead passage do not appear to be sensitive to CCSD's operations because they require high-magnitude, rain-driven flow events (i.e., > 20 cfs). Sensitive streamflow for CRLF would be protected under the same range of conditions required to protect steelhead. Flows to support tidewater goby were not identified during this study because tidewater goby habitat is primarily found in San Simeon Creek Lagoon where effects from CCSD's pumping operations do not appear to be impacting habitat conditions.

To be protective of sensitive aquatic species, Stillwater Sciences recommends the following:

1. CCSD should not pump groundwater when streamflow is between 0 and 1 cfs.

2. When streamflow is between 1.0 and 2.5 cfs, the CCSD's pumping rate should be calculated based on the minimum of the 1.0-cfs threshold for protecting juvenile steelhead rearing. For example, if the streamflow is 1.5 cfs, then CCSD’s pumping rate should not exceed 0.5 cfs to protect the 1.0-cfs threshold for juvenile steelhead rearing.
3. CCSD’s pumping rates should not exceed 0.64 cfs during the spring when streamflow ranges between 4.0 and 5.5 cfs to protect juvenile migration. When flows are above approximately 5.5 cfs, CCSD’s pumping is not expected to affect aquatic habitat because CCSD’s maximum pumping rate is 1.43 cfs, and no pumping restrictions are recommended.
4. When surface flows cease (0 cfs), CCSD’s pumping is not expected to affect aquatic habitat, and no pumping restrictions are recommended.

Table 1. Summary of recommendations for the Cambria Community Services District’s pumping operations to minimize potential effects on sensitive aquatic species based on streamflow and season.

Streamflow (cfs)	Months	Pumping Restrictions	Basis for Restrictions
>5.0	Year-round	No restrictions	NA[1]
4.0 to 5.0	March through June	Pumping rate should not exceed 0.64 cfs	Support juvenile migration
2.5 to 4.0	Year-round	No restrictions	NA[1]
1.0 to 2.5	Year-round	Pumping rate should not exceed amount of streamflow greater than 1.0 cfs (i.e., if streamflow is 1.5 cfs, pumping should not exceed 0.5 cfs)	Protect juvenile steelhead rearing, CRLF breeding and tadpole rearing
0.0 to 1.0	Year-round	No pumping to occur during this range of flows	Protect juvenile steelhead rearing, CRLF breeding and tadpole rearing
<0.0	Year-round	No restrictions[2]	NA[1]

Notes: cfs = cubic feet per second; CRLF = California red-legged frog; NA = not applicable

[1] No resources were identified as being sensitive to CCSD’s pumping operations within this range of streamflow.

6.2 Long-term Monitoring

Monitoring in association with the preceding operational recommendations will be important for directing and informing CCSD’s groundwater pumping operations. Stillwater Sciences recommends long-term monitoring of streamflow, fish stranding, and lagoon water quality as described below.

6.2.1 Stream flows

Streamflow monitoring is recommended to develop a better long-term record of flows in San Simeon Creek and to inform CCSD’s operations and adaptive management practices. Continuous monitoring of streamflow should be conducted near the San Simeon well field and near the upstream end of the groundwater basin at the Palmer Flats gage location. The County of San Luis Obispo currently operates a stream gage near the San Simeon well field that continuously records water levels. However, a stage-discharge rating curve needs to be developed and validated to apply to the stage data collected at this existing gage in order to convert stage-level recordings to streamflow. A continuous stage measuring device is recommended at the Palmer Flats gage location, and additional flow data collection is required to develop a continuous flow record as described above.

6.2.2 Fish stranding

Monitoring of isolated pools is recommended in lower Simeon Creek to assess the risk of juvenile steelhead stranding. Stillwater Sciences recommends visual observations of isolated pool habitat to assess relative abundance of juvenile steelhead “trapped” in isolated pools. Monitoring surveys should be conducted during the spring once surface flows decrease to less than 1 cfs near CCSD’s well field and recur as flows continue to drop and pools become intermittent. Biologists familiar with the identification of juvenile steelhead should walk the channel to identify locations of isolated pool habitats and visually inspect pools from the shore to estimate the number of steelhead within each pool. All observations of potential stranding will be reported to the California Department of Fish and Game (CDFW) for relocation consideration.

CCSD will work closely with CDFW with CDFW taking the lead for relocating stranded fish (Z. Crumb, CDFW, pers. comm., January 15, 2024). Relocation details will be determined based on site-specific conditions that can change between years but is expected to include backpack electrofishing to capture steelhead and relocation to San Simeon Creek Lagoon.

6.2.3 San Simeon Creek Lagoon water quality

Stillwater Sciences also recommends monitoring San Simeon Creek Lagoon stage levels and water quality conditions (temperature, dissolved oxygen, and salinity) at the upstream and downstream ends of the lagoon during the late spring through fall. Water quality measurements should be collected throughout the water column (i.e., upper, lower and middle) at each monitoring location on a monthly basis and evaluated in relation to flows within lower Simeon Creek.

6.3 Annual Reporting

Finally, Stillwater Sciences recommends that CCSD annually summarize the results from the long-term monitoring in a report provided to the Technical Advisory Committee. The report should include the following information to assist in ongoing evaluation of CCSD operations in the San Simoen Creek basin:

1. CCSD pumping operations in relation to streamflow near the county gage, especially for streamflow ranges between 0 and 2.5 cfs and 4.0 to 5.5 cfs, including the number of days and the rate of extraction;
2. The number of days that pumping reduced juvenile steelhead migration flows less than 4 cfs;
3. Summary of fish stranding observations and whether fish relocation occurred; and
4. Summary of San Simeon Creek Lagoon water quality monitoring results.

7 REFERENCES

D.W. Alley and Associates. 1992. Passage requirements for steelhead on San Simeon Creek, San Luis Obispo County, California. 1991. Prepared by Donald W. Alley for the Cambria Community Services District, Cambria, California.

Stillwater Sciences 2024. San Simeon Creek instream flows assessment. Final Report. Prepared by Stillwater Sciences, Morro Bay, California for Cambria Community Services District, Cambria, California.

Todd Groundwater. 2022. Simulated effects of sustainable water facility operation. Prepared by Todd Groundwater Inc., Alameda, California for Cambria Community Services District, Cambria, California.

Todd Groundwater. 2023. Guidance manual for use of Cambria Community Services District's water reclamation facility. Prepared by Todd Groundwater Inc., Alameda, California for Cambria Community Services District, Cambria, California.

Attachment 2

Operational Guidance Manual for WRF

TODD
GROUNDWATER

December 11, 2023

MEMORANDUM

To: James Green, Cambria Community Services District

From: Gus Yates, Senior Hydrologist

Re: **Guidance Manual for Use of Cambria Community Services District's Water Reclamation Facility**

BACKGROUND

Cambria Community Services District (District) constructed an indirect potable reuse facility near its wastewater percolation ponds in the San Simeon Creek groundwater basin in 2014. The facility was permitted on an emergency basis to address water supply shortages during the drought that was then occurring. The plant was operated sporadically during 2014-2016 and has remained idle since then. The facility is now known as the Water Reclamation Facility (WRF), and the District expects to use it during future droughts, if needed. This guidance manual presents systematic decision rules for when and how much to operate the WRF, including when to turn it on, how to adjust the production rate on a weekly or biweekly basis, and when to turn it off. It also describes a monitoring program that should be implemented before and during WRF operation to detect and mitigate any impacts to pools in San Simeon Creek or to its terminal lagoon.

WHEN TO TURN ON WRF

Criteria for when to turn on the WRF in any given year emerged from simulations of WRF operation under various drought and water shortage conditions using a groundwater flow model of the San Simeon Creek groundwater basin (Todd Groundwater, 2022). There are several constraints on the amount of water that the WRF can produce. The limitation that most commonly constrained operation in the simulations was the water-level gradient between well SS-4 and well 9P2 (see locations in **Figure 1**). To prevent the subsurface flow of percolated wastewater toward the well field, the water level in SS-4 should always be higher than the water level in 9P2. The existing permit for operating the percolation ponds allows temporary excursions to a reverse gradient, with SS-4 as much as 0.79 foot below 9P2 (a gradient of -0.79 foot). In practice, CCSD operates the system to avoid a water level difference less than +0.75 foot (that is, SS-4 water level at least 0.75 foot higher than 9P2 water level), and this was the criterion used in the scenarios. Other constraints including the capacity of the supply well (well 9P7), the microfiltration and reverse osmosis capacities, water rights and environmental impacts proved not to be limiting.

The SS-4/9P2 gradient typically declines during the dry season as pumping from the well field gradually lowers water levels near SS-4. The simulations demonstrated that relatively uniform WRF operation could be achieved by turning on the WRF before the gradient fell to less than +0.75 foot. In scenarios where San Simeon Creek flow dropped to near zero at the beginning of April, the WRF needed to start operating in early September. When creek flow approached zero at the beginning of March, the WRF needed to start operating in early August. The minimum gradient occurred later (November or December).

In general, WRF operation will be needed in years when the dry season starts early. The dry season for this purpose is defined as the date when San Simeon Creek flow at Palmer Flats falls below 2 cfs, which is the estimated amount of creek percolation between Palmer Flats and the well field. If the dry season starts early, groundwater levels in the lower San Simeon Creek basin should be checked regularly and trends projected out to the likely end of the dry season to determine whether WRF operation will be needed. The specific steps for implementing this process are as follows:

1. Measure or estimate stream flow at Palmer Flats weekly from March 1 to May 1. Determine the date when flow drops below 2 cfs, which is the start of the dry season. If that date occurs before May 1, continue with the remaining steps.
2. Plot the average water level at the District's three San Simeon production wells on a dry-season hydrograph like the one shown in **Figure 1**, which the District prepares every year. If the curve for the current year is in the bottom third of the range of curves as of August 1, plan to turn on the WRF by mid-August or the beginning of September.

