County of San Luis Obispo
Whale Rock Reservoir
County Service Area 10- Cayucos
Watershed Sanitary Survey
Five Year Update (2016-2020)

Prepared By:

County of San Luis Obispo

Department of Public Works

Utilities Department

Water Quality Laboratory

San Luis Obispo CSA 10 – Cayucos

Whale Rock Reservoir

PWSID: 4010025

March 2021

County of San Luis Obispo
Department of Public Works

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SYSTEM INFORMATION

SWRCB-DDW System No.: 4010025
System Name: San Luis Obispo CSA 10
Survey Period: January 1, 2016, through December 31, 2020

PREPARER INFORMATION

Name of Agency and Address: County of San Luis Obispo
Department of Public Works
Utilities Division, Water Quality Laboratory
County Government Center, Room 206
San Luis Obispo, CA 93408

SURVEY DESCRIPTION

Name of Watershed: Whale Rock Reservoir
Total Watershed Size in acres: 13,000 acres

Location (list counties in which watershed is located or attach map): San Luis Obispo

Name(s) of water treatment plant using the watershed as a source:
Cayucos Water Treatment Plant
City of San Luis Obispo Water Treatment Plant
California Men's Colony Water Treatment Plant

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General Conditions Checklist Form

There were no changes to the general conditions of the Whale Rock Reservoir Watershed since the 2015 update.

Conditions	Significant	Not Significant	Comments
I. General Conditions			
A. Changes in available water supply		X	Drought may impact water supply
B. Construction of water diversion or reservoir projects		X	
C. Relocation of intakes		X	
II. Contaminant Sources			
A. Wastewater Treatment			
1. Treatment plant effluent discharges		X	
2. Storage, transport, treatment, disposal to land		X	
3. Residential septic systems		X	~30 residential septic tanks located within the watershed
4. Commercial/industrial septic systems		X	
B. Reclaimed Water		X	
C. Urban Areas		X	
D. Agricultural Crop Land Use		X	~65% of watershed designated agricultural
E. Pesticide/Herbicide Use		X	
F. Grazing Animals	X		Cattle grazing in watershed two miles upstream
G. Concentrated Animal Facilities (feedlots, etc.)		X	
H. Wild Animal Populations		X	
I. Mines			
1. Active		X	
2. Inactive		X	
J. Disposal Facilities			
1. Solid waste		X	
2. Hazardous waste		X	
K. Logging		X	
L. Recreation			
1. Reservoir body contact		X	
2. Reservoir non-body contact		X	
M. Unauthorized Activity			
1. Illegal dumping		X	
2. Underground storage tank leaks		X	
3. Other			
N. Traffic Accidents/Spills			
1. Transportation corridors		X	
2. History of accidents/spills		X	
O. Groundwater Discharges			
1. Natural discharge		X	
2. Gas, oil, geothermal wells		X	
P. Seawater Intrusion		X	
Q. Geologic Hazards			
1. Landslides	X		
2. Earthquakes	X		
3. Floods	X		
R. Fires	X		
III. Growth			
A. Population/General Urban Area Increase		X	
B. Land Use Changes		X	
C. Industrial Use Increase		X	
IV. Water Quality			
A. Changes in Raw Water Quality		X	
B. Difficulty Meeting Drinking Water Standards		X	

ACRONYMS AND ABBREVIATIONS

CAWO:	Cayucos Area Water Organization (County Service Area 10A - Cayucos, Morro Rock Mutual Water Company, Cayucos Beach Mutual Water Association)
CE:	Counting error
CFU/mL:	Colony forming units per milliliter.
City:	City of San Luis Obispo
County:	County of San Luis Obispo
CSA10:	County Service Area 10 - Cayucos Water Treatment Plant
CSA10A:	County Service Area - Cayucos Distribution
CT:	Concentration times time
CBMWC	Cayucos Beach Mutual Water Company
D/DBP:	Disinfectants and disinfection byproducts
DBP:	Disinfection byproducts
DLR:	Detection Level for Purposes of Reporting
E. coli:	Escherichia coli
Gal:	Gallon
GrossA:	Gross alpha radioactivity
HPC:	Heterotrophic plate count
lb.:	Pound
LI-C:	Langelier Index
LT2ESWTR:	Long Term 2 Enhanced Surface Water Treatment Rule
MBAS:	Methylene blue active substances (surfactants)
MCL:	Maximum contaminant level
MG:	Million Gallon
mg/L:	Milligrams per liter
MRMWC:	Morro Rock Mutual Water Company
MPN:	Most probable number
MPN/100mL:	Most probable number per 100 milliliters
NTU:	Nephelometric turbidity unit
n:	Number of samples collected.
ºC:	Degrees centigrade
oz:	Ounce
PCB:	polychlorinated biphenyl
PFAS:	Per- and polyfluoroalkyl substances
PRBS:	perfluorobutane sulfonic acid
PFOA:	perfluorooctanoic acid
PFOS:	perfluorooctanesulfonic acid
pCi/L:	pico Curies per liter
pH:	pH measured in the lab.
pH-Field:	pH measured in the field.
Qt:	Quart
Ra228:	Radium 228
SOC:	Synthetic organic compounds
SWRCB-DDW	State Water Resources Control Board – Division of Drinking Water
SWTR:	Surface Water Treatment Rule
TDS:	Total dissolved solids
Temp:	Temperature
TON:	Threshold odor number
ug/L:	Micrograms per liter
umhos/cm:	Micromhos per centimeter
VOC:	Volatile organic compound
WRC:	Whale Rock Commission (City of San Luis Obispo, the California Men's Colony, and California Polytechnic State University)

Executive Summary

There have been no significant changes to the Whale Rock Reservoir watershed since the 2015 survey.

The majority of the 13,000-acre watershed is designated as grazing land. The remaining land uses are agricultural crops, rural land, and open space/recreational. The area is sparsely populated and minimally developed. The land surrounding the Whale Rock Reservoir is owned by the State of California and operated by the City of San Luis Obispo under the direction of the Whale Rock Commission. Restrictions on public access are maintained on the State land surrounding the Whale Rock Reservoir. A narrow portion of the east shoreline allows controlled fishing. Boating and physical contact by human bodies is not permitted anywhere on the reservoir, except by City of San Luis Obispo reservoir staff.

Eroding sediments continue to be the most significant contaminants in the watershed. Erosion comes from both paved and unpaved roads, owned by County of San Luis Obispo (County) or private parties. Additional erosion is a result of livestock trails, steep eroding terrain, and croplands. Erosion is more significant during the rainy season and can contribute sedimentation to the reservoir.

Cattle grazing occurs throughout the watershed and is a potential source of contaminants such as Giardia and *E. coli*. The County has been monitoring for total coliforms and *E. coli* bacteria, two indicators of microbial contamination, weekly since the startup of the Cayucos Water Treatment Plant. Total coliform levels or may increase after large rainstorms or unseasonably warm weather. Although total coliform levels may be elevated, *E. coli* (the indicator bacteria for fecal contamination) have been low.

Cattle activity can contribute to increased turbidity and nutrient levels. Such conditions can stimulate excessive growth of nuisance algae, which can have major effects on the filtration and treatment processes at the water treatment plant. The existing cattle controls in the watershed area, which include fencing to prevent cattle direct access to the reservoir and routine watershed patrol, are currently adequate to protect the water quality of the reservoir.

Downstream of the Whale Rock Reservoir in the south-west end of the watershed are four standby wells available for use by the Cayucos Water Treatment Plant (WTP), the Cayucos Area Water Organization (CAWO) well, Cayucos Beach Mutual WC 01, Morro Rock Mutual Wells 01 and 03. Only the CAWO well is designated as “active”; it is not under the influence of surface water and does not require filtration treatment. Morro Rock Mutual Wells 01 and 03 and Cayucos Beach Mutual WC 01 are under the influence of surface water and must first receive full treatment through the Cayucos WTP. These wells have limited capacity and are dependent on water releases from Whale Rock Reservoir.

The CAWO well is chlorinated and pumped directly into the Cayucos WTP's clearwell reservoir to satisfy system demand. Evaluation of the watershed analytical data shows that the condition of the watershed remains very good and the treatment processes at the Cayucos Water Treatment Plant are sufficient to comply with current regulations.

The GAC filters have successfully provided total organic carbon (TOC) reduction as well as taste and odor control. Continued use of the GAC filters allows the plant to meet total trihalomethane (TTHM) and total haloacetic acid (HAA5), disinfection by-products (DBP), requirements in the water delivered to each customer.

Introduction

The California Surface Water Treatment Regulation (SWTR) (Chapter 17, Sections 64650 through 64666) required domestic water suppliers using surface water or ground water under the influence of surface water for their source water, to conduct a sanitary survey of their watersheds by January 1996. The survey is to be updated at least once every five years.

The Cayucos Water Treatment Plant was placed on-line in 1997. The initial sanitary survey of the Whale Rock Reservoir was prepared by Metcalf & Eddy, Inc. on behalf of the Whale Rock Commission (WRC). The WRC consisted of the City of San Luis Obispo, the California Men's Colony, and California Polytechnic State University.

The first update to the Whale Rock sanitary survey was completed by Boyle Engineering Corporation (Boyle) in January of 2001 in a joint effort by both the County of San Luis Obispo and the City of San Luis Obispo.

In 2002, the County of San Luis Obispo (County) and the Cayucos Area Water Organization (CAWO) contracted Boyle to complete a sanitary survey for their five standby wells. The survey covered the County of San Luis Obispo County Service Area 10 (CSA10) Cayucos Wells 02 and 03, Morro Rock Mutual Water Company (MRMWC) Wells 01 and 03, and Cayucos Beach Mutual Water Company (CBMWC) (formerly known as Paso Robles Beach Water Company) Well 01. These five wells are located below Whale Rock Reservoir. In addition to this 2002 survey, the County and CAWO contracted Boyle to prepare a technical memorandum reviewing the Cayucos Water Treatment Plant's ability to meet enforced regulations applicable to surface water treatment.

In 2005, County staff completed its first update to the Cayucos Wells watershed sanitary survey. The Whale Rock Reservoir sanitary survey was completed by City of San Luis Obispo in 2005.

Between 2010 and 2020, all updates were prepared by County staff for the Whale Rock Reservoir Watershed and assessed the Cayucos Water Treatment Plant's ability to meet all drinking water requirements.

Cayucos Wells

In addition to the Whale Rock Reservoir, the Cayucos Water Treatment Plant (WTP) has the option of utilizing four additional wells. The wells are located adjacent to Old Creek below the Whale Rock Reservoir in the south-west end of the watershed. Only one of these wells, referred to as the Cayucos Area Water Organization (CAWO) well, is designated as "active". This well is not under the influence of surface water. The CAWO well is chlorinated and pumped directly into the Cayucos WTP's clearwell reservoir. The CAWO well does not require filtration treatment. The three other wells that could be utilized by the WTP are designated "standby" wells and are under the influence of surface water. These wells are Morro Rock Mutual Wells 01 and 03 and Cayucos Beach Mutual WC 01. Although these wells can be used as a water source, they must first receive full treatment through the Cayucos WTP. These wells have limited capacity and are dependent on water releases from Whale Rock Reservoir.

Two additional standby wells located in this same well field (CSA10 Wells 02 and 03) were abandoned in March 2005.

The standby wells have not been utilized for drinking water since the new water treatment plant was put online in 1997. The wells are occasionally pumped for collection of State Water Resources Control Board – Division of Drinking Water (SWRCB-DDW) required sampling. All standby well water is pumped to waste. The County has submitted a Domestic Water Supply Permit Amendment to reclassify Morro Rock Mutual Wells 01, 03 and Cayucos Beach Mutual Water Company Well 01 as Standby Wells for emergency use at the CSA10 Water Treatment Plant as these well did not appear in the latest Domestic Water Supply Permit approved by the SWRCB-DDW. The Cayucos Beach Mutual Water Company well was previously known as Paso Robles Beach Water Company and was changed to the current name in 2017.

Watershed and Water Supply System

The Whale Rock Reservoir (see **FIGURE 1**) is located on Old Creek Road approximately one-half mile east of Cayucos. The reservoir project was planned, designed, and constructed under the supervision of the State Department of Water Resources (SDWR). Construction began in October 1958 and was completed in April 1961. The reservoir is jointly owned by the City of San Luis Obispo, the California Men's Colony, and the California Polytechnic State University, San Luis Obispo. Day to day operation of the reservoir is provided by the City of San Luis Obispo. In 1996, downstream water rights were granted to the Cayucos Area Water Organization (CAWO). The CAWO consists of the San Luis Obispo County Service Area 10A - Cayucos, Cayucos Beach Mutual Water Association, and the Morro Rock Mutual Water Company. The County built the Cayucos Water Treatment Plant in 1997 and continues to operate it for the CAWO water distribution. The reservoir has a maximum storage capacity of 41,000 acre-feet and a maximum surface area of 650 acres.

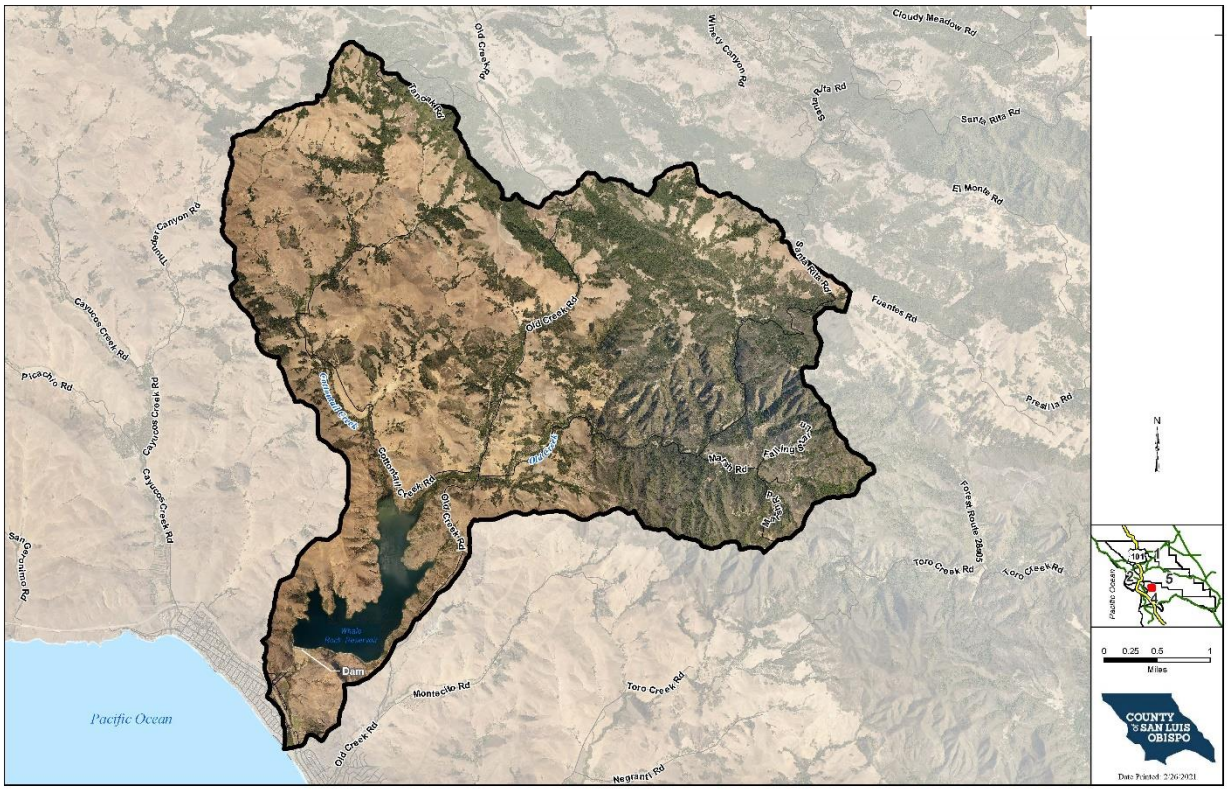
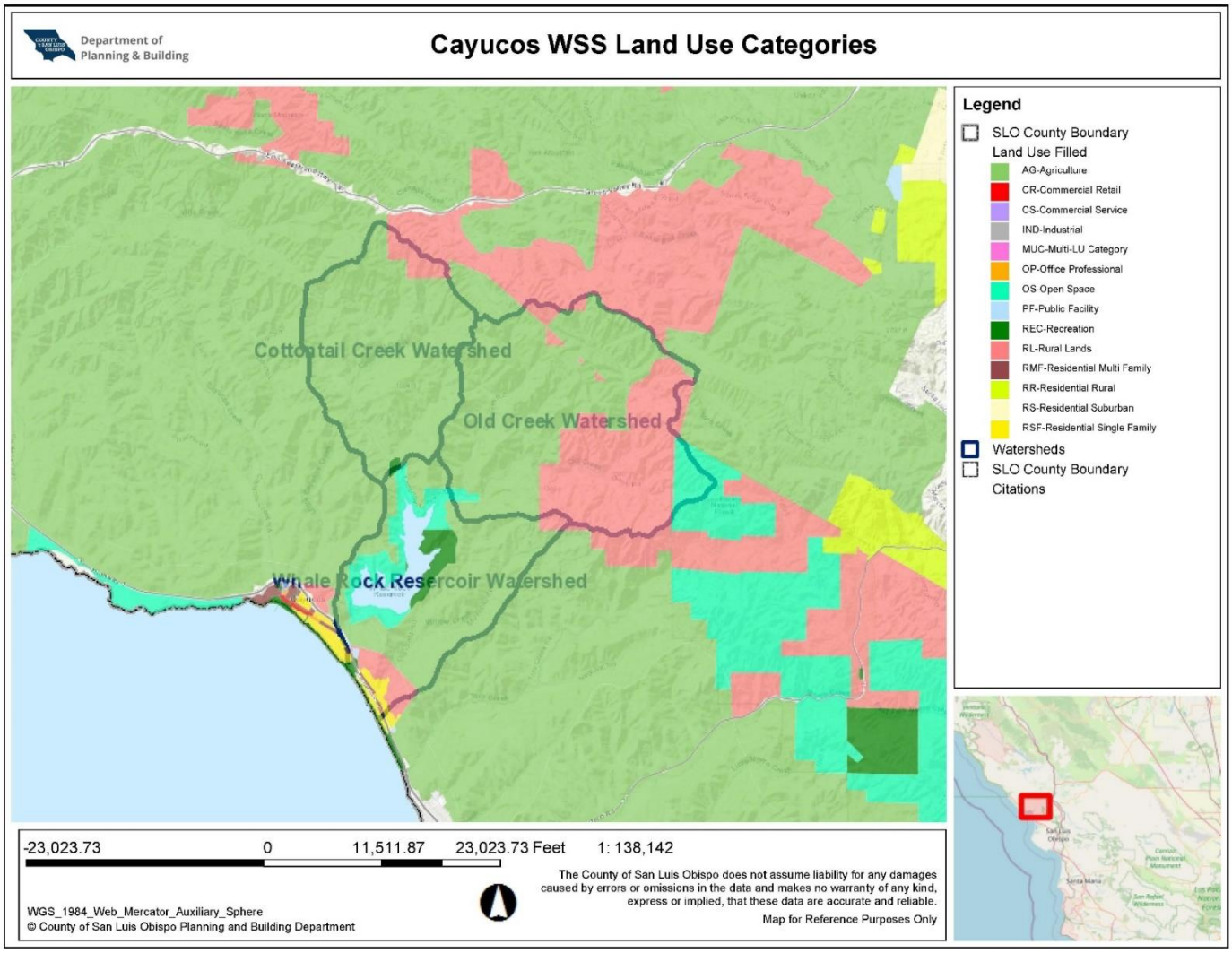


FIGURE 1: WHALE ROCK RESERVOIR WATERSHED

Whale Rock Reservoir and Watershed

Whale Rock Reservoir is part of the Old Creek watershed. The total watershed area is approximately 13,000 acres and is located within the boundaries of the County's Planning Area shown in **APPENDIX A**: CAYUCOS WATERSHED LAND USE CATEGORY MAP


Department of Planning & Building
Cayucos WSS Land Use Categories
Cottontail Creek Watershed
Old Creek Watershed
Whale Rock Resercoir Watershed
Legend
SLO County Boundary
Land Use Filled
AG-Agriculture
CR-Commercial Retail
CS-Commercial Service
IND-Industrial
MUC-Multi-LU Category
OP-Office Professional
OS-Open Space
PF-Public Facility
REC-Recreation
RL-Rural Lands
RMF-Residential Multi Family
RR-Residential Rural
RS-Residential Suburban
RSF-Residential Single Family
Watersheds
SLO County Boundary
Citations
-23,023.73
0
11,511.87
23,023.73 Feet
1: 138,142
WGS_1984_Web_Mercator_Auxiliary_Sphere
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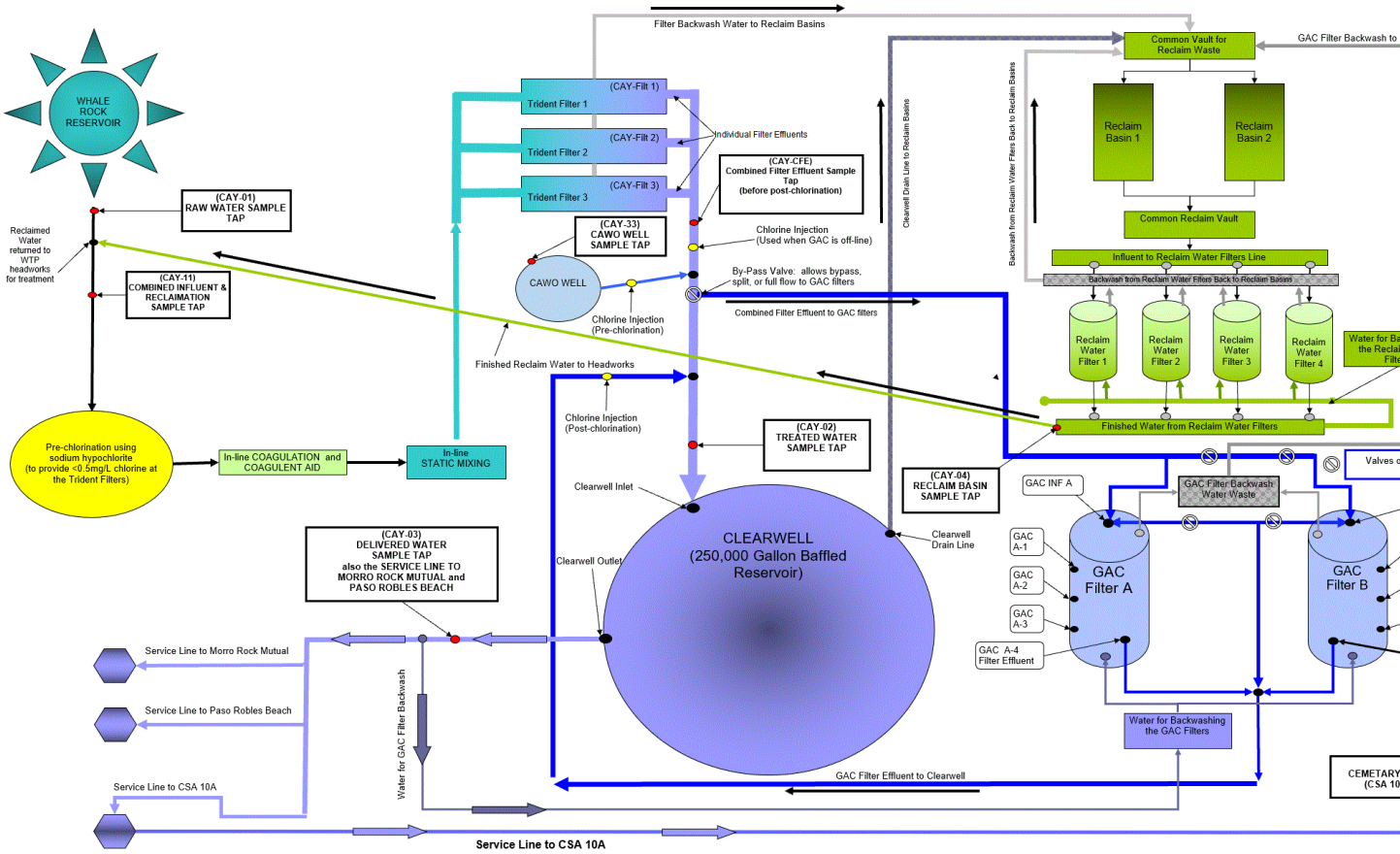
The County of San Luis Obispo does not assume liability for any damages caused by errors or omissions in the data and makes no warranty of any kind, express or implied, that these data are accurate and reliable.
Map for Reference Purposes Only

APPENDIX B: CAYUCOS WATER TREATMENT PLANT FLOW SCHEMATIC



CAYUCOS CSA 10 SAMPLE LOCATIONS	
ALIAS	LOCATION
CAY-01	WHALE ROCK RESERVOIR RAW
CAY-02	TREATMENT PLANT-TREATED
CAY-03	DELIVERED WATER
CAY-04	RECLAIMATION BASIN
CAY-05	CEMETERY ROAD
CAY-11	COMBINED INFLUENT & RECLAIMATION
CAY-33	CAWO WELL

CAYUCOS CSA 10 SAMPLE LOCATIONS	
TOTAL COLIFORM RULE SAMPLES	
ALIAS	LOCATION
CAY-05	CEMETERY ROAD CSA 10A SERVICE LINE
CAY-03	DELIVERED WATER (TCR Upstream)
CAY-05A	2611 OCEAN STREET Hose-bib (TCR Downstream)

CAYUCOS CSA 10 SAMPLE LOCATIONS	
TRIDENT MULTI-MEDIA FILTERS	
ALIAS	LOCATION
CAY-FILT 1	TRIDENT FILTER 1
CAY-FILT 2	TRIDENT FILTER 2
CAY-FILT 3	TRIDENT FILTER 3
CAY-CFE	COMBINED FILTER EFFLUENT

CAYUCOS CSA 10 SAMPLE LOCATIONS	
GRANULAR ACTIVATED CARBON FILTERS	
ALIAS	LOCATION
GAC INF A	GAC FILTER INFLUENT A
GAC A-1	GAC FILTER A-TOP
GAC A-2	GAC FILTER A-MIDDLE
GAC A-3	GAC FILTER A-BOTTOM
GAC A-4	GAC FILTER A-EFFLUENT
GAC INF B	GAC FILTER INFLUENT A
GAC B-1	GAC FILTER B-TOP
GAC B-2	GAC FILTER B-MIDDLE
GAC B-3	GAC FILTER B-BOTTOM
GAC B-4	GAC FILTER B-EFFLUENT

. The headwaters of Old Creek watershed basin rise in the upper elevations approximately 5 miles northeast of the Whale Rock Reservoir dam. Old Creek and its unnamed tributaries drain the east half of the watershed. Cottontail Creek (see

FIGURE 2) and its unnamed tributaries drain the west half of the watershed.

FIGURE 2: COTTONTAIL CREEK ENTERING WHALE ROCK RESERVOIR

Watershed and Whale Rock Description:

Watershed:		Old Creek
Acres:		13,000
Lake Surface Area:		650
Lake Storage Capacity:		40,660 acre-feet
Weir Crest:		200’
Infrastructure:		Multi-port intake structure (five intakes spaced 30 feet apart)
Pipeline:		Gravity fed to Cayucos Water Treatment Plant
Intake Elevations:	Intake 1	190’
	Intake 2	160’
	Intake 3	130’
	Intake 4	100’
	Intake 5	70’

Turnouts:	San Luis Obispo Water District CSA 10, City of San Luis Turnout
Pump Stations:	Morro Rock MWC, Cayucos Beach Mutual Water Company, SLO County District 10A Booster Stations.
Storage Tanks:	0.25 MG Baffled Clearwell Tank
Chemical Treatment:	Polyaluminum hydroxychlorosulfate, Daillyl dimethyl ammonium chloride, Sodium hypochlorite is mixed in-line using a static mixer prior to entering the clarification/filtration process.

Whale Rock Reservoir Rainfall

The mean annual rainfall at the reservoir during the period of this survey was 19.20 inches. The most rainfall fell in the months of November through March. The driest annual rainfall was 2020 with only 8.59 inches of rain and the wettest year was 2017 with 23.83 inches. Monthly precipitation data for 2016 to 2020 can be found below (see **Table 1**).

TABLE 1: PRECIPITATION DATA

Whale Rock Reservoir Precipitation 2016 - 2020													
From Precipitation Gauge at Whale Rock Dam Station (Inches)													
Year	**Jan**	**Feb**	**March**	**April**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Total**
2016	6.16	1.21	4.97	0.23	0	0	0	0	0	2.51	2.53	4.69	22.3
2017	12.42	6.81	1.7	1.51	0.23	0	0	0.04	0.09	0.23	0.71	0.09	23.8
2018	2.33	0.17	8.98	0.63	0.11	0	0	0	0	0.44	3.36	1.78	17.8
2019	4.76	5.1	4.25	0.12	1.65	0.08	0	0	0	0	0.86	6.67	23.5
2020	0.54	0	4.56	1.56	0.35	0	0	0.3	0	0	0.22	1.06	8.6
Monthly Averages	5.24	2.66	4.89	0.81	0.47	0.02	0	0.07	0.02	0.64	1.54	2.86	19.2

Cayucos Water Treatment Plant

The Cayucos Water Treatment Plant's (WTP) primary source of supply water comes from the Whale Rock Reservoir. Treatment at the WTP consists of pre-chlorination with sodium hypochlorite, in-line coagulation, in-line static mixing, up-flow contact clarification and dual media direct filtration using three Trident filters (see **FIGURE 3**). This is followed by granular activated carbon (GAC) filtration (for control of total organic carbon, disinfection byproduct precursors, and taste and odor problems) and post chlorination using free chlorine for CT compliance. The Cayucos WTP reclaims its backwash water to the headworks of the treatment plant after settling and passing through a multi-media pressure filtration system.

FIGURE 3: CAYUCOS WTP FILTERS

The Cayucos WTP maintains an active ground water well, the CAWO Well, to supplement the surface water supply as needed. The CAWO Well is not under the influence of surface water. It is chlorinated and blends with the treated surface water in a 0.25 MG baffled clearwell tank. A diagram of the WTP can be found in **APPENDIX B**.

Assessment of Whale Rock Water Quality and Potential for Treatment

As of this update, the quality of water coming from the reservoir and CAWO well is reliable and shows no concerns regarding its potential for treatment. Recycled water has also remained stable without any treatment issues. The water level has remained consistent; there have been no odor or taste issues from the delivered water, and the current monitoring schedule has shown to be sufficient in determining any potential issues which would require further treatment or adjustments to the water supply. The water treatment operators will continue to monitor for elevated trihalomethanes (THM) to ensure proper filtration by the GAC filters.

History of Watershed Sanitary Surveys and Previous Recommendations

Summary of Past Sanitary Surveys

The initial Sanitary Survey for the Whale Rock Reservoir was completed in January 1996. The survey was prepared by Metcalf & Eddy, Inc. for the City of San Luis Obispo, and the Whale Rock Commission. This survey was sufficient in satisfying the Watershed Sanitary Survey requirements for the Cayucos Water Treatment Plant, CSA10, and no survey was conducted by the County of San Luis Obispo.

Eroding sediments from public and private roads during winter storms, cattle grazing, and pesticide/herbicide use were established as the most significant, potential contaminants in the watershed. At the time, bacteriological and organic compound data was very limited, but all the available data suggested that there were no significant impacts to water quality from the identified potential contaminants. All other potential sources of contamination from wastewater treatment plants, concentrated animal facilities, solid/hazardous waste disposal facilities, and seawater intrusion were not present in the watershed.

The City of San Luis Obispo and the Whale Rock Commission only have control over the reservoir and state lands immediately adjacent to the reservoir. Therefore, they cannot directly implement control measures in most of the watershed. They must rely on control measures of the major landowners in the watershed, as well as the government agencies that regulate land use and contaminant discharges. To provide landowners with information on potential contamination activities and the steps they can take to reduce the risk from these activities, the County set up a website at www.slocounty.ca.gov/planning with information on Land Use, Long Range Planning, and Environmental Impacts within the County. Also, Section "22.10.180 – Water Quality" of the "San Luis Obispo County Code – Title 22, Land Use Ordinance" established a procedure for the notification to the California Central Coast Regional Water Quality Control Board of potential contaminating activities. The Public Works Department continues to work with the Planning and Building Department to identify potential contamination activities in the area and assess the impact of these activities on the water quality.

Based on monitoring of raw water from the Whale Rock Reservoir conducted by the County, raw water has shown elevated levels, some exceeding U.S. Environmental Protection Agency (US EPA) Maximum Contaminant Levels (MCLs), for some general characteristic analytes and manganese in the past. Raw water has shown concentrations well below applicable MCLs for radionuclides, organic chemicals, pesticides, and polychlorinated biphenyls (PCB). The water produced by the Cayucos water treatment plant has consistently met the applicable drinking water standards for treated water delivered to customers. No appreciable changes have been noted in the water quality of the standby wells or raw water in the watershed.

Since the Cayucos Water Treatment Plant was put into service in 1997, the County of San Luis Obispo implemented weekly monitoring of total and fecal coliforms to ensure compliance with the US EPA's revised Total Coliform Rule and conducts general physical analyses (which as of 2001 includes apparent color) on the raw water twice per month to ensure the best quality water is withdrawn from the reservoir. The County also conducts routine inspections of the Whale Rock Reservoir once a month by boat during reservoir sampling events to provide data for further evaluation of temporal and seasonal trends in bacteriological contamination and to focus on general watershed conditions. Heterotrophic plate count (HPC) bacteria monitoring was conducted for operational purposes until it was discontinued in 2016 after total/fecal coliform monitoring was deemed sufficient. Delivered water is continuously monitored to ensure adequate disinfection at the plant and is meeting statutory requirements.

The City of San Luis Obispo inspects the reservoir perimeter roads and the accessible portions of the creek's tributary to Whale Rock Reservoir as part of their daily watershed patrol program. Several times per week, the City conducts routine inspection of the reservoir by boat.

In a joint effort by both the County and the City of San Luis Obispo, Boyle Engineering Corporation (Boyle, 2001) completed the sanitary survey update in January 2001. Their report found the Cayucos Water filtration plant was unable to handle taste and odor problems created by methyl-isoborneol (MIB) and hydrogen sulfide. In September 2002, Boyle completed a sanitary survey of the Cayucos wells watershed which covered five wells below Whale Rock Reservoir: The County of San Luis Obispo, County Service Area 10 (CSA10) Cayucos Wells 02 and 03, Morro Rock Mutual Water Company (MRMWC) Wells 01 and 03, and Cayucos Beach Mutual Water Company (CBMWC) (formerly known as Paso Robles Beach Water Company) Well 01. Since the Cayucos Water Treatment Plant went online in 1997, the five wells were placed on standby status and have not been used since. Water quality data for organic, inorganic, radiological, or algal toxins had not been performed. Well water had elevated iron and manganese levels but showed no evidence of total or fecal coliform bacteria.

The SWRCB-DDW determined that these wells are under the direct influence of surface water and require treatment in conformance with the Surface Water Treatment Rule (SWTR) and would be subjected to the same treatment processes, including coagulation, filtration, and disinfection, in the as Whale Rock Reservoir raw water when used. Cayucos Wells 02 and 03 were officially abandoned in March 2005 and the remaining standby wells (CBMWC Well 01 and MRMWC Wells 01 and 03) continue to remain isolated from the water treatment plant by a pulled spool and are only used in an emergency.

In the period between 2002 and 2015, the Watershed Sanitary Survey Update was prepared by staff from the County of San Luis Obispo Public Works Department. Except for the abandonment of the CSA10 Wells 02 and 03 in March 2005, there were no significant changes in the Cayucos Wells Watershed since the initial report and no appreciable changes were noted in the water quality of the standby wells. The Cayucos Water Treatment Plant is providing effective "surface water treatment" as well as iron and manganese removal and has implemented all recommendations from previous sanitary surveys and updates.

Summary of Outstanding Recommendations:

All previous recommendations have been addressed and/or implemented.

Watershed Sanitary Survey – 2020 Update

The remainder of this report presents the findings of the fourth update to the San Luis Obispo CSA10 – Cayucos Watershed Sanitary Survey for the Whale Rock Reservoir and standby wells. This survey update covers the period January 2016 through December 2020. There have been no significant changes to the watershed since the 2015 Sanitary Survey Update.

Watershed Land Use

The County of San Luis Obispo Department of Planning and Building has designated several lands uses within the watershed. These include agriculture, grazing, multi-use public land, and large lot rural residential. Approximately 85% of the land in the watershed is privately owned while the remaining 15% is publicly owned. Approximately 65% of the watershed has been designated "Agriculture" (predominantly grazing), 25% as "Rural Lands", and the remaining 10% as "Open Space" or "Recreational". Field observations of the watershed confirmed that most of the watershed is agricultural land **APPENDIX A**.

Potential Contaminant Sources

There were no significant changes to the General Conditions Check List Form (located at the front of this report). The following items are present in the watershed but are not considered to be a significant threat to the water quality at Whale Rock Reservoir.

