January 2022 | FINAL

Watershed Sanitary Survey Update

City of Escondido-Vista Irrigation District

Brown AND Caldwell

FINAL

Watershed Sanitary Survey Update

Prepared for

City of Escondido and Vista Irrigation District

Escondido, CA

January 28, 2022

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1,2,3-TCP	*1,2,3-trichloropropane*
Ag	Agricultural
ac-ft	acre-feet
AFY	acre-feet per year
AL	action level
APAP	Aquatic Pesticide Application Plan
APSA	Aboveground Petroleum Storage Act
AST	Aboveground Storage Tank
AWM	San Diego County Department of Agriculture, Weights, and Measures
AWWA	American Water Works Association
BC	Brown and Caldwell
BLM	Bureau of Land Management
BMP	best management practice
$CaCO_3$	calcium carbonate
CAF	confined animal facilities
CalARP	California Accidental Release Prevention
CalEPA	California Environmental Protection Agency
CAL FIRE	California Department of Forestry and Fire Protection
CalRecycle	California Department of Resources Recycling and Recovery
CAP	*Cryptosporidium* Action Plan
CCL	Contaminant Candidate List
CCR	California Code of Regulations
CDEC	California Data Exchange Center
CDFW	California Department of Fish and Wildlife
CDPR	California Department of Pesticide Regulation
CERS	California Environmental Reporting System
cfs	cubic feet per second
CFU	colony forming units
City	City of Escondido
CIWQS	California Integrated Water Quality System
Clean Water Act	Federal Clean Water Act
County	San Diego County
CPA	Community Plan Area
CUPA	Certified Unified Program Agency
DBP	Disinfection Byproducts
DBPR	Disinfection Byproduct Rule
DDT	Dichlorodiphenyltrichloroethane
DDW	State Water Resources Control Board Division of Drinking Water
DEH	San Diego County Department of Environmental Health
DO	dissolved oxygen
DWR	California Department of Water Resources
Escondido	City of Escondido
FHSZ	Fire Hazard Severity Zone
GAMA	Groundwater Ambient Monitoring and Assessment
HAA	haloacetic acid
HAB	harmful algal bloom
HAZMAT	hazardous materials
HDPE	high density polyethylene
HMBP	Hazardous Materials Business Plan
HMD	Hazardous Materials Division
HPC	heterotrophic plate count
HU	hydraulic units
IESWTR	Interim Enhanced Surface Water Treatment Rule
JRMP	Jurisdictional Runoff Management Plan
L	liter
LAMP	Local Agency Management Plan
LCRR	Long-Term Revisions
LSL	*lead service lines (*
LT1ESWTR	Long Term 1 Enhanced Surface Water Treatment Rule
LT2ESWTR	Long Term 2 Enhanced Surface Water Treatment Rule
LUST	Leaking Underground Storage Tanks
LVTO	Limited Volume Transfer Operation
MCL	maximum contaminant level
MCLG	maximum contaminant level goal
MG	million gallons
MGD	million gallons per day
mg/L	milligrams per liter

mL	milliliter
MPN	most probable number
MS4	municipal separate storm and sewer systems
MRDL	maximum residual disinfectant levels
MWD	Municipal Water District
NL	notification level
NOM	natural organic matter
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NTU	nephelometric turbidity units
OES	Office of Emergency Services
OWTS	Onsite Wastewater Treatment Systems
PFAS	Perfluoroalkyl and Polyfluoroalkyl substances
ppt	parts per trillion
PRP	Pesticide Regulation Program
RL	response level
RWQCB	Regional Water Quality Control Board
SANDAG	San Diego Association of Governments
SDCOES	San Diego County Office of Emergency Services
SDCWA	San Diego County Water Authority
SDGE	San Diego Gas and Electric Company
SDWA	Safe Drinking Water Act
SDRWQCB	San Diego Regional Water Quality Control Board
SLRIWA	San Luis Rey Indian Water Authority
SPIR	San Pasqual Indian Reservation
SPUP	San Pasqual Undergrounding Project
SR	state route
SWIS	Solid Waste Information System
SWRCB	State Water Resources Control Board
SWTR	Surface Water Treatment Rule
TDS	total dissolved solids
THMs	trihalomethanes
TMDL	total maximum daily load
TOC	total organic carbon
UCMR	Unregulated Contaminant Monitoring Rule
UCMR 1	First Cycle of the Unregulated Contaminant Monitoring Rule
UCMR 2	Second Cycle of the Unregulated Contaminant Monitoring Rule
UCMR 3	Third Cycle of the Unregulated Contaminant Monitoring Rule
μg/L	micrograms per liter
USDA	United States Department of Agriculture
US EPA	United States Environmental Protection Agency
USFS	United States Forest Service
USGS	United States Geological Survey
UST	Underground Storage Tank
UV	ultraviolet
UWMP	Urban Water Management Plan
VID	Vista Irrigation District
VOCs	Volatile Organic Compounds
WDR	Waste Discharge Requirement
WMA	Watershed Management Area
WQENP	Water Quality Emergency Notification Plan
WQIP	Water Quality Improvement Plan
WSS	Watershed Sanitary Survey
WTP	Water Treatment Plant
#	*number*