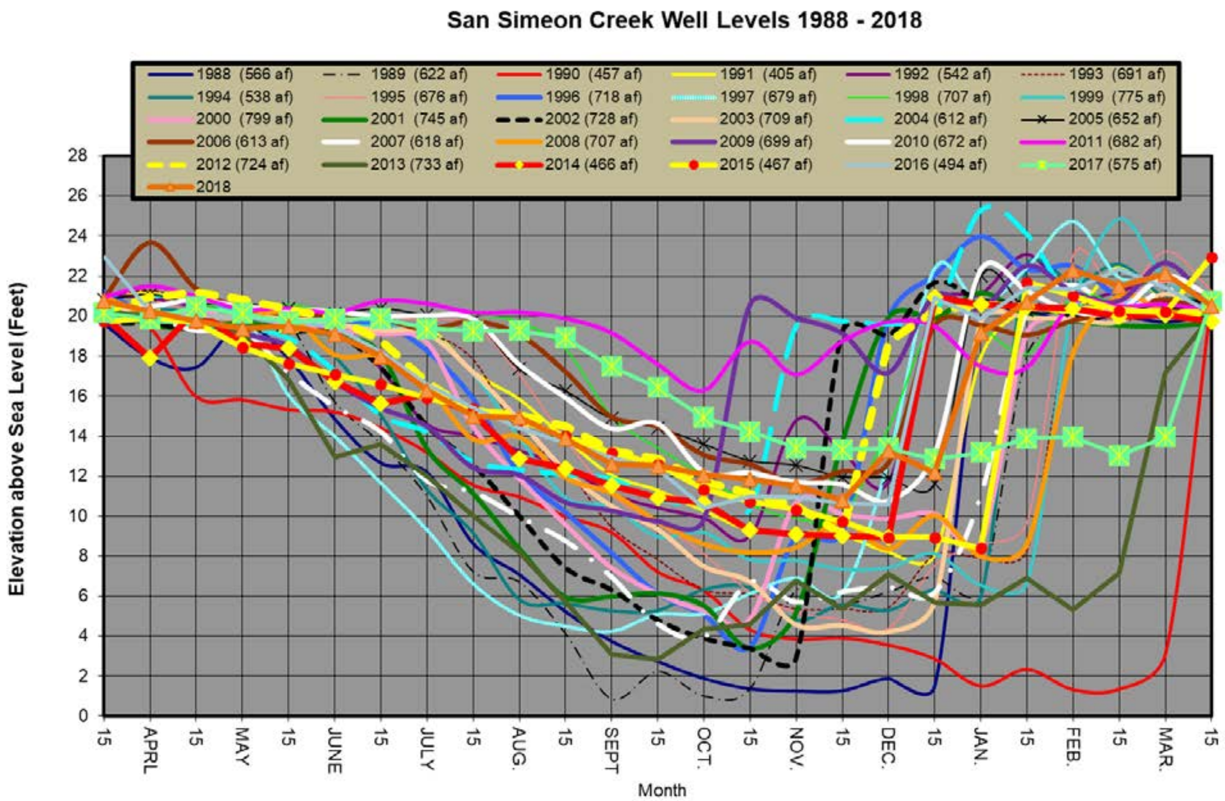


Figure 1. Historical San Simeon Creek Groundwater Levels during the Dry Season, 1988-2018

3. A second and more important criterion is a similar plot of the SS-4/9P2 gradient. Calculate the difference in groundwater elevation between SS-4 and 9P2 (SS-4 minus 9P2) and plot it as a dry-season hydrograph. The District has not historically done this, but an example using simulation results is shown in **Figure 2**. The water-level difference was declining rapidly during April-August of the first year of the simulation (labeled as 2013) and would clearly fall below +0.75 foot before mid-December. In the "Stage 4" scenario, the difference continued to decline to -0.6 by March of the second year. In the "Stage 4 + WRF" scenario, the WRF was turned on at the beginning of September in the first year of the simulation, and the WRF flow was adjusted to maintain a water level difference greater than +0.75 foot.

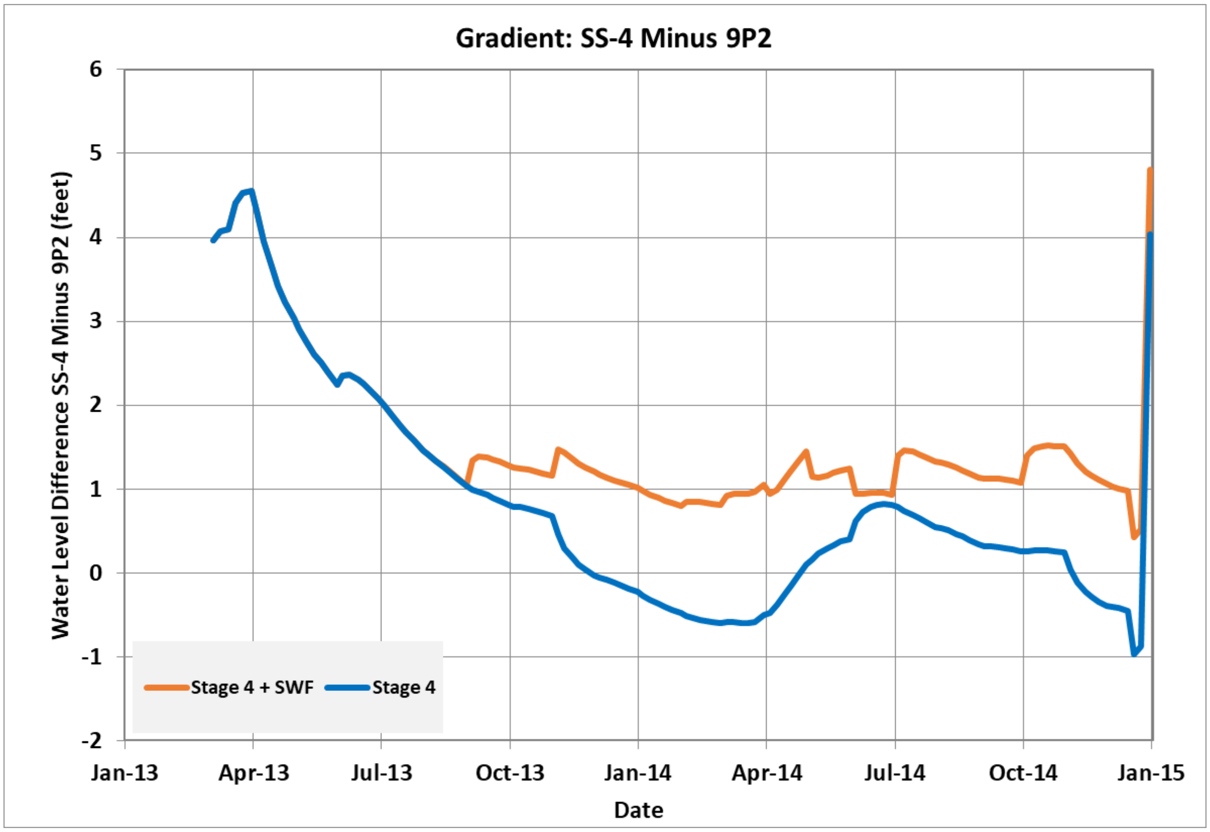


Figure 2. Hydrograph of Simulated SS-4/9P2 Water Level Difference for Two Scenarios

SELECTING WRF FLOW RATE

Well 9P7 is the supply well for the WRF, and it is not designed for variable output. The amount of WRF flow over a week or month is adjusted by changing the percent of time that 9P7 and the microfiltration (MF) and reverse osmosis (RO) treatment trains are operating. This would typically be the number of hours per day and/or days per week that the facility operates.

In a series of scenarios covering Stage 4 and Stage 6 water shortage conditions with and without concurrent increases in pumping by nearby agricultural users, it was found that WRF production rates of 10-35 AF/mo were needed to maintain the SS-4/9P2 gradient above +0.75 foot. This production rate is the volume injected at the injection well. Working backwards through the RO efficiency (92.1%) and microfiltration efficiency (94.5%) and allowing for the lagoon mitigation discharge (100 gpm of microfiltration water), the amount of pumping at the WRF supply well (well 9P7) can be calculated, as shown in **Table 1** below.

Table 1. Well 9P7 Pumping to Supply Target Injection Volume

Recycled Water Injection Well (AF/mo)	9P7 WRF Supply Well Production		
	AF/mo	Equivalent gpm	Percent of Time Operating
10	26.6	198	34%
15	31.4	234	40%
20	37.2	277	48%
25	42.9	319	55%
30	48.7	363	62%
35	54.5	406	70%

The SS-4/9P2 gradient responded fairly quickly to changes in WRF production rate in the simulations. Effects could be seen within 2 weeks, which was the time interval used in the simulations. If the gradient accidentally falls below the target of +0.75 foot, an increase of 5-10 AF/mo of WRF production will likely put it back above +0.75 foot within 2-4 weeks.

Adjustments to WRF production should be made every 2 weeks until the facility is turned off.

WHEN TO TURN OFF WRF

WRF operation is no longer needed when stream flow in San Simeon Creek resumes. Typically, a major storm in early winter (November-January) will initiate substantial flow that replenishes the groundwater basin within a few weeks. In dry winters, there may be periods when the SS-4/9P2 gradient stays slightly above +0.75 foot without WRF operation then falls back below a few weeks later. In that case, the WRF can be turned on and off at low rates to continue meeting the target gradient until a larger stream flow event arrives.

MONITORING BEFORE AND DURING WRF OPERATION

One concern with operating the WRF is that pumping from its supply well might lower the water level in the lagoon or in perennial pools in San Simeon Creek just upstream of the lagoon. The mitigation discharge is designed to ensure that impacts do not occur, but monitoring is recommended for confirmation.

Data Collection

Monitoring should begin before the WRF starts operating because the detection of impacts relies on analysis of trends. In any year when WRF operation is expected, monitoring should start about 2 months in advance. Most of the monitoring focuses on water levels. However, other variables that can affect water levels also need to be monitored so that the cause of a change in water level trend can be correctly identified. This leads to the following steps:

1. Contact San Simeon Basin agricultural pumpers (Jon Pedotti and Clyde Warren) to find out their irrigation plans for the remainder of the dry season. Above-average irrigation by those growers tends to hasten the date when the WRF needs to be turned on and may cause independent, additional impacts on water levels and flow in the creek and lagoon.
2. Contact the Central Coast Wetlands Group to find out whether their monitoring of stage in San Simeon Creek lagoon is still active and will continue through the anticipated WRF operational period. CCWG is located in Moss Landing. The contact person is Kevin O'Connor, Program Manager. (831) 771-4495 (office). E-mail: koconnor@mlml.calstate.edu
3. Start the monitoring program detailed in **Table 2**. The table lists the variables to be monitored and the monitoring frequency for the periods leading up to and during WRF operation.

The "continuous" measurements recommended in the table are assumed to use a pressure transducer with data logger, such as the HOBO© Water Level Loggers currently deployed in the four piezometers near the percolation ponds. Measurements of beach berm width at the ocean end of the lagoon are recommended because the width of the berm can gradually increase during the dry season, and it affects lagoon level and outflow. Those measurements can best be obtained from drone aerial photography.