Wild Animal Population

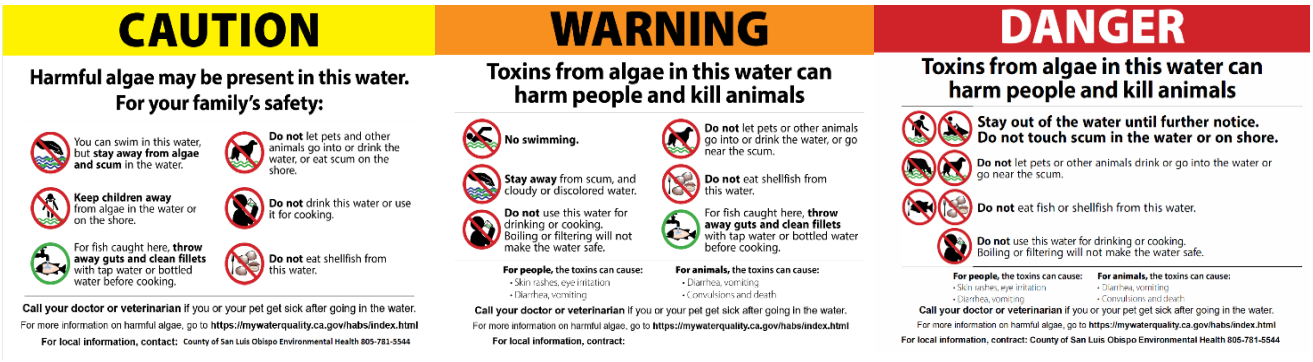
Wildlife in the area consists of deer, muskrat, coyote, resident, and migratory birds, and various small animals. Wild boar, bear and bald eagles have also been sighted but their presence has not been shown to present a threat to water quality.

Earthquakes

According to the United States Geological Survey, the watershed region is crossed by many active and potentially active earthquake faults as shown in **APPENDIX C**. Faults to the vicinity, such as the San Andreas Rift Zone on the east to the Hosgri and Santa Lucia Banks faults to the west, can cause severe ground motion within the watershed. Potential impacts to the watershed include damage to the water supply system and contribution to increased turbidity and suspended solids to the reservoir.

Algal Toxins

Cyanotoxins, from certain types of blue-green algae, in high concentrations have been known to cause illness, paralysis and even death in livestock and wildlife. Based on cyanotoxin testing results and or visual indicators confirming the presence of harmful algal blooms (HAB), the State requires each body of water to post an advisory level, CAUTION, WARNING, or DANGER (see **FIGURE 4**: ALGAL TOXIN SIGNS THAT PLACED UP AROUND THE LAKE DEPENDING ON TOXIN LEVELS). Algae that have been known to produce toxins, such as *Aphanizomenon*, *Anabaena*, *Microcystis*, and *Oscillatoria* were not found at Whale Rock



Reservoir at any time during the five-year survey period.

FIGURE 4: ALGAL TOXIN SIGNS THAT PLACED UP AROUND THE LAKE DEPENDING ON TOXIN LEVELS

Finding more information on Harmful Algae Blooms (HABs)

The State has an interactive map showing which sites were tested for HABs. To get to the map please use the following link:

https://mywaterquality.ca.gov/habs/where/freshwater_events.html

During the summer months approximately 75% of the lakes and rivers are associated with a recommended advisory. Additional information on HABs can be found at the links below:

https://mywaterquality.ca.gov/habs/resources/faqs_for_hab_signs.html

https://fhab.sfei.org/

Reservoir Non-body Contact

Reservoir non-body contact activities consist of limited shoreline fishing. Fishing access is available along approximately 5000 feet of the southeast shoreline adjacent to Old Creek Road. Portable chemical toilets are located along the public trails in the accessible fishing area. No boating or other water activities are permitted at the reservoir.

Watershed Activities

Fishing and picnicking are limited to a designated area on the southeast shoreline. No other public recreational activities are conducted since much of the watershed is privately owned.

Wastewater - Residential Septic Systems

Approximately 30 residential septic systems are located within the watershed. Impacts from these septic systems are expected to be minor. There are no commercial or industrial septic systems within the Whale Rock watershed.

Floods

Flood hazards exist for Old Creek and Cottontail Creek as well as their tributaries following significant precipitation events. The flood plains occur in steep hilly areas where the stream beds narrow and in flat portions of the watershed where the stream beds widen. Potential impacts of flooding include increased turbidity, suspended solids, chemical contamination, and interruption of raw water delivery. Failure of the Whale Rock Reservoir Dam could flood the CSA10 Water Treatment Plant as shown in the maps in **APPENDIX D** and **APPENDIX E**. This would impact the plant's ability to produce potable water from its primary and secondary sources. Given the water treatment plant's proximity to the ocean, a severe tsunami could also impact the plant.

Inactive Mines

Inactive mines identified in the 1993 Regional Water Quality Control Board report "Surface Water Degradation by Inactive Metal Mines in Northwest San Luis Obispo County" include Maninni Nickel Property (nickel), Middlemast Ranch Deposit (chromium), Prodigal Son (copper), Zerfing Ranch Deposit (chromium) and Prospect Mine (commodity unknown). None of the mines were identified as potential polluters.

Grazing Animals

Cattle grazing can be seen throughout the watershed (see **FIGURE 5**) Direct access to the watershed is prevented by fencing which is placed at least 250 feet from the reservoir's shore. Most of the land is further separated from the reservoir by public and private roads. Cattle grazing can be a major contributor to coliform levels in a reservoir. While certain times of the year high amounts of total coliforms have been seen in the reservoir, E. coli (an indicator for fecal contamination), has been extremely low (maximum 98 MPN/100mL, average 1.37 MPN/100mL in the raw water). See the section 'Bacteriology' for further discussion of coliform data.

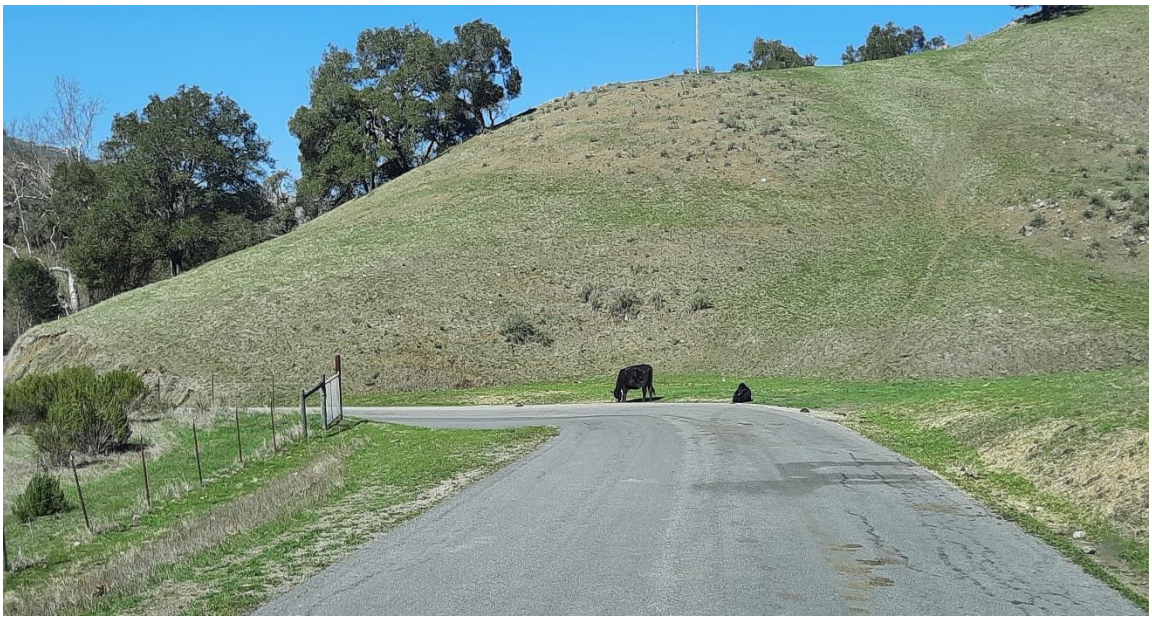


FIGURE 5: CATTLE GRAZING ARE THROUGHOUT THE WATERSHED

Fires

The California Department of Forestry has designated the foothill and flatland areas as "high" hazard areas and the mountainous areas as "very high" hazard areas as shown in **APPENDIX F**.

Landslides

There is the potential for landslides and debris flows in the watershed. The potential is greatest in areas where the surface slopes exceed 25% or where geologic conditions such as locally sheared or weathered rocks, excessively steep slopes, or interbeds of clay, shale, or mudstone exist (see **APPENDIX G**).

Transportation Corridors

Transportation corridors in the Whale Rock watershed consist of several improved and unimproved County roads. The major roads include Old Creek Road, Santa Rita Road, and Cottontail Creek Road. During extreme precipitation events, severe erosion can occur in portions of these roads (see

FIGURE 6). These roads are not considered primary routes for carrying hazardous materials. There are no railroad lines present within the watershed.

FIGURE 6: LANDSLIDE ON SIDE OF OLD CREEK ROAD

Pesticide/Herbicide Use

The County Agricultural Commission has identified the pesticide/herbicide usage in the watershed area (see **FIGURE 7**). A summary of the chemical name, amount applied, acres treated, and the crop being treated can be found in **Appendix H** and **Appendix I.** An annual summary of pesticide usage can be seen in **TABLE 2**TABLE 2: SUMMARY OF PESTICIDES USAGE 2016-2020.

TABLE 2: SUMMARY OF PESTICIDES USAGE 2016-2020

YEAR	TREATED AMOUNT (ACRE)	TREATED AMOUNT (GALLONS)	TREATED AMOUNT (POUNDS)
2016	1479	338	20
2017	2710	604	10
2018	769	430	57
2019	2767	534	80
2020	3048	572	2
AVERAGE	2155	496	34
TOTAL	10773	2478	169

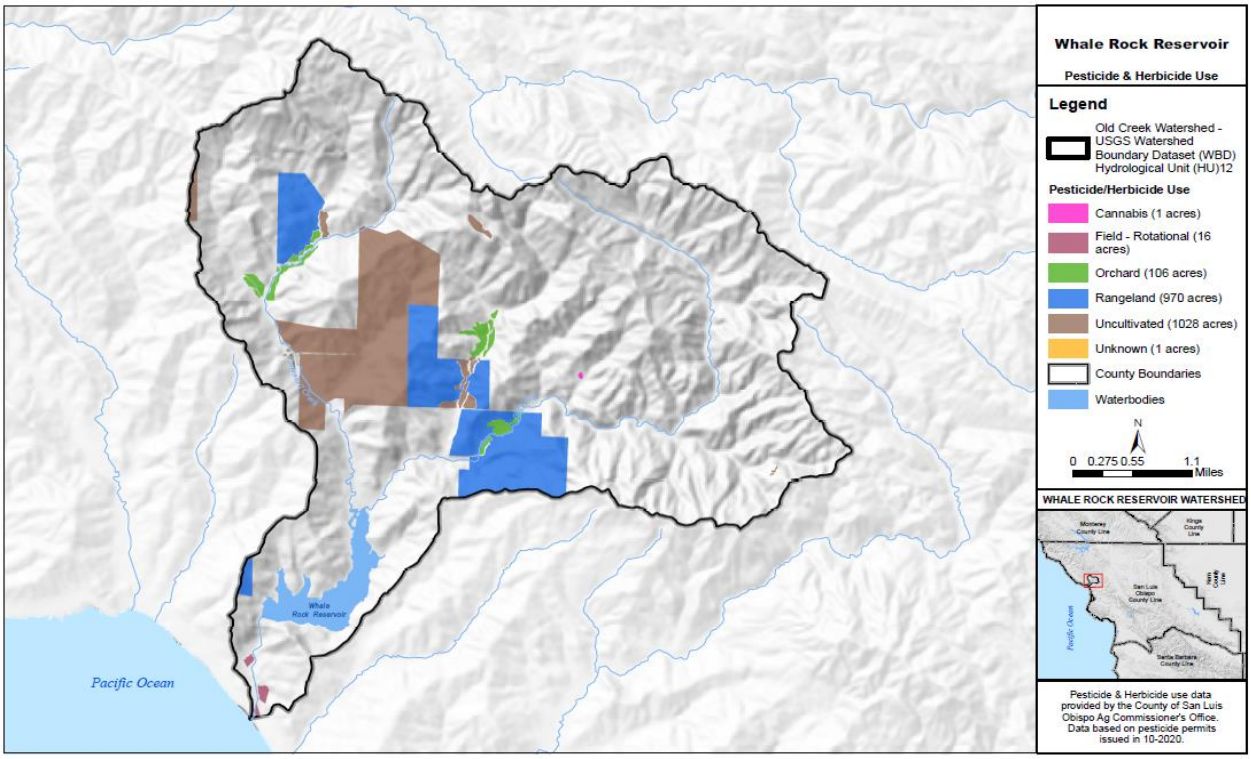


FIGURE 7: PESTICIDE AND HERBICIDE USAGE

Agricultural Crop Land Use

Crops in the watershed include avocado and orange groves, wine grapes, beans, barley, peas, peppers, alfalfa, and summer squash as well as forage hay, pastureland, and rangeland as shown in **FIGURE 7** above). Pesticides and herbicides are used in the agricultural areas, however, the amount of total cropland in the watershed is relatively small (approximately 5%) and no pesticide/herbicide compounds have been detected in raw or treated water.

Watershed Data Evaluation

Limnology

Limnology is the study of the chemical, physical, atmospheric, and biological conditions in freshwater. The County of San Luis Obispo routinely monitors Whale Rock reservoir and uses the limnological data to assess seasonal variability in water quality, determine the cause of objectionable odors or particulate matter, and evaluate the need (and recommended dosage) for algaecide treatment. The data is also used to select the Whale Rock Reservoir intake with the best quality water for delivery to the water treatment plants.

Desirable water quality is typified by adequate dissolved oxygen, pH in the range of 6.5 to 8.5, low algae, low odor and turbidity, low bacteria, low iron, and low manganese, and is free of contamination. Reservoir samples are analyzed for algae (blue-green algae, diatoms, flagellates, and green algae), dissolved oxygen, pH, temperature, odor, turbidity, iron, and manganese. Data collected from this survey period can be found in **APPENDIX J**, **APPENDIX K**, , and **APPENDIX M**.

Data from the reservoir profile shows water temperature during the cooler months (December through April) is relatively uniform throughout the reservoir intake depths. Thermal stratification develops in the reservoir when the surface water begins to warm and decrease in density during the spring and summer months. During the summer months, a warmer, oxygen-rich layer (epilimnion) develops at the top of the reservoir. A colder, oxygen-deficient layer (hypolimnion) can be found at the lower depths of the reservoir. The layer of water that separates these two zones is the thermocline. Water from the epilimnion is generally preferred for delivery to the water treatment plants.

For much of the study period, samples were collected by the County with the assistance of the City twice per month at each of the intake elevations. During the five years covered by this survey, the thermocline developed at or below 25 to 40 feet, which is around the depth of Intake 2. Although this would make Intake 1 (the highest intake) the preferred intake for raw water delivery, Intakes 2 and 3 were often used instead during the survey period, based the available on limnology data. Data collected from this survey period can be found in **APPENDIX J**, **APPENDIX K**, and **APPENDIX L**.

In 2017, the laboratory started using flow cytometer to classify and count algae at the reservoir. Flow cytometry is designed to help provide a better understanding of how abundant the algae may be in the environment. Enumeration of algae has helped with the early detection of HABs. By knowing how much blue-green algae are in a sample we can determine the HAB risk factor by performing an algal toxin screen. These harmful algal blooms (HABs) are often composed of microorganisms known as cyanobacteria that may produce toxins that can cause adverse health effects in humans and animals (see Algal Toxin section for more details). Algae summary counts for Whale Rock Reservoir can be seen in

and **APPENDIX M** for all available algae data.

TABLE 3: WHALE ROCK ALGAE SUMMARY TABLE

Site		Blue-greens	Cryptomonads	Diatoms	Dinoflagellates	Flagellates	Golden	Greens	Total Algae Counts
Surface	Min	0	0	0	0	0	0	0	0
	Max	24000	99	760	48	130	110	13000	24000
	Ave	768	16	80	4	4	5	220	1087
	Med	0	7	7	0	0	0	29	180
	n	113	113	113	113	113	113	113	113
Lake Intake 1	Min	0	0	0	0	0	0	0	0
	Max	780	120	630	34	20	160	4400	5200
	Ave	49	16	74	4	0	9	110	263
	Med	0	7	11	0	0	0	12	120
	n	67	67	67	67	67	67	67	67
Lake Intake 2	Min	0	0	0	0	0	0	0	0
	Max	1300	100	631	36	20	48	4700	4700
	Ave	114	12	51	3	0	3	102	236
	Med	0	5	3.5	0	0	0	11.5	89.5
	n	86	86	86	86	86	86	86	86
Lake Intake 3	Min	0	0	0	0	0	0	0	0
	Max	24000	130	560	53	120	120	1000	24000
	Ave	700	11	41	5	3	3	85	844
	Med	0	4.5	1.5	0	0	0	12.5	88
	n	112	112	112	112	112	112	112	112
Lake Intake 4	Min	0	0	0	0	0	0	0	0
	Max	21000	58	550	26	55	18	1200	21000
	Ave	342	7	38	2	1	0	60	451
	Med	0	1	3	0	0	0	11	58
	n	113	113	113	113	113	113	113	113

Due to COVID-19 policies implemented by the City, the County has not had access to the reservoir sample site since March 2020 but resumed sampling in April 2021.

Bacteriology

Raw and treated water bacteriological data for the reservoir and wells supplying the Cayucos Water Treatment Plant are tabulated in **APPENDIX N** and **APPENDIX O**. A summary of the data is displayed below in **TABLE 4**. Treated water data has been included to demonstrate the water treatment plant's ability to adequately disinfect the raw water.

TABLE 4: SUMMARY OF BACTERIOLOGY DATA

Site		Total Coliforms (MPN/100 mL)	*E. coli* (MPN/100 mL)	Heterotrophic Plate Count (CFU/mL)	Chlorine Residual (mg/L)
Whale Rock Raw	Min	2	0	-----	-----
	Max	24000	180	-----	-----
	Ave	1607	2	-----	-----
	Med	270	0	-----	-----
	n	261	261	-----	-----
Delivered Water	Min	Absent	Absent	0	1.13
	Max	Absent	Absent	31	1.77
	Ave	Absent	Absent	1	1.43
	Med	Absent	Absent	0	1.42
	n	261	261	261	260
Whale Rock Well- CAWO Raw	Min	0	0	0	-----
	Max	1	0	13	-----
	Ave	0	0	4	-----
	Med	0	0	1	-----
	n	23	23	13	-----
Whale Rock Well- CAWO Cl_2	Min	Absent	Absent	0	0.42
	Max	Absent	Absent	0	2.01
	Ave	Absent	Absent	0	1.20
	Med	Absent	Absent	0	1.27
	n	9	9	1	9
MRMW Well 04	Min	Absent	Absent	0	-----
	Max	Absent	Absent	360	-----
	Ave	Absent	Absent	57	-----
	Med	Absent	Absent	28	-----
	n	21	21	19	-----

There were 261 bacteriological samples collected from each of the Whale Rock reservoir raw and treated waters, as well as 21 samples from both the MRMW Well 04 and CAWO raw well, as well as 9 from CAWO treated well between January 2016 and December 2020. The average total coliform MPN/100mL from the raw water was 1607 and ND or absent from the rest of the sites. Total coliform MPNs for Whale Rock raw ranged from 2 to greater than 24000.

The average E. coli MPN/100mL for Whale Rock raw water was 2 and ranged from less than 1 to 180. The higher total coliform MPNs occur mostly in the warmer summer months. Other events of high total coliforms occur after large rainstorms or unseasonably warm weather. There was no total coliform or E. coli detected in the Delivered water during this 5-year survey.

Heterotrophic Plate Counts for delivered water ranged from <1 to 31 CFU/ml with an average of 1 CFU/ml, from <1 to 13 CFU/ml with an average of 4 CFU/mL for CAWO raw, and <1 to 360 CFU/ml with an average of 57 CFU/mL for MRMW Well 04. Chlorine residuals were recorded at the time the delivered water was collected for bacteriological analyses. During the period of this survey update, the average chlorine residual was 1.43 mg/L with a range of 1.13 to 1.77 mg/L for Whale Rock delivered water and 1.20 mg/L with a range of 0.42 to 2.01 mg/L for CAWO chlorinated water. This data demonstrates that the treatment plant adequately filters and disinfects the raw water, even during periods when the raw water is experiencing high coliform levels.

Iron and Manganese

Iron and manganese are monitored weekly from the raw and delivered waters. At certain times during the year, both iron and/or manganese levels exceed drinking water secondary maximum contaminant levels in the raw water. Levels above the MCL can cause staining of fixtures and clothing and are aesthetically unacceptable to consumers. The previous studies have shown that Cayucos WTP has been successful in treating the delivered waters to acceptable levels. It is expected that the plant will continue to adequately treat in future events. (See **TABLE 5**). Complete iron and manganese data can be found in **APPENDIX P** and **APPENDIX Q**.

TABLE 5: IRON AND MANGANESE SUMMARY TABLE

Site		Iron	Manganese
Whale Rock Raw	Min	< 10	< 5.0
	Max	1400	770
	Ave	69	19
	Med	33	7
	n	260	260
Delivered Water	Min	< 10	< 1.0
	Max	19	34
	Ave	< 10	< 5.0
	Med	< 10	< 5.0
	n	261	261

General Physical

Physical samples are collected weekly from both the raw and delivered water. When the Cayucos WTP was initially placed into service, the raw water contained detectable amounts of 2-methylisoborneal (MIB) causing a few taste and odor complaints. At certain times of the year, hydrogen sulfide odors could be detected as well. The two granular activated carbon (GAC) filters installed in June 2006 greatly improved the taste and odor issues the plant was experiencing. The "musty" odor associated with MIB, has rarely been detected in the raw water in more recent years.

In January 2017, the water treatment plant experienced high turbidites in their recycled water backwash and peak raw water. Due to heavy rainfall and elevated raw water turbidity (50 NTU), operators at the Cayucos WTP had to increase the number of filter backwashes to produce drinking water meeting State criteria. A summary of general physical data can be found in **TABLE 6** and the complete data set for the plant and reservoir can be found in **APPENDIX R**.

TABLE 6: PHYSICAL SUMMARY TABLE

Site		Temp (°C)	Odor (TON)	Apparent Color (CU)	Turbidity (NTU)
Whale Rock Raw	Min	10	1	1	0
	Max	23	50	57	22
	Ave	15	4	7	2
	Med	15	3	6	2
	n	261	261	261	261
Delivered Water	Min	2	ND	<1	0
	Max	23	4	6	0
	Ave	16	1	<1	0
	Med	15	1	<1	0
	n	261	261	261	261
Whale Rock Well- CAWO	Min	17.4	1	<1	0.05
	Max	19.1	1.5	4	0.92
	Ave	18	1	<1	0
	Med	18	1	<1	0.11
	n	14	14	14	14

General Mineral

General mineral chemicals are general water quality indicators. If there is a change in these indicators this may indicate industrial, agricultural, or grazing runoff issues in the watershed. General mineral data is collected once per year from the Whale Rock Reservoir and the Water Treatment Plant Treated Water. The constituents in the raw and treated waters meet all the applicable treated water MCLs. General mineral data can be found in **APPENDIX S**: GENERAL MINERALS DATA.

Title 22 Metals

The County conducts analyses for Title 22 metals at the Whale Rock Reservoir raw and Cayucos Water Treatment Plant treated waters once per year. All Title 22 metals monitored in the raw and treated waters met the applicable treated water MCLs.

In past surveys, aluminum was a concern due to the use of aluminum sulfate (alum) in the treatment process. In 2006, the Cayucos Water Treatment Plant changed their coagulation/flocculation treatment from alum to an aluminum polymer blend. This change in chemicals reduced the amount of aluminum remaining in the treated water. Aluminum in finished drinking water has a California primary MCL of 1000 ug/L and a secondary MCL of 200 ug/L. Raw and treated water complied with the secondary MCL with values <200 ug/L during the entire survey period. All metals data can be found in **APPENDIX T**.

Additional Analyses

2-Methylisoborneal (MIB): In past years, issues that the plant experienced with taste and odor complaints and the installation of GAC filters, prompted analysis for MIB. The “musty” odor associated with MIB has not been a challenge during this 2020 watershed survey update period.

Asbestos: Asbestos is required every nine years on surface waters. Asbestos was not detected in the sample collected in 2016.

Cyanide: Cyanide is analyzed yearly from the Whale Rock Reservoir. No cyanide was detected during the 2016-2020 sanitary survey update.

Radioactivity Monitoring for Gross Alpha and Radium 228: To comply with the RWQCB radioactivity monitoring requirements, four quarters of gross alpha and radium 228 were collected in the previous survey period. Radium 228 was a one-time sampling event, and no additional monitoring is required. In the 2020 survey update period, two samples were collected for gross alpha in 2019. The results were 3.31 and 3.54 pCi/L.

Volatile Organic Chemicals (VOC): Samples for VOCs are required to be collected every three years from the Whale Rock Reservoir. Samples were collected in 2019. No VOCs were detected.

Synthetic Organic Chemicals (SOC): 1,2,3-TCP is a new SOC constituent that is required to be collected every three years for the Whale Rock Reservoir. Samples were collected in 2019. No SOCs were found.

Perchlorate: Two samples were collected from the Whale Rock Reservoir raw water for perchlorate during this 5-year watershed update. Perchlorate was not detected in either sample.

Total Organic Carbons (TOCs): TOCs were collected frequently from the Granulated Activated Carbon (GAC) filters' raw and effluent waters. TOCs are monitored to assess formation potential of and the ability of the GAC filters to remove the precursors to disinfectant by-products (DBPs), such as Trihalomethanes (THMs) and Haloacetic Acids (HAAs). According to the US EPA, "Several DBPs have been linked to cancer in laboratory animals and are therefore regulated. Naturally occurring carbon compounds are not hazardous by themselves, but combined with a disinfectant they produce byproducts, which pose a health concern. THMs, one class of DBPs, are formed from the interaction of TOC, naturally occurring bromide, and chlorine." During the survey period, both the TOCs and DBPs remained low and trended down over time, which is demonstrated both in the table below and in the DBP graphs in the System Compliance section. A summary of TOC data can be found in

TABLE 7 and **APPENDIX U**.

TABLE 7: TOTAL ORGANIC CARBON SUMMARY

	Plant Influent TOC (mg/L)	GAC Effluent TOC (mg/L)
Minimum	1.3	0.6
Maximum	5.4	4.0
Average	3.7	2.4
Median	3.8	2.5
n	117	116

Water Quality Monitoring Program

The following sample matrix summarizes suggested sampling for the Cayucos watershed (see **TABLE 8**).

TABLE 8: WATER QUALITY MONITORING MATRIX

C = Continuous; D = Daily; W = Weekly sampling; BW = Biweekly (2x month) sampling; M = Monthly sampling; W/M = Weekly

Site	Bacteriological	Physical	Limnology	Algal Toxins (as needed during blue-green algae blooms)	General Mineral	Fe & Mn	Inorganic	Nutrients (Nitrate, nitrite, ammonia, TKN, phosphorus)	1,2,3-TCP	VOC	SOC	TOC	Gross Alpha
Intakes	-----	BW	BW	AN	-----	M	---	-----	---	----	---	---	---
Raw (Plant Influent)	BW	BW	BW	AN	A	M	3	M	3	3	9	BW	3
Delivered	W	C	---	-----	-----	M	3	-----	---	---	---	BW	---
CAWO Well	M	A	---	-----	3	---	3	-----	3	6	9	---	9
Standby Wells	IU	IU	---	-----	IU	---	IU	-----	IU	IU	IU	---	IU

or Monthly sampling based on the season Q = Quarterly sampling; A = Annual sampling; 3 = Sampling every 3 years; 9 = Sampling every 9 years.; IU – When in Use; AN – As Needed

System Compliance with New and Future Regulations

The Cayucos Water Treatment Plant is required to comply with the Long Term 2 Enhanced Surface Treatment Rule and the Stage 1 and Stage 2 Disinfection Byproduct Rules.

Stage 1 and Stage 2 Disinfectant/Disinfection Byproduct Rules

To ensure compliance with the Stage 1 Disinfectant/Disinfection Byproduct Rule (D/DBPR), the San Luis Obispo County Service Area No. 10 – Cayucos WTP added two 20,000-pound granular activated carbon (GAC) filters (see **FIGURE 8**) to its treatment process. The GAC filters provide TOC reduction and taste and odor control. The GAC filters were put into service in June 2006. The Cayucos WTP has been collecting quarterly total trihalomethanes (TTHM) and haloacetic acids-5 (HAA5) samples from the Cemetery Road sample site. The sample site is located on the pipeline, which provides CSA10 WTP treated water to the San Luis Obispo County Service Area No. 10A – Cayucos Distribution System and represents the maximum residence time in the Cayucos WTP's pipeline.

FIGURE 8: GRANULAR ACTIVATED CARBON FILTERS

The Stage 2 D/DBPR required an Initial Distribution System Evaluation (IDSE) to characterize DBP levels and identify locations for future compliance monitoring. Compliance with the Stage 2 DBPR is based on TTHM and HAA5 locational running annual averages (LRAA) calculated at each monitoring site. All samples met the MCL requirements. Quarterly monitoring is required and will continue. Complete data for TTHM and HAA5 can be found in **APPENDIX V** and **APPENDIX W** . DBP trends are shown in the following graphs in **FIGURE 9** and **FIGURE 10**.

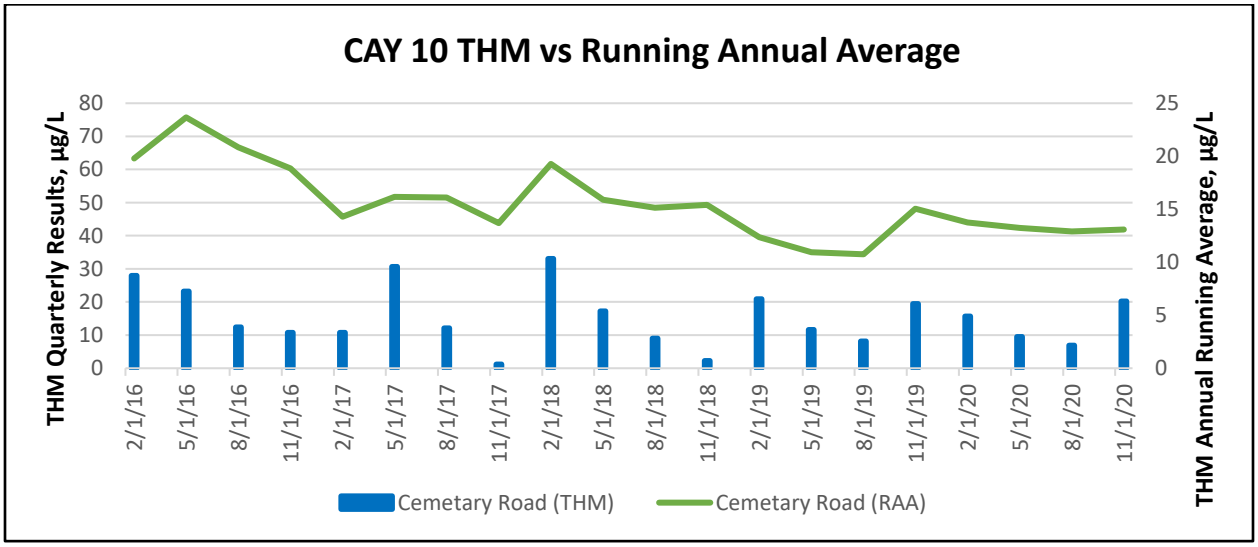


FIGURE 9: 2016 TO 2020 TOTAL TRIHALOMETHANES VS RUNNING AVERAGE

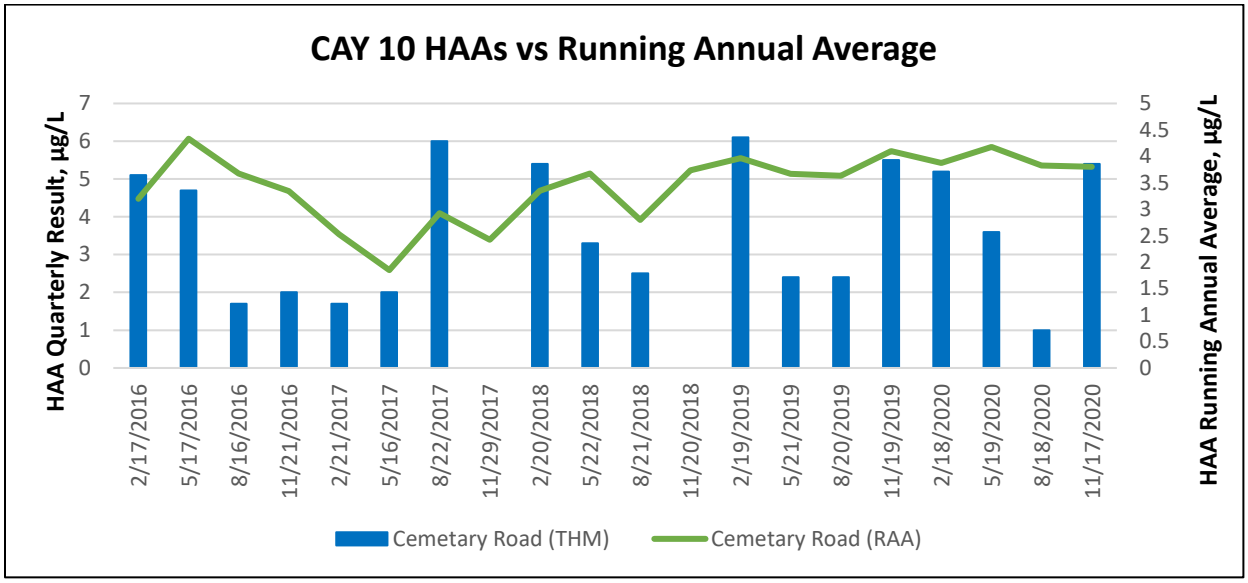


FIGURE 10: 2016 TO 2020 HALOACETIC ACIDS VS RUNNING ANNUAL AVERAGE

Long Term 2 Enhanced Surface Water Treatment Rule

The Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) applies to all systems that use surface or ground water under the direct influence of surface water. This rule supplements other existing regulations by targeting Cryptosporidium and other pathogenic microorganisms in drinking water. Beginning in October of 2015, samples are being collected monthly for cryptosporidium as part of the LT2ESWTR. Sampling was completed in 2017, all samples are non-detect.

The second round of LT2ESWTR required E. coli monitoring was scheduled for 2017, nine years after the initial sampling. Whale Rock Reservoir total coliforms and E. coli have been monitored since the plant was put online in 1996 and based on the bacteriological data, the Cayucos WTP continues to meet the requirements for 3-log Giardia removal/inactivation and 4-log virus removal/inactivation.

Per- and polyfluoroalkyl substances (PFAS) Information

Drinking water containing perfluorooctanoic acid (PFOA), perfluorooctanesulfonic acid (PFOS) – and the larger family of per- and polyfluoroalkyl substances (PFAS) – has become an increasing concern due to the persistence of these chemicals in the environment and their tendency to accumulate in groundwater. Per- and polyfluoroalkyl substances (PFAS) are a group of man-made chemicals used to make fluoropolymer coatings and products that resist heat, oil, stains, grease, and water.

PFAS have been manufactured and used in a variety of industries around the globe, including in the United States since the 1940s. The most extensively produced and studied PFAS chemicals are per-fluoro-octane sulfonic acid (PFOS), perfluorooctanoic acid (PFOA), and perfluorobutane sulfonic acid (PFBS). These chemicals are very persistent in the environment and in the human body – meaning they do not break down and can accumulate over time.

Although no longer manufactured in the United States, they are still produced internationally and can be imported into the United States in consumer goods such as carpet, leather and apparel, textiles, paper and packaging, coatings, rubber, and plastics.

PFAS can be found in:

- Food packaged in PFAS-containing materials, processed with equipment that used PFAS, or grown in PFAS-contaminated soil or water.
- Commercial household products, including stain- and water-repellent fabrics, nonstick products (e.g., Teflon), polishes, waxes, paints, cleaning products, and fire-fighting foams (a major source of groundwater contamination at airports and military bases where firefighting training occurs).
- Workplace, including production facilities or industries (e.g., chrome plating, electronics manufacturing, or oil recovery) that use PFAS.
- Drinking water, typically localized, and associated with a specific facility (e.g., manufacturer, landfill, wastewater treatment plant, firefighter training facility).
- Living organisms, including fish, animals, and humans, where PFAS can build up and persist over time.

There is evidence that exposure to PFAS can lead to adverse health outcomes in humans. Studies indicate that PFOA and PFOS can cause reproductive and developmental, liver and kidney, and immunological effects in laboratory animals. Both chemicals have caused tumors in animals. The most consistent findings are increased cholesterol levels among exposed populations, with more limited findings related to:

- Low infant birth weights,
- Effects on the immune system,
- Cancer (for PFOA), and thyroid hormone disruption (for PFOS and PFBS).

Many chemicals in this group have been a concern because they do not break down in the environment, can move through soils and contaminate drinking water sources, and they build up (bioaccumulate) in fish and wildlife. PFAS have been found in rivers and lakes and in many types of animals on land and in the water.

While toxicity studies have raised important concerns, there is still much we do not know about the effects of PFAS on human health and the environment. Out of the hundreds of known PFAS compounds, only a small number have been studied extensively. We do not know how much PFAS exposure is safe for humans or whether there are important differences in toxicity between different PFAS compounds. And we do not fully understand how PFAS compounds break down in the environment over time and how they travel.[1]

In August 2019, the California State Water Resources Control Board (State Water Board), Division of Drinking Water (DDW) established notification levels (NL) (

TABLE 9) for perfluorooctane sulfonate (PFOS) at **6.5 parts per trillion (ppt)** and perfluorooctanoic acid (PFOA) at **5.1 ppt.** In March 2021, DDW established a NL of **500 ppt** for perfluorobutane sulfonic acid (PFBS).

Notification levels are nonregulatory, health-based advisory levels established for contaminants in drinking water for which maximum contaminant levels have not been established. Notification levels are established as precautionary measures for contaminants that may be considered candidates for establishment of maximum contaminant levels but have not yet undergone or completed the regulatory standard setting process prescribed for the development of maximum contaminant levels and are not drinking water standards.

A response level has also been established for these analytes. A response level (RL) is set higher than a notification level and represents a recommended chemical concentration level at which water systems consider taking a water source out of service or provide treatment if that option is available to them. Starting in January 2020, water systems that receive an order and detect levels of PFAS substances that exceed their response level, shall take a water source out of use, treat the water delivered, or provide public notification.

[1] Monitoring Monday – Let us look at PFAS; State Water Resource Control Board, March 2021

TABLE 9: PFAS DETECTION LIMIT SUMMARY

Analyte	Notification Level (ng/L)	Response Level, (ng/L, running four quarter average)
PFBS	500	5000
PFOA	5.1	10
PFOS	6.5	40

Not all public water systems are required to test for PFAS. A public water system may have received an order because it may be at risk for potential contamination by PFAS due to its proximity to adjacent facilities known to use, produce, or store PFAS or because of proximity to a public water system whose water supply is contaminated by PFAS. A list of public water systems and sources that are required to be sampled are located at the link below. The State Water Resources Control Board, Division of Water Quality information can be found at: https://www.waterboards.ca.gov/water_issues/programs/pfas/

At this time, SLO CSA 10 is not required to test for PFAS substances.

Reservoir Inspections

Inspection of Domestic Water Reservoir Facilities

Staff from the City of San Luis Obispo frequently inspect the areas surrounding the reservoirs that are accessible to the public. The inspections include observations of the toilet/restroom facilities, picnic areas, shoreline fishing areas, refuse storage and collection, the number of patrol personnel and patrol boats on duty, and an inspection of the reservoir in the area.

Reservoir Inspections

County staff collect samples from the reservoir, by boat, twice per month. During these sampling events, the reservoir dam and intake location are inspected. Any unusual activity or events are documented and brought to the attention of City staff.

Watershed Inspections

Complete inspections of the upper watershed area are done less frequently. Since there is relatively little activity in the upper watershed and permits are required for any building or change to the environment, inspections have been conducted on a 5-year frequency. If a significant change were to occur in the water quality, inspections would be increased in to better detect the source of the contaminant or assess the impact from the change in water quality.

Quagga and Zebra Mussel Monitoring

The discovery of freshwater quagga mussels (*Dreissena bugenisis*) and zebra mussels (*Dreissena polymorpha*) in California waterways has prompted the County of San Luis Obispo to establish a monitoring and prevention program for freshwater mussels. The presence of these mussels would present an economic and water quality threat to the beneficial uses established for the Whale Rock Reservoir. The County of San Luis Obispo Public Works and the City of San Luis Obispo have implemented an invasive mussel monitoring program at Whale Rock Reservoir.

Since all boats (except County and City boats) are prohibited on the Whale Rock Reservoir, there is less of a chance for a mussel infestation at this reservoir. The boat(s) used for inspection and water collection are dedicated to the Whale Rock Reservoir and are not used in other waterways. All sampling equipment entering the reservoir is dedicated to the Whale Rock Reservoir as well.

Despite the low risk of infestation, a lake monitoring site was established at the boat dock near the Whale Rock dam. An artificial substrate for the mussel's attachment and growth was deployed at the monitoring location. The substrate and other infrastructure are inspected once per month for mussel growth. If mussel growth is suspected, a sample will be collected for examination at the County of San Luis Obispo Water Quality Lab. If the presence of mussels is tentatively confirmed, the California Department of Fish and Game will be contacted for further investigation. Mussels have not been detected in the Whale Rock Reservoir.

Find out more about mussel prevent and how to help stop the spread please visit the following link: https://www.usgs.gov/ecosystems/invasive-species-program/maps

No suspicious organisms or evidence of their existence in the reservoir or watershed has been observed since the monitoring began.

Standby Wells Watershed Sanitary Survey 2020 Update

In addition to the Whale Rock Reservoir, the Cayucos Water Treatment Plant (WTP) has the option of utilizing four additional wells. The wells are located adjacent to Old Creek below the Whale Rock Reservoir. Only one of these wells, referred to as the "CAWO" well, is designated as "active". The CAWO well is located within the watershed but is not under the influence of surface water. This well has limited production and the only treatment required is disinfection. The water produced by this well can be pumped directly to the Clearwater reservoir at the Cayucos WTP.

The three other wells that could be utilized by the WTP were designated "standby" wells up to 2007. These wells are referred to as Morro Rock Mutual Water Company Wells 01, 03, and Cayucos Beach Mutual Water Company Well 01. Due to the shallow construction of the wells, their proximity to Old Creek, and their lack of adequate annular seals, the RWQCB has determined that these wells are under the influence of surface water. Although these wells can be used as a water source, they must first receive full treatment through the Cayucos WTP. These wells have limited capacity and are dependent on water releases from the Whale Rock Reservoir.

Two additional standby wells located in this same well field (CSA10 - Cayucos Wells 02 and 03) were abandoned in March of 2005.

The standby wells have not been utilized for drinking water since the new water treatment plant was put online in 1997. The wells are occasionally pumped for the collection of SWRCB-DDW required samples. All standby well water is pumped to waste.

In 2015, a permit amendment was filed with SWRCB-DDW on classify Morro Rock Mutual Water Company's Wells 01 and 03 along with Cayucos Beach Mutual Water Authority's Well 01 as a standby well for emergency use at the CSA10-Cayucos WTP.

Security of Watershed and Treatment Facilities

An Emergency Response Plan (ERP) was updated in January 2010. Disasters/emergencies that are likely to occur in the water system's service area were addressed. These include earthquakes, major fire emergencies, water outages due to loss of power, localized flooding, water contamination, and acts of sabotage. The ERP consists of four major sections:

Designated Responsible Personnel: This is a list of designated responsible personnel, their identified responsibilities, and work/home/cell phone numbers. It also includes additional mutual assistance and emergency resources phone numbers (Fire Dept., Sheriff's Dept., SLO County Emergency Services, FBI Office, DHS District office, SLO County Environmental Health, SLO City Utilities Dept., and the office for Morro Rock Mutual/Cayucos Beach Mutual).

Inventory of Resources: This section includes an inventory list of system resources that are used for normal operations and available for emergencies; maps and schematic diagrams of the water system, lists of emergency equipment, equipment suppliers, and emergency contract agreements that are kept at the water system office.

Action Plan: This section goes over specific possible or actual emergencies and how personnel should respond. These include:

- Contamination to water
- Structural damage from an explosive device
- Winter storm/flood
- Earthquake
- Wildland fire
- Employee assaulted by an armed intruder

Maintaining Crime Scene Integrity: This section supplies personnel with instructions on how to maintain a crime scene. It also contains a "Suspect Description Form" for accurately documenting any observed suspects.

Watershed Security

The Whale Rock Reservoir itself has restricted access on the south shore for hiking and fishing from the shore only. No public boats are allowed on the reservoir and no body contact is allowed. Signs are posted at the entrance and along the shoreline informing visitors of the reservoir's access limits. Most of the land within the defined watershed is privately owned and is utilized for large lot residential homes and small agriculture. Due to the remoteness of the reservoir and its inaccessibility, threats to the reservoir are not likely.

Security at the water treatment plant is maintained by a SCADA (supervisory control and data acquisition) system as well as a private security system. The system manages infrastructure processes within the water treatment plant. Any alarm calls out an operator as well as the Fire or Police department. The plant also has a CCTV system with cameras that cover all areas of the water treatment plant 24 Hours a day, everything is gated and fenced off, and is always locked. Overall, the security at both the Whale Rock Reservoir and the Cayucos Water Treatment Plant are satisfactory.

SANITARY SURVEY UPDATE

Summary of Findings

This watershed sanitary survey update covers the period from January 2016 through December 2020. There have been no significant changes to the watershed during this period. County staff performed field evaluations of Whale Rock Reservoir, Cayucos Water Treatment Plant, and corresponding distribution systems throughout this period. The overall condition of the watershed has not changed except for the depletion of the water supply.

Most of the 13,000-acre Old Creek watershed is designated as grazing land. The area is sparsely populated and minimally developed but there is continued agricultural activity, including various crops, vineyards, and cattle as well as the potential for severe impacts from natural disasters such as fire, floods, earthquakes, and landsides. An increase in population density or the effects of climate change have the potential for adversely impacting water quality in the watershed. Significant increases are unlikely with the present zoning regulations.

Potential source of contaminants are cattle grazing and eroding sediments, which continue to be the most significant contaminants in the watershed. Erosion contributes to sedimentation in the reservoir, especially during the rainy season and is the result of both paved and unpaved roads, livestock trails, steep eroding terrain, and croplands. Cattle grazing occurs throughout the watershed and is a potential source of Giardia and *E. coli* as well as increased turbidity and nutrient levels. No algal issues or sustained turbidity issues have been observed, indicating the cattle control measures around the watershed are effective and although total coliform levels have been elevated after large rainstorms or unseasonably warm weather, *E. coli* (the indicator bacteria for fecal contamination) has remained low throughout the Cayucos Water Treatment Plant's weekly microbial monitoring program.

During the last months of 2016 (before the rainy season) Whale Rock Reservoir's elevation was at its lowest point during the survey period. In early 2017, heavy rains resulted in a rapid rise in water levels at Whale Rock Reservoir. This increased turbidity in the raw water treated at the plant which caused the plant operators to increase the number of filter backwashes to produce drinking water meeting State water quality standards. This increase in filter backwashes caused the reclaim basins to fill beyond capacity. To avoid an uncontrolled release of reclaim water, an emergency discharge and controlled release of 31,700 gallons of filtered reclaim basin water was discharged over two days into Old Creek. No adverse impacts to the watershed were observed during nor after the release was completed.

The County will continue to monitor the total organic carbon (TOC) reduction by GAC filtration to ensure compliance and safe water quality as well as to determine whether there is a need to increase TOC monitoring. Thus far, GAC filters have successfully provided TOC reduction, allowed the plant to meet total trihalomethane (TTHM) and total haloacetic acid (HAA5), disinfection by-products (DBP) requirements, as well as taste and odor control. No odor and taste issues have been reported during the study period.

Access to the treatment facility is via a passcode-controlled front door and padlocked gate which is monitored during working hours. All visitors are required to check in at the office.

Evaluation of the watershed analytical data shows that the condition of the watershed remains very good and the treatment processes at the Cayucos Water Treatment Plant are sufficient to comply with current regulations.

Sanitary Survey Recommendations

Recommendation 1- TOC Monitoring

The scope of the GAC filter and Storage Tanks sampling program should be maintained and/or expanded in terms of scope and frequency based on the quality of delivered water.

Recommendation 2 – Drought impacts

The changing climate situation on our planet should be considered when planning mitigation of drastic changes to supply and water quality, such as large influx of low-quality water to the Cayuco WTP from rain events occurring after a period of extreme drought, as it becomes a predictably regular pattern in the future.

Recommendation 3 – Standby Well Use

The standby wells should be evaluated for the ability to be treated at the Cayucos WTP in case Whale Rock Reservoir water is compromised.

Conclusions

There have been no significant changes to the Whale Rock Reservoir watershed since the 2015 survey. Evaluation of the watershed analytical data shows that the condition of the watershed remains very good and the treatment processes at the Cayucos Water Treatment Plant are sufficient to comply with current regulations. The County will continue comply with all current and future regulations as well as update its Emergency Response Plan for this system to demonstrate its emergency preparedness and security measures as sufficient.

Throughout the survey period, the CAY WTP GAC filters have successfully provided total organic carbon (TOC) reduction as well as taste and odor control.

Finally, although drought is a reality in California, the Cayucos watershed remains stable and resilient. Water quality in the reservoir remained consistently high and there were few impacts to the supply during the dry periods experienced in the survey period. However, as evidenced by the emergency discharge event that occurred in 2017, the changing climate situation on our planet, such as larger rain events after a period of extreme drought, should be considered going forward when discussing potential approaches in preventing drastic changes to supply and quality of water to the plant.

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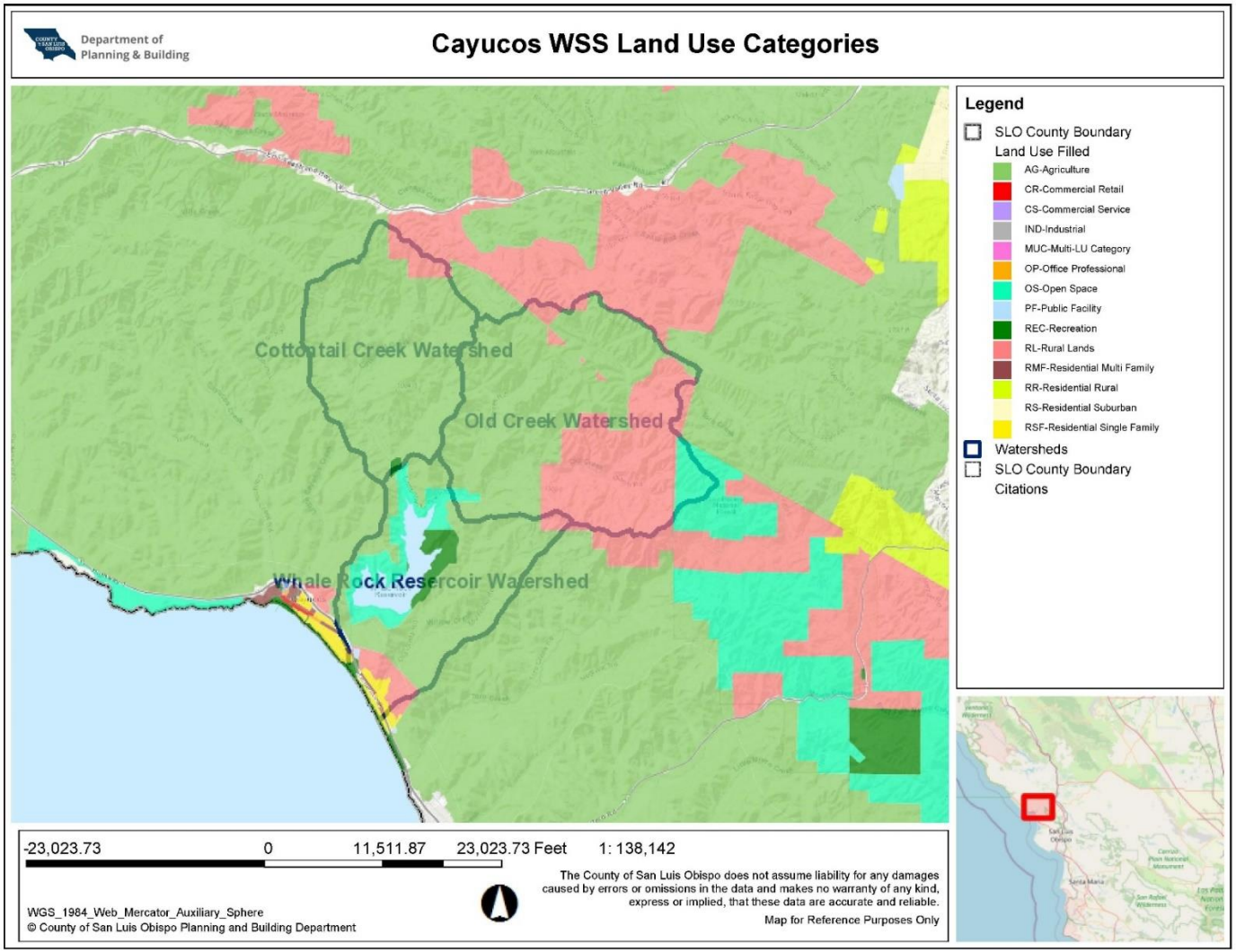
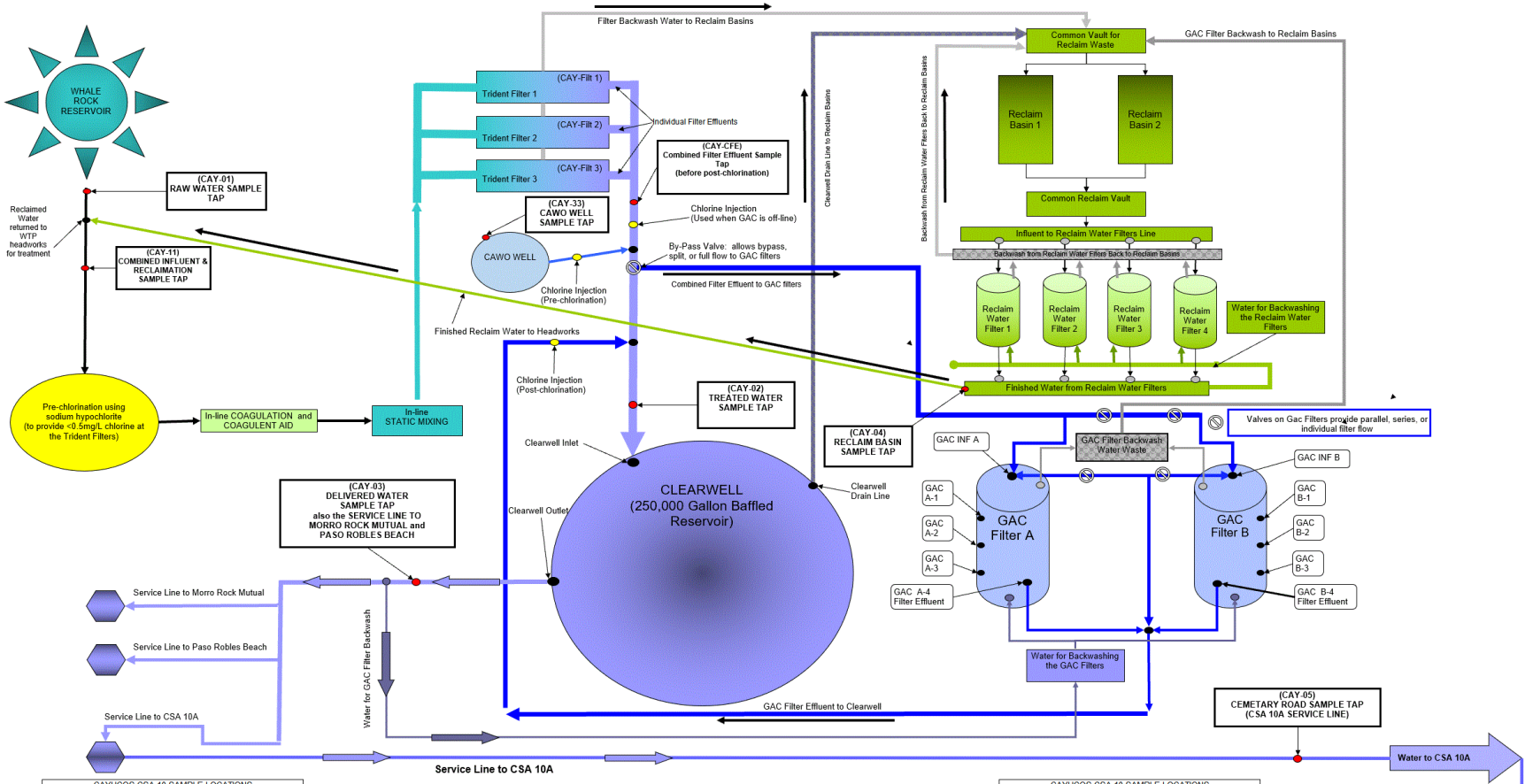
APPENDIX A: CAYUCOS WATERSHED LAND USE CATEGORY MAP



APPENDIX B: CAYUCOS WATER TREATMENT PLANT FLOW SCHEMATIC



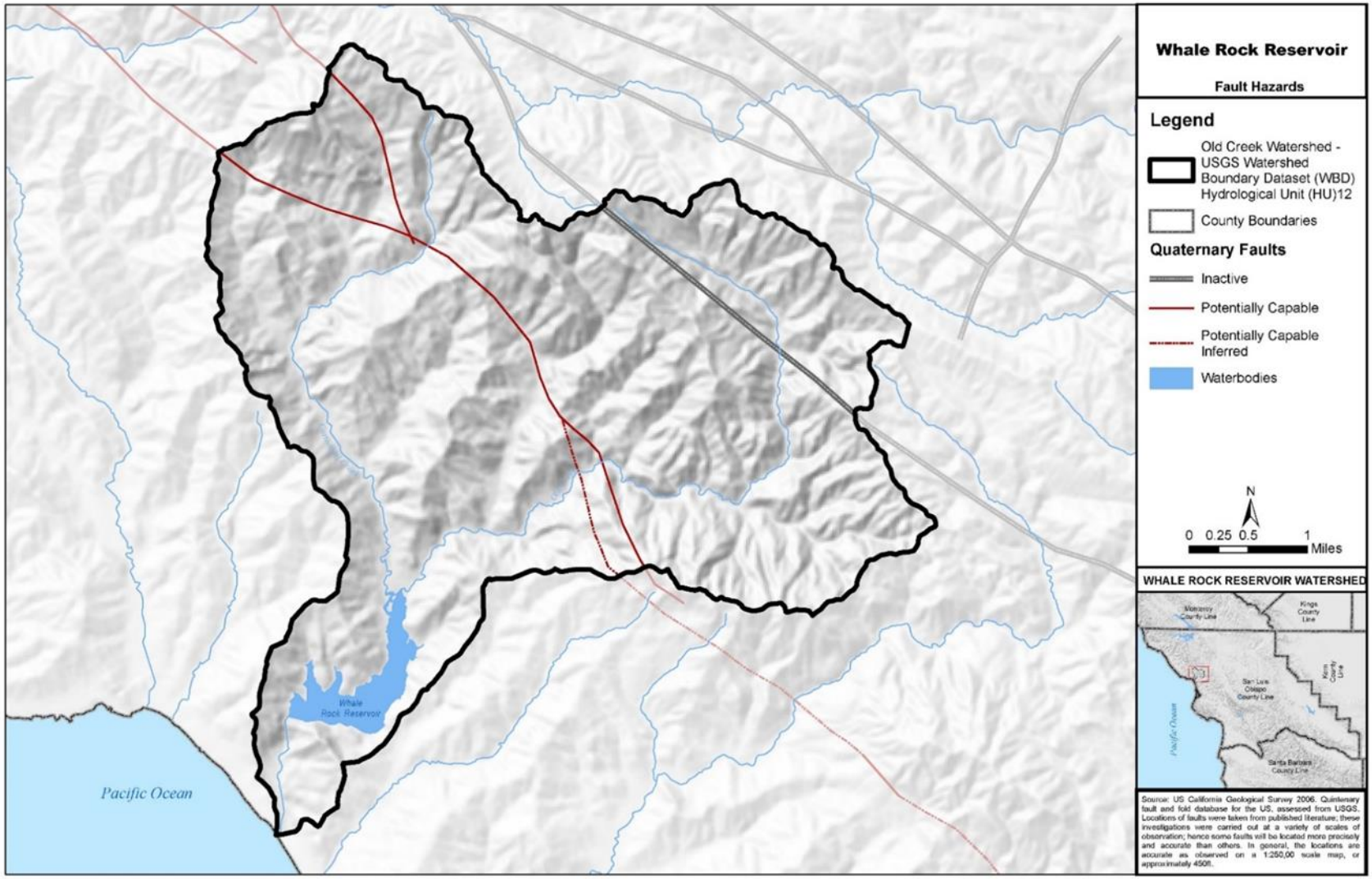
CAYUCOS CSA 10 SAMPLE LOCATIONS	
ALIAS	LOCATION
CAY-01	WHALE ROCK RESERVOIR RAW
CAY-02	TREATMENT PLANT-TREATED
CAY-03	DELIVERED WATER
CAY-04	RECLAIMATION BASIN
CAY-05	CEMETERY ROAD
CAY-11	COMBINED INFLUENT & RECLAIMATION
CAY-33	CAWO WELL

CAYUCOS CSA 10 SAMPLE LOCATIONS TOTAL COLIFORM RULE SAMPLES	
ALIAS	LOCATION
CAY-05	CEMETERY ROAD CSA 10A SERVICE LINE
CAY-03	DELIVERED WATER (TCR Upstream)
CAY-05A	2611 OCEAN STREET Hose-bib (TCR Downstream)

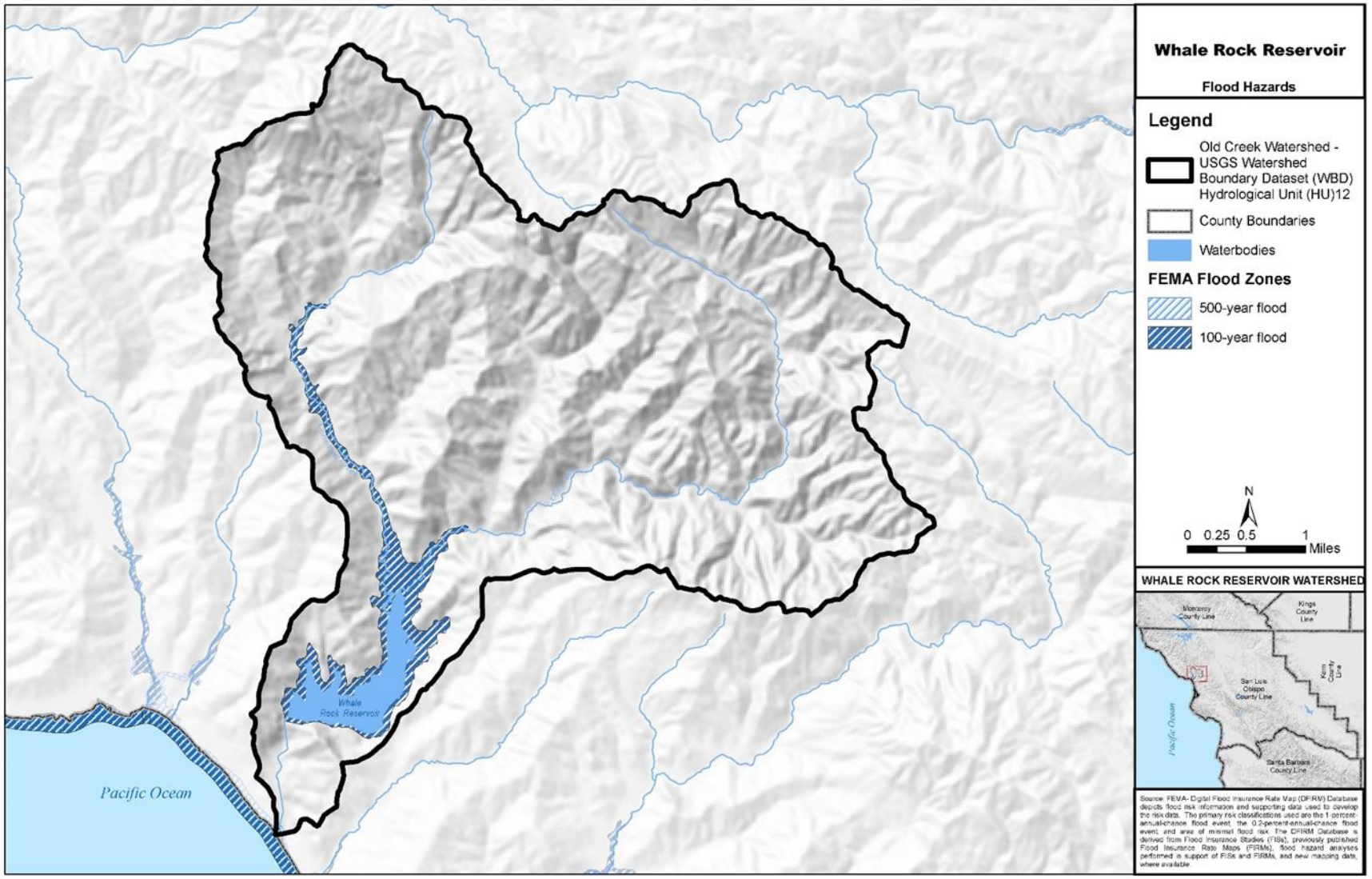
CAYUCOS CSA 10 SAMPLE LOCATIONS TRIDENT MULTI-MEDIA FILTERS	
ALIAS	LOCATION
CAY-FILT 1	TRIDENT FILTER 1
CAY-FILT 2	TRIDENT FILTER 2
CAY-FILT 3	TRIDENT FILTER 3
CAY-CFE	COMBINED FILTER EFFLUENT

CAYUCOS CSA 10 SAMPLE LOCATIONS GRANULAR ACTIVATED CARBON FILTERS	
ALIAS	LOCATION
GAC INF A	GAC FILTER INFLUENT A
GAC A-1	GAC FILTER A-TOP
GAC A-2	GAC FILTER A-MIDDLE
GAC A-3	GAC FILTER A-BOTTOM
GAC A-4	GAC FILTER A-EFFLUENT
GAC INF B	GAC FILTER INFLUENT A
GAC B-1	GAC FILTER B-TOP
GAC B-2	GAC FILTER B-MIDDLE
GAC B-3	GAC FILTER B-BOTTOM
GAC B-4	GAC FILTER B-EFFLUENT

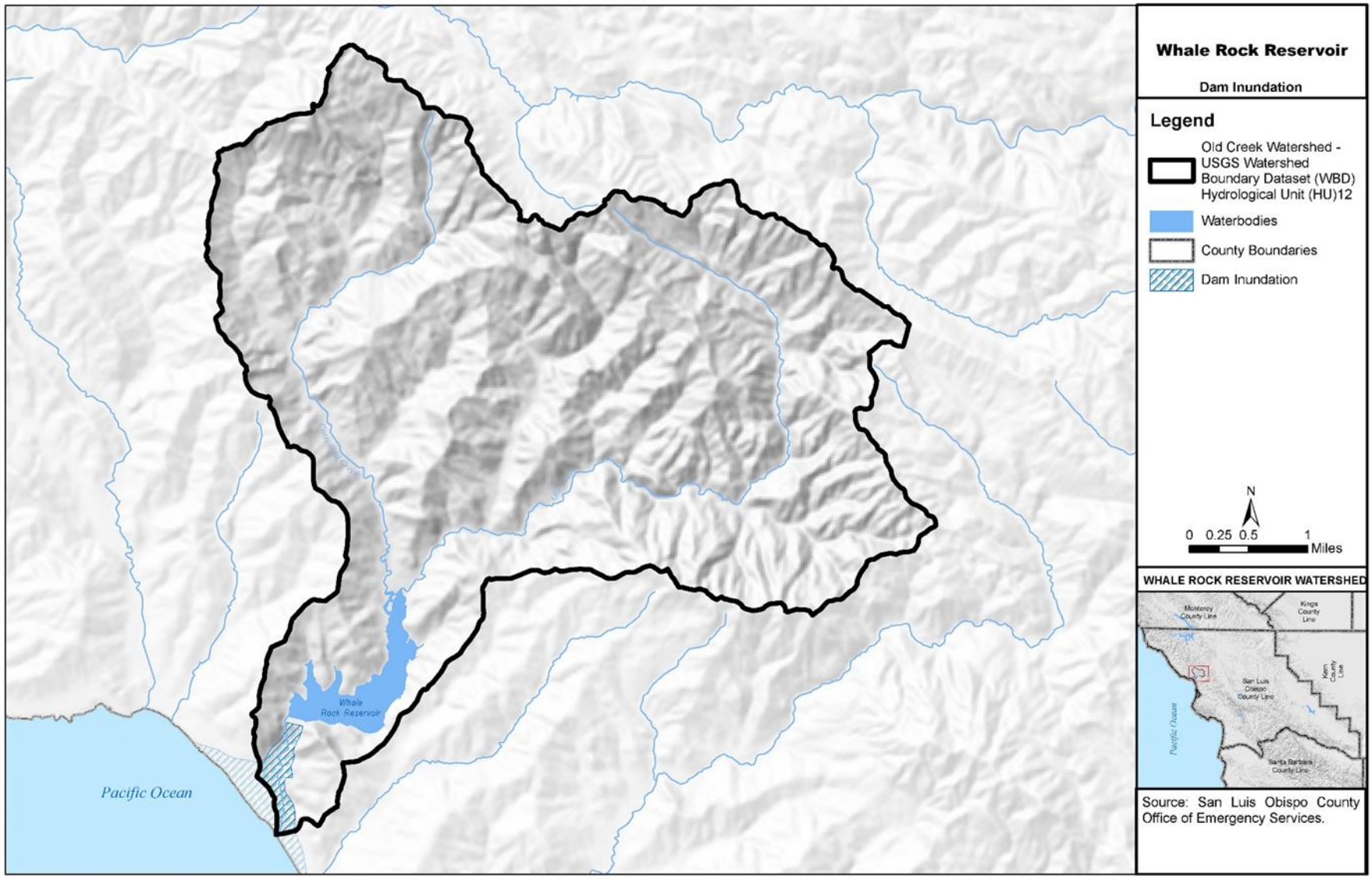
APPENDIX C: FAULT HAZARDS



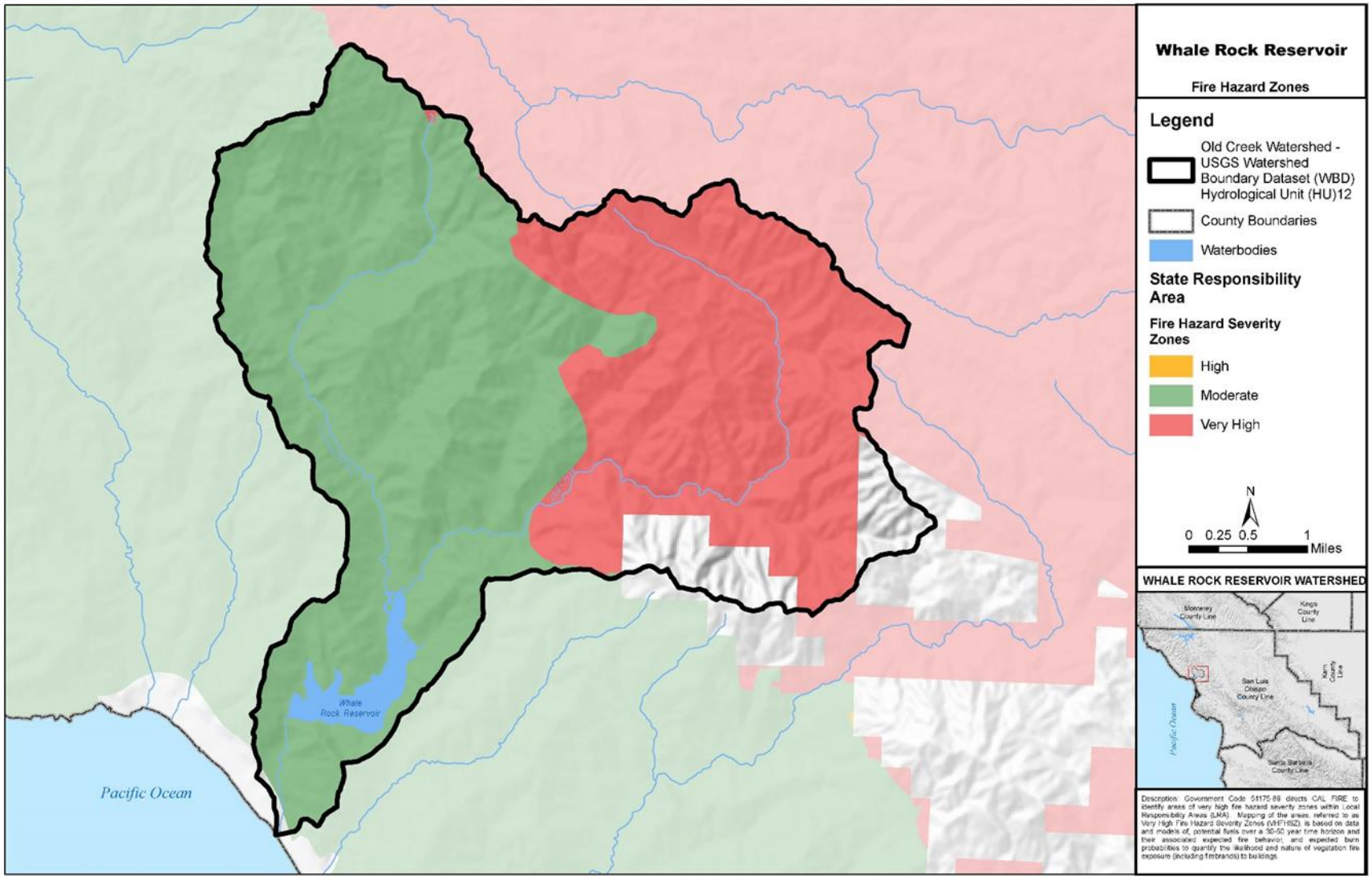
APPENDIX D: CAYUCOS PLANNING AREA FLOOD MAP