Table 2. Monitoring Program Locations, Variables and Measurement Frequencies

Start Date for Monitoring Phase	Starting at Least 2 Months Before WRF Operation[1]	SS-4 to 9P2 Gradient Will Decline to 0.75 ft within 3 Weeks	Comments
WRF Status	**Off**	**On**	
Water Levels			
16D1	Biweekly	Weekly	To compare with historical record as means of detecting impact.
MW4	Continuous	Continuous	This well near 16D1 may be tidally influenced. Continuous measurements by data logger are needed to detect tidal fluctuations so they can be subtracted from the measurement record to reveal any 9P7 pumping drawdown.
SS-3, SS-4, 9P2	Continuous	Continuous	SS-3 will be idle when WRF is injecting, so it will have relatively reliable water levels. All of these wells will be influenced by nearby pumping well on/off cycles, so continuous HOBO records will be more accurate. SS-4 and 9P2 define the gradient that is the primary criterion for WRF operation.
Four piezometers in percolation area	Continuous	Continuous	Continuous recording with loggers when WRF turns on will confirm the spread of drawdown from 9P7 and whether it reaches San Simeon Creek.
San Simeon Creek pools (e.g. Van Gordon and red-legged)	Biweekly	Weekly	Install staff plates in the pools at the start of monitoring. Remove prior to the next high flow season.
Lagoon	Continuous	Continuous	Obtain data from Central Coast Wetlands Group, or deploy a separate water level data logger.
Flows			
Pumping at SS-1, SS-2 and SS-3	Weekly	Weekly	Many of these flows have hourly and daily variations that would be attenuated to average rates by the time any effects reached the creek or lagoon. Evaluation of more frequent pumping subtotals is not necessary.
Warren pumping	Weekly	Weekly	Weekly volume is sufficiently frequent. Well is metered.
Pumping at 9P7	Weekly	Hourly to Weekly	When the WRF is first turned on, monitor the pumping rate at 9P7 hourly for the first 12 hours, and at the beginning, middle and end of each operational cycle for the next week. This is to support aquifer test analysis in conjunction with piezometer water levels. Thereafter, weekly pumping subtotals are sufficient.
Wastewater percolation	Weekly	Weekly	Weekly volume is sufficiently frequent. Record which pond receives the water.
WRF lagoon discharge	n.a.	Weekly	Weekly volume and instantaneous rate when operating.
San Simeon Creek at campground bridge (or nearby upper end of lagoon)	Biweekly	Weekly	Instantaneous flow, in cubic feet per second. Inflow may consist of a barely visible trickle entering ponded conditions in the lagoon. Measurement by pygmy meter would not likely be feasible. An alternative such as salt dilution may be needed.
Other			
Drone air photos of beach berm	Montly	Monthly	Preferably taken at similar tide levels. Altitude of drone needs to be high enough to include fixed objects (such as outcrops, Highway 1) that can be used to georeference and overlay successive photos.

Notes:
[1] WRF operation can be anticipated to start around September 1 in years when the dry season starts before May 1 or when a Stage 4, 5 or 6 Water Shortage Condition has been declared.

Routine Data Analysis

The general approach to detecting impacts on creek and lagoon water levels and flows is to plot time series of those variables to identify departures from normal seasonal trends that commence after the WRF is turned on. Comparison with time series plots of other variables will indicate whether WRF operation caused the change in water levels and flows. Step by step instructions are as follows:

1. Create time series graphs of all monitored variables so that trends and changes in trends can be seen. Update the graphs with new data as they are obtained. If there appears to be a new or increased downward trend in the water level at well 16D1, in creek pool water levels or in stream flow entering the top of the lagoon, continue to step 2.

2. Download and plot the continuous water level data from well MW4 to confirm whether the trend is also present in that well (if it's a real trend, it should be). Otherwise, the apparent trend at 16D1 and the pools could be an artifact of tidal noise in the weekly measurements.

3. Compare the 16D1 water level hydrograph with the historical range of water levels at that well, which is shown in **Figure 3**. For more exact comparison, dates and elevations defining the line that bounds the lower end of the historical range are listed in **Table 3**. For context, there has been a long-term declining trend in 16D1 water levels since about 2002 correlated with and probably caused by decreased percolation volumes at the nearby wastewater percolation ponds (Todd Groundwater, 2019). Thus, low water levels specifically associated with the period of WRF operation are more diagnostic than low water levels in general.

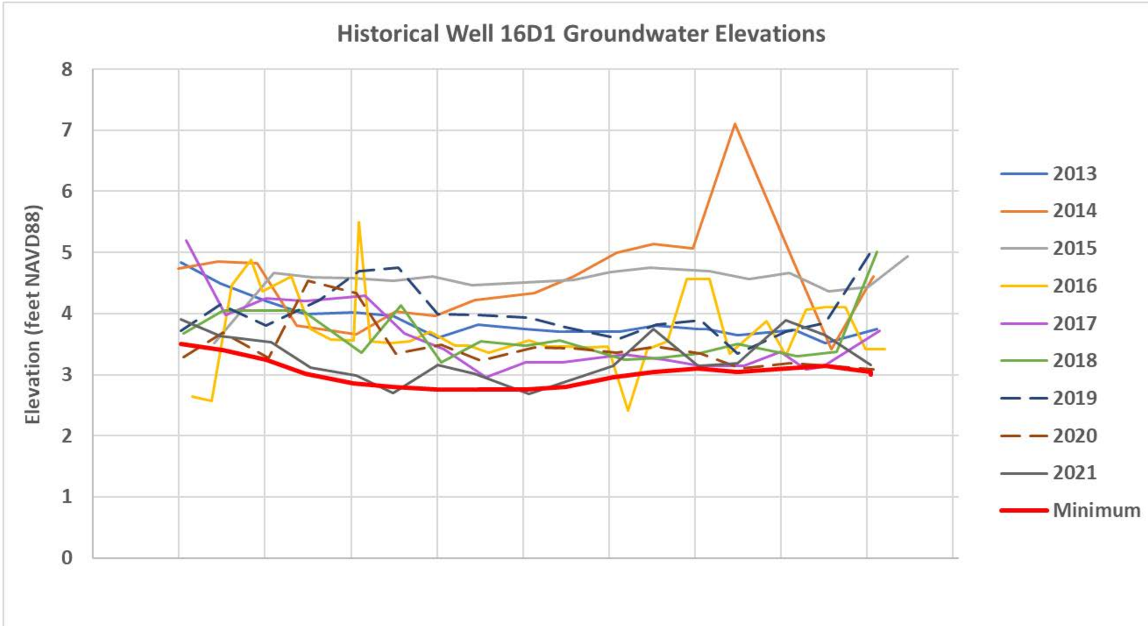


Figure 3. Historical Dry Season Water Levels at Well 16D1

Table 3. Historical Minimum Dry-Season Water Levels at Well 16D1

Date	Julian Day	Elevation (ft NAVD88)
Apr 1	91	3.50
Apr 15	106	3.40
May 1	121	3.25
My 15	135	3.02
Jun 1	152	2.85
Jun 15	166	2.80
Jul 1	182	2.75
Jul 15	196	2.75
Aug 1	213	2.75
Aug 15	227	2.80
Sep 1	244	2.95
Sep 15	258	3.05
Oct 1	274	3.10
Oct 15	288	3.05
Nov 1	305	3.10
Nov 15	319	3.15
Dec 1	335	3.05
Dec 15	335	3.00

4. Compare the creek pool water level hydrographs with hydrographs from previous years to assess whether current declines appear unusual. Biological monitoring reports from prior years have shown relatively stable pool depths during the dry season, as illustrated by the hydrographs for the Van Gordon and Red Legged pools during 2017 in **Figure 4**. The temporary upward spikes in water levels in August, October and December coincided with spikes in lagoon level and probably resulted from wave overwash at the beach berm.

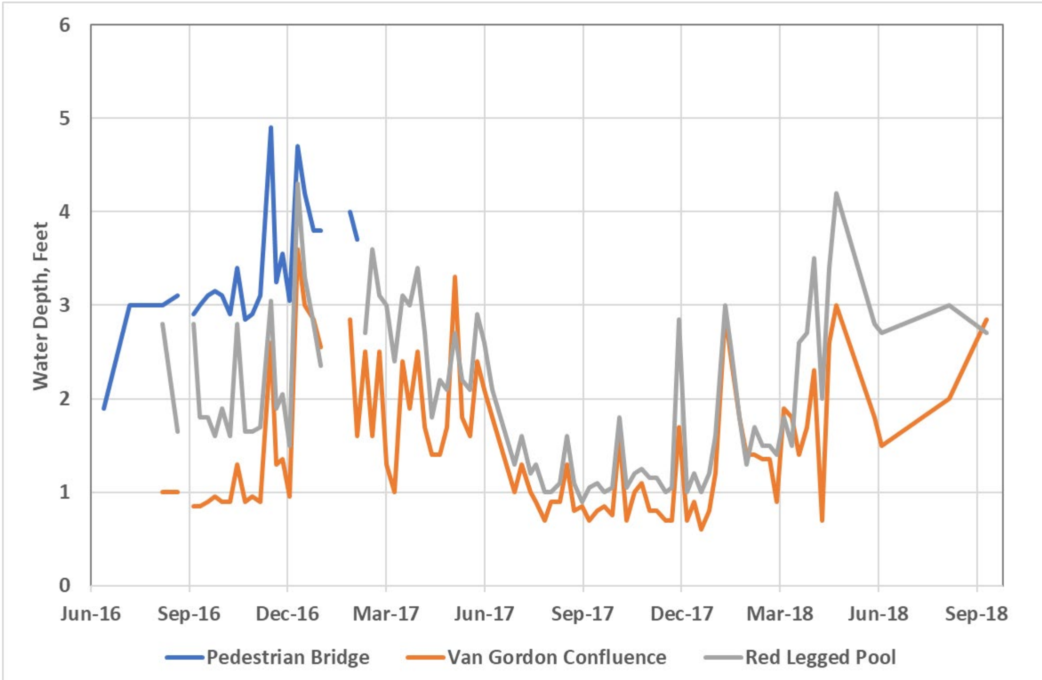


Figure 4. Water Levels in San Simeon Creek Pools, 2016-2018

5. If the changes in trends in well 16D1, well MW4, creek pool levels and lagoon inflow appear real, compare those hydrographs with the time series plots for variables that could cause a change in water levels:
    a. Wastewater percolation volumes
    b. 9P7 pumping
    c. Warren pumping
    d. Beach berm width
    e. SS-4 to 9P2 gradient
    f. CCSD well field pumping
    g. Piezometer water levels (rate of radial spread of drawdown around 9P7)

    The features to look for are a significant change in magnitude of any of those variables that occurred shortly before the observed decline in MW4 water level, such as an increase in pumping at 9P7, 9P4 (Warren) or the CCSD well field, a decrease in beach berm width, a change in the wastewater percolation location, or a decrease in the SS-4 to 9P2 gradient.

6. If it appears that accelerated decline in water levels and/or inflow at the top end of the lagoon may be caused by WRF operation, increase the lagoon discharge rate by an amount approximately equal to the reduction in lagoon inflow.

7. Repeat steps 1-6 again every 2 weeks and adjust lagoon discharge as needed.

8. Monitoring may be discontinued when stream flow resumes in winter and WRF operation ceases.
9. In subsequent years of WRF operation, monitoring is not needed as long as groundwater conditions at the time WRF is turned on are similar to those during the initial year. Aquifer characteristics and stream-aquifer interaction do not change over time. New monitoring would be needed only if operating conditions are significantly different than during the first year, such as substantial increases in WRF production, CCSD well field pumping, agricultural pumping or decreases in wastewater percolation.

Additional Analysis for First Year of WRF Operation

After the first month of WRF operation, the 9P7 pumping data and water-level data for the percolation pond piezometers should be analyzed to quantify the magnitude and spread of drawdown around that well. By applying the Theis Equation for drawdown around a pumping well, the arrival time of drawdown at creek pools and the upper end of the lagoon can be calculated. The extent to which wastewater percolation in Pond A blocks the spread of drawdown in that direction can also be calculated. Finally, the percent of 9P7 pumping derived from storage depletion versus stream flow depletion can be estimated. All of these calculations reveal whether 9P7 pumping is impacting pools in the creek or the lagoon.

This analysis does not need to be repeated in future years unless WRF operation is significantly greater in terms of pumping rate or duration.

REFERENCES CITED

Todd Groundwater. March 22, 2022. Simulated effects of water reclamation facility operation. Technical memorandum prepared for Cambria Community Services District, Cambria, CA.

Attachment 3

Summary of Responses to Comments on the Draft San Simeon Creek Instream Flows Assessment Report

Table 3-1. Responses to comments received on the Draft San Simeon Creek Instream Flow Study.

Comment #	Commenter Name/Affiliation (Date)	Comment	Response
1	Tom Luster/ California Coastal Commission (Jan. 23, 2023)	The draft report notes that project pumping under certain conditions is likely to reduce habitat quality and quantity. It describes these reductions as fairly minimal–e.g., a two-day reduction in the suitable period for juvenile steelhead migration – however, it appears that the project could result in greater adverse effects if some additional project-related or streamflow characteristics were included in the analysis. These include 1) the range of expected project extraction rates; 2) effects of nearby well extractions; and 3) no analysis of the effects of delayed streamflow "rebound."	The final San Simeon Instream Flows Assessment report was revised to include expanded analyses of juvenile fish passage conditions under the following pumping rates: 1. A total combined pumping rate of 1.85 cubic feet per second (cfs) based on the maximum Cambria Community Services District (CCSD) pumping rate of 1.43 cfs plus the Pedotti private well pumping rate of 0.42 cfs; 2. 1.43-cfs pumping rate based on the maximum CCSD pumping rate; 3. 1.06-cfs pumping rate based on the upper end of CCSD's average daily pumping rate of 0.64 cfs plus the Pedotti private well pumping rate of 0.42 cfs; and 4. 0.64-cfs pumping rates, which is the upper end of the average daily CCSD pumping rate. The private groundwater pumps in the lower end of the study reach are downstream of the well field and are not expected to influence passage conditions because of their location in watershed, and is supported by the results groundwater modeling (Yates 2022); therefore, the extraction from these pumps is not included in the assessment. Part 3 of this comment inquires whether groundwater depletion by CCSD pumping during the dry season increases stream percolation losses when flow first resumes the following winter and thereby delays the start of the passage opportunity for migrating adult steelhead. Based on multiple flow measurements

Comment #	Commenter Name/Affiliation (Date)	Comment	Response
			collected during a large storm event that initiated flow in San Simeon Creek on December 23–26, 1988, percolation losses along the creek at the start of the flow event were approximately 25 cfs and decreased to 2.2 cfs by December 27, 1988. The decrease in percolation over the 4-day period suggests that groundwater levels in the basin recovered within four days following the onset of surface flows during this event. The minimum flow required for adult up-migration has been estimated to be 67.5 cfs based on surveys of several riffles along the creek (D.W. Alley & Associates 1992). Because of the high magnitude of flows required for adult migration in lower San Simeon Creek, and the rate of surface loss during the onset of surface flow, groundwater "rebound" is not expected to have a significant effect on adult migration conditions.
2	Tom Luster/ California Coastal Commission (Jan. 23, 2023)	It is not clear what pumping rate(s) served as the basis for the analysis. The draft report mentions that the CCSD expects an average extraction rate of 0.6 cfs, though it also mentions that pumping could occur at rates ranging from 0.41 to 1.43 cfs. It is not clear whether the analysis evaluated the expected effects from just the average extraction rate or from the full range of extraction rates. It is also not clear how these different extraction rates could result in different effects depending on their timing and streamflow conditions at the time of extraction – e.g., a high extraction rate in summer when streamflow and aquifer levels are declining versus that same rate during winter high flows. We recommend the analysis be modified to address these issues.	The final San Simeon Instream Flows Assessment report was revised to include additional analysis of juvenile fish passage conditions over an expanded range of extraction rates including the maximum CCSD extraction rate of 1.43 cfs, as described in the previous comment. In addition to the juvenile steelhead passage assessment, the study also evaluated the potential impacts to juvenile steelhead rearing habitat from CCSD's operations. An Incremental Flow Instream Flow Methodology (IFIM) was used along with a one-dimensional (1D) model developed for the Study Reach to identify flows that are critical for supporting juvenile steelhead rearing in the Study Area. Based on the results of the model, 1.0 cfs was identified as the critical flow. To be protective of the 1.0-cfs flow, Stillwater Sciences assumed maximum district pump

Comment #	Commenter Name/Affiliation (Date)	Comment	Response
			rates (1.43 cfs) could relate to direct surface flow loss (e.g., CCSD groundwater pumping of 1.43 cfs = direct loss of surface flow of 1.43 cfs) and concluded that CCSD pumping could affect habitat conditions for juvenile rearing steelhead when stream flows are at 2.5 cfs (2.5 cfs = 1.0 cfs flow for juvenile rearing plus 1.43 cfs maximum pumping rate rounded up to nearest 0.1 cfs). The assessment includes pumping at the maximum rate and the flow threshold is for any time of year, capturing pumping at the highest extraction rate during the summer, as well as during the winter, spring, and fall.
3	Tom Luster/ California Coastal Commission (Jan. 23, 2023)	The report (at page 10) notes that the CCSD operates three groundwater wells along Lower San Simeon Creek and provides their expected extraction rates. It also notes that there are several agricultural wells in the area, though it does not describe how or whether their effects were evaluated in the study. Of particular importance is Well 9P2, which is less than 100 feet from one of the CCSD wells and is operated in part through an agreement between CCSD and a nearby property owner. Well 9P2 can extract at up to 275 gallons per minute, which is roughly the same rate at the CCSD's average 0.6 cfs rate. When Well 9P2 is operating concurrently with nearby CCSD wells, it appears likely that there would be cumulative adverse effects on streamflow and that the combined operations could increase those adverse effects substantially. We recommend that the report be modified to incorporate allowable extractions from Well 9P2 into the analysis.	The expanded groundwater modeling effort conducted by Gus Yates in 2022 indicates that groundwater levels in this location appear to be stabilized by the Simeon Creek Lagoon connection to the groundwater basin. Furthermore, the report focuses on the effect of CCSD operations, but it does not provide recommendations for the groundwater extraction by private wells, which are not under CCSD's control.

Comment #	Commenter Name/Affiliation (Date)	Comment	Response
4	Tom Luster/ California Coastal Commission (Jan. 23, 2023)	The report describes some of the streamflow drawdowns expected from the facility's groundwater extraction, but it doesn't identify the effects associated with delayed streamflow "rebound" from facility pumping. That is, it describes the "front end" of the effects when extraction reduces streamflows but doesn't evaluate the "back end" additional recovery time it would take for the late summer/autumn lower aquifer levels to increase sufficiently to allow for renewed streamflows.	Surface flow rebound following the dry season is discussed above under comment #1.
5	Tom Luster/ California Coastal Commission (Jan. 23, 2023)	Streamflow data and expected flow rates: The report's Section 3.3.3 notes that flow rates were based on data collected from two locations between 1972 and 2001 and that the models were calibrated based on those rates. It is not clear why the report didn't use more recent data – for example, a 2014 CCSD report used stream gauge data from up through 2013 (see CDM Smith, San Simeon Creek Basin Groundwater Modeling Report, May 2014). It's also not clear how applicable the 1972-2001 data may be to expected future conditions in the San Simeon Basin – e.g., more extreme precipitation events due to climate change. It would be useful for the report to either incorporate more recent stream gauge data or provide the reasoning for why it isn't being used. It would also be helpful to identify predicted changes in precipitation and describe how those would affect San Simeon's streamflow and habitat values. This may be particularly important, given the report's apparent acknowledgement (on page 42) that older data may not adequately reflect current watershed conditions.	The final San Simeon Instream Flows Assessment report was revised to clarify that the best available data on streamflow was used to prepare the report. The Palmer Flats gage (formerly County Gage #14) located at the upstream end of the Study Area only covered the period from October 1970 through September 1995, after which point the gage was discontinued. A gage near the CCSD well field (County Gage #718, formerly County Gage #22) was operated from October 1987 through February 2003, after which San Luis Obispo County ceased maintaining the rating curve and the gage only recorded stage levels. The final report includes a recommendation to monitor streamflow to help understand future flow conditions in the watershed as they may relate to climate change and CCSD's pumping operations.

Comment #	Commenter Name/Affiliation (Date)	Comment	Response
6	Tom Luster/ California Coastal Commission (Jan. 23, 2023)	Section 3.5 describes three assumptions used in the assessment of juvenile steelhead migration. One of them – that CCSD pumping occurs at 0.6 cfs during the April-May migration season – does not appear adequate to fully characterize the project's potential effects. We recommend the report be modified to apply the full range of expected extraction rates to the analysis.	The analysis for juvenile steelhead migration was expanded to include four extraction scenarios as follows: (1) the upper end of the average daily pumping rate of 0.60 cfs by CCSD; (2) the upper end of the average daily pumping rate of 0.60 cfs by CCSD plus the estimated maximum pumping rate of 0.42 cfs by the Pedotti private well for a total of 1.02 cfs; (3) the maximum extraction capacity of 1.43 cfs by CCSD; and (4) the maximum extraction capacity of 1.43 cfs by CCSD plus the estimated maximum pumping rate of 0.42 cfs by the Pedotti private well for a total of 1.86 cfs.