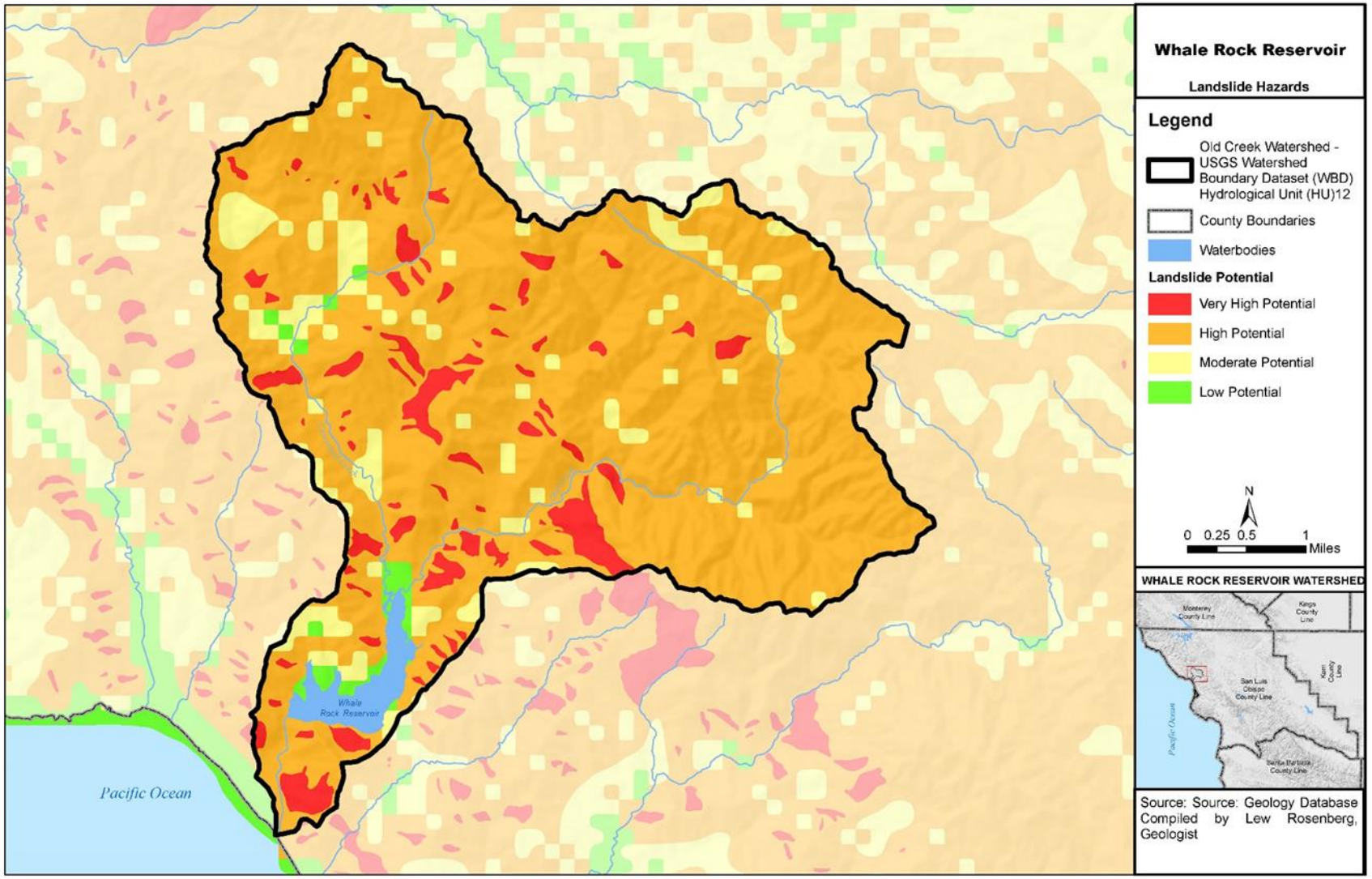
APPENDIX E: CAYUCOS PLANNING AREA DAM INUNDATION MAP



APPENDIX F: CAYUCOS PLANNING AREA FIRE HAZARDS MAP



APPENDIX G: CAYUCOS PLANNING AREA LANDSLIDE HAZARDS MAP



APPENDIX H: PESTICIDE PRODUCT USE BY YEAR 2016-2020

2016 Pesticide Treated Amount by Product			
Product	Treated Amount (Acre)	Treated Amount (Gallons)	Treated Amount (Pounds)
AGRI-MEK SC	56.3	1.5	-----
AGRI-MEK SC (CA, HI,	16.3	0.5	-----
AGRI-MEK SC MITICIDE/INSECTICIDE	4.0	0.2	-----
DANITOL(R) 2.4 EC SP	27.0	4.0	-----
DELEGATE WG	6.0	0.2	-----
ENTRUST SC	15.1	0.8	-----
GLY STAR PLUS	18.0	0.8	-----
GOAL 2XL	16.0	0.4	-----
GOALTENDER	8.0	1.2	-----
LEAF LIFE GAVICIDE GREEN 415	12.6	6.2	-----
MILESTONE	450.0	21.1	-----
NO FOAM A	454.0	6.6	-----
OMNI OIL 6-E	6.0	3.0	-----
PHT 440 SUPREME SPRA	106.1	258.7	-----
PRINCEP CALIBER 90 HERBICIDE	8.0	-----	20.0
QUINTEC	5.0	0.2	-----
RALLY 40W AGRICULTURAL FUNGICIDE IN WATER SOLUBLE POUCHES	5.0	0.1	-----
ROUNDUP WEATHERMAX H	6.5	1.3	-----
ROUNDUP WEATHERMAX HERBICIDE	251.0	30.5	-----
SURFLAN AS SPECIALTY HERBICIDE	4.0	0.2	-----
ZEAL(R) MITICIDE(1)	4.0	0.1	-----
Total	1479	338	20

2017 Pesticide Treated Amount by Product			
Product	Treated Amount (Acre)	Treated Amount (Pounds)	Treated Amount (Pounds)
AGRI-MEK SC	85.3	2.7	-----
AGRI-MEK SC (CA & PR	28.0	0.8	-----
AGRI-MEK SC MITICIDE/INSECTICIDE	17.5	0.5	-----
DELEGATE WG	23.5	1.1	-----
ENTRUST SC	10.4	0.5	-----
GLY STAR PLUS	50.0	8.5	-----
GOAL 2XL	19.0	0.4	-----
GOALTENDER	4.0	0.4	-----
LEAF LIFE GAVICIDE G	8.5	2.1	-----
MILESTONE	915.0	38.6	-----
NO FOAM A	723.0	9.0	-----
PHT 415 SUPREME SPRAY OIL	19.0	41.5	-----
PHT 440 SUPREME SPRA	130.8	395.9	-----
PHT 440 SUPREME SPRAY OIL	1.9	4.0	-----
PRINCEP CALIBER 90 HERBICIDE	4.0	-----	10.0
QUINTEC	7.5	0.4	-----
RALLY 40 WSP	2.5	0.1	-----
RALLY 40W AGRICULTURAL FUNGICIDE IN WATER SOLUBLE POUCHES	5.0	0.1	-----
REMEDY ULTRA	10.0	2.5	-----
ROUNDUP POWERMAX HER	175.0	60.2	-----
ROUNDUP WEATHERMAX H	4.0	0.9	-----
ROUNDUP WEATHERMAX HERBICIDE	274.0	31.0	-----
SPREADER 90	192.0	2.4	-----
Total	2710	604	10

2018 Pesticide Treated Amount by Product			
Product	Treated Amount (Acre)	Treated Amount (Gallons)	Treated Amount (Pounds)
AGRI-MEK SC	146.3	4.1	-----
FLINT FUNGICIDE	5	0.1	-----
GLY STAR PLUS	54	6.7	-----
GOAL 2XL	29.5	1.2	-----
GOALTENDER	20	1.2	-----
MUSTANG INSECTICIDE	6	0.2	-----
PHT 440 SUPREME SPRA	146.3	366.9	-----
PRINCEP CALIBER 90 HERBICIDE	34.5	1.1	57
PROGIBB(R) LV PLUS	25	2.4	-----
QUINTEC	5	0.1	-----
RALLY 40W AGRICULTURAL FUNGICIDE IN WATER SOLUBLE POUCHES	2.5	0.1	-----
ROUNDUP POWERMAX HER	11.25	10.1	-----
ROUNDUP WEATHERMAX HERBICIDE	278	31.7	-----
SUPPRESS EC	3.5	4.0	-----
TEBUSTAR 45 WSP	2.5	0.1	-----
Total	769	430	57

2019 Pesticide Treated Amount by Product			
Product	Treated Amount (Acre)	Treated Amount (Gallons)	Treated Amount (Pounds)
AGRI-MEK SC	161.7	5.0	-----
BRANDT NO FOAM A	840.0	10.5	-----
BRANDT SUPER WETTER	24.0	0.6	-----
DIMETHOATE 400	4.5	0.4	-----
ENTRUST SC	3.0	0.2	-----
GLY STAR PLUS	118.0	8.1	-----
GOAL 2XL	43.0	1.5	-----
GOALTENDER	68.0	1.9	-----
IAP SUMMER 415 SPRAY	73.5	220.5	-----
KALIGREEN	5.0	-----	16.0
LEAF LIFE GAVICIDE GREEN 415	3.0	9.0	-----
MILESTONE	840.0	45.9	-----
MUSTANG INSECTICIDE	6.0	0.2	-----
ORTHENE 97	3.0	0.0	1.5
PHT 440 SUPREME SPRA	88.2	176.4	-----
PRINCEP CALIBER 90 HERBICIDE	75.0	0.6	62.7
PROGIBB(R) LV PLUS	24.0	2.4	-----
QUINTEC	2.5	0.2	-----
RALLY 40WSP	5.0	0.1	-----
ROUNDUP POWERMAX HER	4.0	0.9	-----
ROUNDUP POWERMAX HERBICIDE	30.3	13.5	-----
ROUNDUP WEATHERMAX HERBICIDE	340.0	36.0	-----
TEBUSTAR 45 WSP	5.0	0.1	-----
Total	2767	534	80

2020 Pesticide Treated Amount by Product			
Product	Treated Amount (Acre)	Treated Amount (Gallons)	Treated Amount (Pounds)
AGRI-MEK SC MITICIDE/INSECTICIDE	146	4.6	0.0
BRANDT NO FOAM A	1105	13.8	0.0
BRANDT SUPER WETTER	28	1.3	0.0
FORMULA F-30 ALGAE CONTROL	4	6.0	0.0
GLY STAR PLUS	77	0.5	0.0
GOAL 2XL	21	0.3	0.0
GOALTENDER	42	0.5	0.0
IAP SUMMER 415 SPRAY OIL	88.5	265.5	0.0
MILESTONE	1105	60.4	0.0
PHT 440 SUPREME SPRAY OIL	57.5	172.5	0.0
PRINCEP CALIBER 90 HERBICIDE	28	-----	2.4
PROGIBB LV PLUS PLANT GROWTH REGULATOR SOLUTION	28	2.7	0.0
ROUNDUP POWERMAX HERBICIDE	59.2	26.8	0.0
ROUNDUP WEATHERMAX HERBICIDE	259	17.5	0.0
Total	3048	572	2

APPENDIX I: PESTICIDE COMMODITY USE BY YEAR 2016-2020

2016 Commodity Pesticide Treated Amount	
Commodity	**Treated Amount (Acre)**
AVOCADO	524.6
GRAPE, WINE	10
ORANGE	27
ORANGE ORGANIC	17.2
RANGELAND	900
Total	1479

2017 Commodity Pesticide Treated Amount	
Commodity	**Treated Amount (Acre)**
AVOCADO	619.9
GRAPE, WINE	15
ORANGE	33
RANGELAND	2015
UNCULTIVATED AG	27
Total	2710

2018 Commodity Pesticide Treated Amount	
Commodity	**Treated Amount (Acre)**
AVOCADO	683.85
GRAPE, WINE	15
ORANGE	16.5
RANGELAND	27
UNCULTIVATED AG	27
Total	769

2019 Commodity Pesticide Treated Amount	
Commodity	**Treated Amount (Acre)**
AVOCADO	1051.7
BEAN SUCCULENT	1.5
GRAPE, WINE	17.5
ORANGE	10
PEPPER FRUITNG	6
RANGELAND	1680
Total	2767

2020 Commodity Pesticide Treated Amount	
Commodity	**Treated Amount (Acre)**
AVOCADO	838.2
RANGELAND	2210
Total	3048

APPENDIX J: LIMNOLOGY WHALE ROCK TEMPERATURE PROFILE

Whale Rock Reservoir Temperature Profile, ºC versus Depth, Feet

Date	2'	5'	10'	15'	20'	25'	30'	35'	40'	45'	50'	55'	60'	65'	70'	75'	80'	85'	90'	95'	100'
1/12/2016	11.1	10.9	10.9	10.9	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	-	-	-
1/27/2016	12.2	12.1	12.1	12	12	12	12	12	11.8	11.8	11.5	11.5	11.4	11.2	11.1	11	10.9	10.9	-	-	-
2/9/2016	13.1	12.9	12.6	12.4	12.4	12.3	12.3	12.2	12.2	12.2	12.2	12.1	12.1	12	12	12	11.9	-	-	-	-
2/23/2016	14.8	14.2	14.4	14.4	14.3	14.3	13.9	13.9	13.6	13.5	13.2	13.2	13.1	13	12.9	12.7	12.6	12.3	-	-	-
3/17/2016	16.1	16	15.7	15.8	15.6	15.5	15.4	15.2	15.1	14.8	14.6	14.5	13.6	13.5	13.4	13.2	13.2	13.2	-	-	-
3/29/2016	16.8	16.6	16.6	16.5	16.5	16.4	16.4	15.9	15	14.8	14.7	14.4	14.2	14.1	13.9	13.8	13.6	13.5	-	-	-
4/12/2016	18.6	18.3	18.2	18.1	18	16.9	16.4	16.1	15.9	15.6	15.4	15.1	14.7	14.4	14.1	13.9	13.7	13.7	-	-	-
4/26/2016	18.7	18.7	18.5	18.5	18.5	18.4	18.3	17.3	16.2	15.7	15.4	15	14.3	14.5	14.2	14.1	14	13.9	-	-	-
5/10/2016	19.6	19.6	19.6	19.6	19.5	19.5	18.6	17.8	17.1	16.5	15.6	15	14.7	14.4	14.3	14.2	14.2	14.1	-	-	-
5/24/2016	20.1	20.1	20	19.9	19.9	19.9	19.8	18.5	17.5	16.9	15.8	15.4	14.9	14.6	14.4	14.3	14.2	14.2	-	-	-
6/14/2016	21.7	21.6	21.5	21.5	21.4	21.4	21.3	19.3	18.5	17.5	16.3	15	14.7	14.6	14.6	14.5	14.4	-	-	-	-
6/28/2016	22.6	22.6	22.6	22.6	22.6	22.5	21.7	20.5	18.8	17.2	15.9	15.2	14.9	14.7	14.6	14.5	14.5	-	-	-	-
7/12/2016	22.8	22.8	22.7	22.7	22.7	22.6	22.5	21	19.6	17.6	15.8	15.2	14.9	14.8	14.7	14.6	14.5	14.4	-	-	-
7/26/2016	22.7	22.7	22.7	22.8	22.8	22.6	22.6	21.5	20	18.1	15.2	15.2	15	14.8	14.7	14.6	-	-	-	-	-
8/9/2016	22.5	22.6	22.6	22.6	22.6	22.6	22.6	22.6	20.7	18.2	16.7	15.4	15.1	14.9	14.7	14.6	14.5	-	-	-	-
8/23/2016	22.5	22.4	22.4	22.3	22.3	22.3	22.3	22.3	22.4	18.5	16.3	15.2	14.9	14.8	14.7	14.6	14.5	-	-	-	-
9/27/2016	21.7	21.5	21.4	21.2	21.1	21.1	21.1	21	21	20.5	18.2	15.5	15.1	14.8	14.7	14.6	14.5	-	-	-	-
10/11/2016	19.5	19.5	19.6	19.6	19.6	19.6	19.5	19.6	19.6	19.6	19.5	16.7	15.3	15	14.7	14.7	14.6	-	-	-	-
10/25/2016	18.6	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5	17.7	17	15.5	14.9	14.7	14.6	-	-	-	-
11/14/2016	17.7	17.7	17.7	17.7	17.7	17.7	17.7	17.7	17.7	17.7	17.7	17.7	17.7	17.6	16.1	14.9	14.6	-	-	-	-
11/29/2016	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.3	15.3	15.3	15.3	-	-	-	-
12/13/2016	14.7	14.7	14.6	14.6	14.5	14.2	14.1	14	14	13.9	13.9	13.8	13.8	13.8	13.7	13.7	13.7	-	-	-	-
1/9/2017	11.9	11.8	11.8	11.8	11.8	11.8	11.7	11.5	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	-	-
1/26/2017	11.4	11.3	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	-
2/14/2017	13.6	13.6	13.5	13.4	13.2	13.2	13.2	12.4	12	11.9	11.7	11.5	11.2	11.2	11.2	11.1	11.1	11	11	11	-
2/28/2017	12.8	12.7	12.7	12.5	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.2	12.2	12	11.9	11.7	11.6	11.6	11.4	11.4	11.3
3/14/2017	14.5	14.3	14	14	13.7	13.6	13.5	13.2	13.2	13.1	13.1	13	13	13	13	12.9	12.8	12.7	12.6	12.5	12.4

Whale Rock Reservoir Temperature Profile, ºC versus Depth, Feet																					
Date	**2'**	**5'**	**10'**	**15'**	**20'**	**25'**	**30'**	**35'**	**40'**	**45'**	**50'**	**55'**	**60'**	**65'**	**70'**	**75'**	**80'**	**85'**	**90'**	**95'**	**100'**
3/28/2017	16.4	16.2	16.1	16	15.9	15.4	13.6	13.4	13.2	13.1	13.1	13	13	12.9	12.9	12.9	12.8	12.7	12.7	12.6	12.6
4/11/2017	17	16.9	16.8	16.8	16.5	16	14.4	13.8	13.5	13.3	13.2	13.2	13.1	13	12.9	12.9	12.8	12.8	12.7	12.7	12.6
4/25/2017	18.7	18.4	18.3	18.3	17	17	15.3	14.7	14	13.4	13.2	13.1	13	13	13	12.9	12.9	12.9	12.9	12.8	12.8
5/9/2017	19.2	19.2	19.1	19.1	19.1	17.9	15.8	14.6	14.1	13.8	13.4	13.2	13.2	13.1	13	13	13	12.9	12.9	12.9	12.9
5/23/2017	20.5	20.5	20.4	20.2	19	17.9	16.3	15.4	14.8	14	13.6	13.5	13.3	13.2	13.2	13.1	13.1	13.1	13	13	13
6/13/2017	21	20.9	20.7	20.7	20.6	20.6	18	16.2	15	14.2	13.7	13.5	13.3	13.3	13.2	13.2	13.1	13.1	13.1	13.1	13
6/27/2017	22.9	22.8	22.8	22.8	22.8	20.9	17.1	16.1	14.9	14.2	13.9	13.7	13.4	13.3	13.2	13.1	13.1	13.1	13.1	13.1	13.1
7/11/2017	23.2	23.2	23.1	23.1	23	22.9	18.9	16.4	15.1	14.4	13.9	13.7	13.5	13.3	13.2	13.2	13.2	13.1	13.1	13.1	13.1
7/25/2017	23.2	23.2	23.3	23.3	23.2	23.2	19.1	16.6	15.7	14.7	14.1	13.7	13.4	13.3	13.3	13.2	13.2	13.2	13.2	13.1	13.1
8/15/2017	20.7	23.1	23.1	23.1	23	23	22.7	17	15.4	14.4	14	13.5	13.4	13.3	13.3	13.3	13.2	13.2	13.2	13.2	13.2
8/29/2017	22.8	22.9	22.9	22.9	22.8	22.8	22.6	18.1	15.9	14.8	14.2	13.7	13.7	13.4	13.3	13.3	13.3	13.2	13.2	13.2	13.2
9/12/2017	23.7	23.8	23.7	23.7	23.6	23.5	21.8	18.7	16	15.1	14.4	14	13.7	13.5	13.4	13.3	13.3	13.3	13.3	13.3	13.2
9/26/2017	21.3	21.3	21.2	21.2	21.1	21.1	21.1	21.1	18.8	14.8	13.9	13.6	13.5	13.4	13.3	13.3	13.3	13.2	13.2	13.2	-
10/10/2017	19.5	19.5	19.5	19.5	19.5	19.4	19.4	19.4	17.8	14.9	14	13.6	13.6	13.5	13.4	13.4	13.4	13.3	13.3	13.3	13.3
10/31/2017	17.2	17.3	17.3	17.3	17.3	17.3	17.3	17.3	17.2	17	16.6	16.1	15.6	14.6	14	13.8	13.6	13.5	13.4	13.4	13.4
11/17/2017	16.4	16.4	16.4	16.4	16.4	16.4	16.3	16.3	16.3	16.2	16.2	16.2	16.1	15.1	14.7	14.4	13.8	13.6	13.5	13.5	13.5
12/12/2017	13.1	13	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9
12/26/2017	11.8	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	-
1/9/2018	12.5	12.3	12.3	12.3	12	12	11.9	11.8	11.8	11.8	11.8	11.7	11.7	11.6	11.6	11.6	11.5	11.5	11.5	11.5	11.5
1/31/2018	12.5	12.5	12.5	12.5	12.4	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.1	12.1	12.1	12.1	12	12	12	12	12
2/16/2018	13.2	13	12.9	12.9	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.7	12.7	12.7	12.6	12.6
2/27/2018	12.3	12.3	12.2	12.2	12.2	12.2	12.2	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	-
3/12/2018	13.5	13.3	13.2	13.2	13.1	12.9	12.7	12.6	12.4	12.3	12.3	12.2	12.2	12.2	12.2	12.1	12.1	12.1	12.1	12.1	12.1
3/27/2018	13.9	13.9	13.8	13.7	13.7	13.5	13.4	13.3	13.3	12.9	12.8	12.7	12.5	12.4	12.3	12.3	12.3	12.3	12.2	12.2	12.2
4/10/2018	17.1	17	16.8	16.6	16.2	15.6	14.9	14.1	13.4	13.1	12.9	12.8	12.8	12.6	12.5	12.5	12.4	12.4	12.4	12.4	12.4
4/24/2018	17.9	17.6	17.6	17.6	17.2	16.4	14.2	13.4	13.1	12.8	12.8	12.7	12.6	12.6	12.5	12.5	12.5	12.5	12.4	12.4	12.4
5/15/2018	19.5	19.4	19.3	19.2	19.2	19.1	16.5	15.6	14.4	13.7	13.2	13.1	12.9	12.7	12.7	12.6	12.6	12.6	12.5	12.5	12.5
5/29/2018	20	20	19.9	19.9	19.8	19.7	17.4	15.9	14.7	13.9	13.3	13	12.8	12.7	12.7	12.7	12.6	12.6	12.6	12.6	12.5

Whale Rock Reservoir Temperature Profile, ºC versus Depth, Feet																					
Date	**2'**	**5'**	**10'**	**15'**	**20'**	**25'**	**30'**	**35'**	**40'**	**45'**	**50'**	**55'**	**60'**	**65'**	**70'**	**75'**	**80'**	**85'**	**90'**	**95'**	**100'**
6/12/2018	20.9	20.9	20.9	20.8	20.7	20.5	17.9	15.4	14.6	13.8	13.2	12.9	12.8	12.7	12.7	12.6	12.6	12.6	12.6	12.6	12.6
6/26/2018	21	21.1	21.1	21.1	21.1	21.1	17.8	15.8	14.7	13.9	13.4	13	12.9	12.8	12.7	12.7	12.7	12.7	12.6	12.6	12.6
7/24/2018	23.6	23.6	23.5	23.5	23.3	23.1	20.2	17.3	14.9	14.3	13.7	13.3	13	12.8	12.8	12.7	12.7	12.7	12.7	12.7	12.7
8/28/2018	22.3	22.3	22.3	22.3	22.3	22.3	21.7	19	15.2	14.4	13.6	13.3	13.1	12.9	12.9	12.8	12.8	12.8	12.8	12.7	12.7
9/10/2018	22.7	22.6	22.4	22.4	22.3	22.3	21.4	18.3	16	15.1	14.3	13.5	13.1	12.8	12.8	12.7	12.7	12.7	12.7	12.7	12.7
9/24/2018	21	21	21	21	21	21	21	21	17.1	14.3	13.5	13.3	13	12.9	12.9	12.9	12.9	12.8	12.8	12.8	12.8
10/9/2018	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	18.4	15.2	13.8	13.4	13.1	13	13	12.9	12.9	12.9	12.8	12.8	12.8
10/30/2018	18.7	18.6	18.6	18.6	18.6	18.6	18.6	18.5	18.5	16.7	14	13.5	13.3	13	12.9	12.9	12.9	12.9	12.8	12.8	12.8
11/13/2018	15.8	15.7	15.7	15.7	15.6	15.6	15.6	15.6	15.6	15.6	15.6	15.4	13.7	13.2	13	12.9	12.9	12.9	12.9	12.9	12.8
1/8/2019	12.4	12.3	12.2	12.2	12.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.8	11.8	11.8	11.8	11.8
1/29/2019	12.9	12.5	12.4	12.2	12.1	12.1	12.1	12.1	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
2/26/2019	12.0	12.0	11.9	11.9	11.9	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.7	11.7	11.6	11.6	11.6	11.6	11.6	11.6	11.6
3/12/2019	13.2	13.1	12.9	12.9	12.9	12.7	12.6	12.5	12.4	12.2	12.0	11.9	11.8	11.8	11.8	11.8	11.8	11.7	11.7	11.7	11.7
3/26/2019	14.9	14.8	14.6	14.6	14.5	14.2	13.5	13.4	12.8	12.7	12.6	12.6	12.3	12.3	12.2	12.2	12.1	12.1	12.1	12.0	12.0
4/9/2019	17.5	17.5	17.5	17.4	17.3	16.6	15.4	14.5	14.5	13.7	12.9	12.7	12.6	12.5	12.5	12.4	12.3	12.3	12.2	12.2	12.2
4/23/2019	18.4	18.4	18.4	18.4	18.2	17.6	15.2	13.6	13.1	12.8	12.6	12.6	12.5	12.5	12.5	12.3	12.2	12.3	12.3	12.2	12.2
5/14/2020	19.9	19.9	19.8	19.7	19.7	18.3	16.1	15.2	14.0	13.5	12.9	12.7	12.6	12.5	12.5	12.4	12.4	12.4	12.4	12.4	12.3
5/28/2020	18.9	18.8	18.7	18.6	18.6	18.5	18.5	17.1	14.5	13.8	13.1	12.7	12.6	12.5	12.4	12.4	12.4	12.4	12.4	12.3	12.3
6/11/2019	21.3	21.2	21.0	20.8	20.4	18.6	17.4	16.7	14.8	14.1	13.4	13.1	12.8	12.6	12.5	12.5	12.5	12.5	12.4	12.4	12.4
6/25/2019	21.0	21.0	21.0	21.0	21.0	19.5	17.6	16.3	15.2	14.4	13.7	13.0	12.9	12.6	12.6	12.5	12.5	12.5	12.5	12.4	12.4
7/9/2019	21.6	21.6	21.5	21.5	21.5	18.7	17.4	15.9	15.2	14.5	13.4	12.9	12.8	12.7	12.5	12.5	12.5	12.5	12.5	12.5	12.5
7/23/2019	22.6	22.6	22.6	22.6	22.6	22.1	19.2	16.7	15.5	14.5	13.9	13.2	13.0	12.8	12.7	12.6	12.6	12.5	12.5	12.5	12.5
8/13/2019	22.8	22.8	22.7	22.7	22.6	22.5	22.0	17.7	15.8	14.8	13.5	13.1	12.9	12.7	12.6	12.6	12.6	12.5	12.5	12.5	12.5
8/27/2019	22.8	22.8	22.8	22.8	22.8	22.7	21.8	18.0	16.2	14.5	13.5	13.1	12.8	12.7	12.6	12.6	12.6	12.6	12.5	12.5	12.5
9/10/2019	22.8	22.8	22.7	22.7	22.7	21.6	18.5	15.9	14.4	13.7	13.2	12.9	12.7	12.7	12.6	12.6	12.6	12.6	12.6	12.5	12.5
9/24/2019	21.7	21.6	21.5	21.5	21.5	21.5	21.5	21.4	19.0	15.1	14.2	13.5	13.0	12.8	12.7	12.7	12.6	12.6	12.6	12.6	12.6
10/15/2019	18.3	18.3	18.2	18.2	18.2	18.2	18.2	18.2	18.2	18.2	14.4	13.3	13.1	12.9	12.8	12.7	12.7	12.6	12.6	12.6	12.6
10/24/2019	18.2	18.1	18.1	18.1	18.1	18.1	18	17.9	17.9	17.9	15.8	13.4	12.9	12.8	12.7	12.7	12.6	12.6	12.6	12.6	12.6

Whale Rock Reservoir Temperature Profile, ºC versus Depth, Feet																				
Date	**2'**	**5'**	**10'**	**15'**	**20'**	**25'**	**30'**	**35'**	**40'**	**45'**	**50'**	**55'**	**60'**	**65'**	**70'**	**75'**	**80'**	**85'**	**90'**	**95'**	**100'**
11/12/2019	15.7	15.7	15.6	15.6	15.9	15.6	15.6	15.6	15.6	15.6	15.6	15.4	14.5	13.4	12.9	12.9	12.6	12.7	12.7	12.7	12.6
11/25/2019	14.9	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.6	14.5	14.2	13.7	13.2	12.9	12.8	12.8
12./10/2019	13.9	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.5	13.5	13.5	13.4	13.2
1/29/2020	12.3	12.2	12.1	12.1	12.1	12.0	12.0	11.9	11.9	11.8	11.7	11.7	11.6	11.5	11.4	11.4	11.4	11.4	11.3	11.3	11.3
2/10/2020	12.4	12.2	12.0	11.8	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.6	11.5	11.5	11.5	11.5	11.5
2/26/2020	13.6	13.4	13.2	13.1	13.1	13.0	13.0	12.9	12.9	12.9	12.6	12.6	12.3	12.3	12.1	12.0	11.9	11.9	11.8	11.8	11.7
Summary Whale Rock Reservoir Temperature Profile, ºC versus Depth, Feet																					
Depth	**2'**	**5'**	**10'**	**15'**	**20'**	**25'**	**30'**	**35'**	**40'**	**45'**	**50'**	**55'**	**60'**	**65'**	**70'**	**75'**	**80'**	**85'**	**90'**	**95'**	**100'**
Average	17.9	17.8	17.8	17.7	17.7	17.4	16.7	15.8	15.0	14.4	13.8	13.5	13.3	13.1	13.0	12.9	12.8	12.6	12.5	12.5	12.5
Minimum	11.1	10.9	10.9	10.9	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	11.0	11.0	11.3
Maximum	23.7	23.8	23.7	23.7	23.6	23.5	22.7	22.6	22.4	20.5	19.5	17.7	17.7	17.6	16.1	15.3	15.3	14.4	13.5	13.5	13.5
Total #	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	88	77	67	66	61

APPENDIX K: LIMNOLOGY WHALE ROCK DISSOLVED OXYGEN PROFILE

Date	2'	5'	10'	15'	20'	25'	30'	35'	40'	45'	50'	55'	60'	65'	70'	75'	80'	85'	90'	95'	100'
1/4/2016	8.1	8.6	8.7	8.4	8.4	8.2	7.2	6.2	5.5	4.9	4.3	3.8	3.3	2.8	2.0	1.5	1.1	0.8	-	-	-
1/12/2016	10.2	10.7	10.5	10.6	10.1	10.1	10.2	9.8	10.0	10.0	10.0	10.1	9.9	9.9	10.0	10.0	10.0	10.0	-	-	-
1/27/2016	11.0	10.9	10.9	10.9	10.9	9.9	9.4	9.2	8.8	8.6	8.5	8.6	8.4	8.3	8.2	7.8	7.5	7.3	-	-	-
2/9/2016	10.6	10.4	10.5	10.4	10.4	10.4	10.4	10.2	10.3	10.1	10.2	10.1	10.1	10.0	10.0	10.0	9.9	-	-	-	-
2/23/2016	10.9	10.6	10.7	10.6	10.6	10.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3/17/2016	10.0	9.5	9.4	8.4	8.8	8.7	8.4	8.4	8.0	7.9	7.6	7.6	7.1	6.5	6.4	5.8	5.3	4.9	-	-	-
3/29/2016	8.8	8.7	8.2	8.5	8.4	8.5	8.6	8.4	7.9	7.6	7.2	6.4	6.4	6.6	6.0	5.6	5.1	4.3	-	-	-
4/12/2016	9.4	8.8	9.0	9.3	8.8	8.4	8.0	7.9	7.5	7.0	6.9	6.7	6.1	6.0	5.3	3.7	3.0	2.9	-	-	-
4/26/2016	8.5	8.4	8.3	8.5	8.6	8.5	8.4	6.9	6.3	5.9	5.7	5.1	4.9	4.5	3.0	2.5	2.0	1.4	-	-	-
5/24/2016	9.0	8.7	7.8	8.5	7.7	7.8	7.7	5.6	4.7	4.1	3.1	2.9	2.3	1.8	1.2	0.7	0.5	0.1	-	-	-
6/14/2016	8.0	7.9	7.8	7.6	7.6	7.2	7.1	4.0	2.9	2.0	1.5	0.8	0.7	0.4	0.1	0.1	0.1	-	-	-	-
6/28/2016	8.1	8.1	8.0	8.0	7.8	7.6	7.5	4.7	1.9	0.8	0.3	0.3	0.1	0.1	0.1	0.1	0.1	-	-	-	-
7/12/2016	7.0	6.7	6.4	6.1	6.1	6.4	6.3	3.1	1.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.1	-	-	-
7/26/2016	7.0	6.8	6.6	6.6	6.6	6.6	6.5	2.9	0.6	0.1	0.1	0.1	0.1	0.1	0.1	0.1		-	-	-	-
8/9/2016	6.1	6.0	6.0	5.6	5.8	5.7	5.9	5.6	1.2	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	-	-	-	-
8/23/2016	6.0	6.0	6.4	6.0	5.9	5.9	5.8	5.9	1.3	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	-	-	-	-
9/27/2016	8.3	7.7	7.7	7.5	7.5	7.5	7.4	7.4	7.3	6.2	0.9	0.1	0.1	0.1	0.0	0.0	0.0	-	-	-	-
10/11/2016	7.7	7.8	7.5	7.3	7.6	7.9	7.7	7.5	7.4	7.7	7.4	0.4	0.2	0.2	0.1	0.2	0.1	-	-	-	-
10/25/2016	8.4	8.3	8.2	8.0	8.0	7.4	7.4	7.4	7.4	7.4	7.1	5.2	2.1	0.2	0.1	0.1	0.1	-	-	-	-
11/14/2016	8.5	8.5	8.3	8.3	8.5	8.0	8.2	8.4	8.3	8.2	8.1	8.0	7.9	7.3	0.3	0.1	0.1	-	-	-	-
11/29/2016	9.0	8.8	8.3	8.2	8.2	8.2	8.2	8.1	8.0	8.0	8.0	8.0	8.0	7.9	7.9	7.9	7.8	-	-	-	-
12/13/2016	9.0	9.0	9.1	8.9	9.6	8.7	8.0	7.9	7.7	7.8	7.7	7.4	7.1	7.1	6.5	5.9	5.6	-	-	-	-
1/9/2017	10.2	10.1	10.0	9.9	9.9	9.6	9.8	9.8	9.7	9.6	9.7	9.7	9.7	9.4	9.5	9.3	9.1	9.1	9.1	-	-
1/26/2017	9.6	9.5	9.5	9.3	9.3	9.3	9.3	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.1	9.1	9.1	9.1	9.1	8.8	-
2/14/2017	9.8	9.8	9.7	9.6	9.6	9.5	9.5	9.5	9.3	9.3	9.3	9.3	9.3	9.2	9.0	8.8	8.6	8.6	8.6	8.5	-
2/28/2017	9.5	9.4	9.3	8.8	9.1	9.2	8.8	9.3	8.8	8.8	8.7	8.2	8.2	8.1	8.1	7.9	8.0	7.7	7.4	7.8	7.5

Date	2'	5'	10'	15'	20'	25'	30'	35'	40'	45'	50'	55'	60'	65'	70'	75'	80'	85'	90'	95'	100'
3/14/2017	9.5	8.8	8.4	8.4	8.8	8.2	7.8	7.9	8.2	7.7	8.2	8.2	7.9	8.4	8.1	8.2	8.5	8.0	7.9	8.1	8.0
3/28/2017	9.8	10.1	9.7	10.3	9.7	9.1	8.6	8.6	8.7	8.6	8.7	8.6	8.5	8.6	8.3	8.0	8.2	7.8	7.6	7.4	7.4
4/11/2017	9.3	9.7	9.1	9.1	8.8	8.5	6.8	7.3	7.5	7.7	7.5	7.6	7.5	7.7	7.4	7.0	6.7	6.7	6.5	6.2	5.9
4/25/2017	10.0	9.9	9.8	9.5	8.4	8.3	6.5	6.6	6.4	6.3	6.3	6.2	6.2	6.2	6.2	6.0	5.9	5.9	5.9	5.8	5.7
5/9/2017	8.2	8.2	8.0	8.2	8.0	5.3	3.9	6.6	3.5	3.0	3.0	2.8	2.9	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.1
5/23/2017	8.6	8.6	8.3	8.4	7.6	4.5	2.6	2.5	2.2	2.1	2.5	2.4	2.2	2.2	2.2	2.1	2.2	2.1	2.1	2.0	2.0
6/13/2017	8.0	8.3	8.0	7.6	7.7	7.8	0.2	0.1	1.0	2.0	3.2	3.6	3.7	3.6	3.6	3.5	3.4	2.8	2.6	2.6	2.5
6/27/2017	8.1	7.8	7.8	7.7	7.8	2.5	0.1	0.1	0.5	1.5	2.2	2.4	2.9	2.9	2.6	2.2	1.7	1.6	1.5	1.6	1.4
7/11/2017	7.5	7.3	7.6	7.5	7.0	7.0	0.2	0.1	0.1	0.8	1.3	1.7	1.8	1.7	1.6	1.5	1.2	1.1	1.0	0.9	1.0
7/25/2017	7.3	7.6	7.2	7.0	7.3	7.1	0.2	0.1	0.1	0.1	0.6	1.3	1.5	1.5	1.3	1.2	0.9	0.8	0.7	0.6	0.3
8/15/2017	8.7	7.2	7.3	7.7	7.5	7.1	3.9	0.2	0.2	0.2	0.5	0.9	1.0	0.9	0.8	0.6	0.6	0.4	0.3	0.3	0.2
8/29/2017	7.6	7.3	7.3	7.3	7.1	7.1	6.2	0.2	0.1	0.1	0.1	0.4	0.6	0.4	0.3	0.1	0.1	0.1	0.1	0.1	0.1
9/12/2017	7.3	7.3	7.1	6.8	6.7	6.5	2.5	0.2	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1
9/26/2017	8.2	7.8	7.6	7.6	7.4	7.5	7.6	7.2	0.9	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	-
10/10/2017	7.8	7.7	7.4	7.4	7.3	7.3	7.1	7.1	3.8	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
10/31/2017	8.2	8.2	8.3	8.2	8.2	8.0	8.0	7.9	7.7	7.1	6.4	5.9	4.1	1.7	0.6	0.2	0.2	0.2	0.2	0.2	0.1
11/17/2017	9.6	9.5	9.5	9.4	9.4	9.4	9.1	9.1	8.6	8.6	8.5	8.3	7.4	2.7	1.4	0.8	0.1	0.1	0.1	0.1	0.1
12/12/2017	9.8	9.7	9.3	9.4	9.3	9.3	9.3	9.2	9.1	9.2	9.2	9.2	9.3	9.1	9.1	9.1	9.1	9.0	9.1	9.1	9.0
12/26/2017	10.1	10.0	10.0	10.0	10.0	10.0	10.0	10.0	9.9	9.9	9.9	9.8	9.9	9.8	9.9	9.9	9.8	9.9	9.9	9.8	-
1/9/2018	10.0	10.2	10.1	10.1	9.8	9.7	9.7	9.9	9.7	9.6	9.4	9.4	9.3	9.4	9.2	9.2	8.9	9.0	8.9	8.6	8.6
1/31/2018	11.1	11.0	10.9	10.8	10.8	10.7	10.7	10.7	10.8	10.7	10.7	10.6	10.4	10.4	10.4	10.4	10.4	10.3	10.3	10.3	10.1
2/16/2018	10.2	10.2	10.1	9.9	9.9	9.8	10.0	9.9	9.9	10.0	10.1	9.9	9.9	9.6	9.7	9.7	9.9	9.6	9.4	9.3	9.1
2/27/2018	9.9	9.8	9.6	9.6	9.4	9.4	9.3	9.3	9.4	9.4	9.3	9.3	9.2	9.2	9.3	9.3	9.2	9.0	9.1	9.1	-
3/12/2018	10.4	9.9	10.2	9.9	10.1	9.6	10.0	9.6	9.7	9.5	9.5	9.3	9.4	9.1	9.4	9.5	9.5	9.5	9.4	9.3	9.0
3/27/2018	10.4	10.1	10.0	9.8	9.9	9.8	9.6	9.6	9.4	9.6	9.6	9.5	9.5	9.3	9.3	9.3	9.2	9.0	8.6	8.6	8.5
4/10/2018	9.8	9.4	9.5	9.5	9.2	8.9	8.8	8.5	8.6	8.6	8.5	8.9	8.3	8.5	8.4	8.1	8.6	8.2	8.0	7.9	7.7
4/24/2018	9.8	9.8	9.8	9.8	9.0	8.9	8.8	8.0	7.9	7.8	7.7	7.6	7.6	7.5	7.5	7.4	7.4	7.2	7.2	7.2	7.2

Date	2'	5'	10'	15'	20'	25'	30'	35'	40'	45'	50'	55'	60'	65'	70'	75'	80'	85'	90'	95'	100'
5/15/2018	8.4	8.3	8.2	8.2	8.2	8.2	6.7	6.3	6.0	6.0	5.8	5.9	5.1	5.2	5.0	5.1	5.0	4.9	4.7	4.9	4.9
5/29/2018	8.6	8.6	8.4	8.3	8.3	8.4	5.7	5.2	5.1	5.4	5.8	6.4	6.4	6.6	6.4	6.3	6.2	6.0	5.9	5.8	5.7
6/12/2018	8.4	8.4	8.4	8.3	8.3	7.7	4.8	4.1	4.1	4.9	5.4	5.4	5.8	5.8	5.6	5.4	5.4	5.3	5.2	5.0	4.9
6/26/2018	8.3	7.8	7.4	7.8	7.4	8.0	3.6	2.9	2.9	4.0	4.4	4.7	5.4	5.3	5.0	4.9	4.6	4.4	4.3	4.2	4.0
7/24/2018	8.1	8.0	8.0	8.1	8.1	7.4	3.1	1.3	1.5	2.4	3.0	3.6	4.0	4.0	3.6	3.7	3.4	3.1	2.8	2.4	2.4
8/28/2018	7.7	7.5	7.3	7.5	7.5	7.2	2.1	0.5	0.9	1.3	2.1	2.3	2.5	2.4	1.9	1.9	1.6	1.5	1.2	1.1	1.0
9/10/2018	7.9	7.8	7.9	7.8	7.7	7.7	6.4	2.6	2.0	2.3	2.8	3.7	4.6	4.3	4.7	4.0	4.1	3.8	3.7	3.4	3.2
9/24/2018	7.6	7.5	7.5	7.3	7.2	7.2	7.2	7.2	0.6	0.6	1.1	1.5	1.6	1.6	1.4	1.4	1.2	1.2	1.0	0.9	0.9
10/9/2018	7.6	7.6	7.3	7.9	7.5	7.5	7.4	7.6	0.5	0.4	1.0	1.1	1.4	1.2	1.0	1.0	0.9	0.9	0.6	0.6	0.4
10/30/2018	8.1	8.2	8.0	8.0	7.7	7.7	7.7	7.6	7.5	2.2	0.7	0.7	0.8	0.5	0.4	0.3	0.2	0.2	0.2	0.2	0.2
11/13/2018	8.4	8.4	8.3	8.1	8.1	8.1	8.0	8.1	7.9	7.9	8.1	6.8	0.8	0.4	0.2	0.2	0.1	0.1	0.1	0.1	0.1
1/8/2019	10.2	10.5	10.2	9.9	9.8	9.7	9.7	9.3	9.8	9.5	9.5	9.1	9.3	9.2	9.4	9.5	9.4	9.4	9.2	9.4	9.1
1/29/2019	10.3	9.9	9.8	9.8	9.8	9.3	9.3	9.3	9.3	9.1	9.1	9.0	9.0	9.1	8.8	8.9	8.6	8.6	8.7	8.8	8.3
2/26/2019	10.7	10.7	10.6	10.6	10.5	10.3	10.3	10.1	10.0	9.9	9.8	9.8	9.7	9.7	9.6	9.7	9.7	9.6	9.6	9.6	9.6
3/12/2019	10.3	10.0	9.8	9.8	9.8	8.8	8.8	8.9	8.6	10.4	9.8	9.3	8.7	8.2	10.4	10.1	10.1	8.8	8.8	8.9	8.6
3/26/2019	10.4	10.1	10.1	9.8	9.8	9.8	9.4	9.4	9.3	9.3	9.3	9.3	9.3	9.2	9.1	8.7	8.8	8.5	8.4	8.3	8.3
4/9/2019	9.8	9.7	9.4	9.4	9.6	9.0	9.0	8.7	8.7	8.9	8.9	8.8	8.9	8.8	8.6	8.5	8.4	8.4	8.2	8.1	8.0
4/23/2019	9.1	9.1	9.1	9.1	8.5	8.2	7.3	8.0	8.0	8.0	8.3	8.1	7.9	8.0	8.1	7.5	7.5	7.3	7.3	7.2	7.0
5/14/2019	8.3	8.3	8.2	8.2	8.2	6.9	5.9	5.9	6.0	5.9	5.9	5.8	5.7	5.7	5.8	5.7	5.4	5.4	5.4	5.4	5.1
5/28/2019	9.6	9.5	9.2	8.2	9.1	9.0	8.5	6.2	5.7	6.2	7.2	7.1	7.2	7.1	6.9	6.8	6.6	6.3	6.3	6.3	6.1
6/11/2019	10.9	10.9	10.9	10.8	10.7	8.8	6.2	5.3	4.9	5.0	6.0	6.3	6.3	6.3	6.0	6.0	6.0	6.1	6.0	6.0	5.9
6/25/2019	10.9	11.0	10.7	10.7	10.9	6.6	4.3	3.0	2.9	3.2	4.1	5.4	5.6	5.7	5.9	5.9	5.7	5.3	5.3	5.1	5.0
7/9/2019	10.2	10.3	10.5	10.1	10.1	8.1	1.9	1.3	1.2	2.0	3.7	4.5	4.8	5.2	5.3	5.3	4.7	4.5	4.5	4.5	4.0
7/23/2019	9.4	9.2	9.1	9.2	9.2	8.8	3.3	1.4	0.8	1.0	1.5	3.3	3.7	4.0	4.1	4.4	4.0	3.7	3.4	3.2	3.0
8/13/2019	8.4	8.3	8.1	8.1	8.1	8.0	5.6	3.3	0.6	0.3	1.6	1.9	2.4	2.7	2.7	2.7	2.6	2.2	2.0	1.8	1.5
8/27/2019	8.0	8.0	8.0	8.4	8.3	8.2	5.1	2.5	2.1	0.7	1.2	1.7	2.1	2.2	2.0	2.1	1.8	1.4	1.1	0.9	0.6
9/10/2019	6.6	6.7	6.9	6.8	7.0	6.8	6.5	6.1	5.7	5.5	5.1	5.1	4.8	4.7	4.6	4.4	4.4	4.2	3.9	3.5	3.1

Date	2'	5'	10'	15'	20'	25'	30'	35'	40'	45'	50'	55'	60'	65'	70'	75'	80'	85'	90'	95'	100'
9/24/2019	8.6	8.4	8.4	8.3	8.2	8.1	8.2	8.1	4.3	3.4	2.1	1.8	1.7	1.6	1.5	1.0	0.9	0.6	0.5	0.4	0.3
10/15/2019	9.3	9.1	9.1	9.2	9.1	8.9	9.0	9	9.0	8.9	5.6	4.8	4.1	3.6	3.3	2.2	1.7	1.3	1.2	1.1	1.1
10/24/2019	8.1	8.1	8.1	8.1	8.1	8.2	8.2	8.2	8.2	8.3	4.0	2.2	1.7	1.5	1.2	0.9	0.8	0.7	0.5	0.4	0.3
11/12/2019	9.3	9.3	9.1	8.9	9.0	9.1	9.3	9.1	9.2	9.3	9.3	8.7	6.4	3.4	2.6	1.8	1.3	1.0	0.7	0.3	0.2
11/25/2019	9.5	8.9	8.9	8.7	8.6	8.7	8.6	8.5	8.6	8.6	8.4	8.4	8.3	8.0	7.1	6.2	5.2	3.6	3.2	2.9	2.7
12/10/2019	10.1	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.1	10.1	10.1	10.1	10.2	10.2	10.1	8.7	8.4	8.0	7.5	5.4
12/24/2019	10.1	10.0	9.9	9.7	9.7	9.5	9.6	9.5	9.4	9.3	9.3	9.2	9.2	9.1	9.1	9.1	9.1	9.0	9.1	9.0	8.9
1/29/2020	11.7	11.2	11.0	11.1	11.1	11.2	11.2	11.1	11.0	10.8	10.8	10.8	10.4	10.6	10.4	10.3	10.4	10.2	10.2	10.1	10.0
2/10/2020	11.4	11.3	11.3	11.4	11.4	11.4	11.4	11.4	11.3	11.2	11.3	11.2	11.2	11.4	11.2	10.8	10.8	10.5	10.4	10.4	10.1
2/26/2020	10.6	10.6	10.4	9.9	9.8	9.9	9.9	9.9	9.8	9.7	9.8	10.1	9.8	9.7	9.6	9.4	9.5	9.5	9.2	9.0	8.7
Summary Whale Rock Reservoir Dissolved Oxygen, mg/L versus Depth, Feet																					
Depth	**2'**	**5'**	**10'**	**15'**	**20'**	**25'**	**30'**	**35'**	**40'**	**45'**	**50'**	**55'**	**60'**	**65'**	**70'**	**75'**	**80'**	**85'**	**90'**	**95'**	**100'**
Average	9.1	8.9	8.8	8.8	8.7	8.3	7.3	6.7	6.1	5.9	5.8	5.7	5.5	5.3	5.1	4.9	4.8	5.0	5.0	4.9	4.6
Minimum	6.0	6.0	6.0	5.6	5.8	2.5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1
Maximum	11.7	11.3	11.3	11.4	11.4	11.4	11.4	11.4	11.3	11.2	11.3	11.2	11.2	11.4	11.2	10.8	10.8	10.5	10.4	10.4	10.1
Total #	90	90	90	90	90	90	89	89	89	89	89	89	89	89	89	89	88	77	68	67	62

APPENDIX L: LIMNOLOGY WHALE ROCK PH AND TURBIDITY

	pH					Turbidity				
Date	Surface	Intake #1	Intake #2	Intake #3	Intake #4	Surface	Intake #1	Intake #2	Intake #3	Intake #4
1/12/2016	8.28	-	8.24	8.17	7.89	1.77	-	-	1.28	1.30
1/27/2016	8.32	-	8.31	8.27	7.91	1.25	-	-	1.48	2.30
2/9/2016	8.22	-	8.19	8.15	8.07	2.08	-	-	3.19	2.61
2/23/2016	8.31	-	8.32	8.29	8.16	1.97	-	-	2.21	4.13
3/17/2016	8.31	-	8.25	8.14	8.05	2.09	-	-	2.83	5.21
3/29/2016	8.37	8.37	8.34	8.22	8.09	1.74	-	-	2.14	3.89
4/12/2016	8.41	8.35	8.17	8.11	7.99	0.92	-	-	1.16	2.03
4/26/2016	8.18	8.30	8.13	8.10	8.08	1.45	-	-	2.28	4.86
5/10/2016	8.32	8.40	8.10	8.06	8.02	1.35	-	-	1.97	7.52
5/24/2016	8.32	8.42	7.88	7.80	7.85	1.92	-	-	2.56	6.86
6/14/2016	8.26	8.37	7.75	7.78	7.53	1.40	-	-	2.01	6.29
7/12/2016	-	7.93	7.87	7.62	-	1.60	-	-	2.32	2.32
7/26/2016	8.25	8.31	7.73	7.60	7.58	1.05	-	-	1.58	2.49
8/9/2016	8.12	8.28	7.74	7.60	7.57	1.30	-	-	1.64	2.69
8/23/2016	8.09	8.26	7.69	7.54	7.52	1.57	-	-	2.04	1.89
9/27/2016	8.17	8.27	7.59	7.53	7.50	1.28	-	-	2.66	2.73
10/11/2016	8.17	8.21	8.19	7.50	7.40	2.00	-	-	2.61	2.35
10/25/2016	8.15	8.23	8.21	7.67	7.56	1.30	-	-	1.98	1.57
11/14/2016	7.93	8.02	8.07	7.94	7.66	1.34	-	-	2.02	2.49
11/29/2016	7.90	8.14	8.20	8.25	8.29	2.70	-	-	3.76	4.08
12/13/2016	8.16	8.25	8.28	8.32	8.36	1.97	-	-	2.84	6.80
1/10/2017	8.38	-	-	8.39	8.42	24.60	-	-	27.10	21.80
1/26/2017	8.43	-	8.35	8.37	8.37	14.20	-	14.50	15.00	10.50
2/14/2017	8.31	-	8.2	8.22	8.23	9.49	-	10.10	7.38	12.50
2/28/2017	8.12	8.14	8.19	8.14	8.1	4.13	4.88	5.09	5.07	8.92
3/14/2017	8.25	8.17	8.18	8.19	8.14	2.61	3.12	4.25	5.02	8.86
3/28/2017	8.5	8.45	8.18	8.18	8.14	1.92	1.44	1.02	2.79	7.37
4/11/2017	8.39	8.4	7.97	8.01	7.93	1.71	1.59	1.35	2.01	7.99
4/25/2017	8.67	8.65	8.06	8.02	7.99	1.97	2.34	1.49	2.30	2.88
5/9/2017	8.52	8.52	7.74	7.67	7.62	2.36	2.46	3.11	2.10	3.01
5/23/2017	8.69	8.69	7.99	8	7.97	1.29	1.35	1.69	1.21	1.81
6/13/2017	8.5	8.49	7.62	7.74	7.7	1.73	4.10	3.50	1.90	3.30
6/27/2017	8.5	8.53	7.59	7.65	7.62	0.75	0.68	1.10	2.00	2.50
7/11/2017	8.48	8.45	7.67	7.63	7.61	1.80	2.30	1.10	1.40	2.10
7/25/2017	8.33	8.37	7.62	7.61	7.56	1.20	1.40	1.60	1.60	2.00
8/15/2017	7.84	8.27	7.4	7.39	7.34	1.47	1.80	1.70	1.50	1.50
8/29/2017	7.65	8.49	7.74	7.66	7.65	1.00	0.97	1.10	2.40	1.30

	pH					Turbidity				
Date	Surface	Intake #1	Intake #2	Intake #3	Intake #4	Surface	Intake #1	Intake #2	Intake #3	Intake #4
9/12/2017	8.37	8.44	7.64	7.52	7.53	1.40	1.40	1.20	2.50	1.40
9/26/2017	8.46	8.24	7.83	7.56	7.56	0.88	1.00	1.30	1.70	1.40
10/10/2017	8.54	8.55	8.21	7.69	7.69	0.58	0.71	1.20	1.50	1.50
10/31/2017	8.49	8.41	8.38	7.75	7.66	0.79	0.97	1.10	1.90	1.60
11/17/2017	8.43	8.45	8.44	7.87	7.74	1.20	1.10	1.30	2.40	1.50
12/12/2017	8.42	8.25	8.29	8.19	8.27	3.60	3.50	3.60	4.10	4.90
12/26/2017	8.28	8.19	8.23	8.27	8.28	3.00	3.10	3.30	3.30	3.60
1/9/2018	8.44	8.21	8.29	8.30	8.28	1.40	1.60	2.00	2.40	3.50
1/31/2018	8.40	8.31	8.06	7.99	7.97	2.20	2.40	2.60	2.40	3.10
2/16/2018	8.26	8.27	8.37	8.42	8.44	1.80	1.90	1.80	2.00	3.10
2/27/2018	8.43	8.41	8.36	8.35	8.37	1.40	1.60	1.70	2.10	2.80
3/12/2018	8.53	8.54	8.71	8.65	8.71	0.80	0.94	1.20	1.40	2.30
3/27/2018	8.30	8.32	8.34	8.31	8.31	5.30	5.80	5.30	4.50	5.90
4/10/2018	8.41	8.42	8.27	8.26	8.27	2.20	2.90	4.50	4.80	6.20
4/24/2018	8.58	8.60	8.32	8.20	8.20	0.96	1.00	1.90	2.40	4.50
5/15/2018	8.72	8.74	8.28	8.27	8.27	0.93	1.20	1.20	1.70	2.50
5/29/2018	8.61	8.62	8.12	8.24	8.23	0.91	0.86	1.50	1.20	4.70
6/12/2018	8.64	8.54	7.85	7.77	7.75	0.78	0.88	2.40	1.80	6.80
6/26/2018	8.51	8.52	7.90	7.67	7.70	1.60	2.10	3.60	4.40	7.00
7/10/2018	7.41	8.50	7.92	7.76	7.66	1.50	1.70	2.60	6.00	11.00
7/24/2018	8.62	8.64	8.20	7.78	7.78	1.50	1.10	1.70	3.90	10.00
8/28/2018	8.45	8.57	8.61	7.73	7.75	0.64	0.73	1.90	4.40	4.00
9/11/2018	8.41	8.32	8.43	7.73	7.83	0.45	0.56	1.10	2.30	2.40
9/24/2018	8.56	7.93	8.30	8.22	7.72	0.38	0.55	0.72	1.60	0.98
10/9/2018	8.62	8.64	8.20	7.78	7.78	1.00	0.77	1.70	1.60	1.80
10/30/2018	8.45	8.57	8.61	7.73	7.75	0.75	0.99	1.60	1.40	0.81
11/13/2018	8.41	8.32	8.43	7.73	7.83	0.38	2.33	2.64	1.33	0.83
11/27/2018	8.56	7.93	8.30	8.22	7.72	0.98	1.00	1.20	1.70	1.20
1/8/2019	7.99	7.83	8.21	8.26	8.28	0.89	0.97	1.46	1.27	1.29
1/29/2019	8.21	7.96	8.15	8.20	8.27	1.20	1.40	1.90	1.90	2.00
2/26/2019	8.21	8.03	8.42	8.45	8.46	1.70	1.70	1.70	1.80	2.80
3/12/2019	8.21	8.26	8.36	8.39	8.44	1.46	1.61	1.99	1.73	2.02
3/26/2019	8.10	8.27	8.17	8.16	8.22	0.65	0.63	1.30	1.40	1.90
4/9/2019	8.01	8.38	8.11	8.16	-	0.60	0.62	1.37	1.10	1.62
4/23/2019	8.02	8.37	8.05	8.13	8.16	0.80	1.08	0.72	1.41	2.28
5/14/2019	8.75	8.73	8.44	8.40	8.41	0.97	0.79	1.00	1.10	2.20
5/28/2019	8.15	8.47	8.16	8.12	8.12	1.28	1.79	1.57	2.08	3.08

	pH					Turbidity				
Date	Surface	Intake #1	Intake #2	Intake #3	Intake #4	Surface	Intake #1	Intake #2	Intake #3	Intake #4
6/11/2019	8.26	8.33	8.08	8.11	8.15	1.80	1.80	1.90	1.80	3.30
6/25/2019	8.11	8.38	7.67	7.75	8.22	3.13	3.00	1.82	2.02	2.95
7/9/2019	8.38	8.52	7.92	7.97	8.10	2.40	3.10	1.70	1.70	6.00
7/23/2019	8.33	8.38	7.90	7.97	8.11	1.40	1.00	0.92	2.20	2.81
8/13/2019	8.16	8.28	7.72	7.73	7.69	0.91	1.04	0.65	2.02	2.79
8/27/2019	8.08	8.35	7.75	7.72	8.11	1.28	1.26	0.97	1.13	1.39
9/10/2019	8.25	7.93	7.72	7.65	7.90	0.76	1.25	1.32	1.83	4.21
9/24/2019	8.38	8.49	8.07	7.92	7.90	0.80	0.82	1.13	1.33	3.07
10/15/2019	8.07	8.16	8.22	7.74	7.71	0.85	1.02	1.37	0.90	1.50
10/24/2019	8.22	8.33	8.40	7.79	7.75	1.33	1.21	1.32	1.13	0.84
11/12/2019	7.96	8.04	8.46	7.72	7.72	-	1.15	1.24	1.19	0.83
11/25/2019	7.99	7.93	8.01	7.98	7.70	0.80	0.92	1.36	1.35	2.10
12/10/2019	7.95	7.66	7.85	7.95	7.85	0.94	1.09	1.11	1.26	1.57
12/24/2019	7.79	7.77	7.83	7.92	8.06	1.07	1.01	1.11	1.27	1.32
1/29/2020	8.34	8.08	8.16	8.16	8.16	0.67	1.60	1.40	1.10	1.40
2/10/2020	7.81	7.75	8.06	8.07	8.18	0.81	0.75	0.89	0.87	1.30
2/26/2020	8.23	7.97	8.06	8.01	8.14	0.80	0.99	0.90	1.10	1.20
Summary	pH					Turbidity				
	Surface	Intake #1	Intake #2	Intake #3	Intake #4	Surface	Intake #1	Intake #2	Intake #3	Intake #4
Average	8.29	8.31	8.10	7.98	7.96	1.94	1.59	2.10	2.62	3.67
Minimum	7.41	7.66	7.40	7.39	7.34	0.38	0.55	0.65	0.87	0.81
Maximum	8.75	8.74	8.71	8.65	8.71	24.6	5.8	14.5	27.1	21.8
Total #	90	83	90	91	89	90	67	69	91	91

APPENDIX M: LIMNOLOGY WHALE ROCK ALGAE (INTAKE 1-4 & SURFACE) 2016-2020

	Blue-greens	Cryptomonads	Diatoms	Dinoflagellates	Flagellates	Golden Algae	Greens	Total Algae Counts
Date	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**
Whale Rock Intake Surface								
1/13/2015	0	0	720	7	0	0	0	730
1/27/2015	0	0	389	0	0	0	0	389
2/24/2015	0	0	220	0	0	0	0	220
3/10/2015	1300	0	0	0	0	0	59	1400
3/24/2015	440	0	11	0	0	0	44	500
4/14/2015	1200	0	7	0	0	0	44	1300
4/28/2015	37	0	0	0	0	0	150	190
5/12/2015	110	0	4	0	0	0	44	160
5/27/2015	0	4	0	0	0	0	66	70
6/9/2015	0	0	0	0	0	0	73	73
6/23/2015	-----	-----	-----	-----	-----	-----	-----	-----
7/14/2015	220	0	0	0	0	0	29	250
7/28/2015	590	0	4	0	0	0	200	790
8/11/2015	370	0	0	0	0	0	130	500
8/25/2015	440	0	7	0	0	0	110	560
9/15/2015	0	0	0	3	0	0	0	3
9/29/2015	250	0	0	0	3	0	5	260
10/14/2015	660	5	0	0	0	0	0	660
10/27/2015	63	0	76	0	0	0	10	150
11/9/2015	38	15	0	0	0	0	13	66
11/24/2015	0	10	0	0	0	0	15	25
12/15/2015	0	5	8	0	0	0	250	260
12/29/2015	0	20	25	0	0	0	260	300
1/12/2016	0	0	81	0	0	0	190	270
1/27/2016	350	15	81	0	0	0	740	1200
2/9/2016	76	58	5	0	0	0	81	220
2/23/2016	11000	81	50	0	0	0	50	11000
3/7/2016	0	58	78	0	0	0	180	320
3/29/2016	0	28	0	3	0	0	53	83
4/12/2016	0	20	0	0	0	0	63	83
4/26/2016	25	28	0	0	0	0	130	180
5/10/2016	-----	-----	-----	-----	-----	-----	-----	-----
5/24/2016	50	18	0	0	130	0	120	310

	Blue-greens	Cryptomonads	Diatoms	Dinoflagellates	Flagellates	Golden Algae	Greens	Total Algae Counts
Date	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**
6/14/2016	0	23	190	25	10	0	170	400
6/28/2016	0	38	270	25	20	40	350	740
7/12/2016	100	43	370	28	0	0	380	930
7/26/2016	0	23	300	10	18	0	360	720
8/9/2016	0	96	140	43	120	0	1100	1500
8/23/2016	0	58	140	48	110	0	1100	1500
9/27/2016	6100	5	760	0	0	0	710	7600
10/11/2016	6800	0	10	0	0	0	43	6900
10/25/2016	16000	20	5	0	3	0	320	16000
11/14/2016	24000	20	63	0	0	0	500	24000
11/29/2016	8300	8	81	0	3	0	210	8600
12/13/2016	3100	5	15	0	0	0	160	3300
1/10/2017	0	0	33	0	0	0	140	180
1/26/2017	0	0	0	0	0	0	88	88
2/14/2017	0	11	0	0	0	0	0	11
2/28/2017	0	33	0	0	0	0	0	33
3/14/2017	0	88	22	0	0	0	0	110
3/28/2017	0	20	81	0	0	0	0	100
4/11/2017	0	33	0	11	0	0	0	44
4/25/2017	0	20	40	0	0	0	80	140
5/9/2017	0	0	0	0	0	0	13000	13000
5/23/2017	110	11	700	0	0	0	220	1000
6/13/2017	0	0	0	2	0	16	130	150
6/27/2017	0	30	0	0	0	0	1	31
7/11/2017	0	11	8	0	3	20	10	52
7/25/2017	0	16	1	1	4	24	16	62
8/15/2017	340	1	3	1	0	0	4	350
8/29/2017	500	0	0	0	0	0	5	500
9/12/2017	100	0	460	0	0	0	60	620
9/26/2017	0	54	220	2	0	90	120	490
10/10/2017	200	7	15	0	0	110	2	330
10/31/2017	30	26	21	6	0	0	8	91
11/17/2017	260	17	21	13	0	0	750	1100
12/12/2017	100	1	5	1	0	0	40	150
12/26/2017	0	6	3	9	0	0	160	180
1/9/2018	0	0	0	0	0	0	0	0

	Blue-greens	Cryptomonads	Diatoms	Dinoflagellates	Flagellates	Golden Algae	Greens	Total Algae Counts
Date	cells/mL	cells/mL	cells/mL	cells/mL	cells/mL	cells/mL	cells/mL	cells/mL
1/31/2018	0	31	6	0	0	0	23	60
2/16/2018	160	9	80	0	0	0	3	250
2/27/2018	100	4	140	1	0	0	0	240
3/12/2018	0	1	110	1	0	0	48	160
3/27/2018	100	14	3	1	0	0	12	130
4/10/2018	0	7	160	0	0	0	42	210
4/24/2018	2100	1	580	0	0	0	83	2800
5/15/2018	24	14	220	35	0	0	18	310
5/29/2018	0	4	27	0	0	0	3	34
6/12/2018	45	8	0	1	0	0	15	69
6/26/2018	0	13	0	1	0	0	450	460
7/10/2018	0	3	31	1	0	0	0	35
7/24/2018	0	0	0	1	0	0	18	19
8/28/2018	20	0	0	1	0	0	92	110
9/11/2018	0	0	0	0	0	0	6	6
9/24/2018	0	0	0	0	0	0	12	12
10/9/2018	12	0	1	0	0	0	0	13
10/30/2018	0	23	0	0	0	0	12	35
11/13/2018	0	13	0	0	0	0	12	25
11/27/2018	0	60	220	0	0	0	51	330
1/8/2019	0	99	7	21	0	0	20	150
1/29/2019	0	4	0	0	0	0	36	40
2/26/2019	0	23	0	0	0	0	24	47
3/12/2019	0	51	20	14	0	0	31	120
3/26/2019	0	45	0	9	0	0	10	64
4/9/2019	0	30	33	11	0	0	84	160
4/23/2019	0	11	61	1	0	0	16	89
5/14/2019	0	3	54	18	0	9	77	160
5/28/2019	90	3	0	3	0	47	10	150
6/11/2019	75	6	0	1	0	8	0	90
6/25/2019	40	7	0	1	0	61	4	110
7/9/2019	40	10	0	13	0	23	16	100
7/23/2019	47	36	80	4	0	48	2	220
8/13/2019	0	3	20	0	0	6	1	30
8/27/2019	60	2	520	1	0	0	84	670
9/10/2019	80	20	80	17	0	41	13	25

	Blue-greens	Cryptomonads	Diatoms	Dinoflagellates	Flagellates	Golden Algae	Greens	Total Algae Counts
Date	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**
9/24/2019	0	10	180	1	0	0	0	190
10/15/2019	0	6	240	10	0	0	0	260
10/24/2019	0	13	360	3	0	20	2	400
11/12/2019	0	44	0	0	0	0	0	44
11/25/2019	0	3	5	0	0	0	0	8
12/10/2019	0	33	76	0	0	0	96	200
12/24/2019	580	7	0	0	0	0	0	590
1/29/2020	0	3	12	0	0	0	20	35
2/10/2020	0	22	0	0	0	0	7	29
2/26/2020	0	0	0	0	0	0	24	24
Whale Rock Intake 1								
2/28/2017	110	0	11	0	0	0	0	120
3/14/2017	0	33	0	0	0	0	0	33
3/28/2017	0	0	0	0	0	0	0	0
4/11/2017	0	0	77	0	0	0	0	77
4/25/2017	0	0	20	20	0	0	100	140
5/9/2017	0	120	630	0	20	0	4400	5200
5/23/2017	110	0	380	0	0	0	44	530
6/13/2017	90.0	2	12	0	0	0	270	370
6/27/2017	90	27	0	0	0	0	17	44
7/11/2017	0	9	6	0	1	90	7	110
7/25/2017	0	11.0	1.0	3.0	0.0	88.0	12.0	120.0
8/15/2017	0	0	1	1	0	0	1	100
8/29/2017	100	10	0	0	0	0	21	31
9/12/2017	0	0	290	0	0	16	0	360
9/26/2017	50	44	120	7	0	60	210	440
10/10/2017	0	4	0	6	1	160	2	340
10/31/2017	160	18	90	18	0	0	2	170
11/17/2017	40	17	20	6	0	0	440	550
12/12/2017	60	6	12	7	0	0	280	540
12/26/2017	230	7	3	34	0	0	72	120
1/9/2018	0	0	0	0	0	0	0	0
1/31/2018	0	17	54	2	0	20	30	120
2/16/2018	0	4	7	1	0	0	2	84
2/27/2018	70	4	340	1	0	0	30	450
3/12/2018	70	0	200	1	0	0	160	460

	Blue-greens	Cryptomonads	Diatoms	Dinoflagellates	Flagellates	Golden Algae	Greens	Total Algae Counts
Date	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**
3/27/2018	100	18	10	0	0	0	0	28
4/10/2018	0	3	330	0	0	0	0	410
4/24/2018	80	1	530	4	0	0	320	1600
5/15/2018	780	23	63	28	0	0	41	160
5/29/2018	0	3	0	0	0	0	100	160
6/12/2018	56	7	18	0	1	0	41	140
6/26/2018	70	8.0	0.0	3.0	0.0	0.0	160.0	400.0
7/10/2018	190	7	0	0	0	0	12	19
7/24/2018	0	6	480	0	0	18	1	500
8/28/2018	0	4	0	1	0	0	38	43
9/11/2018	0	1	30	0	0	0	3	34
9/24/2018	0	0	0	0	0	0	12	12
10/9/2018	0	3	0	0	0	0	0	3
10/30/2018	0	17	0	0	0	0	12	29
11/13/2018	0	26	0	0	0	6	110	140
11/27/2018	0	84	60	0	0	0	13	160
1/8/2019	0	100	29	7	0	0	23	160
1/29/2019	0	40	6	0	0	0	25	71
2/26/2019	0	28	0	7	0	0	13	48
3/12/2019	0	20	5	11	0	0	38	74
3/26/2019	0	26	43	11	0	0	6	86
4/9/2019	0	21	0	6	0	0	71	98
4/23/2019	0	2	60	9	0	0	14	85
5/14/2019	0	6	49	5	0	6	10	76
5/28/2019	0	3	16	4	0	46	20	100
6/11/2019	15	6	0	1	0	3	6	130
6/25/2019	110	9	0	4	0	4	4	51
7/9/2019	90	28	0	4	0	2	0	120
7/23/2019	0	57	80	0	0	0	6	140
8/13/2019	0	8	0	0	1	30	22	61
8/27/2019	20	14	240	2	0	20	68	360
9/10/2019	160	14	80	14	0	2	0	270
9/24/2019	0	3	120	1	0	0	1	120
10/15/2019	0	7	240	11	0	22	2	280
10/24/2019	0	7	60	0	0	3	4	74
11/12/2019	0	33	11	0	0	0	0	44