Comment #	Commenter Name/Affiliation (Date)	Comment	Response
7	Tom Luster/ California Coastal Commission (Jan. 23, 2023)	Section 4 notes that field surveys to conduct stream habitat typing were conducted between December 2021 and July 2022, with the report's flow analyses then applied to the identified habitat types – e.g., riffles, pools, etc. The seven-month survey period omits late summer, which may not be of concern during times when streamflow is non-existent, but it also omits the return of streamflow in autumn, which could be an important period for adult steelhead upstream migration as well as steelhead incubation. This omission, along with the concern above about the potential delay in streamflow "rebound," may result in the report underestimating the project's effects on steelhead.	Habitat surveys and IFIM surveys were conducted over a range of targeted stream flows. The targeted flows were selected to assess conditions when surface flows that are most likely to be influenced by CCSD operations were present to calibrate the model to simulate habitat conditions over a wide range of flows. Additional surveys targeting different seasons would not change the model results because the model uses physical habitat features (e.g. cross-section topography and channel gradient), which are not affected by seasonal changes in flow. Model simulations included conditions with flows ranging from 0 cfs to 7.6 cfs, when CCSD operations are likely to have the greatest effect on aquatic habitat. The potential delay in surface flow rebound is discussed above under comment #1.
8	Tom Luster/ California Coastal Commission (Jan. 23, 2023)	The report's Section 6 suggests the CCSD conduct long-term stream flow monitoring at and near the CCSD's well field to better characterize flows. We recommend the report describe whether any of these monitoring efforts are occurring (or when they are scheduled to occur) and identify how any data collected from these monitoring efforts will be used to further calibrate the modeling conducted to date or to "ground truth" current modeling results.	Section 6, *Long-term Monitoring*, of the final San Simeon Instream Flows Assessment report was revised to clarify that Stillwater Sciences recommends long-term monitoring to provide information about the effects of CCSD's pumping operations on sensitive aquatic species and their habitat in lower San Simeon Creek and to enable CCSD to operate in a way that minimizes impacts to these aquatic species because no such monitoring is currently being conducted. The System for Environmental Flow Analysis (SEFA) model used for the IFIM component of the instream flow study allowed Stillwater Sciences to determine that under flows between 0 and 2.5 cfs, habitat conditions are most sensitive to CCSD pumping activities. The SEFA model was fully calibrated using standardized methods. Long-term flow monitoring will enable CCSD to determine when sensitive flows (i.e., flows

Comment #	Commenter Name/Affiliation (Date)	Comment	Response
			between 0 and 2.5 cfs) are occurring in real time and use that information to manage operations to be protect steelhead.
9	Tom Luster/ California Coastal Commission (Mar. 6, 2023)	Re: location of project components in sensitive habitat - underpinning our evaluation is the ongoing and unresolved nonconformity of having project elements (and former project elements, such as the evaporation basin) located within ESHA. We are about to get to Year 9 of the project being located in sensitive habitat without mitigation and without a determination about feasible alternative locations.	This comment is outside the scope of the instream flow study.

Comment #	Commenter Name/Affiliation (Date)	Comment	Response
10	Schani Siong/ SLO County (Mar. 2, 2023)	The County agrees that it would be a good idea to broaden the scope of the analysis to show a range of pumping within all seasons to analyze the potential impacts during those different scenarios. The study mentions that higher reduction of suitable migration days for juvenile steelhead may occur if pumping rates are above the daily average rate of 0.6 cfs assumed for the analysis. The analysis should include information that would account for worst case scenario (highest 1.43 cfs pumping rate) to fully understand the full extent of impacts. *If there is desire not to incur additional impacts beyond analyzed thresholds in this IFS– provide information on how operation will avoid doing so*.	The analysis of juvenile steelhead migration was expanded to include four extraction scenarios: (1) the upper end of the average daily pumping rate of 0.60 cfs by CCSD; (2) the upper end of the average daily pumping rate of 0.60 cfs by CCSD plus the estimated maximum pumping rate 0.42 cfs by the Pedotti private well for a total of 1.02 cfs; (3) the maximum extraction capacity of 1.43 cfs by CCSD; and (4) the maximum extraction capacity of 1.43 cfs by CCSD plus the estimated maximum pumping rate of 0.42 cfs by the Pedotti private well for a total of 1.86 cfs. The maximum pumping rate of 1.43 by CCSD plus the estimated maximum pumping rate of 0.42 cfs by the Pedotti private well may lead to a reduction in juvenile passage days at the 4-cfs threshold; however, CCSD's pumping at the daily average rate of 0.60 cfs shows very little effect on juvenile passage conditions.
11	Schani Siong/ SLO County (Mar. 2, 2023)	As part of the CDP review, the County must make required LCP findings for SRA and ESHA that CCSD have identified mitigation measures to lessen impacts to sensitive resources and species to maximum extent. For example, CCSD have been advised to incorporate a rescue and relocation protocol as part of the project. At what point would the rescue and relocation protocol be initiated? What does that look like and who are the responsible entities? Avoidance and minimization measures should be detailed out for identified impact, duration of impact, and responsible parties should be developed as part of the AMP.	Detailed recommendations are provided in separate technical memoranda that include avoidance and minimization measures along with annual reporting to the Technical Advisory Committee to evaluate the effectiveness of avoidance and minimization measures. Fish rescue and relocation efforts were discussed with California Department of Fish and Wildlife (CDFW) Regional Biologist Zach Crumb, who indicated that CDFW would lead any fish rescue and relocation efforts.

Comment #	Commenter Name/Affiliation (Date)	Comment	Response
12	Schani Siong/ SLO County (Mar. 2, 2023)	SRA Findings: e. Required findings: Any land use permit application within a Sensitive Resource Area shall be approved only where the Review Authority can make the following required findings: (1) The development will not create significant adverse effects on the natural features of the site or vicinity that were the basis for the Sensitive Resource Area designation, and will preserve and protect such features through the site design. (2) Natural features and topography have been considered in the design and siting of all proposed physical improvements. (3) Any proposed clearing of topsoil, trees, or other features is the minimum necessary to achieve safe and convenient access and siting of proposed structures, and will not create significant adverse effects on the identified sensitive resource. (4) The soil and subsoil conditions are suitable for any proposed excavation; site preparation and drainage improvements have been designed to prevent soil erosion, and sedimentation of streams through undue surface runoff.	This comment is outside the scope of the instream flow study.
13	Schani Siong/ SLO County (Mar. 2, 2023)	ESHA Findings: b. Required findings: Approval of a land use permit for a project within or adjacent to an Environmentally Sensitive Habitat shall not occur unless the applicable review body first finds that: (1) There will be no significant negative impact on the identified sensitive habitat and the proposed use will be consistent with the biological continuance of the habitat.	This comment is outside the scope of the instream flow study.

Comment #	Commenter Name/Affiliation (Date)	Comment	Response
		(2) The proposed use will not significantly disrupt the habitat.	
14	Steph Wald and Tim Delany/ Creek Lands Conservation (Mar. 17, 2023)	It might be helpful to readers to understand that the CCSD commenced its San Simeon diversions in 1979, that no supplemental water from Santa Rosa Creek was needed until 1984 and that in 1984, 1985, and 1986, Santa Rosa Creek underflow had to be used to supplement San Simeon supply (McClelland Engineers 1987).	It is not clear how this historical operation is relevant to current management. CCSD's water rights allow up to 370 acre-feet of dry-season extraction from the San Simeon River basin and up to 155 acre-feet from the Santa Rosa Basin, and CCSD operates within these limits.
15	Steph Wald and Tim Delany/ Creek Lands Conservation (Mar. 17, 2023)	Is the intent of the report to provide an instream flow assessment that evaluates impacts of the WRF facility during Stage 3 droughts only, the operation of the WRF across a range of water year types, or the operation of all CCSD pumping activities across a range of water year types?	The intent of the San Simeon Instream Flows Assessment is to assess the effects of CCSD operations on aquatic habitat in lower San Simoen Creek, identify sensitive flows for aquatic species, and develop long-term monitoring to inform CCSD operations and allow CCSD to operate in a way that minimizes impacts to sensitive aquatic species.
16	Steph Wald and Tim Delany/ Creek Lands Conservation (Mar. 17, 2023)	In Study Goals and Objectives (Section 2.3, page 11), the following statement is made, "The analysis focuses on drought periods when the WRF would likely be operated and when potential ecological impacts would be most severe." It is unclear if this refers to Task 1 (instream flow assessment) or Task 2. Based on language used throughout the study and in the conclusions, it seems the instream flow assessment is intended to cover all CCSD operations including existing operations. If this is the case, then an expanded instream flow assessment is needed– for example to inform the potential impact CCSD	The has been revised to clarify that the statement about analysis being focused on drought years is referring to Task 2 (Groundwater Modeling). The instream flow study covered under Task 1 applies to all CCSD operations in San Simeon Creek basin because it identifies streamflows that are protective of aquatic species in lower San Simeon Creek. The report specifies that a streamflow of 1.0 cfs is required to provide juvenile steelhead rearing habitat based on the instream flow study and incorporates the range of CCSD extraction rates that have a maximum capacity of 1.43 cfs to a protective flow

Comment #	Commenter Name/Affiliation (Date)	Comment	Response
		operations has on habitat in lower San Simeon Creek in wetter years.	level of 2.5 cfs (approximately 1.0 cfs plus 1.43 cfs) These results are independent of water year types.
17	Steph Wald and Tim Delany/ Creek Lands Conservation (Mar. 17, 2023)	CCSD operations, and their potential impacts to aquatic habitats, began in 1979. Section 2.2 (Operations Information) only presents CCSD operational data starting in 2012. The operations summary does not provide an overview of CCSD operation since 1979, nor how operations or their impacts have changed over time, nor the potential impact of existing operations on flow data utilized in the study.	The final San Simeon Instream Flows Assessment report includes CCSD operational data from the last 10 years to provide a representative summary of CCSD operations in the watershed. Historical operations and changes in operations over time were not the focus of the study, rather Stillwater Sciences assessed (1) the range of CCSD groundwater extraction rates from the lower average pumping rate of 0.41 cfs to the maximum pumping rate of 1.43 cfs and (2) how that range of extraction would affect aquatic habitat over a range of surface flows in the study area. All available streamflow data were used to evaluate the frequency of specific surface flows in the Study Area, but the key flows (i.e., 1.0 cfs) identified in the study remain static for informing CCSD operations to be protective of steelhead rearing conditions.
18	Steph Wald and Tim Delany/ Creek Lands Conservation (Mar. 17, 2023)	The cumulative impact from existing water uses including historical CCSD operations and impacts of senior water rights upstream of CCSD should be acknowledged and integrated into the report.	Impacts from the Pedotti private well were included in the assessment of impacts to juvenile migration conditions. The Warren pumps are downstream of well field and not expected to influence passage based on location in watershed and groundwater modeling (Yates 2022). The recommendation of

Comment #	Commenter Name/Affiliation (Date)	Comment	Response
			establishing and maintaining a stream flow gage at the location of the county gage, which currently only records stage, is included in the report to inform future CCSD operations. Streamflow data at this location would capture any influence on surface flows from the Warren wells.
19	Steph Wald and Tim Delany/ Creek Lands Conservation (Mar. 17, 2023)	If there is sufficient data, flow statistics and conclusions about flow patterns could be made distinct for two different periods in San Simeon Creek. a. Stream flows before 1979 (the first year CCSD began diverting from the Creek) b. Stream flows from 1979 onward (active period of CCSD diversions)	There are not sufficient flow data to identify flow patterns between pre-CCSD operations and post-CCSD operations. The San Simeon Gage only covers from 1987–2003, which is after CCSD operations began, and although some data from the Palmer Flats Gage (1971–1995) provide some data; the data are for only 8 years before and 15 after 1979 and are limited for this type of comparison. In addition, the Palmer Flats Gage is located at the upstream end of the groundwater basin and is less likely to provide representative information about CCSD pumping operations.
20	Steph Wald and Tim Delany/ Creek Lands Conservation (Mar. 17, 2023)	If this is not possible, the historical operations and their potential impacts on flow data should be acknowledged.	The final San Simeon Instream Flows Assessment report primarily relies on data from the Palmer Flats Gage. As discussed in the final report, this gage is located at the upstream end of the groundwater basin and thus is not likely to see a strong influence from CCSD pumping operations.
21	Steph Wald and Tim Delany/ Creek Lands Conservation (Mar. 17, 2023)	Given the importance of historical flow data, all flow collection methods need to be explained, and flow data (including rating curves) should be published as an appendix if not publicly available elsewhere (in which case references are needed).	Mean daily flow data for each stream gage were used to characterize flow conditions for the final San Simeon Instream Flows Assessment Report. These data have been included as an appendix to the final report. Additional detailed flow data for the watershed could not be located.