	Blue-greens	Cryptomonads	Diatoms	Dinoflagellates	Flagellates	Golden Algae	Greens	Total Algae Counts
Date	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**
11/25/2019	0	0	10	0	0	0	0	10
12/10/2019	0	25	78	0	0	0	60	160
12/24/2019	510	0	29	7	0	0	0	550
1/29/2020	0	36	0	0	0	0	0	36
2/10/2020	0	7	0	0	0	0	0	7
2/26/2020	0	36	0	0	0	0	0	36
Whale Rock Intake 2								
1/13/2015	0	0	360	0	0	0	0	360
1/27/2015	0	0	631	0	0	0	0	631
2/24/2015	0	0	312	0	0	0	22	330
3/10/2015	370	4	7	0	0	0	4	380
3/24/2015	110	0	0	0	0	0	48	160
4/14/2015	840	0	0	4	0	0	44	890
4/28/2015	700	0	0	0	0	0	81	780
5/12/2015	0	4	4	0	0	0	77	85
5/27/2015	18	4	4	0	0	0	62	88
6/9/2015	110	4	4	4	4	15	44	180
6/23/2015	-----	-----	-----	-----	-----	-----	-----	-----
7/14/2015	330	0	0	0	0	0	51	380
7/28/2015	810	0	0	4	0	0	160	970
8/11/2015	510	0	11	0	0	0	73	590
8/25/2015	380	0	66	0	0	0	51	500
9/15/2015	700	0	7	22	0	0	290	1000
9/29/2015	25	0	0	0	0	0	5	30
10/27/2015	25	0	0	0	13	3	50	91
11/9/2015	140	8	10	0	0	0	93	250
1/26/2017	0	0	0	0	0	0	33	33
2/14/2017	0	33	0	0	0	0	0	0
2/28/2017	0	11	0	0	0	0	0	0
3/14/2017	0	11	0	0	0	0	0	0
3/28/2017	0	20	0	0	0	0	0	0
4/11/2017	0	0	22	0	0	0	0	0
4/25/2017	0	20	0	0	20	0	200	200
5/9/2017	0	40	0	0	0	0	4700	4700
5/23/2017	0	22	0	0	0	0	240	240
6/13/2017	310	2	60	0	0	0	150	150

	Blue-greens	Cryptomonads	Diatoms	Dinoflagellates	Flagellates	Golden Algae	Greens	Total Algae Counts
Date	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**
6/27/2017	0	26	3	0	0	0	1	1
7/11/2017	15	10	0	0	0	0	0	0
7/25/2017	0	0	0	3	0	0	10	10
8/15/2017	1300	10	0	0	0	0	4	4
8/29/2017	1200	12	0	0	0	0	5	5
9/12/2017	10	10	0	7	0	0	0	0
9/26/2017	0	44	18	3	0	0	250	250
10/10/2017	380	24	0	7	0	48	7	7
10/31/2017	40	4	60	10	0	0	15	15
11/17/2017	10	3	16	0	0	0	1000	1000
12/12/2017	160	3	1	1	0	0	130	130
12/26/2017	0	11	0	36	0	0	100	100
1/9/2018	0	0	3	0	0	0	0	3
1/31/2018	0	19	45	0	0	0	23	87
2/16/2018	100	16	26	0	0	0	5	150
2/27/2018	50	1	190	0	0	0	10	250
3/12/2018	70	1	410	0	0	20	48	550
3/27/2018	0	4	1	0	0	0	2	7
4/10/2018	80	0	96	0	0	0	48	220
4/24/2018	60	4	470	1	0	0	41	580
5/15/2018	0	17	63	19	0	0	64	160
5/29/2018	-----	-----	-----	-----	-----	-----	-----	-----
6/12/2018	0	4	0	0	0	0	0	4
6/26/2018	21	1	0	1	0	0	41	64
7/10/2018	0	4	0	1	0	0	36	41
7/24/2018	0	1	120	1	1	0	3	130
8/28/2018	0	0	0	0	0	0	2	2
9/11/2018	0	0	30	0	0	0	1	31
9/24/2018	0	0	0	0	0	0	0	0
10/9/2018	20	9	0	0	0	4	1	34
10/30/2018	0	10	3	3	0	0	13	29
11/13/2018	0	20	1	0	0	0	37	58
11/27/2018	0	3	140	0	0	0	1	150
1/8/2019	0	100	29	7	0	0	23	160
1/29/2019	0	40	6	0	0	0	25	71
2/26/2019	0	28	0	7	0	0	13	48

	Blue-greens	Cryptomonads	Diatoms	Dinoflagellates	Flagellates	Golden Algae	Greens	Total Algae Counts
Date	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**
3/12/2019	0	20	5	11	0	0	38	74
3/26/2019	0	26	43	11	0	0	6	86
4/9/2019	0	21	0	6	0	0	71	98
4/23/2019	0	2	60	9	0	0	14	85
5/14/2019	0	6	49	5	0	6	10	76
5/28/2019	15	3	16	4	0	46	20	100
6/11/2019	110	6	0	1	0	3	6	130
6/25/2019	30	9	0	4	0	4	4	51
7/9/2019	90	28	0	4	0	2	0	120
7/23/2019	0	57	80	0	0	0	6	140
8/13/2019	0	8	0	0	1	30	22	61
8/27/2019	20	14	240	2	0	20	68	360
9/10/2019	160	14	80	14	0	2	0	270
9/24/2019	0	3	120	1	0	0	1	120
10/15/2019	0	7	240	11	0	22	2	280
10/24/2019	0	7	60	0	0	3	4	74
11/12/2019	0	33	11	0	0	0	0	44
11/25/2019	0	0	10	0	0	0	0	10
12/10/2019	0	25	78	0	0	0	60	160
12/24/2019	510	0	29	7	0	0	0	550
1/29/2020	0	36	0	0	0	0	0	36
2/10/2020	0	7	0	0	0	0	0	7
2/26/2020	0	36	0	0	0	0	0	36
Whale Rock Intake 3								
1/13/2015	0	0	320	0	0	0	0	320
1/27/2015	0	0	195	0	0	0	0	195
2/24/2015	0	0	316	0	0	0	73	390
3/10/2015	150	7	0	0	0	0	4	160
3/24/2015	0	0	0	0	0	0	48	48
4/14/2015	180	0	4	0	0	0	22	210
4/28/2015	0	0	0	0	0	0	44	44
5/12/2015	0	0	0	0	0	0	18	18
5/27/2015	0	4	0	4	0	0	33	40
6/9/2015	0	4	0	7	0	4	44	59
6/23/2015	-----	-----	-----	-----	-----	-----	-----	-----
7/14/2015	290	0	0	22	0	0	40	360

	Blue-greens	Cryptomonads	Diatoms	Dinoflagellates	Flagellates	Golden Algae	Greens	Total Algae Counts
Date	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**
7/28/2015	660	4	15	48	0	0	120	830
8/11/2015	44	0	18	0	0	0	66	120
8/25/2015	180	0	0	0	0	0	37	240
9/15/2015	-----	-----	-----	-----	-----	-----	-----	-----
9/29/2015	0	0	10	0	3	0	0	3
10/14/2015	450	3	8	0	0	0	8	470
10/27/2015	0	0	150	0	8	0	8	24
11/9/2015	0	13	0	3	0	0	5	170
11/24/2015	0	8	110	3	0	0	78	89
12/15/2015	0	10	38	3	0	0	18	140
12/29/2015	0	13	0	0	0	0	210	260
1/12/2016	0	0	20	0	0	0	190	210
1/27/2016	0	28	53	5	0	0	360	440
2/9/2016	0	60	130	0	0	0	100	300
2/23/2016	2000	58	91	0	0	0	150	2300
3/17/2016	0	40	100	0	0	0	23	160
3/29/2016	0	35	150	3	0	0	10	200
4/12/2016	0	23	0	3	0	0	40	66
4/26/2016	280	33	180	3	0	0	63	550
5/10/2016	-----	-----	-----	-----	-----	-----	-----	-----
5/24/2016	50	43	50	3	20	0	60	230
6/14/2016	0	10	160	50	15	0	250	500
6/28/2016	0	30	13	50	18	0	400	510
7/12/2016	0	18	350	53	15	0	540	980
7/26/2016	0	25	15	18	25	0	360	450
8/9/2016	280	130	560	53	120	0	870	2000
8/23/2016	0	93	15	38	91	0	480	720
9/27/2016	18000	5	0	0	0	0	230	18000
10/11/2016	24000	13	0	0	0	0	260	24000
10/25/2016	2400	50	0	0	0	0	510	3000
11/14/2016	5600	23	25	0	0	0	130	5800
11/29/2016	10000	13	81	0	5	3	510	11000
12/13/2016	9400	5	20	0	0	0	1000	10000
1/10/2017	0	0	0	0	0	0	0	0
1/26/2017	11	0	0	0	0	0	120	130
2/14/2017	0	0	0	0	0	0	11	11

	Blue-greens	Cryptomonads	Diatoms	Dinoflagellates	Flagellates	Golden Algae	Greens	Total Algae Counts
Date	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**
2/28/2017	0	0	0	0	0	0	0	0
3/14/2017	0	0	0	0	0	0	0	0
3/28/2017	0	0	0	0	0	0	0	0
4/11/2017	0	0	33	0	0	0	0	33
4/25/2017	0	20	0	0	20	0	200	240
5/9/2017	0	40	0	0	0	0	0	40
5/23/2017	0	11	0	0	0	0	220	230
6/13/2017	72	0	20	0	0	0	230	320
6/27/2017	0	0	0	0	0	0	8	8
7/11/2017	18	0	0	1	0	0	0	19
7/25/2017	0	10	3	3	0	120	7	140
8/15/2017	1100	0	0	0	0	0	0	1100
8/29/2017	1100	5	0	1	0	0	4	1100
9/12/2017	120	0	0	0	0	0	0	120
9/26/2017	0	38	60	13	0	38	68	180
10/10/2017	650	1	0	28	0	6	8	690
10/31/2017	100	0	10	10	0	0	0	120
11/17/2017	130	0	1	3	0	0	340	470
12/12/2017	440	3	13	10	0	0	32	500
12/26/2017	0	10	0	14	0	0	53	77
1/9/2018	0	0	0	0	0	0	0	0
1/31/2018	0	15	2	0	0	0	20	37
2/16/2018	30	9	48	0	0	0	0	87
2/27/2018	110	1	160	1	0	45	13	330
3/12/2018	20	0	260	0	0	0	200	480
3/27/2018	0	0	3	0	0	0	11	14
4/10/2018	48	0	33	0	0	0	0	81
4/24/2018	96	0	110	0	0	0	0	210
5/15/2018	0	11	180	10	0	76	18	280
5/29/2018	240	1	10	1	0	0	64	320
6/12/2018	0	8	10	0	0	0	1	19
6/26/2018	30	1	0	0	0	0	0	31
7/10/2018	0	6	1	0	0	0	0	7
7/24/2018	0	4	90	0	0	0	37	130
8/28/2018	5	0	0	0	0	0	0	5
9/11/2018	0	0	0	0	0	0	0	0

	Blue-greens	Cryptomonads	Diatoms	Dinoflagellates	Flagellates	Golden Algae	Greens	Total Algae Counts
Date	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**
9/24/2018	0	0	0	0	0	0	0	0
10/9/2018	32	0	0	0	0	0	0	32
10/30/2018	0	1	0	0	0	0	0	1
11/13/2018	0	0	0	0	0	0	12	12
11/27/2018	0	0	81	0	0	0	3	84
1/8/2019	0	38	0	13	0	0	18	69
1/29/2019	0	17	0	0	0	0	120	140
2/26/2019	0	11	30	0	0	0	13	54
3/12/2019	0	10	35	17	0	0	23	85
3/26/2019	0	6	3	13	0	0	32	54
4/9/2019	0	23	0	16	0	0	20	59
4/23/2019	0	16	1	3	0	0	18	38
5/14/2019	0	13	0	6	0	0	10	29
5/28/2019	0	10	0	4	0	0	11	25
6/11/2019	45	3	0	0	0	0	6	54
6/25/2019	0	10	0	2	0	0	4	16
7/9/2019	0	6	22	2	0	0	8	38
7/23/2019	10	10	1	1	0	0	4	26
8/13/2019	0	4	30	0	0	0	0	34
8/27/2019	20	1	48	0	0	20	8	97
9/10/2019	40	14	0	6	0	0	8	68
9/24/2019	0	0	0	0	0	0	4	4
10/15/2019	0	10	40	4	0	0	0	54
10/24/2019	0	0	0	0	0	0	0	0
11/12/2019	0	0	0	0	0	0	0	0
11/25/2019	0	0	10	0	0	0	0	10
12/10/2019	0	35	3	0	0	0	120	170
12/24/2019	0	7	7	7	0	0	0	21
1/29/2020	0	14	0	0	0	0	3	17
2/10/2020	0	7	0	0	0	0	4	11
2/26/2020	0	5	0	0	0	0	0	5
Whale Rock Intake 4								
1/13/2015	0	0	550	0	0	0	26	570
1/27/2015	0	0	477	0	0	0	0	477
2/24/2015	0	0	81	0	0	0	110	190
3/10/2015	0	0	0	0	0	0	0	0

	Blue-greens	Cryptomonads	Diatoms	Dinoflagellates	Flagellates	Golden Algae	Greens	Total Algae Counts
Date	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**
3/24/2015	0	0	7	0	0	0	18	25
4/14/2015	290	0	4	0	0	0	4	300
4/28/2015	0	0	0	0	0	0	15	15
5/12/2015	0	0	4	0	0	0	15	19
5/27/2015	0	0	0	0	0	0	22	22
6/9/2015	0	0	4	0	0	18	4	26
6/23/2015	-----	-----	-----	-----	-----	-----	-----	-----
7/14/2015	220	0	0	0	0	0	40	260
7/28/2015	220	0	0	0	0	0	7	230
8/11/2015	180	0	4	0	0	0	22	200
8/25/2015	150	0	0	4	0	0	11	170
9/15/2015	0	0	5	0	0	0	0	0
9/29/2015	38	0	3	0	0	3	0	46
10/14/2015	25	0	3	0	0	0	0	28
10/27/2015	0	0	0	0	0	0	0	3
11/9/2015	0	3	0	0	3	8	8	22
11/24/2015	0	28	25	0	0	0	100	130
12/15/2015	0	38	150	0	0	3	400	470
12/29/2015	0	25	0	3	0	3	140	320
1/12/2016	0	0	5	3	0	0	50	58
1/27/2016	0	38	100	3	0	0	1200	1400
2/9/2016	0	38	55	0	0	0	25	120
2/23/2016	50	13	150	0	0	0	0	210
3/17/2016	0	13	0	0	0	0	3	15
3/29/2016	0	18	50	0	0	0	55	120
4/12/2016	0	5	0	0	0	0	20	25
4/26/2016	25	10	0	0	0	0	81	120
5/10/2016	-----	-----	-----	-----	-----	-----	-----	-----
5/24/2016	0	5	0	0	5	0	0	10
6/14/2016	0	3	120	10	8	0	110	250
6/28/2016	0	30	0	23	23	0	210	290
7/12/2016	0	25	190	10	0	0	220	450
7/26/2016	0	18	220	5	15	0	200	460
8/9/2016	0	38	110	23	55	0	530	760
8/23/2016	0	30	86	20	38	0	240	410
9/27/2016	960	3	0	0	0	0	3	970

	Blue-greens	Cryptomonads	Diatoms	Dinoflagellates	Flagellates	Golden Algae	Greens	Total Algae Counts
Date	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**
10/11/2016	1700	3	25	0	0	5	45	1800
10/25/2016	0	10	3	0	5	0	58	76
11/14/2016	5800	13	13	0	0	0	160	6000
11/29/2016	21000	3	91	0	0	3	140	21000
12/13/2016	1600	10	130	0	0	0	810	2600
1/10/2017	0	0	0	0	0	0	0	0
1/26/2017	11	0	0	0	0	0	66	77
2/14/2017	0	0	0	0	0	0	0	0
2/28/2017	0	0	0	0	0	0	0	0
3/14/2017	0	0	0	0	0	0	0	0
3/28/2017	0	0	20	0	0	0	0	20
4/11/2017	0	0	190	0	0	0	0	190
4/25/2017	0	0	0	0	0	0	0	0
5/9/2017	0	0	0	0	0	0	0	0
5/23/2017	0	11	99	0	0	0	220	330
6/13/2017	0	0	60	0	0	0	0	60
6/27/2017	0	0	30	0	0	0	48	78
7/11/2017	6	0	0	0	0	0	6	12
7/25/2017	0	4	1	10	0	0	0	15
8/15/2017	1500	0	8	0	0	0	0	1500
8/29/2017	2500	0	5	0	0	0	1	2500
9/12/2017	190	0	0	0	0	0	16	210
9/26/2017	0	28	100	0	0	0	11	140
10/10/2017	470	9	0	4	0	0	25	510
10/31/2017	240	0	0	3	0	0	60	300
11/17/2017	90	1	3	3	0	0	170	270
12/12/2017	30	1	16	1	0	0	110	160
12/26/2017	0	8	7	26	0	0	35	86
1/9/2018	0	0	0	0	0	0	0	0
1/31/2018	0	12	3	0	0	0	7	22
2/16/2018	110	0	36	0	0	0	0	150
2/27/2018	230	1	420	1	0	4	24	680
3/12/2018	0	0	170	9	0	0	120	300
3/27/2018	90	0	0	0	0	0	12	100
4/10/2018	8	0	0	0	0	0	0	8
4/24/2018	260	3	56	0	0	0	1	320

	Blue-greens	Cryptomonads	Diatoms	Dinoflagellates	Flagellates	Golden Algae	Greens	Total Algae Counts
Date	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**
5/15/2018	0	10	120	10	0	0	21	160
5/29/2018	12	0	10	0	0	0	33	55
6/12/2018	10	0	0	0	0	0	0	10
6/26/2018	32	0	10	0	0	0	0	42
7/10/2018	0	6	1	0	0	0	0	7
7/24/2018	0	0	0	0	0	0	4	4
8/28/2018	8	0	0	0	0	0	6	14
9/11/2018	0	0	0	0	0	0	0	0
9/24/2018	0	1	0	0	0	0	48	49
10/9/2018	0	1	0	0	0	0	0	1
10/30/2018	0	9	0	1	0	0	0	10
11/13/2018	0	0	0	0	0	0	0	0
11/27/2018	0	0	0	0	0	0	0	0
1/8/2019	0	26	0	13	0	0	20	59
1/29/2019	0	14	30	0	0	0	72	120
2/26/2019	0	17	0	0	0	0	13	30
3/12/2019	0	0	15	6	0	0	22	43
3/26/2019	0	10	60	17	0	0	0	87
4/9/2019	0	28	2	11	0	0	17	58
4/23/2019	0	4	0	4	0	0	14	22
5/14/2019	0	6	3	8	0	0	7	24
5/28/2019	0	7	0	4	0	0	18	29
6/11/2019	0	4	10	0	0	0	11	25
6/25/2019	0	11	0	3	0	0	10	24
7/9/2019	0	6	2	2	0	0	0	10
7/23/2019	10	6	1	0	0	0	10	27
8/13/2019	0	58	0	0	1	0	12	71
8/27/2019	0	13	46	1	0	0	8	68
9/10/2019	0	10	40	4	0	0	2	56
9/24/2019	0	1	30	0	0	0	3	34
10/15/2019	0	14	0	11	0	0	1	26
10/24/2019	0	0	0	0	0	0	0	0
11/12/2019	0	0	0	0	0	0	0	0
11/25/2019	0	3	8	0	0	0	0	11
12/10/2019	0	23	0	0	0	0	0	23
12/24/2019	610	22	29	0	0	0	56	720

	Blue-greens	Cryptomonads	Diatoms	Dinoflagellates	Flagellates	Golden Algae	Greens	Total Algae Counts
Date	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**	**cells/mL**
1/29/2020	0	0	0	0	0	0	14	14
2/10/2020	0	0	0	0	0	0	0	0
2/26/2020	0	0	8	0	0	2	360	370

APPENDIX N: BACTERIOLOGICAL DATA FOR RAW WATER AND DELIVERED WATER

Analyte	Total Coliforms		*E. coli*		Heterotrophic Plate Count	Chlorine Residual
Units	(MPN/100 mL)	Present/Absent	(MPN/100 mL)	Present/Absent	CFU/mL	mg/L
Site	Whale Rock Raw	Delivered Water	Whale Rock Raw	Delivered Water	Delivered Water	Delivered Water
1/5/2016	4.1	Absent	2	Absent	ND	1.33
1/12/2016	3	Absent	ND	Absent	ND	1.52
1/19/2016	12	Absent	2	Absent	ND	1.42
1/26/2016	28	Absent	ND	Absent	ND	1.39
2/2/2016	13	Absent	1	Absent	ND	1.41
2/9/2016	18	Absent	ND	Absent	3	1.43
2/17/2016	8.6	Absent	ND	Absent	ND	1.29
2/23/2016	16	Absent	ND	Absent	ND	1.36
3/1/2016	18	Absent	ND	Absent	ND	1.34
3/8/2016	28	Absent	1	Absent	ND	1.44
3/15/2016	70	Absent	7	Absent	1	1.69
3/22/2016	19	Absent	2	Absent	ND	1.42
3/29/2016	12	Absent	ND	Absent	ND	1.48
4/5/2016	13	Absent	ND	Absent	2	1.42
4/12/2016	13	Absent	ND	Absent	6	1.35
4/19/2016	23	Absent	ND	Absent	ND	1.34
4/26/2016	60	Absent	ND	Absent	ND	1.39
5/3/2016	820	Absent	ND	Absent	ND	1.36
5/10/2016	71	Absent	ND	Absent	2	1.30
5/17/2016	140	Absent	2	Absent	3	1.33
5/24/2016	66	Absent	ND	Absent	1	1.34
6/1/2016	64	Absent	ND	Absent	ND	1.42
6/7/2016	67	Absent	ND	Absent	1	1.27
6/14/2016	410	Absent	ND	Absent	3	1.38
6/21/2016	440	Absent	ND	Absent	ND	1.40
6/28/2016	140	Absent	ND	Absent	5	1.30
7/6/2016	490	Absent	ND	Absent	ND	1.40
7/12/2016	1000	Absent	ND	Absent	ND	1.33
7/19/2016	1100	Absent	ND	Absent	1	1.32
7/26/2016	2500	Absent	ND	Absent	ND	1.26
8/2/2016	2000	Absent	ND	Absent	ND	1.38
8/9/2016	2000	Absent	ND	Absent	ND	1.60
8/16/2016	1700	Absent	ND	Absent	1	1.48

Analyte	Total Coliforms		*E. coli*		Heterotrophic Plate Count	Chlorine Residual
Units	(MPN/100 mL)	Present/Absent	(MPN/100 mL)	Present/Absent	CFU/mL	mg/L
Site	Whale Rock Raw	Delivered Water	Whale Rock Raw	Delivered Water	Delivered Water	Delivered Water
8/23/2016	2800	Absent	ND	Absent	ND	1.52
8/30/2016	1700	Absent	ND	Absent	1	1.46
9/6/2016	2400	Absent	2	Absent	1	1.35
9/13/2016	1200	Absent	ND	Absent	ND	1.44
9/20/2016	100	Absent	ND	Absent	11	1.46
9/27/2016	1600	Absent	2	Absent	ND	1.46
10/4/2016	2000	Absent	1	Absent	ND	1.42
10/11/2016	3600	Absent	1	Absent	ND	1.48
10/18/2016	610	Absent	ND	Absent	ND	1.48
10/25/2016	230	Absent	ND	Absent	ND	1.49
11/1/2016	160	Absent	3	Absent	1	1.39
11/8/2016	330	Absent	1	Absent	1	1.54
11/14/2016	24	Absent	ND	Absent	ND	1.73
11/21/2016	41	Absent	ND	Absent	ND	1.52
11/29/2016	190	Absent	ND	Absent	ND	1.44
12/7/2016	120	Absent	ND	Absent	1	1.43
12/13/2016	46	Absent	ND	Absent	ND	1.46
12/20/2016	25	Absent	3	Absent	ND	1.50
12/27/2016	63	Absent	3	Absent	ND	1.51
1/3/2017	29	Absent	ND	Absent	1	1.53
1/10/2017	3200	Absent	180	Absent	ND	1.48
1/17/2017	550	Absent	6	Absent	ND	1.27
1/24/2017	1700	Absent	46	Absent	1	1.30
1/31/2017	340	Absent	7	Absent	ND	1.43
2/7/2017	140	Absent	2	Absent	ND	1.38
2/14/2017	120	Absent	6	Absent	ND	1.38
2/21/2017	190	Absent	5	Absent	ND	1.27
2/28/2017	210	Absent	3	Absent	ND	1.25
3/7/2017	330	Absent	1	Absent	ND	1.38
3/14/2017	160	Absent	2	Absent	ND	1.37
3/20/2017	36	Absent	ND	Absent	ND	1.40
3/28/2017	8.6	Absent	ND	Absent	ND	1.37
4/4/2017	16	Absent	ND	Absent	ND	1.65
4/11/2017	4.1	Absent	ND	Absent	ND	1.77

Analyte	Total Coliforms		*E. coli*		Heterotrophic Plate Count	Chlorine Residual
Units	(MPN/100 mL)	Present/Absent	(MPN/100 mL)	Present/Absent	CFU/mL	mg/L
Site	Whale Rock Raw	Delivered Water	Whale Rock Raw	Delivered Water	Delivered Water	Delivered Water
4/18/2017	72	Absent	ND	Absent	ND	1.46
4/25/2017	20	Absent	ND	Absent	1ND	1.56
5/3/2017	35	Absent	ND	Absent	ND	1.47
5/9/2017	41	Absent	ND	Absent	ND	1.47
5/16/2017	32	Absent	ND	Absent	ND	1.48
5/23/2017	36	Absent	ND	Absent	ND	1.38
5/30/2017	190	Absent	ND	Absent	ND	1.48
6/6/2017	64	Absent	ND	Absent	ND	1.35
6/13/2017	140	Absent	ND	Absent	ND	1.50
6/20/2017	920	Absent	ND	Absent	ND	1.40
6/27/2017	260	Absent	ND	Absent	ND	1.34
7/3/2017	190	Absent	ND	Absent	ND	1.44
7/11/2017	870	Absent	ND	Absent	ND	1.31
7/18/2017	440	Absent	ND	Absent	ND	1.47
7/25/2017	550	Absent	ND	Absent	ND	1.54
8/1/2017	330	Absent	ND	Absent	ND	1.66
8/8/2017	580	Absent	ND	Absent	ND	1.61
8/15/2017	730	Absent	ND	Absent	ND	1.74
8/22/2017	5500	Absent	ND	Absent	ND	1.50
8/29/2017	1400	Absent	ND	Absent	ND	1.33
9/5/2017	490	Absent	ND	Absent	ND	1.24
9/12/2017	1600	Absent	ND	Absent	ND	1.25
9/19/2017	2400	Absent	ND	Absent	ND	1.32
9/26/2017	2400	Absent	1	Absent	ND	1.39
10/3/2017	2000	Absent	ND	Absent	2	1.44
10/10/2017	230	Absent	1	Absent	ND	1.57
10/17/2017	150	Absent	3	Absent	ND	1.71
10/24/2017	46	Absent	ND	Absent	ND	1.61
10/31/2017	40	Absent	ND	Absent	ND	1.51
11/7/2017	30	Absent	3	Absent	ND	1.33
11/14/2017	12	Absent	ND	Absent	ND	1.50
11/20/2017	11	Absent	ND	Absent	ND	1.60
11/28/2017	10	Absent	1	Absent	ND	NA
12/5/2017	2	Absent	ND	Absent	ND	1.58

Analyte	Total Coliforms		*E. coli*		Heterotrophic Plate Count	Chlorine Residual
Units	(MPN/100 mL)	Present/Absent	(MPN/100 mL)	Present/Absent	CFU/mL	mg/L
Site	Whale Rock Raw	Delivered Water	Whale Rock Raw	Delivered Water	Delivered Water	Delivered Water
12/12/2017	5.2	Absent	ND	Absent	ND	1.53
12/19/2017	6	Absent	ND	Absent	ND	1.54
12/26/2017	2	Absent	1	Absent	ND	1.42
1/2/2018	10	Absent	2	Absent	ND	1.30
1/9/2018	5.2	Absent	ND	Absent	ND	1.41
1/16/2018	5.3	Absent	ND	Absent	ND	1.22
1/23/2018	3	Absent	ND	Absent	ND	1.39
1/30/2018	6.3	Absent	ND	Absent	ND	1.33
2/6/2018	2	Absent	ND	Absent	ND	1.30
2/13/2018	3	Absent	ND	Absent	ND	1.47
2/20/2018	16	Absent	ND	Absent	ND	1.40
2/27/2018	2	Absent	ND	Absent	ND	1.53
3/6/2018	6	Absent	ND	Absent	1	1.44
3/12/2018	12	Absent	ND	Absent	ND	1.37
3/19/2018	5	Absent	ND	Absent	ND	1.28
3/26/2018	690	Absent	32	Absent	ND	1.35
4/3/2018	70	Absent	ND	Absent	ND	1.68
4/10/2018	120	Absent	1	Absent	ND	1.59
4/17/2018	290	Absent	ND	Absent	ND	1.44
4/24/2018	69	Absent	ND	Absent	ND	1.40
5/1/2018	52	Absent	ND	Absent	ND	1.40
5/8/2018	18	Absent	ND	Absent	ND	1.40
5/15/2018	20	Absent	ND	Absent	ND	1.37
5/22/2018	37	Absent	ND	Absent	2	1.35
5/29/2018	44	Absent	ND	Absent	ND	1.44
6/5/2018	90	Absent	ND	Absent	ND	1.55
6/12/2018	7.5	Absent	1	Absent	1	1.51
6/19/2018	520	Absent	1	Absent	1	1.44
6/26/2018	360	Absent	ND	Absent	ND	1.43
7/2/2018	150	Absent	ND	Absent	ND	1.53
7/10/2018	460	Absent	ND	Absent	ND	1.58
7/17/2018	6500	Absent	ND	Absent	ND	1.44
7/24/2018	1700	Absent	ND	Absent	ND	1.62
7/31/2018	4400	Absent	ND	Absent	ND	1.50

Analyte	Total Coliforms		*E. coli*		Heterotrophic Plate Count	Chlorine Residual
Units	(MPN/100 mL)	Present/Absent	(MPN/100 mL)	Present/Absent	CFU/mL	mg/L
Site	Whale Rock Raw	Delivered Water	Whale Rock Raw	Delivered Water	Delivered Water	Delivered Water
8/7/2018	1600	Absent	ND	Absent	ND	1.49
8/14/2018	520	Absent	ND	Absent	ND	1.40
8/21/2018	440	Absent	ND	Absent	ND	1.50
8/28/2018	610	Absent	ND	Absent	ND	1.49
9/4/2018	1100	Absent	ND	Absent	ND	1.45
9/11/2018	1600	Absent	ND	Absent	ND	1.35
9/18/2018	1000	Absent	ND	Absent	ND	1.52
9/24/2018	690	Absent	ND	Absent	ND	1.50
10/2/2018	100	Absent	ND	Absent	ND	1.56
10/9/2018	81	Absent	4	Absent	ND	1.59
10/16/2018	83	Absent	2	Absent	ND	1.24
10/23/2018	56	Absent	4.1	Absent	1	1.53
10/30/2018	29	Absent	3.1	Absent	ND	1.47
11/5/2018	60	Absent	2	Absent	1	1.47
11/13/2018	32	Absent	3.1	Absent	ND	1.77
11/19/2018	29	Absent	1	Absent	ND	1.57
11/27/2018	35	Absent	1	Absent	ND	1.65
12/4/2018	19	Absent	1	Absent	ND	1.62
12/11/2018	58	Absent	1	Absent	ND	1.50
12/18/2018	50	Absent	ND	Absent	ND	1.55
12/26/2018	29	Absent	ND	Absent	ND	1.48
1/2/2019	77	Absent	ND	Absent	ND	1.38
1/8/2019	68	Absent	ND	Absent	2	1.48
1/15/2019	260	Absent	1	Absent	4	1.50
1/22/2019	290	Absent	11	Absent	1	1.45
1/29/2019	490	Absent	1	Absent	ND	1.47
2/5/2019	90	Absent	3	Absent	ND	1.39
2/13/2019	290	Absent	4	Absent	1	1.39
2/19/2019	400	Absent	1	Absent	ND	1.41
2/26/2019	290	Absent	1	Absent	1	1.45
3/5/2019	210	Absent	ND	Absent	ND	1.32
3/12/2019	110	Absent	ND	Absent	ND	1.13
3/18/2019	110	Absent	1	Absent	ND	1.30
3/26/2019	170	Absent	1	Absent	ND	1.52

Analyte	Total Coliforms		*E. coli*		Heterotrophic Plate Count	Chlorine Residual
Units	(MPN/100 mL)	Present/Absent	(MPN/100 mL)	Present/Absent	CFU/mL	mg/L
Site	Whale Rock Raw	Delivered Water	Whale Rock Raw	Delivered Water	Delivered Water	Delivered Water
4/2/2019	210	Absent	ND	Absent	ND	1.49
4/9/2019	70	Absent	ND	Absent	ND	1.43
4/16/2019	440	Absent	ND	Absent	ND	1.38
4/23/2019	580	Absent	ND	Absent	ND	1.37
4/30/2019	410	Absent	ND	Absent	2	1.51
5/7/2019	120	Absent	ND	Absent	ND	1.51
5/14/2019	820	Absent	ND	Absent	ND	1.27
5/21/2019	1000	Absent	ND	Absent	ND	1.18
5/28/2019	690	Absent	ND	Absent	ND	1.41
6/4/2019	1600	Absent	ND	Absent	ND	1.37
6/11/2019	2000	Absent	ND	Absent	ND	1.40
6/18/2019	1700	Absent	ND	Absent	1	1.41
6/25/2019	1600	Absent	ND	Absent	1	1.42
7/1/2019	1900	Absent	ND	Absent	ND	1.39
7/9/2019	3700	Absent	ND	Absent	ND	1.36
7/15/2019	5200	Absent	ND	Absent	1	1.40
7/23/2019	4600	Absent	ND	Absent	ND	1.45
7/30/2019	6500	Absent	ND	Absent	ND	1.59
8/6/2019	1600	Absent	ND	Absent	ND	1.65
8/13/2019	2400	Absent	ND	Absent	ND	1.53
8/20/2019	4900	Absent	ND	Absent	ND	1.42
8/27/2019	6100	Absent	ND	Absent	ND	1.39
9/4/2019	1600	Absent	ND	Absent	ND	1.36
9/10/2019	1700	Absent	ND	Absent	1	1.47
9/17/2019	110	Absent	1	Absent	ND	1.45
9/24/2019	88	Absent	ND	Absent	ND	1.36
10/1/2019	170	Absent	ND	Absent	2	1.30
10/7/2019	52	Absent	ND	Absent	ND	1.27
10/15/2019	340	Absent	1	Absent	ND	1.47
10/22/2019	260	Absent	3	Absent	ND	1.41
10/29/2019	460	Absent	1	Absent	ND	1.46
11/5/2019	120	Absent	1	Absent	ND	1.38
11/12/2019	210	Absent	1	Absent	ND	1.42
11/19/2019	6500	Absent	1	Absent	ND	1.39

Analyte	Total Coliforms		*E. coli*		Heterotrophic Plate Count	Chlorine Residual
Units	(MPN/100 mL)	Present/Absent	(MPN/100 mL)	Present/Absent	CFU/mL	mg/L
Site	Whale Rock Raw	Delivered Water	Whale Rock Raw	Delivered Water	Delivered Water	Delivered Water
11/25/2019	410	Absent	1	Absent	1	1.50
12/3/2019	1700	Absent	1	Absent	ND	1.39
12/10/2019	170	Absent	1	Absent	1	1.47
12/17/2019	120	Absent	1	Absent	12	1.41
12/23/2019	550	Absent	ND	Absent	ND	1.47
12/30/2019	920	Absent	ND	Absent	ND	1.35
1/7/2020	310	Absent	1	Absent	ND	1.30
1/14/2020	550	Absent	ND	Absent	1	1.30
1/21/2020	550	Absent	ND	Absent	ND	1.37
1/28/2020	270	Absent	ND	Absent	ND	1.31
2/4/2020	99	Absent	ND	Absent	ND	1.21
2/10/2020	200	Absent	ND	Absent	15	1.36
2/18/2020	43	Absent	ND	Absent	ND	1.39
2/25/2020	61	Absent	ND	Absent	ND	1.43
3/3/2020	130	Absent	ND	Absent	ND	1.41
3/10/2020	160	Absent	ND	Absent	ND	1.45
3/17/2020	290	Absent	ND	Absent	ND	1.39
3/23/2020	340	Absent	ND	Absent	ND	1.35
3/31/2020	220	Absent	ND	Absent	ND	1.50
4/7/2020	250	Absent	ND	Absent	ND	1.39
4/14/2020	460	Absent	ND	Absent	ND	1.41
4/21/2020	410	Absent	1	Absent	1	1.30
4/28/2020	490	Absent	ND	Absent	ND	1.38
5/5/2020	980	Absent	ND	Absent	ND	1.43
5/12/2020	820	Absent	ND	Absent	ND	1.30
5/19/2020	1200	Absent	31	Absent	31	1.45
5/26/2020	1600	Absent	ND	Absent	ND	1.40
6/2/2020	17000	Absent	ND	Absent	ND	1.29
6/9/2020	24000	Absent	ND	Absent	ND	1.29
6/16/2020	24000	Absent	3	Absent	3	1.45
6/23/2020	24000	Absent	ND	Absent	ND	1.30
6/30/2020	24000	Absent	ND	Absent	ND	1.29
7/7/2020	14000	Absent	ND	Absent	ND	1.31
7/14/2020	11000	Absent	ND	Absent	ND	1.14

Analyte	Total Coliforms		*E. coli*		Heterotrophic Plate Count	Chlorine Residual
Units	**(MPN/100 mL)**	**Present/Absent**	**(MPN/100 mL)**	**Present/Absent**	**CFU/mL**	**mg/L**
Site	**Whale Rock Raw**	**Delivered Water**	**Whale Rock Raw**	**Delivered Water**	**Delivered Water**	**Delivered Water**
7/21/2020	1000	Absent	ND	Absent	ND	1.41
7/27/2020	7700	Absent	1	Absent	1	1.28
8/4/2020	24000	Absent	ND	Absent	ND	1.61
8/11/2020	11000	Absent	ND	Absent	ND	1.54
8/18/2020	7700	Absent	ND	Absent	ND	1.42
8/25/2020	12000	Absent	1	Absent	1	1.63
9/1/2020	3100	Absent	ND	Absent	ND	1.43
9/8/2020	2400	Absent	ND	Absent	ND	1.36
9/15/2020	2000	Absent	ND	Absent	ND	1.34
9/22/2020	330	Absent	ND	Absent	ND	1.47
9/29/2020	610	Absent	ND	Absent	ND	1.19
10/6/2020	460	Absent	ND	Absent	ND	1.46
10/13/2020	980	Absent	ND	Absent	ND	1.34
10/20/2020	500	Absent	ND	Absent	ND	1.36
10/27/2020	1200	Absent	ND	Absent	ND	1.38
11/3/2020	1200	Absent	1	Absent	ND	1.41
11/10/2020	2400	Absent	ND	Absent	ND	1.35
11/17/2020	1700	Absent	2	Absent	ND	1.56
11/23/2020	20000	Absent	ND	Absent	ND	1.53
12/1/2020	8200	Absent	1	Absent	ND	1.51
12/7/2020	6900	Absent	ND	Absent	ND	1.59
12/15/2020	690	Absent	ND	Absent	1	1.49
12/22/2020	610	Absent	ND	Absent	1	1.62
12/28/2020	5500	Absent	ND	Absent	ND	1.58
Minimum	**2**	Absent	**ND**	Absent	ND	1.13
Maximum	**24000**	Absent	**180**	Absent	31	1.77
Average	**1607**	Absent	**2**	Absent	1	1.43
Median	**270**	Absent	**ND**	Absent	ND	1.42
n	**261**	261	**261**	261	261	260

APPENDIX O: BACTERIOLOGICAL DATA FOR WELL WATER

Whale Rock Well- CAWO Raw			
Date	**Total Coliforms (MPN/100 mL)**	***E. coli* (MPN/100 mL)**	**Heterotrophic Plate Count (CFU/mL)**
2/2/2016	0	0	1
5/3/2016	0	0	13
8/2/2016	0	0	10
11/8/2016	0	0	6
2/7/2017	0	0	3
5/3/2017	0	0	1
8/8/2017	0	0	0
11/7/2017	0	0	2
2/6/2018	0	0	10
5/8/2018	0	0	0
8/7/2018	0	0	0
11/5/2018	1	0	0
11/15/2018	0	0	0
2/5/2019	0	0	-----
5/7/2019	0	0	-----
8/6/2019	0	0	-----
11/5/2019	0	0	-----
2/4/2020	0	0	-----
5/5/2020	0	0	-----
8/4/2020	0	0	-----
11/3/2020	0	0	-----
11/3/2020	0	0	-----
2/9/2021	0	0	-----
Minimum	0	0	0
Maximum	1	0	13
Average	0	0	4
Median	0	0	1
n	23	23	13

Morro Rock MWC Well 04- D Street			
Date	**Total Coliforms (MPN/100 mL)**	***E. coli* (MPN/100 mL)**	**Heterotrophic Plate Count (CFU/mL)**
3/15/2016	Absent	Absent	0
6/14/2016	Absent	Absent	8
9/13/2016	Absent	Absent	39
12/13/2016	Absent	Absent	74
12/21/2016	Absent	Absent	-----
3/14/2017	Absent	Absent	51
6/13/2017	Absent	Absent	-----
9/12/2017	Absent	Absent	28
12/12/2017	Absent	Absent	0
3/12/2018	Absent	Absent	44
6/12/2018	Absent	Absent	21
9/11/2018	Absent	Absent	89
12/11/2018	Absent	Absent	82
3/12/2019	Absent	Absent	45
6/11/2019	Absent	Absent	190
9/10/2019	Absent	Absent	5
12/10/2019	Absent	Absent	360
3/17/2020	Absent	Absent	11
6/9/2020	Absent	Absent	20
9/15/2020	Absent	Absent	11
12/8/2020	Absent	Absent	7
Minimum	Absent	Absent	0
Maximum	Absent	Absent	360
Average	Absent	Absent	57
Median	Absent	Absent	28
n	21	21	19

APPENDIX P: IRON AND MANGANESE CAYUCOS CSA-10 RAW AND DELIVERED

Analyte	Iron		Manganese	
Units	ug/L		ug/L	
MCL	300		50	
DLR	100		20	
Date	Plant Influent	Delivered Water	Plant Influent	Delivered Water
1/5/2016	<10	<10	5	<5.0
1/12/2016	38	<10	5	<5.0
1/19/2016	29	<10	<5.0	<5.0
1/26/2016	76	<10	5	<5.0
2/2/2016	65	<10	6	<5.0
2/9/2016	83	<10	6	<5.0
2/17/2016	91	<10	5	<5.0
2/23/2016	37	<10	<5.0	<5.0
3/1/2016	87	<10	<5.0	<5.0
3/8/2016	44	<10	<5.0	<5.0
3/15/2016	120	<10	7	<5.0
3/22/2016	27	<10	<5.0	<5.0
3/29/2016	55	<10	<5.0	<5.0
4/5/2016	19	<10	<5.0	<5.0
4/12/2016	36	<10	<5.0	<5.0
4/19/2016	40	<10	<5.0	<5.0
4/26/2016	45	<10	<5.0	<5.0
5/3/2016	56	<10	<5.0	<5.0
5/10/2016	210	<10	210	<5.0
5/17/2016	250	<10	16	<5.0
5/24/2016	240	<10	14	<5.0
6/1/2016	83	<10	<5.0	<5.0
6/7/2016	49	<10	<5.0	<5.0
6/14/2016	95	<10	6	<5.0
6/21/2016	<10	<10	33	<5.0
6/28/2016	31	<10	<5.0	<5.0
7/6/2016	33	<10	<5.0	<5.0
7/12/2016	13	<10	<5.0	<5.0
7/19/2016	65	<10	5	<5.0
7/26/2016	73	<10	9	8
8/2/2016	150	<10	8	34
8/9/2016	110	<10	7	<5.0
8/16/2016	120	<10	7	<5.0
8/23/2016	230	<10	12	<5.0
8/30/2016	240	<10	8	<5.0
9/6/2016	150	<10	6	<5.0

Analyte	Iron		Manganese	
Units	ug/L		ug/L	
MCL	300		50	
DLR	100		20	
Date	Plant Influent	Delivered Water	Plant Influent	Delivered Water
9/13/2016	28	<10	<5.0	<5.0
9/20/2016	73	<10	<5.0	<5.0
9/27/2016	91	<10	5	<5.0
10/4/2016	200	10	12	<5.0
10/11/2016	130	<10	11	<5.0
10/18/2016	42	<10	5	<5.0
10/25/2016	35	<10	12	<5.0
11/1/2016	26	<10	5	<5.0
11/8/2016	57	<10	11	<5.0
11/14/2016	22	<10	<5.0	<5.0
11/21/2016	14	<10	7	<5.0
11/29/2016	170	12	49	<5.0
12/7/2016	330	<10	46	<5.0
12/13/2016	55	<10	6	<5.0
12/20/2016	140	<10	13	<5.0
12/27/2016	280	<10	21	<5.0
1/3/2017	120	<10	8	<5.0
1/10/2017	700	<10	20	<5.0
1/17/2017	320	<10	11	<5.0
1/24/2017	550	<10	15	<5.0
1/31/2017	590	<10	15	<5.0
2/7/2017	410	<10	14	<5.0
2/14/2017	250	<10	9	<5.0
2/21/2017	300	<10	9	<5.0
2/28/2017	160	<10	6	<5.0
3/7/2017	150	<10	5	<5.0
3/14/2017	310	<10	14	<5.0
3/20/2017	100	<10	<5.0	<5.0
3/28/2017	80	<10	<5.0	<5.0
4/4/2017	170	<10	10	<5.0
4/11/2017	140	<10	8	<5.0
4/18/2017	130	<10	8	<5.0
4/25/2017	91	<10	7	<5.0
5/2/2017	65	<10	6	<5.0
5/9/2017	72	<10	7	<5.0
5/16/2017	49	<10	6	<5.0
5/23/2017	62	10	10	<5.0
5/30/2017	69	<10	9	<5.0

Analyte	Iron		Manganese	
Units	ug/L		ug/L	
MCL	300		50	
DLR	100		20	
Date	Plant Influent	Delivered Water	Plant Influent	Delivered Water
6/6/2017	46	<10	12	<5.0
6/13/2017	33	<10	10	<5.0
6/20/2017	77	<10	25	<5.0
6/27/2017	17	<10	16	<5.0
7/3/2017	19	<10	10	<5.0
7/11/2017	15	<10	54	<5.0
7/18/2017	13	<10	28	<5.0
7/25/2017	16	<10	43	<5.0
8/1/2017	15	<10	58	<5.0
8/8/2017	21	<10	63	<5.0
8/15/2017	-----	<10	-----	<5.0
8/22/2017	65	<10	92	<5.0
8/29/2017	26	<10	180	<5.0
9/5/2017	61	<10	770	<5.0
9/12/2017	36	<10	79	<5.0
9/19/2017	21	<10	67	<5.0
9/26/2017	15	<10	120	<5.0
10/3/2017	20	<10	11	<5.0
10/10/2017	27	<10	<5.0	<5.0
10/17/2017	84	<10	10	5.3
10/24/2017	52	<10	6	<5.0
10/31/2017	30	<10	6	<5.0
11/7/2017	22	<10	<5.0	<5.0
11/14/2017	31	<10	<5.0	<5.0
11/20/2017	28	<10	<5.0	<5.0
11/28/2017	58	<10	6	<5.0
12/5/2017	79	<10	32	<5.0
12/12/2017	345	<10	45	<5.0
12/19/2017	76	<10	11	<5.0
12/26/2017	111	<10	9	<5.0
1/2/2018	100	<10	6	<5.0
1/9/2018	64	<10	<5.0	<5.0
1/16/2018	91	<10	8	<5.0
1/23/2018	56	<10	<5.0	<5.0
1/30/2018	140	<10	11	<5.0
2/6/2018	180	<10	16	<5.0
2/13/2018	62	<10	5	<5.0
2/20/2018	46	<10	<5.0	<5.0

Analyte	Iron		Manganese	
Units	ug/L		ug/L	
MCL	300		50	
DLR	100		20	
Date	Plant Influent	Delivered Water	Plant Influent	Delivered Water
2/27/2018	28	<10	<5.0	<5.0
3/6/2018	59	<10	<5.0	<5.0
3/12/2018	30	<10	<5.0	<5.0
3/19/2018	17	<10	<5.0	<5.0
3/26/2018	160	<10	<5.0	<5.0
4/3/2018	130	<10	<5.0	<5.0
4/10/2018	110	<10	<5.0	<5.0
4/17/2018	48	<10	<5.0	<5.0
4/24/2018	33	<10	<5.0	<5.0
5/1/2018	82	<10	<5.0	<5.0
5/8/2018	51	<10	<5.0	<5.0
5/15/2018	32	<10	<5.0	<5.0
5/22/2018	41	<10	<5.0	<5.0
5/29/2018	47	<10	<5.0	<5.0
6/5/2018	25	<10	<5.0	<5.0
6/12/2018	34	<10	<5.0	<5.0
6/19/2018	36	<10	<5.0	<5.0
6/26/2018	40	<10	<5.0	<5.0
7/2/2018	37	<10	<5.0	<5.0
7/10/2018	130	<10	13	<5.0
7/17/2018	25	<10	<5.0	<5.0
7/24/2018	21	<10	5	<5.0
7/31/2018	22	11	7	<5.0
8/7/2018	60	<10	8	<5.0
8/14/2018	27	<10	12	<5.0
8/21/2018	16	<10	27	<5.0
8/28/2018	91	<10	23	<5.0
9/4/2018	46	<10	10	<5.0
9/11/2018	58	<10	7	<5.0
9/18/2018	33	<10	<5.0	<5.0
9/24/2018	13	<10	<5.0	<5.0
10/2/2018	1400	<10	150	<5.0
10/9/2018	23	<10	<5.0	<5.0
10/16/2018	29	<10	<5.0	<5.0
10/23/2018	14	<10	<5.0	5
10/30/2018	30	<10	<5.0	<5.0
11/5/2018	49	19	7	<5.0
11/13/2018	55	<10	6	<5.0

Analyte	Iron		Manganese	
Units	ug/L		ug/L	
MCL	300		50	
DLR	100		20	
Date	Plant Influent	Delivered Water	Plant Influent	Delivered Water
11/19/2018	37	<10	<5.0	<5.0
11/27/2018	17	<10	<5.0	<5.0
12/4/2018	21	<10	<5.0	<5.0
12/11/2018	22	<10	12	<5.0
12/18/2018	20	<10	19	<5.0
12/26/2018	31	<10	7	<5.0
1/2/2019	24	<10	<5.0	<5.0
1/8/2019	24	<10	<5.0	<5.0
1/15/2019	42	<10	<5.0	<5.0
1/22/2019	51	<10	<5.0	<5.0
1/29/2019	31	<10	<5.0	<5.0
2/5/2019	81	<10	6	<5.0
2/13/2019	68	<10	<5.0	<5.0
2/19/2019	54	<10	<5.0	<5.0
2/26/2019	35	<10	<5.0	<5.0
3/5/2019	23	<10	<5.0	<5.0
3/12/2019	53	<10	<5.0	<5.0
3/18/2019	76	<10	<5.0	<5.0
3/26/2019	75	<10	5	<5.0
4/2/2019	41	<10	<5.0	<5.0
4/9/2019	25	<10	<5.0	<5.0
4/16/2019	13	<10	<5.0	<5.0
4/23/2019	13	<10	<5.0	<5.0
4/30/2019	36	<10	<5.0	<5.0
5/7/2019	80	<10	7	<5.0
5/14/2019	33	<10	<5.0	<5.0
5/21/2019	21	<10	<5.0	<5.0
5/28/2019	26	<10	5	<5.0
6/4/2019	15	<10	5	<5.0
6/11/2019	11	<10	6	<5.0
6/18/2019	<10	<10	7	<5.0
6/25/2019	<10	<10	7	<5.0
7/1/2019	<10	<10	7	<5.0
7/9/2019	<10	<10	8	<5.0
7/15/2019	11	<10	18	<5.0
7/23/2019	21	<10	14	<5.0
7/30/2019	<10	<10	6	<5.0
8/6/2019	11	<10	7	<5.0

Analyte	Iron		Manganese	
Units	ug/L		ug/L	
MCL	300		50	
DLR	100		20	
Date	Plant Influent	Delivered Water	Plant Influent	Delivered Water
8/13/2019	42	<10	24	<5.0
8/20/2019	<10	<10	40	<5.0
8/27/2019	10	<10	203	<5.0
9/4/2019	35	<10	102	<5.0
9/10/2019	31	<10	40	<5.0
9/17/2019	16	<10	25	<5.0
9/24/2019	18	<10	38	<5.0
10/1/2019	13	<10	68	<5.0
10/7/2019	15	<10	21	<5.0
10/15/2019	26	<10	<5.0	<5.0
10/22/2019	76	<10	8	<5.0
10/29/2019	28	<10	<5.0	<5.0
11/5/2019	79	<10	14	<5.0
11/12/2019	50	<10	8	<5.0
11/19/2019	24	<10	8	<5.0
11/25/2019	37	<10	12	<5.0
12/3/2019	24	<10	18	<5.0
12/10/2019	29	<10	10	<5.0
12/17/2019	22	<10	18	<5.0
12/23/2019	16	<10	23	<5.0
12/30/2019	16	<10	9	<5.0
1/7/2020	49	<10	10	<5.0
1/14/2020	27	<10	<5.0	<5.0
1/21/2020	24	<10	<5.0	<5.0
1/28/2020	12	<10	<5.0	<5.0
2/4/2020	14	<10	6	<5.0
2/10/2020	19	<10	11	<5.0
2/18/2020	12	<10	15	<5.0
2/25/2020	19	<10	6	<5.0
3/3/2020	15	<10	<5.0	<5.0
3/10/2020	<10	<10	<5.0	<5.0
3/17/2020	<10	<10	<5.0	<5.0
3/23/2020	10	<10	<5.0	<5.0
3/31/2020	<10	<10	<5.0	<5.0
4/7/2020	10	<10	<5.0	<5.0
4/14/2020	11	<10	<5.0	<5.0
4/21/2020	<10	<10	<5.0	<5.0
4/28/2020	11	<10	<5.0	<5.0

Analyte	Iron		Manganese	
Units	ug/L		ug/L	
MCL	300		50	
DLR	100		20	
Date	Plant Influent	Delivered Water	Plant Influent	Delivered Water
5/5/2020	10	<10	<5.0	<5.0
5/12/2020	12	<10	<5.0	<5.0
5/19/2020	19	<10	<5.0	<5.0
5/26/2020	13	<10	<5.0	<5.0
6/2/2020	12	<10	<5.0	<5.0
6/9/2020	18	<10	<5.0	<5.0
6/16/2020	<10	<20	<5.0	<5.0
6/23/2020	16	<20	<5.0	<5.0
6/30/2020	11	<10	<5.0	<5.0
7/7/2020	<10	<10	<5.0	<5.0
7/14/2020	10	<10	<5.0	<5.0
7/21/2020	21	<10	<5.0	<5.0
7/27/2020	<10	<10	<5.0	<5.0
8/4/2020	13	<10	<5.0	<5.0
8/11/2020	<10	<10	<5.0	<5.0
8/18/2020	<10	17	<5.0	<5.0
8/25/2020	<10	<10	<5.0	<5.0
9/1/2020	<10	<10	<5.0	<5.0
9/8/2020	<10	<10	<5.0	<5.0
9/15/2020	<10	<10	<5.0	<5.0
9/22/2020	<10	<10	<5.0	<5.0
9/29/2020	<10	<10	<5.0	<5.0
10/6/2020	<10	<10	<5.0	<5.0
10/13/2020	38	<10	5	<5.0
10/20/2020	34	<10	<5.0	<5.0
10/27/2020	19	<10	<5.0	<5.0
11/3/2020	26	<10	<5.0	<5.0
11/10/2020	50	<10	6	<5.0
11/17/2020	27	<10	17	<5.0
11/23/2020	17	<10	17	<5.0
12/1/2020	10	<10	20	<5.0
12/7/2020	18	<10	23	<5.0
12/15/2020	28	<10	13	<5.0
12/22/2020	32	<10	6	<5.0
12/28/2020	21	<10	<5.0	<5.0
Minimum	**<10**	**<10**	**<5.0**	**<5.0**
Maximum	**1400**	**19**	**770**	**34**
Average	**68**	**<10**	**16**	**<5.0**

Analyte	Iron		Manganese	
Units	ug/L		ug/L	
MCL	300		50	
DLR	100		20	
Date	Plant Influent	Delivered Water	Plant Influent	Delivered Water
Median	33	<10	5	<5.0
n	260	261	260	261

APPENDIX Q: IRON AND MANGANESE WHALE ROCK RESERVOIR INTAKES

	Iron (ug/L)					Manganese (ug/L)				
Date	Surface	Intake #1	Intake #2	Intake #3	Intake #4	Surface	Intake #1	Intake #2	Intake #3	Intake #4
1/12/2016	-----	-----	-----	56	45	-----	-----	-----	5.6	5.6
1/27/2016	-----	-----	-----	79	160	-----	-----	-----	5.8	14
2/9/2016	-----	-----	-----	94	170	-----	-----	-----	6.9	7.7
2/23/2016	-----	-----	-----	140	180	-----	-----	-----	5.9	6.9
3/17/2016	-----	-----	-----	140	220	-----	-----	-----	7.1	13
3/29/2016	-----	-----	-----	79	140	-----	-----	-----	4.5	12
4/12/2016	-----	-----	-----	41	75	-----	-----	-----	2.1	8.5
4/26/2016	-----	-----	-----	63	120	-----	-----	-----	3.8	20
5/10/2016	-----	-----	-----	72	350	-----	-----	-----	72	350
5/24/2016	-----	-----	-----	79	260	-----	-----	-----	<5	44
6/14/2016	-----	-----	-----	62	220	-----	-----	-----	<5	180
6/28/2016	-----	-----	-----	52	240	-----	-----	-----	<5	230
7/12/2016	-----	-----	-----	190	200	-----	-----	-----	4.9	360
7/26/2016	-----	-----	-----	67	94	-----	-----	-----	3.6	400
8/9/2016	-----	-----	-----	58	120	-----	-----	-----	4.2	440
8/23/2016	-----	-----	-----	95	76	-----	-----	-----	4.8	480
9/27/2016	-----	-----	-----	94	160	-----	-----	-----	5.1	510
10/11/2016	-----	-----	-----	120	94	-----	-----	-----	7.7	630
10/25/2016	-----	-----	-----	49	89	-----	-----	-----	17	230
11/14/2016	-----	-----	-----	68	100	-----	-----	-----	12	14
11/29/2016	-----	-----	-----	140	92	-----	-----	-----	42	43
12/13/2016	-----	-----	-----	70	160	-----	-----	-----	7.6	23
1/10/2017	-----	-----	-----	1700	560	-----	-----	-----	39	20
1/26/2017	-----	-----	560	550	500	-----	-----	13	14	16
2/14/2017	-----	-----	350	260	430	-----	-----	9.3	9.4	23
2/28/2017	-----	170	160	170	300	-----	<5.0	<5.0	6.2	15
3/14/2017	-----	140	160	190	290	-----	5.6	7.6	8.1	14
3/28/2017	-----	50	66	91	240	-----	<5.0	<5.0	<5.0	14
4/11/2017	-----	55	47	67	260	-----	5.4	<5.0	<5.0	49
4/25/2017	-----	82	42	55	120	-----	<5.0	<5.0	5.4	19
5/9/2017	-----	110	67	65	93	-----	<5.0	7.8	7.5	19
5/23/2017	-----	47	47	44	53	-----	<5.0	7.9	8.5	28
6/13/2017	-----	46	71	260	67	-----	<5.0	17	22	89
6/27/2017	-----	19	28	51	58	-----	7.4	22	50	<5.0
7/11/2017	-----	15	25	42	52	-----	<5.0	6.2	12	60
7/25/2017	-----	10	19	42	39	-----	<5.0	14	12	58

	Iron (ug/L)					Manganese (ug/L)				
Date	Surface	Intake #1	Intake #2	Intake #3	Intake #4	Surface	Intake #1	Intake #2	Intake #3	Intake #4
8/15/2017	-----	31	65	45	39	-----	<5.0	27	14	94
8/29/2017	-----	30	28	110	45	-----	<5.0	36	20	180
9/12/2017	-----	34	31	86	47	-----	<5.0	55	79	220
9/26/2017	-----	27	28	67	48	-----	73	160	310	30
10/10/2017	-----	28	52	63	55	-----	<5.0	6	110	280
10/31/2017	-----	28	33	41	59	-----	6	7.6	150	290
11/17/2017	-----	<2.3	63.2	75.8	57.4	-----	3.59	5.01	37.8	310
12/12/2017	-----	345	200	240	201	-----	59	30	32	36
12/26/2017	-----	158	116	101	78.1	-----	10	9.4	9.4	8.7
1/9/2018	-----	70	76	100	160	-----	<5.0	<5.0	5.6	9.5
1/31/2018	-----	93	84	110	130	-----	6.6	5.9	6.9	8
2/16/2018	-----	48	45	43	70	-----	4.2	4.3	4.3	8
2/27/2018	-----	62	52	67	98	-----	6.2	<5.0	<5.0	<5.0
3/12/2018	-----	30	45	52	78	-----	<5.0	<5.0	<5.0	<5.0
3/27/2018	-----	226	224	146	288	-----	6	6.1	5.1	8.8
4/10/2018	-----	94	170	160	230	-----	5.3	<5.0	6.2	16
4/24/2018	-----	39	70	92	180	-----	<5.0	<5.0	<5.0	15
5/15/2018	-----	50	48	67	150	-----	<5.0	<5.0	<5.0	10
5/29/2018	-----	33	55	39	230	-----	<5.0	<5.0	<5.0	15
6/12/2018	-----	45	82	60	270	-----	<5.0	<5.0	<5.0	22
6/26/2018	-----	24	53	100	250	-----	<5.0	<5.0	6.5	12
7/10/2018	-----	27	98	200	440	-----	<5.0	7.6	9.8	110
7/24/2018	-----	14	36	140	360	-----	<5.0	<5.0	7.7	130
8/28/2018	-----	15	45	88	94	-----	<5.0	7.8	9.9	32
9/11/2018	-----	28	26	130	56	-----	<5.0	<5.0	10	37
9/24/2018	-----	15	28	57	34	-----	<5.0	5.3	12	16
10/9/2018	-----	15	32	50	46	-----	<5.0	9	20	82
10/30/2018	-----	23	26	27	32	-----	<5.0	<5.0	100	520
11/13/2018	-----	62	71	34	32	-----	6.4	6.3	130	350
11/27/2018	-----	33	50	52	33	-----	<5.0	5.5	10	370
1/8/2019	-----	170	12	31	32	-----	170	< 5.0	5.8	7.5
1/29/2019	-----	45	53	89	77	-----	< 5.0	< 5.0	5.8	6.2
2/26/2019	-----	65	61	68	100	-----	< 5.0	< 5.0	< 5.0	9.6
3/12/2019	-----	61	44	53	53	-----	< 5.0	< 5.0	< 5.0	6.6
3/26/2019	-----	23	46	62	75	-----	< 5.0	< 5.0	5.1	11
4/9/2019	-----	31	25	41	57	-----	5.9	< 5.0	< 5.0	11
4/23/2019	-----	23	21	66	51	-----	5.1	< 5.0	28	5.9
5/14/2019	-----	21	35	35	68	-----	< 5.0	5.1	< 5.0	16

	Iron (ug/L)					Manganese (ug/L)				
Date	Surface	Intake #1	Intake #2	Intake #3	Intake #4	Surface	Intake #1	Intake #2	Intake #3	Intake #4
5/28/2019	-----	27	26	42	57	-----	< 5.0	8.5	23	70
6/11/2019	-----	17	22	35	67	-----	< 5.0	11	23	170
6/25/2019	-----	12	19	25	35	-----	< 5.0	9.9	62	110
7/9/2019	-----	18	21	25	160	-----	< 5.0	9.5	34	220
7/23/2019	-----	< 10	14	36	33	-----	5.7	8.7	34	110
8/13/2019	-----	23	22	38	19	-----	< 5.0	6.3	28	250
8/27/2019	-----	11	11	18	15	-----	< 5.0	8.9	16	54
9/10/2019	-----	13	15	19	< 10	-----	< 5.0	7.3	55	530
9/24/2019	-----	21	20	26	11	-----	< 5.0	47	45	340
10/15/2019	-----	33	27	13	14	-----	< 5.0	8.9	120	390
10/24/2019	-----	48	41	20	23	-----	< 5.0	< 5.0	180	400
11/12/2019	-----	27	29	17	21	-----	5.2	5.6	270	350
11/25/2019	-----	40	39	43	26	-----	10	9.6	58	440
12/10/2019	-----	41	37	37	21	-----	9.9	9.7	21	690
12/24/2019	-----	30	26	34	29	-----	43	37	44	41
1/29/2020	-----	25	30	24	30	-----	< 5.0	< 5.0	11	24
2/10/2020	-----	31	31	32	50	-----	15	16	30	74
2/26/2020	-----	17	25	34	33	-----	6.3	9.3	25	42
Average	**-----**	**52**	**65**	**100**	**128**	**-----**	**7**	**10**	**29**	**131**
Max	**-----**	**345**	**560**	**1700**	**560**	**-----**	**170**	**160**	**310**	**690**
Median	**-----**	**31**	**43**	**63**	**78**	**-----**	**6**	**9**	**12**	**39**
Min	**-----**	**<10**	**11**	**13**	**<10**	**-----**	**<5**	**<5**	**<5**	**6**
n	**-----**	**66**	**69**	**92**	**92**	**-----**	**66**	**69**	**92**	**92**

APPENDIX R: PHYSICAL DATA - TEMPERATURE, ODOR, COLOR, TURBIDITY

Analyte (units)	Temperature (° C)			Odor (TON)			Apparent Color (PCU)			Turbidity (NTU)		
Site	Plant Influent	Delivered Water	CAWO Well	Plant Influent	Delivered Water	CAWO Well	Raw Water	Delivered Water	CAWO Well	Plant Influent	Delivered Water	CAWO Well
1/5/2016	12.0	13.0	-----	3	1	-----	5	<1	-----	2.9	0.14	-----
1/12/2016	9.8	10.0	-----	2	2	-----	4	<1	-----	1.7	0.16	-----
1/19/2016	12.0	12.0	-----	3	2	-----	5	<1	-----	1.8	0.07	-----
1/26/2016	10.4	10.8	-----	3	1	-----	5	<1	-----	2.0	0.07	-----
2/2/2016	12.0	12.0	18.0	1	2	1	6	<1	<1	2.4	0.2	0.07
2/9/2016	12.9	13.9	-----	4	2	-----	5	<1	-----	1.9	0.08	-----
2/17/2016	13.0	14.0	-----	4	2	-----	6	<1	-----	2.3	0.08	-----
2/23/2016	15.1	15.6	-----	4	1	-----	3	<1	-----	0.9	0.06	-----
3/1/2016	15.0	15.0	-----	4	2	-----	15	<1	-----	6.7	0.15	-----
3/8/2016	15.0	15.0	-----	4	2	-----	4	<1	-----	1.2	0.07	-----
3/15/2016	15.2	15.2	-----	3.3	1.2	-----	7.0	<1	-----	2.5	0.1	-----
3/22/2016	15.0	15.5	-----	4	2	-----	17	<1	-----	7.5	0.09	-----
3/29/2016	17.1	17.0	-----	5	1	-----	5	<1	-----	1.4	0.08	-----
4/5/2016	15.8	16.9	-----	2	1	-----	4	1	-----	0.6	0.06	-----
4/12/2016	16.1	16.0	-----	3	1	-----	4	<1	-----	0.8	0.04	-----
4/19/2016	18.0	18.0	-----	5	1	-----	8	<1	-----	2.8	0.06	-----
4/26/2016	19.0	20.0	-----	3	1	-----	4	<1	-----	1.3	0.05	-----
5/3/2016	18.0	18.0	18.0	2	2	1	4	<1	<1	1.4	0.05	0.15
5/10/2016	19.3	19.9	-----	2	4	-----	7	<1	-----	3.0	0.09	-----
5/17/2016	19.5	19.0	-----	2	1	-----	14	<1	-----	6.3	0.05	-----
5/24/2016	19.9	20.0	-----	3	1	-----	9	<1	-----	4.7	0.08	-----
6/1/2016	20.0	20.0	-----	4	1	-----	4	<1	-----	7.6	0.07	-----
6/7/2016	21.0	20.5	-----	2	2	-----	1	2	-----	2.0	0.09	-----
6/14/2016	21.4	21.7	-----	2	1	-----	5	<1	-----	2.5	0.06	-----

Analyte (units)	Temperature (° C)			Odor (TON)			Apparent Color (PCU)			Turbidity (NTU)		
Site	Plant Influent	Delivered Water	CAWO Well	Plant Influent	Delivered Water	CAWO Well	Raw Water	Delivered Water	CAWO Well	Plant Influent	Delivered Water	CAWO Well
6/21/2016	21.5	21.0	-----	7	1	-----	14	<1	-----	7.8	0.07	-----
6/28/2016	20.8	20.9	-----	7	1	-----	3	<1	-----	1.2	0.07	-----
7/6/2016	22.0	22.0	-----	4	2	-----	11	<1	-----	5.5	0.06	-----
7/12/2016	22.4	22.3	-----	4	2	-----	3	1	-----	0.5	0.05	-----
7/19/2016	22.0	22.0	-----	4	1	-----	7	<1	-----	3.5	0.08	-----
7/26/2016	21.0	21.0	-----	2	2	-----	5	<1	-----	2.3	0.09	-----
8/2/2016	23.0	22.5	18.3	5	1	1	13	<1	<1	7.4	0.09	0.33
8/9/2016	22.5	22.4	-----	2.5	1.5	-----	5.0	<1	-----	2.3	0.1	-----
8/16/2016	22.1	21.9	-----	6	2	-----	6	<1	-----	2.2	0.07	-----
8/23/2016	21.0	20.9	-----	4	2	-----	9	1	-----	3.6	0.09	-----
8/30/2016	20.5	20.6	-----	4	1	-----	8	1	-----	3.1	0.05	-----
9/6/2016	20.1	20.3	-----	2	1	-----	7	<1	-----	2.3	0.11	-----
9/13/2016	19.9	19.8	-----	1	3	-----	4	1	-----	0.7	0.09	-----
9/20/2016	20.4	20.2	-----	2	1	-----	5	1	-----	0.1	0.06	-----
9/27/2016	21.8	22.5	-----	3	2	-----	6	1	-----	1.8	0.09	-----
10/4/2016	18.9	19.3	-----	2	1	-----	7	1	-----	3.4	0.06	-----
10/11/2016	20.0	20.1	-----	3	2	-----	4	1	-----	2.9	0.06	-----
10/18/2016	18.2	18.3	-----	4	1	-----	5	1	-----	1.1	0.09	-----
10/25/2016	17.6	17.9	-----	3	2	-----	4	1	-----	1.0	0.09	-----
11/1/2016	19.1	19.2	-----	3	2	-----	4	1	-----	0.8	0.07	-----
11/8/2016	17.1	17.5	17.4	4	2	1	5	<1	1	1.6	0.06	0.11
11/14/2016	17.0	17.2	-----	3	2	-----	3	1	-----	0.5	0.06	-----
11/21/2016	17.0	17.0	-----	1	ND	-----	4	<1	-----	1.6	0.1	-----
11/29/2016	16.1	16.3	-----	3	1	-----	12	<1	-----	4.9	0.07	-----
12/7/2016	14.3	15.1	-----	4	2	-----	17	1	-----	7.9	0.14	-----