Comment #	Commenter Name/Affiliation (Date)	Comment	Response
22	Steph Wald and Tim Delany/ Creek Lands Conservation (Mar. 17, 2023)	Page 4. While it is true that San Simeon is flashy like other streams, this does not mean that the extent of temporal and spatial intermittent trends is natural. Rather as stated in Yates & Konyenburg (1998) flows in this reach have been impacted by existing land and water management practices. Please acknowledge and edit language throughout the report as appropriate.	This statement has revised in the final San Simeon Instream Flows Assessment report to acknowledge that groundwater pumping (municipal and agricultural) likely increases the extent and frequency of intermittent flows above natural levels.
23	Steph Wald and Tim Delany/ Creek Lands Conservation (Mar. 17, 2023)	Page 4, last sentence that lower San Simeon is dry "to the Lagoon" is vague, please be specific.	The final San Simeon Instream Flows Assessment report was revised to clarify that the dry section of San Simeon Creek often extends to just downstream of Van Gordon Creek.
24	Steph Wald and Tim Delany/ Creek Lands Conservation (Mar. 17, 2023)	Page 19, Section 3.3.3. Paragraph 2. More information about the rating curves and sampling intervals at Palmer Flats and Gage #718 is needed.	See response to comment 21.

Comment #	Commenter Name/Affiliation (Date)	Comment	Response
25	Steph Wald and Tim Delany/ Creek Lands Conservation (Mar. 17, 2023)	Page 21, Section 3.4, Paragraph 1. "Palmer Flats is located just upstream of the San Simeon Creek groundwater basin and is not affected by groundwater pumping." Please cite data or a report for this. Regardless of groundwater basin delineation, data from wells 27S/8E-10G1 and 10G2 appear to show seasonal declines that would be consistent with pumping influence (Yates & Konyenburg 1998)2. Subsequent statements about how Palmer Flats represents the maximum potential surface flow is thus also called into question by this data. This also applies to Section 4.3 Paragraph 1.	This comment questions whether the Palmer Flats Gage was in fact upstream of the influence of groundwater pumping. The gage was located at the San Simeon Creek Road Bridge 600 feet downstream of the confluence with Steiner Creek. That location is near the upstream end of the groundwater basin and 1,390 feet upstream of the nearest water supply well (Pedotti irrigation well 27S/8E-11C1). Previous reports going back to Yates and Van Konynenburg (1998) have considered the Palmer Flats gaged flows to represent surface inflow to the basin, and that assumption was reasonable for most purposes. Geologic maps show alluvium extending about 1 mile farther up San Simeon Creek and Steiner Creek (for example, Dibblee and Minch 2007). Although the alluvium is narrower and, undoubtedly shallower upstream of the gage, it would still be capable of conveying water via the subsurface. Natural stream percolation would likely be relatively high upstream of the gage because sediments at the apex of alluvial fans tend to be relatively coarse. There could be additional percolation upstream of the gage caused by pumping at 11C1 during April–May, but it is probably negligible for several reasons. First, the irrigation season does not usually get underway until April, and when the well starts pumping, most of the water comes from storage as the cone of depression expands outward. It would take days to weeks to extend as far as the gage location. Second, well 11C1 is only about 100 feet from the channel of San Simeon Creek. When flow is present in the creek, any percolation induced by pumping would be along the reach closest to the well. When it was drilled in 1977, the well was tested at 250 gallons per minute,

Comment #	Commenter Name/Affiliation (Date)	Comment	Response
			which equals 0.57 cfs. Channel percolation between the gage and the well (and an equal distance downstream) could supply most or all of that flow rate.
26	Steph Wald and Tim Delany/ Creek Lands Conservation (Mar. 17, 2023)	Page 30, Section 4.3, Paragraph 1. "Note that flows at Palmer Flats during the spring and summer are generally expected to be higher than flows within the Study Area…" It should also be acknowledged that good passage conditions at Palmer Flats do not always result in passage conditions in the lower reaches.	The description of the methods used for juvenile steelhead passage assessment provided in Section 3.5 of the final San Simeon Instream Flows Assessment report was revised to clarify Stillwater Science's approach and to acknowledge that fish passage conditions at Palmer Flats are not necessarily the same as passage conditions.
27	Steph Wald and Tim Delany/ Creek Lands Conservation (Mar. 17, 2023)	Page 42, Section 5, Paragraph 3. This paragraph should explain why the creek's intermittency in the lower reaches should cause the EWD analysis points to be moved upstream near Steiner Creek. Is the lower reach unsuitable for EWD analysis because of natural conditions or because of human impacts or both?	The lower reach is unsuitable for an analysis of Environmental Water Demand (EWD) because it is naturally intermittent and EWD analysis was intended for locations with perennial flows.
28	Steph Wald and Tim Delany/ Creek Lands Conservation (Mar. 17, 2023)	Page 42, Section 5, Paragraph 3. Is "natural groundwater losses" the correct term here? The cause of natural groundwater loss is natural subsurface drainage out to sea. The rest of groundwater losses are not natural and are caused by pumping water out for human uses. This sentence should include an acknowledgement of the fact that some proportion of groundwater losses are also anthropogenic.	The final San Simeon Instream Flows Assessment report was revised to address this comment. The sentence no longer uses the phase "natural groundwater losses," and has been revised as follows: "…the lowermost analysis points used in the EWD study (Stillwater Sciences 2014) should be relocated upstream of the groundwater basin to the confluence of Steiner Creek or adjusted to reflect the intermittent flow conditions in lower San Simeon Creek.

Comment #	Commenter Name/Affiliation (Date)	Comment	Response
29	Steph Wald and Tim Delany/ Creek Lands Conservation (Mar. 17, 2023)	Page 42, Section 5, Paragraph 5. "CCSD pumping operations have the potential to reduce the amount and quality of juvenile steelhead rearing habitat within the Study Area at flows less than 2.5 cfs" Please specify at what point(s) along the creek this 2.5 cfs threshold is relevant. When flow is 2.5 cfs at Palmer Flats?	This threshold is relevant throughout the entire length of Reach 1 of the Study Area where 1D modeling surveys were conducted. The location of the current county gage would serve as the best indicator for these flows; however, that gage only records stage elevation and lacks a current stage discharge rating curve to convert measurements to flow. The final San Simeon Instream Flows Assessment Report includes a recommendation for developing and maintaining a rating curve for the county gage to inform CCSD operations to be protective of steelhead.
30	Steph Wald and Tim Delany/ Creek Lands Conservation (Mar. 17, 2023)	Page 42 first sentence: "The lower reach of San Simeon Creek in the absence of CCSD pumping operations potentially provides migratory and rearing habitat for steelhead in the winter and spring and is typically dry during the summer and fall. This reach would only provide steelhead rearing habitat during the dry season infrequently" Please indicate the specific reach that is dry under existing land and water management conditions – from Palmer to the footbridge? In all water year types? For example, this sentence might read "Limited data is available to assess natural flow conditions in San Simeon Creek. However, based on the geology and similar watersheds, some portion of lower San Simeon Creek was likely historically intermittent. Under existing land and water management practices, the lower reach of San Simeon Creek typically provides migratory and rearing habitat for steelhead in the winter and spring and it dries out in the summer and fall from Palmer Flats to one mile upstream of the lagoon."	Section 5, *Conclusions*, of the final San Simeon Instream Flows Assessment report was revised to clarify which section of lower San Simeon goes dry and how that conclusion was formed. The text was revised as follows: "The lower reach of San Simeon Creek provides potential migratory and rearing habitat for steelhead in the winter and spring, and this habitat often becomes constrained during the late spring and disappears during the summer and fall when surface flows cease. Available stream flow data at Palmer Flats Gage (1970 to 1995) and County Gage #718 (1987 to 2003) indicate that most of lower San Simeon Creek within the Study Area (from the Palmer Flats Gage downstream to approximately the confluence with Van Gordon Creek) would naturally (i.e., without CCSD groundwater pumping) go dry for extended periods during the summer through fall of most years."

Comment #	Commenter Name/Affiliation (Date)	Comment	Response
31	Steph Wald and Tim Delany/ Creek Lands Conservation (Mar. 17, 2023)	Page 43, Section 6.1, Paragraph 1: The recommendation to collect additional flow data at Palmer Flats is good, but the comment above (Page 21, Section 3.4) about the non-influence of groundwater pumping at this location suggests that going somewhat further upstream (perhaps on both Steiner and upper San Simeon) could be a better way to monitor inflows to the groundwater basin. There is a water right in the vicinity of Palmer Flats that could influence surface water levels at this site when water is being pumped. Reported flow rate for the well associated with this water right is 300 gpm (0.67 cfs).	The Palmer Flats Gage was located at the San Simeon Creek Road Bridge 600 feet downstream of the confluence with Steiner Creek. That location is near the upstream end of the groundwater basin. Previous reports going back to Yates and Van Konynenburg (1998) have considered the gaged flows to represent surface inflow to the basin. Continuing to reoccupy the former gage site will allow the data to continue on the historical record and allow the analysis of long-term trends.
32	Clyde Warren/ Landowner (Mar. 6, 2023)	The report on page 10 only mentions that my irrigation well (formally the Molinari well) has an annual use of 183.5 acre feet. It does not mention the pumping rate of 275 gpm and not less than 105 psi at the meter which is located at my property line. See attachment.	The final San Simeon Instream Flows Assessment report was revised to specify the pumping rate for this well is 0.61 cfs (275 gallons per minute).
33	Clyde Warren/ Landowner (Apr. 2023)	This letter includes multiple comments focused on effects of CCSD pumping on Private wells operated by C. Warren that pump near Van Gordon Creek and how CCSD operations might affect private water rights.	These comments are addressed in a separate memo titled *Responses to Clyde Warren Comment Letter*, which is now provided as an attachment to the final San Simeon Instream Flow Assessment report.

Attachment 4

Responses to Clyde Warren Comment Letter

TODD GROUNDWATER

August 22, 2024

MEMORANDUM

To: James Green, Cambria Community Services District

From: Gus Yates, PG, CHG, Senior Hydrologist

Re: Water Reclamation Facility: Responses to Clyde Warren Comment Letter Dated April 4, 2023

I have reviewed the comment letter and associated files Mr. Warren submitted to Cambria Community Services District (District) on April 4, 2023 outlining his concerns regarding potential impacts of the District's Water Reclamation Facility (WRF) on his supply wells. The locations of his wells and relevant nearby wells are shown in **Figure 1**. I have investigated his assertions and completed additional analysis to evaluate their merits. For discussion purposes, I have grouped his comments into three issues, each of which is discussed below.

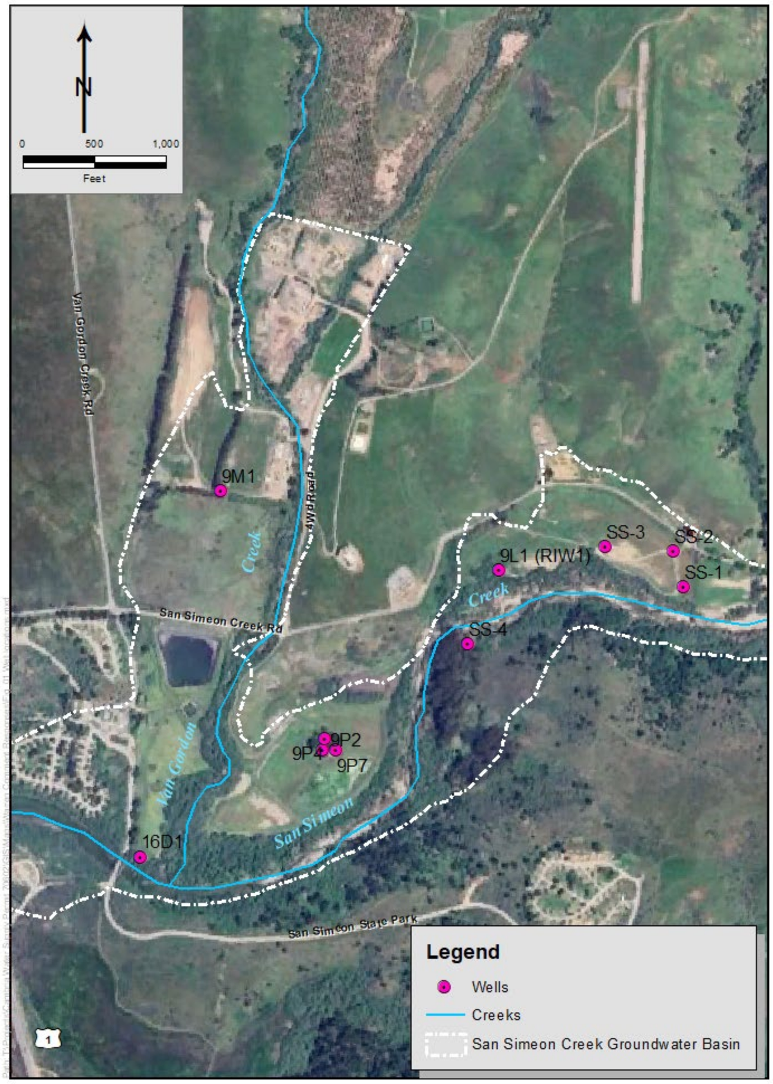


Figure 1. Locations of Wells

Issue 1: 9P7 Pumping Impacts on Van Gordon Creek Wells

Mr. Warren cited material in my January 23, 2020 memorandum to the District. That memorandum interpreted older CDM Smith modeling results. It pointed to the need for improved modeling, which led to my work in 2021-2022 that included model improvements, recalibration and simulation of WRF operational scenarios. I documented the more recent modeling in a memorandum to the District dated March 22, 2022.

A major difference between the CDM Smith modeling and the more recent modeling is that the CDM Smith modeling assumed much more WRF operation than would actually be needed. Sensitivity analysis with the new model showed that the water-level gradient between wells SS-4 and 9P2 dictated whether and how much WRF production would be needed in a given month. In the absence of WRF operation, the gradient gradually shifts from down-valley (forward gradient) to up-valley (reverse). The District operates facilities to avoid reverse gradients. Modeling showed that WRF operation rapidly establishes a forward gradient. Thus, average WRF flows could be adjusted semi-monthly (the model stress period) to closely match the target gradient. This led to the 9P7 pumping rates for various scenarios shown toward the bottom of the graph in **Figure 2**. Well 9P7 is the supply well for the WRF. For all of the scenarios, semi-monthly pumping rates are less than half the rates assumed in the CDM Smith modeling (the lone curve near the top of the graph).

The CDM Smith modeling and my more recent modeling both assumed a longer duration of WRF operation than is likely to occur. The CDM Smith model assumed the WRF would operate continuously with zero San Simeon Creek flow in winter. This is unrealistically conservative because it implicitly assumed two exceptionally dry years in a row. My more recent modeling similarly assumed two exceedingly dry years in a row, but they were evaluated separately. This allowed two types of dry year to be evaluated in a single simulation, but the probability of two such years in a row is on the order of one year out of 360 years (Yates and Van Konynenburg, 1998). A more realistic estimate of a year with heavy WRF operation would assume the plant is turned on around mid-summer in a year when the dry season started exceptionally early. It would continue operating at the rate needed to maintain the target gradient between SS-4 and 9P2 until San Simeon Creek stream flow resumes, which is commonly in December, sometimes in January and rarely as late as February.

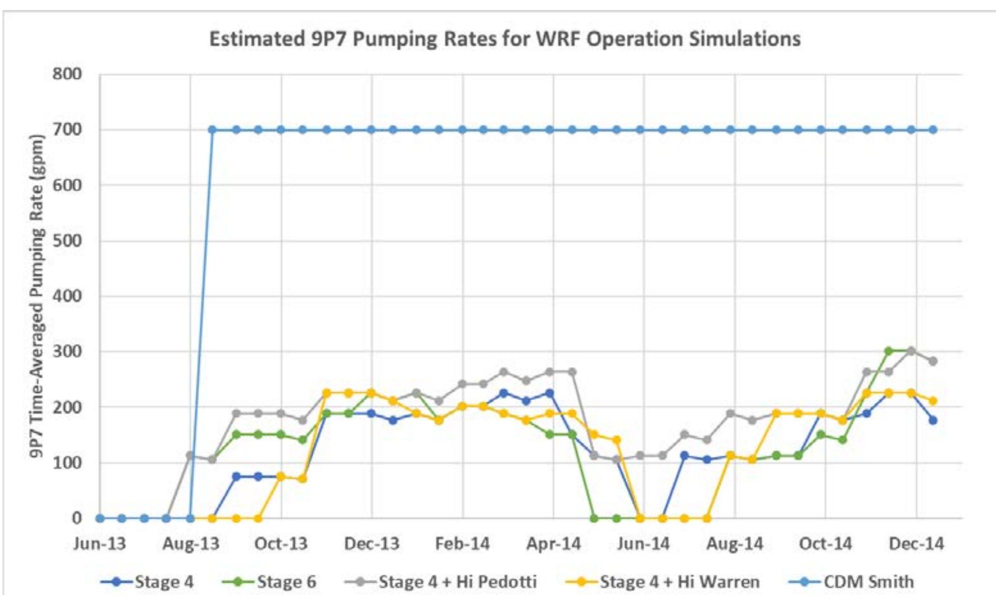


Figure 2. Estimated 9P7 Pumping Rates

My recent modeling also assumed an annual District water demand of 700 AFY, which included an increment of growth relative to current demand. Annual water use during 2015-2020 averaged 503 AFY. The scenarios have not been repeated with this smaller water demand, but the result would be smaller semi-monthly WRF production and a slightly shorter WRF operational season. The effects of pumping at well 9P7 would also be proportionally smaller.

Most of the issues raised by Mr. Warren regarding pumping impacts on water levels can be answered by inspection of historical water-level data for wells 9M1 and 9P2, which have been monitored by the District for many years. **Figure 3** shows hydrographs of groundwater elevations measured in those two wells from 2004-2019.

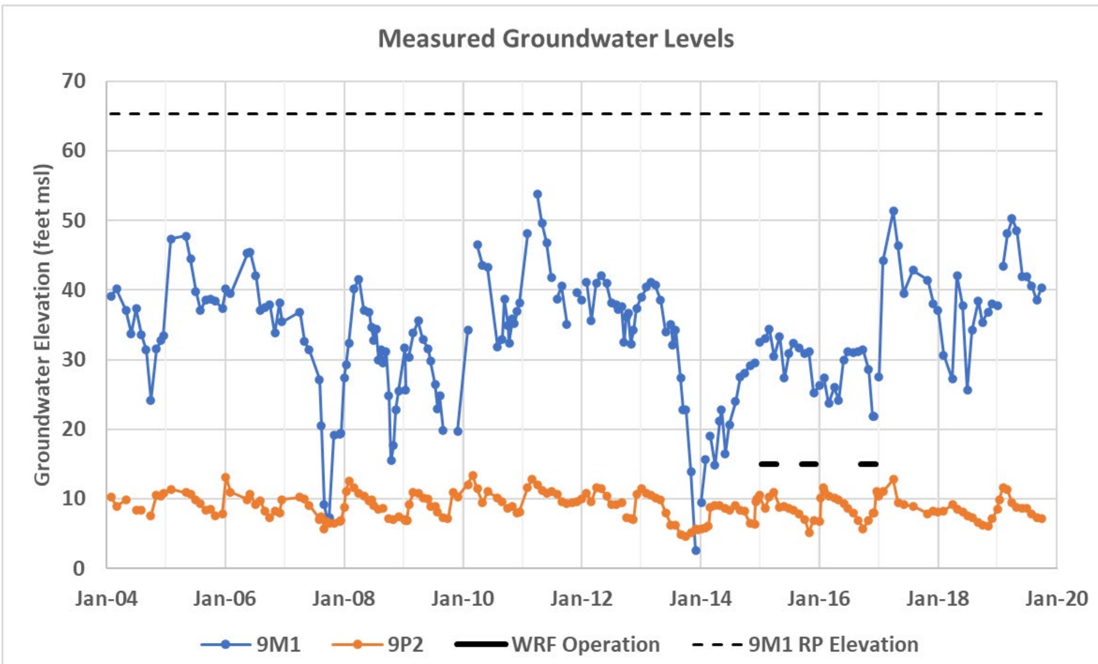


Figure 3. Groundwater Levels in Wells 9M1 and 9P2

Water levels in well 9P2 remained within a narrow range (6-13 ft msl) because of the stabilizing effects of nearby recycled water percolation and the lagoon. Also, there has not been much pumping at nearby wells 9P7 (WRF supply well) and 9P4 (Warren's irrigation well). In contrast, 9M1 water levels fluctuated much more widely: 15-54 ft msl in typical years and plunging as low as 3 ft msl in drought years. These variations are obviously not caused by pumping for the WRF, which would have to also lower 9P2 water levels if it were having an impact on the much more distant well 9M1.