Analyte (units)	Temperature (° C)			Odor (TON)			Apparent Color (PCU)			Turbidity (NTU)		
Site	Plant Influent	Delivered Water	CAWO Well	Plant Influent	Delivered Water	CAWO Well	Raw Water	Delivered Water	CAWO Well	Plant Influent	Delivered Water	CAWO Well
12/13/2016	13.3	14.0	-----	3	1	-----	5	1	-----	1.6	0.09	-----
12/20/2016	14.0	14.0	-----	2	1	-----	12	<1	-----	6.0	0.07	-----
12/27/2016	12.5	13.7	-----	2	2	-----	14	3	-----	5.8	0.05	-----
1/3/2017	10.3	12.5	-----	2	1	-----	8	1	-----	2.8	0.1	-----
1/10/2017	12.2	13.1	-----	4	1	-----	57	1	-----	22.0	0.13	-----
1/17/2017	12.0	12.0	-----	2	1	-----	29	1	-----	10.0	0.13	-----
1/24/2017	12.0	11.5	-----	2	2	-----	50	1	-----	18.0	0.12	-----
1/31/2017	11.9	13.1	-----	3	1	-----	3	1	-----	11.0	0.11	-----
2/7/2017	10.5	11.8	17.7	2	1	1	30	4	4	8.9	0.1	0.11
2/14/2017	12.5	13.2	-----	4	2	-----	25	4	-----	6.5	0.09	-----
2/21/2017	13.9	13.4	-----	2	2	-----	20	2	-----	6.8	0.26	-----
2/28/2017	12.9	13.1	-----	2	1	-----	19	3	-----	4.3	0.15	-----
3/7/2017	12.3	13.4	-----	2	1	-----	9	1	-----	3.6	0.21	-----
3/14/2017	12.8	13.7	-----	3	1	-----	23	2	-----	7.2	0.21	-----
3/20/2017	13.8	14.5	-----	2	1	-----	10	<1	-----	3.2	0.28	-----
3/28/2017	13.0	13.5	-----	2	1	-----	8	2	-----	2.8	0.18	-----
4/4/2017	14.0	15.0	-----	4	1	-----	15	<1	-----	3.8	0.09	-----
4/11/2017	12.9	13.6	-----	1	2	-----	13	<1	-----	3.1	0.12	-----
4/18/2017	13.0	15.0	-----	3	1	-----	9	<1	-----	2.8	0.08	-----
4/25/2017	13.0	14.0	-----	3	2	-----	4	<1	-----	2.1	0.16	-----
5/2/2017	13.0	14.6	18.0	2	1	1	10	<1	<1	1.7	0.068	0.072
5/9/2017	13.0	14.0	-----	6	1	-----	9	<1	-----	1.6	0.09	-----
5/16/2017	13.0	14.5	-----	4	1	-----	8	1	-----	1.3	0.14	-----
5/23/2017	13.0	14.7	-----	3	2	-----	10	<1	-----	1.7	0.19	-----
5/30/2017	13.0	14.2	-----	2	1	-----	8	<1	-----	1.5	0.24	-----

Analyte (units)	Temperature (° C)			Odor (TON)			Apparent Color (PCU)			Turbidity (NTU)		
Site	Plant Influent	Delivered Water	CAWO Well	Plant Influent	Delivered Water	CAWO Well	Raw Water	Delivered Water	CAWO Well	Plant Influent	Delivered Water	CAWO Well
6/6/2017	14.2	15.9	-----	3	2	-----	10	<1	-----	1.8	0.12	-----
6/13/2017	14.6	15.8	-----	3	1	-----	8	<1	-----	1.0	0.12	-----
6/20/2017	15.1	17.2	-----	15	1	-----	9	2	-----	1.0	0.1	-----
6/27/2017	15.2	16.2	-----	30	1	-----	9	<1	-----	0.6	0.1	-----
7/3/2017	14.7	16.7	-----	7	1	-----	8	1	-----	0.1	0.08	-----
7/11/2017	15.4	17.0	-----	6	3	-----	9	1	-----	0.8	0.13	-----
7/18/2017	15.1	16.2	-----	10	1	-----	9	<1	-----	1.0	0.07	-----
7/25/2017	16.5	17.8	-----	50	2	-----	6	<1	-----	1.2	0.11	-----
8/1/2017	16.2	16.1	-----	45	1	-----	9	<1	-----	1.2	0.1	-----
8/8/2017	15.4	17.0	18.3	7	2	1	9	<1	1	1.5	0.06	0.20
8/15/2017	16.0	16.6	-----	50	1	-----	15	<1	-----	2.9	0.08	-----
8/22/2017	16.3	17.8	-----	50	2	-----	15	1	-----	3.5	0.14	-----
8/29/2017	16.4	17.9	-----	15	2	-----	9	<1	-----	1.9	0.05	-----
9/5/2017	16.5	17.4	-----	6	3	-----	9	<1	-----	1.7	0.09	-----
9/12/2017	18.1	19.0	-----	4	1	-----	12	<1	-----	2.1	0.06	-----
9/19/2017	17.0	18.0	-----	18	2	-----	11	<1	-----	1.8	0.07	-----
9/26/2017	16.6	18.3	-----	15	1	-----	9	1	-----	1.9	0.06	-----
10/3/2017	18.7	18.6	-----	4	1	-----	7	<1	-----	1.0	0.08	-----
10/10/2017	17.8	19.7	-----	4	1	-----	5	<1	-----	0.7	0.12	-----
10/17/2017	18.5	18.8	-----	7	2	-----	7	<1	-----	2.1	0.16	-----
10/24/2017	18.2	19.3	-----	2	1	-----	5	<1	-----	1.4	0.2	-----
10/31/2017	17.1	16.8	-----	4	1	-----	6	1	-----	0.8	0.08	-----
11/7/2017	16.5	16.4	17.9	3	1	1	6	<1	<1	1.0	0.14	0.08
11/14/2017	16.4	16.5	-----	4	1	-----	5	<1	-----	0.9	0.08	-----
11/20/2017	16.0	16.0	-----	4	1	-----	6	<1	-----	1.1	0.06	-----

Analyte (units)	Temperature (° C)			Odor (TON)			Apparent Color (PCU)			Turbidity (NTU)		
Site	Plant Influent	Delivered Water	CAWO Well	Plant Influent	Delivered Water	CAWO Well	Raw Water	Delivered Water	CAWO Well	Plant Influent	Delivered Water	CAWO Well
11/28/2017	15.8	16.3	-----	4	1	-----	7	<1	-----	1.5	0.1	-----
12/5/2017	14.0	14.1	-----	4	1	-----	8	1	-----	2.3	0.11	-----
12/12/2017	13.5	14.7	-----	1	ND	-----	10	2	-----	3.2	0.16	-----
12/19/2017	12.7	13.0	-----	3	1	-----	8	<1	-----	2.7	0.21	-----
12/26/2017	12.5	13.6	-----	3	2	-----	8	1	-----	2.8	0.1	-----
1/2/2018	12.0	13.0	-----	3	ND	-----	6	1	-----	2.5	0.14	-----
1/9/2018	12.1	12.7	-----	3	1	-----	8	2	-----	1.6	0.16	-----
1/16/2018	12.3	13.2	-----	3	2	-----	1	<1	-----	2.4	0.07	-----
1/23/2018	12.3	12.9	-----	4	2	-----	7	1	-----	1.4	0.07	-----
1/30/2018	12.9	13.7	-----	5	2	-----	8	2	-----	3.0	0.2	-----
2/6/2018	13.2	14.5	19.1	4	3	2	2	1	2	4.2	0.08	0.17
2/13/2018	12.5	12.8	-----	4	3	-----	7	1	-----	2.1	0.08	-----
2/20/2018	12.4	12.6	-----	4	3	-----	6	6	-----	1.2	0.06	-----
2/27/2018	12.3	12.0	-----	3	2	-----	6	1	-----	1.0	0.15	-----
3/6/2018	12.3	13.1	-----	6	3	-----	6	1	-----	1.5	0.07	-----
3/12/2018	12.8	13.3	-----	3	3	-----	5	1	-----	0.8	0.09	-----
3/19/2018	13.0	13.4	-----	4	2	-----	5	1	-----	0.6	0.09	-----
3/26/2018	13.3	14.0	-----	4	3	-----	11	1	-----	4.2	0.08	-----
4/3/2018	13.1	14.1	-----	3	2	-----	10	2	-----	3.1	0.06	-----
4/10/2018	13.7	15.1	-----	3	2	-----	9	<1	-----	3.3	0.04	-----
4/17/2018	13.7	14.6	-----	3	2	-----	7	1	-----	1.6	0.06	-----
4/24/2018	13.8	14.4	-----	3	2	-----	6	<1	-----	1.1	0.05	-----
5/1/2018	14.5	14.9	-----	4	3	-----	8	<1	-----	1.8	0.05	-----
5/8/2018	14.1	14.7	18.1	3	1	1	7	<1	1	1.5	0.09	0.09
5/15/2018	14.8	16.2	-----	4	3	-----	7	1	-----	1.0	0.05	-----

Analyte (units)	Temperature (° C)			Odor (TON)			Apparent Color (PCU)			Turbidity (NTU)		
Site	Plant Influent	Delivered Water	CAWO Well	Plant Influent	Delivered Water	CAWO Well	Raw Water	Delivered Water	CAWO Well	Plant Influent	Delivered Water	CAWO Well
5/22/2018	14.6	15.5	-----	4	2	-----	7	<1	-----	1.2	0.08	-----
5/29/2018	14.9	15.9	-----	4	3	-----	7	<1	-----	1.3	0.07	-----
6/5/2018	14.9	15.6	-----	3	2	-----	6	1	-----	0.8	0.09	-----
6/12/2018	15.2	16.2	-----	3	2	-----	6	<1	-----	0.9	0.06	-----
6/19/2018	14.8	15.8	-----	3	2	-----	6	<1	-----	1.4	0.07	-----
6/26/2018	15.1	15.6	-----	4	1	-----	7	1	-----	1.6	0.07	-----
7/2/2018	18.0	16.8	-----	4	2	-----	6	<1	-----	1.2	0.06	-----
7/10/2018	15.2	16.5	-----	3	1	-----	9	1	-----	3.2	0.05	-----
7/17/2018	16.0	16.8	-----	4	ND	-----	6	<1	-----	0.7	0.08	-----
7/24/2018	16.2	17.4	-----	4	1	-----	6	<1	-----	0.6	0.09	-----
7/31/2018	15.9	16.6	-----	4	1	-----	6	<1	-----	0.7	0.09	-----
8/7/2018	17.0	18.2	18.7	2	1	1.0	7	1	1.0	1.9	0.07	0.05
8/14/2018	17.3	18.0	-----	4	1	-----	6	<1	-----	0.8	0.07	-----
8/21/2018	16.3	16.9	-----	4	1	-----	6	<1	-----	0.6	0.09	-----
8/28/2018	18.2	18.6	-----	3	1	-----	8	<1	-----	2.2	0.05	-----
9/4/2018	18.6	18.1	-----	3	1	-----	6	<1	-----	1.6	0.11	-----
9/11/2018	17.9	17.8	-----	3	1	-----	6	<1	-----	1.7	0.09	-----
9/18/2018	19.5	19.8	-----	4	1	-----	5	<1	-----	1.5	0.06	-----
9/24/2018	19.0	18.0	-----	1	1	-----	4	<1	-----	0.4	0.09	-----
10/2/2018	19.1	18.6	-----	2	1	-----	3	<1	-----	0.3	0.06	-----
10/9/2018	20.0	19.5	-----	1	1	-----	3	1	-----	0.5	0.06	-----
10/16/2018	19.4	19.4	-----	2	1	-----	4	1	-----	0.5	0.09	-----
10/23/2018	18.5	18.4	-----	2	1	-----	4	<1	-----	0.5	0.09	-----
10/30/2018	18.3	18.2	-----	2	1	-----	4	<1	-----	0.6	0.07	-----
11/5/2018	18.6	17.8	18.0	3	2	1	5	1	1	1.1	0.06	0.05

Analyte (units)	Temperature (° C)			Odor (TON)			Apparent Color (PCU)			Turbidity (NTU)		
Site	Plant Influent	Delivered Water	CAWO Well	Plant Influent	Delivered Water	CAWO Well	Raw Water	Delivered Water	CAWO Well	Plant Influent	Delivered Water	CAWO Well
11/13/2018	15.5	15.8	-----	1	1	-----	6	1	-----	1.5	0.06	-----
11/19/2018	14.9	15.1	-----	1	1	-----	4	<1	-----	0.8	0.1	-----
11/27/2018	15.0	15.1	-----	2	1	-----	4	<1	-----	0.5	0.07	-----
12/4/2018	14.4	14.5	-----	2	1	-----	3	<1	-----	0.5	0.14	-----
12/11/2018	13.9	13.9	-----	3	1	-----	4	<1	-----	0.6	0.09	-----
12/18/2018	13.5	13.7	-----	3	1	-----	4	<1	-----	0.6	0.07	-----
12/26/2018	13.3	13.4	-----	4	ND	-----	4	<1	-----	1.0	0.05	-----
1/2/2019	12.5	12.3	-----	3	1	-----	4	<1	-----	0.7	0.06	-----
1/8/2019	11.9	12.6	-----	2	2	-----	4	1	-----	1.2	0.1	-----
1/15/2019	12.7	13.2	-----	2	1	-----	4	1	-----	0.5	0.29	-----
1/22/2019	12.2	12.6	-----	2	1	-----	6	1	-----	1.4	0.08	-----
1/29/2019	12.4	13.8	-----	4	1	-----	5	1	-----	1.0	0.048	-----
2/5/2019	10.0	13.5	-----	3	2	-----	6	<1	-----	2.2	0.07	-----
2/13/2019	11.9	11.9	-----	3	1	-----	6	<1	-----	2.0	0.07	-----
2/19/2019	12.0	11.7	-----	4	1	-----	6	<1	-----	1.7	0.05	-----
2/26/2019	13.6	13.6	-----	2	2	-----	6	1	-----	1.5	0.19	-----
3/5/2019	12.0	12.9	-----	3	1	-----	5	<1	-----	1.2	0.1	-----
3/12/2019	12.2	12.6	-----	2	1	-----	6	<1	-----	1.7	0.06	-----
3/18/2019	12.5	13.5	-----	4	ND	-----	7	<1	-----	2.2	0.05	-----
3/26/2019	12.6	13.2	-----	3	1	-----	7	<1	-----	1.9	0.06	-----
4/2/2019	12.8	13.8	-----	2	1	-----	6	<1	-----	1.4	0.06	-----
4/9/2019	12.8	13.9	-----	3	ND	-----	6	<1	-----	1.0	0.12	-----
4/16/2019	12.8	13.7	-----	2	1	-----	5	1	-----	0.5	0.09	-----
4/23/2019	12.8	13.2	-----	2	2	-----	5	<1	-----	0.4	0.08	-----
4/30/2019	12.9	13.5	-----	2	1	-----	7	<1	-----	1.1	0.07	-----

Analyte (units)	Temperature (° C)			Odor (TON)			Apparent Color (PCU)			Turbidity (NTU)		
Site	Plant Influent	Delivered Water	CAWO Well	Plant Influent	Delivered Water	CAWO Well	Raw Water	Delivered Water	CAWO Well	Plant Influent	Delivered Water	CAWO Well
5/7/2019	12.7	13.8	-----	3	ND	-----	7	<1	-----	2.6	0.2	-----
5/14/2019	12.1	13.9	18.0	2	1	1	6	<1	1	1.2	0.08	0.16
5/21/2019	13.0	13.8	-----	3	1	-----	6	<1	-----	0.8	0.06	-----
5/28/2019	13.1	13.8	-----	2	2	-----	6	<1	-----	0.8	0.08	-----
6/4/2019	13.6	14.1	-----	2	ND	-----	5	<1	-----	0.8	0.078	-----
6/11/2019	14.0	15.1	-----	5	ND	-----	6	<1	-----	0.8	0.07	-----
6/18/2019	13.7	14.1	-----	2	2	-----	5	<1	-----	0.9	0.11	-----
6/25/2019	13.6	14.3	-----	2	ND	-----	5	<1	-----	0.8	0.08	-----
7/1/2019	13.8	14.6	-----	4	1	-----	5	<1	-----	0.5	0.11	-----
7/9/2019	14.6	14.7	-----	2	3	-----	6	<1	-----	1.2	0.06	-----
7/15/2019	13.9	14.2	-----	3	ND	-----	5	<1	-----	2.3	0.11	-----
7/23/2019	13.7	14.2	-----	3	ND	-----	6	<1	-----	1.1	0.12	-----
7/30/2019	14.2	14.5	-----	4	ND	-----	5	<1	-----	0.4	0.09	-----
8/6/2019	13.8	14.6	-----	4	ND	-----	5	<1	-----	0.8	0.06	-----
8/13/2019	14.2	14.9	-----	4	1	-----	7	<1	-----	1.9	0.05	-----
8/20/2019	14.0	14.3	-----	6	1	-----	6	<1	-----	0.9	0.09	-----
8/27/2019	14.1	14.8	-----	10	1	-----	6	<1	-----	0.6	0.1	-----
9/4/2019	14.6	14.9	-----	7	1	-----	7	<1	-----	1.0	0.09	-----
9/10/2019	14.4	15.1	-----	4	1	-----	6	<1	-----	0.9	0.11	-----
9/17/2019	14.1	15.1	-----	3	ND	-----	6	<1	-----	1.1	0.16	-----
9/24/2019	14.5	16.1	-----	4	1	-----	7	<1	-----	1.4	0.06	-----
10/1/2019	14.5	15.3	-----	4	1	-----	7	<1	-----	1.7	0.05	-----
10/7/2019	14.6	16.2	-----	4	2	-----	8	<1	-----	2.7	0.12	-----
10/15/2019	17.6	16.1	-----	2	1	-----	7	<1	-----	0.8	0.075	-----
10/22/2019	17.8	18.0	-----	2	ND	-----	4	<1	-----	2.9	0.07	-----

Analyte (units)	Temperature (° C)			Odor (TON)			Apparent Color (PCU)			Turbidity (NTU)		
Site	Plant Influent	Delivered Water	CAWO Well	Plant Influent	Delivered Water	CAWO Well	Raw Water	Delivered Water	CAWO Well	Plant Influent	Delivered Water	CAWO Well
10/29/2019	16.5	16.6	-----	4	2	-----	4	<1	-----	1.3	0.14	-----
11/5/2019	15.4	15.2	-----	4	1	-----	6	<1	-----	2.5	0.09	-----
11/12/2019	15.2	15.5	-----	4	1	-----	5	<1	-----	1.6	0.13	-----
11/19/2019	15.4	15.7	-----	3	1	-----	4	<1	-----	0.8	0.13	-----
11/25/2019	14.8	15.4	-----	4	1	-----	5	<1	-----	1.3	0.08	-----
12/3/2019	13.7	14.5	-----	4	1	-----	5	2	-----	0.9	0.11	-----
12/10/2019	13.6	13.8	-----	4	2	-----	4	<1	-----	1.1	0.30	-----
12/17/2019	13.0	12.9	-----	4	ND	-----	5	<1	-----	1.3	0.11	-----
12/23/2019	13.1	12.9	-----	3	ND	-----	4	<1	-----	0.8	0.05	-----
12/30/2019	13.1	12.9	-----	3	1	-----	4	<1	-----	0.8	0.05	-----
1/7/2020	12.6	13.1	-----	4	1	-----	4	<1	-----	4.4	0.07	-----
1/14/2020	12.0	12.0	-----	4	ND	-----	4	<1	-----	1.3	0.08	-----
1/21/2020	11.4	11.7	-----	4	1	-----	5	<1	-----	1.7	0.05	-----
1/28/2020	12.0	12.2	-----	4	1	-----	4	<1	-----	1.4	0.06	-----
2/4/2020	11.8	11.6	-----	4	ND	-----	4	<1	-----	4.8	0.06	-----
2/10/2020	11.7	11.9	-----	4	1	-----	5	<1	-----	1.4	0.07	-----
2/18/2020	12.0	12.2	-----	2	2	-----	4	1	-----	3.7	0.19	-----
2/25/2020	12.7	14.4	-----	3	1	-----	5	<1	-----	1.5	0.06	-----
3/3/2020	12.8	13.1	-----	4	1	-----	3	<1	-----	1.3	0.10	-----
3/10/2020	12.8	13.4	-----	4	1	-----	3	<1	-----	0.7	0.07	-----
3/17/2020	13.1	12.8	-----	3	1	-----	3	<1	-----	8.8	0.10	-----
3/23/2020	13.4	13.8	-----	4	2	-----	3	<1	-----	0.5	0.10	-----
3/31/2020	13.5	14.1	-----	3	1	-----	3	<1	-----	3.0	0.06	-----
4/7/2020	13.4	13.5	-----	2	2	-----	3	<1	-----	2.5	0.05	-----
4/14/2020	13.4	13.7	-----	4	1	-----	3	<1	-----	1.1	0.06	-----

Analyte (units)	Temperature (° C)			Odor (TON)			Apparent Color (PCU)			Turbidity (NTU)		
Site	Plant Influent	Delivered Water	CAWO Well	Plant Influent	Delivered Water	CAWO Well	Raw Water	Delivered Water	CAWO Well	Plant Influent	Delivered Water	CAWO Well
4/21/2020	13.7	14.7	-----	3	1	-----	3	<1	-----	1.1	0.06	-----
4/28/2020	13.7	14.3	-----	3	ND	-----	3	<1	-----	0.9	0.08	-----
5/5/2020	14.1	14.8	-----	2	1	-----	4	<1	-----	1.0	0.07	-----
5/12/2020	14.2	15.4	18.0	4	1	1	4	<1	1	1.2	0.07	0.92
5/19/2020	14.1	15.0	-----	4	ND	-----	4	1	-----	3.9	0.09	-----
5/26/2020	14.5	16.3	-----	3	ND	-----	4	<1	-----	1.4	0.07	-----
6/2/2020	14.4	15.3	-----	3	1	-----	4	<1	-----	2.1	0.14	-----
6/9/2020	15.1	15.3	-----	4	2	-----	3	<1	-----	1.2	0.11	-----
6/16/2020	14.8	15.4	-----	3	1	-----	4	<1	-----	3.1	0.07	-----
6/23/2020	15.0	16.3	-----	3	2	-----	4	<1	-----	1.0	0.07	-----
6/30/2020	15.1	15.7	-----	1	1	-----	4	1	-----	3.4	0.15	-----
7/7/2020	15.4	15.9	-----	2	1	-----	3	<1	-----	3.3	0.07	-----
7/14/2020	15.7	15.8	-----	1	2	-----	4	<1	-----	1.5	0.11	-----
7/21/2020	15.6	16.7	-----	4	ND	-----	3	<1	-----	3.2	0.13	-----
7/27/2020	16.3	16.7	-----	2	1	-----	3	<1	-----	1.2	0.09	-----
8/4/2020	16.7	17.0	-----	3	ND	-----	2	<1	-----	9.5	0.09	-----
8/11/2020	17.9	17.7	-----	3	2	-----	4	<1	-----	1.2	0.21	-----
8/18/2020	17.4	18.0	-----	3	ND	-----	3	<1	-----	1.6	0.07	-----
8/25/2020	17.6	18.0	-----	3	1	-----	4	1	-----	1.5	0.07	-----
9/1/2020	18.5	18.3	-----	2	2	-----	7	<1	-----	13.0	0.07	-----
9/8/2020	18.6	18.9	-----	3	2	-----	3	<1	-----	15.0	0.19	-----
9/15/2020	18.9	18.8	-----	4	2	-----	3	<1	-----	3.0	0.07	-----
9/22/2020	19.0	19.8	-----	4	1	-----	2	<1	-----	2.2	0.11	-----
9/29/2020	20.3	19.5	-----	2	1	-----	3	<1	-----	1.1	0.09	-----
10/6/2020	20.2	19.8	-----	3	1	-----	4	<1	-----	3.8	0.11	-----

Analyte (units)	Temperature (° C)			Odor (TON)			Apparent Color (PCU)			Turbidity (NTU)		
Site	**Plant Influent**	**Delivered Water**	**CAWO Well**	**Plant Influent**	**Delivered Water**	**CAWO Well**	**Raw Water**	**Delivered Water**	**CAWO Well**	**Plant Influent**	**Delivered Water**	**CAWO Well**
10/13/2020	20.6	21.1	-----	2	1	-----	2	<1	-----	1.8	0.07	-----
10/20/2020	19.8	19.4	-----	2	1	-----	3	<1	-----	2.5	0.08	-----
10/27/2020	18.9	19.0	-----	2	ND	-----	2	<1	-----	1.0	0.06	-----
11/3/2020	17.9	17.9	-----	4	2	-----	3	1	-----	2.4	0.07	-----
11/10/2020	16.0	16.0	-----	3	2	-----	4	<1	-----	1.6	0.07	-----
11/17/2020	14.9	15.5	-----	3	1	-----	4	<1	-----	0.8	0.06	-----
11/23/2020	14.5	15.1	-----	2	ND	-----	4	1	-----	0.5	0.10	-----
11/30/2020	13.8	13.9	-----	3	1	-----	4	<1	-----	0.8	0.17	-----
12/7/2020	13.4	13.3	-----	2	2	-----	3	<1	-----	0.6	0.10	-----
12/15/2020	12.3	12.1	-----	2	ND	-----	5	<1	-----	1.2	0.12	-----
12/22/2020	12.2	12.4	-----	3	ND	-----	5	1	-----	1.6	0.15	-----
12/28/2020	11.9	12.0	-----	2	ND	-----	4	<1	-----	0.6	0.07	-----
Min	**9.8**	**10.0**	**17.4**	**1**	**ND**	**1**	**1**	**<1**	**<1**	**0.07**	**0.04**	**0.05**
Max	**23.0**	**22.5**	**19.1**	**50**	**4**	**2**	**57**	**6**	**4**	**22**	**0.30**	**0.92**
Average	**15.2**	**15.7**	**18.1**	**4**	**1**	**1**	**7**	**<1**	**<1**	**2.3**	**0.09**	**0.18**
Median	**14.5**	**15.1**	**18.0**	**3**	**1**	**1**	**6**	**<1**	**<1**	**1.5**	**0.08**	**0.11**
n	**261**	**261**	**14**	**261**	**261**	**14**	**261**	**261**	**14**	**261**	**261**	**14**

APPENDIX S: GENERAL MINERALS DATA

	Bicarbonate as $CaCO_3$	Calcium	Aggressive Index	Calculated Langelier Index	Carbonate as $CaCO_3$	Chloride	Electrical Conductivity	Fluoride, Without Predistillation	Hydroxide as $CaCO_3$	Magnesium	Methylene Blue Active Substances	Nitrate as Nitrogen	Nitrate as NO_3	Nitrite as Nitrogen	pH (measured in field)	pH (measured in the Lab)	Sodium	Sulfate	Temperature	Total Alkalinity as CaCO3	Total Dissolved Solids	Total Hardness as CaCO3
	mg/L	mg/L			mg/L	mg/L	umhos/cm	mg/L	mg/L	mg/L	mg/L	ug/L	mg/L	mg/L			mg/L	mg/L	°C	mg/L	mg/L	mg/L
MCLs						500*	1600*				0.5*	10000	45	1000				500*			1000*	
Whale Rock Reservoir Raw Water																						
5/3/16	173	43	12.9	0.86	53	32.8	732	0.396	0	53	<0.1	<100	<0.44	<100	8.48	8.67	43	96.9	18.0	226	440	325
5/2/17	206	26	12.2	0.13	0	23.8	640	0.401	0	53	<0.1	551	2.43	<100	8.11	8.13	32	82.6	13.0	206	380	282
5/8/18	204	56	12.9	0.78	15	24.3	650	0.297	0	39	<0.1	146	0.646	<100	8.39	8.34	32	88.4	14.1	219	360	290
5/7/19	232	54	12.8	0.46	0	24.0	670	0.230	0	42	<0.10	<100	<0.44	<100	8.10	8.34	40	88.0	12.7	232	390	306
5/12/20	231	50	12.7	0.60	0	24.1	697	0.310	0	43	<0.1	<100	<0.44	<100	-----	8.22	34	94.5	14.2	231	392	302
Cayucos Water Treatment Plant Treated																						
5/3/16	193	42	12.7	0.73	40	38.3	755	0.416	0	52	<0.1	<100	<0.44	<100	8.35	7.49	48	97.2	18.0	233	440	321
5/2/17	209	43	12.4	0.32	0	30.0	660	0.375	0	44	<0.1	540	2.39	<100	8.08	8.02	36	83.3	14.6	209	370	287
5/8/18	222	41	12.7	0.58	0	29.1	680	0.315	0	40	<0.1	138	0.611	<100	8.18	8.20	36	88.6	14.7	22	340	300
5/7/19	261	54	12.7	0.23	0	33.0	721	0.260	0	43	<0.10	<100	<0.44	<100	7.82	8.16	43	83.0	13.8	261	420	313
5/5/20	229	50	12.4	0.30	0	29.5	687	0.320	0	42	<0.1	3367	14.9	<100	-----	7.95	36	95.9	14.8	302	406	298
Whale Rock Well (1989)- CAWO																						
5/8/18	342	70	12.5	0.47	0	21.8	890	0.310	0	54	<0.10	740	3.27	<100	-----	7.7	51	45.1	18.1	342	500	400
5/14/19	360	64	12.5	0.50	0	52.0	900	0.300	0	19	<0.10	610	2.69	<100	7.70	7.75	54	41.0	18.0	364	600	390
5/5/20	350	65	12.6	0.62	0	51.0	860	0.320	0	18	<0.10	460		<100	-----	7.88	47	40.0	18.0	347	480	370
CBMW Standby Well 01																						
5/10/16	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	652	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
5/11/17	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	1009	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
5/15/18	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	456	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
11/25/19	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	733	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
12/15/20	400	63	12.6	0.24	0	58.0	970	0.230	0	63	<0.10	250	56.0	<100	-----	7.56	64	50.0	-----	400	590	420

APPENDIX T: METALS DATA

Date	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Thallium	Zinc
Treated Water MCL	1000	6	10	1000	4	5	50	1000	Action Level 15	2	100	50	100	2	5000
Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
WHALE ROCK RESERVOIR RAW															
5/3/16	45	<1	2.8	86	<1	<0.5	<1	<5.0	<5.0	<0.2	<5.0	<5.0	<5.0	<1.0	<5.0
5/2/17	76	<1	<1	75	<1	<0.5	<1	<5.0	<5.0	<0.2	5.5	<5.0	<5.0	<1.0	<5.0
5/8/18	54	1.7	3.6	81	<1	<1.0	<1	<5.0	<5.0	<0.2	<5.0	<5.0	<5.0	-----	<5.0
5/7/19	58	<1	2	74	<1	<1.0	1.3	<5.0	<5.0	<0.2	<5.0	<5.0	<5.0	<1.0	<5.0
5/12/20	<20	<1	2.2	81	<1	<1.0	<1	<10	<0.50	<0.2	<10	<5.0	<10	<1.0	<15
CAYUCOS WATER TREATMENT PLANT TREATED WATER															
5/3/16	210	<1	2.7	84	<1	<0.5	<1	<5.0	<5.0	<0.2	<5.0	<5.0	<5.0	<1.0	<5.0
5/2/17	55	<1	1.3	69	<1	<0.5	<1	<5.0	<5.0	<0.2	<5.0	<5.0	<5.0	<1.0	<5.0
5/8/18	110	<1	1.5	70	<1	<1.0	<1	<5.0	<5.0	<0.2	<5.0	<5.0	<5.0	NA	<5.0
5/7/19	96	<1	2.6	80	<1	<1.0	1	<5.0	<5.0	<0.20	<5.0	11	<5.0	<1.0	<5.0
5/12/20	98	<1	2.0	78	<1	<1.0	<1	<10	<0.50	<0.2	<10	<5.0	<10	<1.0	<15
CAWO Well															
5/8/18	<50	<1.0	1.2	110	<1	<1.0	<2.0	<5.0	<5.0	<0.20	<5.0	21	<5.0	<1.0	<5.0
CBMW Standby Well 01															
12/15/20	<50	<1.0	2.3	160	<1	<0.5	<10	<5.0	1.3	0.74	<5.0	<5.0	<5.0	<1.0	140
MRMW Standby Well 03															
5/15/18	-----	<6	2	-----	-----	-----	-----	-----	-----	<2.0	-----	<5.0	-----	<1.0	-----

APPENDIX U: TOTAL ORGANIC CARBON

Date	Plant Influent TOC (mg/L)	GAC Effluent TOC (mg/L)
1/5/16	3.7	2.9
1/19/16	3.6	2.8
2/2/16	3.2	2.7
2/17/16	3.3	2.7
3/1/16	3.2	2.7
3/22/16	3.2	1.7
4/5/16	3.5	2.4
4/19/16	3.3	2.4
5/3/16	3.3	2.5
5/17/16	3.5	2.8
6/7/16	3.3	2.7
6/21/16	3.7	3.0
7/6/16	3.1	3.5
7/19/16	3.8	2.9
8/2/16	2.6	1.6
8/16/16	3.4	2.2
9/6/16	3.1	2.7
9/20/16	3.6	3.0
10/4/16	3.2	2.7
10/18/16	3.1	2.7
11/8/16	3.6	1.8
11/21/16	3.7	1.9
12/7/16	3.7	2.6
12/20/16	3.3	2.4
1/3/17	3.5	3.0
1/17/17	4.1	3.6
2/7/17	4.3	3.4
2/21/17	4.0	3.1
3/7/17	3.8	3.6
3/20/17	3.9	3.6
4/4/17	4.0	1.2
4/18/17	3.3	2.1
5/2/17	2.4	1.9
5/16/17	3.3	2.8
6/6/17	3.5	2.6

Date	Plant Influent TOC (mg/L)	GAC Effluent TOC (mg/L)
6/20/17	3.6	3.5
7/3/17	3.7	3.9
7/18/17	3.4	3.4
8/8/17	2.6	1.8
8/22/17	3.7	2.1
9/5/17	3.9	2.3
9/19/17	3.6	2.5
10/3/17	3.4	2.2
10/17/17	3.6	1.5
11/7/17	3.9	1.9
11/20/17	2.0	2.4
12/5/17	3.8	2.6
12/19/17	4.3	1.2
1/2/18	3.4	2.0
1/16/18	3.3	2.0
2/6/18	3.8	2.4
2/20/18	2.9	2.7
3/6/18	4.5	3.1
3/19/18	3.8	2.7
4/3/18	3.8	0.6
4/17/18	4.1	2.0
5/8/18	4.0	2.2
5/22/18	4.5	2.6
6/5/18	4.6	3.7
6/19/18	3.9	2.7
7/2/18	3.9	2.7
7/17/18	4.1	0.9
8/7/18	3.1	2.0
8/21/18	4.6	1.6
9/4/18	4.1	2.5
9/18/18	4.1	2.4
10/2/18	5.4	4.0
10/16/18	3.8	2.5
11/5/18	3.2	2.7
11/19/18	4.2	1.8
12/4/18	2.7	1.3
12/18/18	3.8	1.8

Date	Plant Influent TOC (mg/L)	GAC Effluent TOC (mg/L)
1/8/19	3.9	2.3
1/22/19	4.3	2.6
2/5/19	4.3	2.3
2/19/19	2.7	2.0
3/5/19	3.6	2.4
3/18/19	3.9	2.7
4/2/19	3.6	2.2
4/16/19	3.8	1.6
5/7/19	3.9	1.9
5/21/19	4.1	2.6
6/4/19	4.2	2.8
6/18/19	4.2	3.0
7/1/19	3.8	2.6
7/15/19	4.0	2.8
8/6/19	3.9	1.7
8/20/19	3.9	2.1
9/4/19	4.0	2.2
9/17/19	4.1	2.4
10/7/19	3.8	2.3
10/22/19	4.2	2.5
11/5/19	4.2	2.7
11/19/19	4.8	3.7
12/3/19	4.4	2.8
12/17/19	3.8	1.6
1/7/20	4.3	2.4
1/21/20	1.3	2.4
2/4/20	3.7	2.4
2/18/20	3.8	2.5
3/3/20	3.9	2.7
3/17/20	4.2	3.0
4/7/20	2.9	1.6
4/21/20	2.9	2.7
5/19/20	3.4	2.2
6/2/20	3.4	2.2
6/16/20	3.4	2.5
7/7/20	4	----
7/21/20	3.4	2.7

Date	Plant Influent TOC (mg/L)	GAC Effluent TOC (mg/L)
8/18/20	3.6	2.0
9/22/20	3.7	2.5
10/6/20	4.1	2.7
10/20/20	3.8	2.8
11/3/20	4.0	2.6
11/17/20	4.1	2.6
12/1/20	3.9	0.6
12/15/20	4.4	2.9

APPENDIX V: THM DATA FROM 2016-2020

	Cemetery Road	
	CSA-10A Service Line	
Date	Total Trihalomethane (ug/L)	Running Annual Average
2/17/2016	28	19.8
5/17/2016	23.2	23.7
8/16/2016	12.4	20.9
11/21/2016	10.8	18.8
2/21/2017	10.8	14.3
5/16/2017	30.7	16.2
8/22/2017	12.1	16.1
11/20/2017	1.2	13.7
2/20/2018	33.1	19.3
5/22/2018	17.2	15.9
8/21/2018	9	15.1
11/20/18	2.3	15.4
2/19/2019	20.9	12.4
5/21/2019	11.6	11.0
8/20/2019	8.2	10.8
11/19/19	19.5	15.1
2/18/2020	15.7	13.8
5/19/2020	9.5	13.2
8/18/2020	6.9	12.9
11/17/20	20.2	13.1

APPENDIX W: HALOACETIC ACIDS DATA FROM 2016-2020

	Cemetery Road	
	CSA-10A Service Line	
Date	Haloacetic Acids (ug/L)	Running Annual Average
2/17/2016	5.1	3.2
5/17/2016	4.7	4.3
8/16/2016	1.7	3.7
11/21/2016	2	3.3
2/21/2017	1.7	2.5
5/16/2017	2	1.9
8/22/2017	6	2.9
11/29/2017	0	2.4
2/20/2018	5.4	3.4
5/22/2018	3.3	3.7
8/21/2018	2.5	2.8
11/20/18	<1	3.7
2/19/2019	6.1	4.0
5/21/2019	2.4	3.7
8/20/2019	2.4	3.6
11/19/19	5.5	4.1
2/18/2020	5.2	3.9
5/19/2020	3.6	4.2
8/18/2020	1	3.8
11/17/20	5.4	3.8