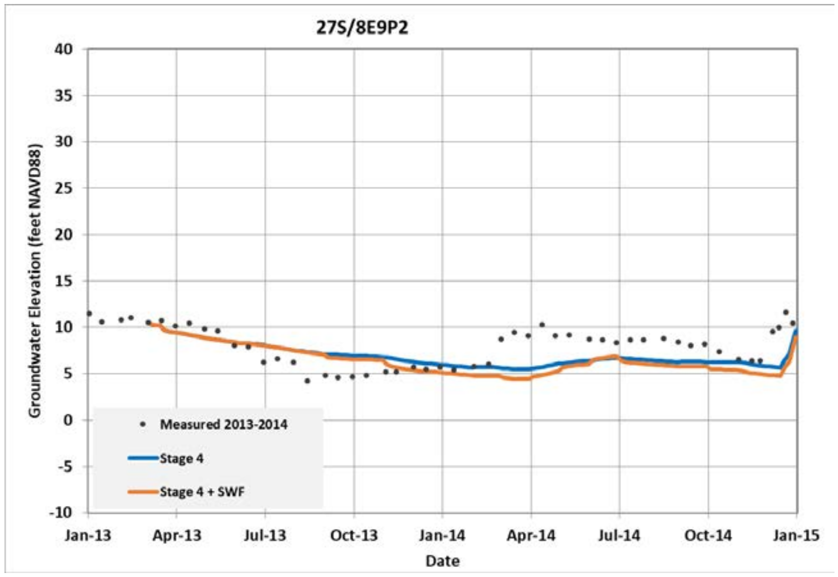
The 9P2 hydrograph demonstrates that fluctuations in water levels in the San Simeon Creek basin near Van Gordon Creek are not the cause of the large water-level fluctuations observed in the Van Gordon area. In fact, in December 2013 the 9M1 water level was **lower** than the 9P2 water level. At that time, one could argue that Van Gordon drawdown was impacting 9P2 water levels, not the other way around.

The large water level fluctuations at 9M1 are likely due to local irrigation pumping and variations in recharge in the Van Gordon Creek area. Warren irrigation has been small since 1995, based on Google Earth historical aerial imagery that shows little active irrigation on his lands on the Van Gordon Creek valley floor. So pumping at 9M1 or Warren's other nearby wells probably did not contribute substantially to the observed water level fluctuations. However, a much larger stress would be pumping to irrigate the 56 acres of avocado orchard immediately upstream of Warren's property (visible in Figure 1). I completed a daily soil moisture budget simulation of the orchard during 2004-2021, which produced an estimate of 131 AFY of irrigation pumping.[1] That is a large stress on that relatively small corner of the basin. The irrigation pumping contributes to dry-season water-level declines every year. The exceptionally large dry-season water level declines in 2007 and 2013 probably resulted from below-average recharge during the preceding winter. Recharge correlates with precipitation and stream flow, which vary much more widely from year to year than evapotranspiration and irrigation do. Annual irrigation demand does go up if the summer is hot or the dry season is long, but as a percent of normal, the variations are small compared to variations in precipitation and stream flow.

Figure 2 also shows that water levels in well 9M1 drop as low as the 12.5 ft msl elevation shown in the CDM Smith figure cited by Mr. Warren even in the absence of WRF operation, such as in 2007 and 2013. Thus, the assumption that the low water levels resulted from 9P7 pumping is incorrect. The relevant question is how much **additional** drawdown at 9M1 did 9P7 pumping contribute? The drawdown impact at 9M1 would necessarily be smaller than at nearby wells in the San Simeon Basin (such as 9P2 and 16D1) because drawdown decreases with distance from a pumping well.

My modeling of scenarios in 2021-2022 showed that WRF operation would lower water levels at 9P2 by only 2 ft by the end of the dry season, as shown in **Figure 4** for the drought stage 4 + WRF scenario. At well 16D1 water levels would be lower by less than 1 foot. The effect of WRF operation on water levels at 9M1 would certainly be less than 1 foot, not the 23.13 ft asserted in the comment letter. The 0.5-2 ft of drawdown caused by 9P7 pumping at 9P2 and 16D1 at the end of the dry season would not appreciably increase the southward gradient at Well 9M1, which is located 2,000-2,500 ft away.

[1] Daily rainfall and reference ET for Cambria from ClimateEngine.org; available water capacity = 0.13; root depth = 10 ft; crop coefficient = 0.7 in all months; irrigation deep percolation = 10% of applied water.



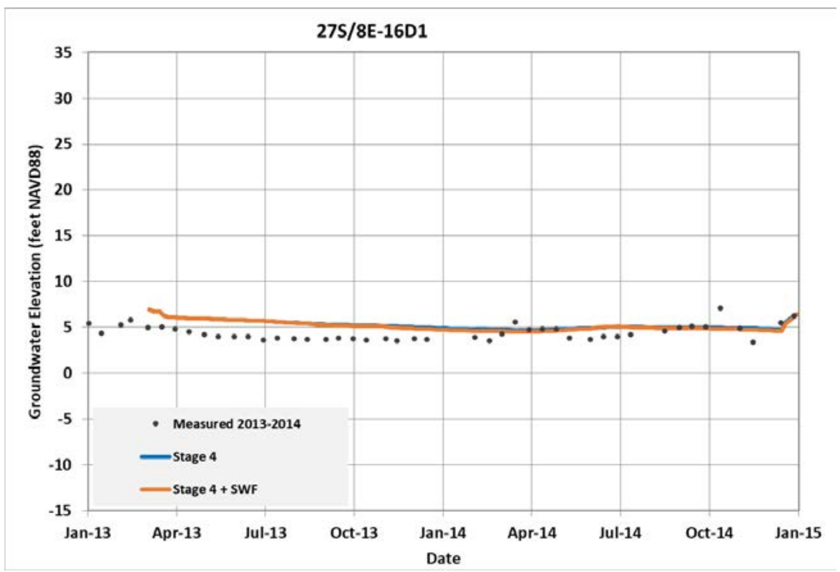


Figure 4. Simulated Water Levels at Wells 9P2 and 16D1 during WRF Operation

Issue 2: 9P7 Pumping Impacts on 9P4

Well 9P4 is an irrigation well owned by Mr. Warren and located in the District's recycled water percolation area less than 100 ft from WRF supply well 9P7. Well 9P2 is a similar distance from 9P7 and is the well with the long history of measured water levels shown in Figure 3. The periods of pumping at well 9P7 during 2015-2016 are indicated by the horizontal black bars in Figure 3. There was no concurrent decline in water levels at 9P2, just the usual seasonal pattern of cyclic fluctuations. The amounts of 9P7 pumping in 2015-2016 were smaller than would occur in a year of heavy WRF operation, but if 9P7 impacted water levels at 9P2, some evidence of drawdown should have been visible and wasn't.

Model simulations also indicated that pumping at 9P7 during WRF operation would not cause substantial drawdown at 9P2 and by extension at 9P4, which is a similar distance from 9P7. The hydrographs in Figure 4 shows the simulated effects of more sustained WRF operation compared to the same simulation without WRF operation. Over the course of two consecutive very dry years, 9P2 water levels with WRF operation were at most 2 ft lower than without WRF operation. Thus, the fear that 9P2 water levels would be drastically lowered by WRF operation or that Warren's nearby supply well 9P4 would lose capacity appear to be unfounded.

The comment letter also mentioned that WRF operation could impact groundwater quality at Warren's irrigation well 9P4. No mechanism was suggested for how water quality would be impacted. The treatment plant does not add chemicals to the basin. Salts that are extracted by reverse osmosis treatment will be trucked out of the basin. The advance treated recycled water injected for the WRF project at well RIW1 near the District's well field is of higher quality than groundwater presently extracted by Warren's well 9P4.

Issue 3: Water Rights

The District has three primary responses to the water rights issues raised in letters from Mr. Warren and his attorney.

First, as confirmed in the March 22, 2022, report prepared by Todd Groundwater, the WRF extracts, treats and reinjects wastewater that was percolated by the District, and the annual volume of wastewater percolation equals 92% of the volume extracted at the District's well field (Todd Groundwater, 2022, p. 4). The WRF simply moves highly-treated percolated wastewater to a location in the aquifer that is accessible to the District's municipal wells. The District holds exclusive rights to this developed water supply (Water Code section 1210). The central premise of the WRF project is the percolation and recharge of the District's treated wastewater and subsequent recovery thereof. Mr. Warren has no claim of water rights regarding this source of supply.

Second, and as referenced in correspondence from Mr. Warren and his attorney, the District and Mr. Warren have a Settlement Agreement that governs their relationship with regard to these matters. The District abides by the terms of the agreement and will continue to do so. The Settlement Agreement has clear terms for dispute resolution, and Mr. Warren may avail himself of those processes if warranted. The Settlement Agreement was executed in 2006 and has successfully and amicably governed relations between Mr. Warren and the District since that time.

Third, the District disputes Mr. Warren's claims and assumptions that the District pumps Van Gordon Creek surface water (via subterranean stream flow). Unlike the San Simeon aquifer, there has been no court/regulatory determination that the the District is pumping from the subterranean streamflow associated with Van Gordon Creek. In fact, there is evidence indicating the groundwater flow direction in the vicinity of the WRF supply well (9P7) runs is perpendicular to the direction of Van Gordon Creek, thus nullifying a key element for finding the existence of a subterranean stream. Water level data from well

9M1 in Van Gordon Creek Valley and groundwater modeling both show that the groundwater gradient and flow direction in Van Gordon Creek Valley are parallel to Van Gordon Creek and perpendicular to San Simeon Creek. Thus, groundwater from the Van Gordon Creek Valley enters San Simeon Creek Valley from the side and is not part of the subterranean stream associated with San Simeon Creek. There is no evidence that the WRF project is pumping from a subterranean stream associated with Van Gordon Creek or that the project will interfere in any way with Mr. Warren's claimed Van Gordon Creek surface water rights.

References Cited

Todd Groundwater. March 2022. Simulated effects of water reclamation facility operation. Prepared for Cambria Community Services District, Cambria CA.

Yates, E.B. and K.M. Van Konynenburg. 1998. Hydrogeology, water quality, water budgets and simulated responses to hydrologic changes in Santa Rosa and San Simeon Creek groundwater basins, San Luis Obispo County, California. Water Resources Investigations Report 98-4061. U.S. Geological Survey, Sacramento, CA.