Section 1

Introduction

This Watershed Sanitary Survey (WSS) has been prepared for the City of Escondido (Escondido) and Vista Irrigation District (VID). The California Surface Water Treatment Rule (SWTR) requires that all domestic water suppliers using surface water supply sources conduct a watershed sanitary survey (WSS) of their water supply watersheds, and to update that survey every five years thereafter. The survey is required to evaluate potential contaminant sources within the watershed that may impact drinking water quality. The intent of the WSS is also to identify mitigations or best practices to enhance watershed protection. Escondido and VID conducted a WSS of the Escondido-VID watershed system in 1996, 2005, 2011, and 2016. This 2021 WSS is an update to the previous surveys.

This section discusses the history of source water protection in the watershed, project objectives, study approach, and report organization. Information from the previous WSS is included throughout this WSS for context and completeness.

1.1 Background

Source water protection is the first and foremost barrier required for inclusion in a well-developed, multiple-barrier protection and treatment program for public drinking water supplies. A comprehensive source water protection program can prevent contaminants from entering the public water supply, reduce treatment costs, and increase public confidence in the quality, reliability, and safety of drinking water supplies. Developing and implementing source protection includes an assessment of potential sources of contamination in the watershed.

The 1986 Amendments to the Safe Drinking Water Act (SDWA) require watershed sanitary surveys and watershed management plans only for surface water supplies qualifying for filtration avoidance. Title 22 of the State of California Code of Regulations (22 CCR), Chapter 17, Article 7, Section 64665, requires all water suppliers to conduct a sanitary survey of their watersheds at least once every five years.

Later SDWA amendments in 1996 made source water protection a national priority. The 1996 amendments required that a more comprehensive, watershed-based "prevention" approach be applied for the purpose of improving and preserving water quality of the public water supply source. The prevention approach has two key elements:

- Assignment of primary responsibility to the individual states, in recognition of each state's unique characteristics, flexibility, expertise, and resources needed to achieve optimum results.
- A strong directive to include public information disclosure and involvement within the states' decision-making processes.

The preparation of this WSS fulfills SWTR and SDWA requirements, and the national and state goals of developing a comprehensive watershed-based prevention approach to water quality.

1.2 Objectives

The objectives of this WSS are to:

- Meet the regulatory requirements;
- Analyze available source water quality data with respect to applicable drinking water regulations;
- Conduct an inventory of potential contaminant sources within the watershed and document changes in conditions and activities since the last WSS in 2016;
- Report on future developments that might impact water quality;
- Evaluate existing controls and management practices intended to protect drinking water quality within the watershed; and
- Provide recommendations to improve protection of water quality.

1.3 Study Approach

Brown and Caldwell (BC) prepared this WSS. The project team reviewed reports, maps, and public agency documents provided by Escondido, VID, and gathered from online public sources. Results from Escondido-VID's 2016 Watershed Sanitary Survey are included in this report to compare water quality and contaminant source information over time.

Water quality and quantity data sources used in this report include:

- Water quality sampling conducted by Escondido and VID between 2016 and 2021;
- Laboratory test results sampled by Escondido and VID and conducted by contract laboratories for samples collected at source water locations between 2016 and 2021;
- Department of Water Resources (DWR) California Data Exchange Center (CDEC) monthly storage data from 2016-2021 for Lake Henshaw; and
- United States Geological Survey (USGS) streamflow data for San Luis Rey River at the City of Oceanside.

On October 21st , 2021, BC staff conducted a field survey of the Lake Wohlford and Dixon Lake Watersheds, and portions of the Escondido Canal Watershed. On November 16th 2021, BC staff visited portions of the San Luis Rey and Lake Henshaw Watersheds.

Observed watershed characteristics from this field study supplement the analysis provided in this report.

1.4 Report Content and Organization

The content and organization of this WSS report is consistent with the format recommended in 22 CCR Section 64665. The report is organized according to the following sections:

- Section 1: Introduction – This section identifies the study's objectives and approach.
- Section 2: Watershed Study Area and Water Supply System - This section provides an overview of the physical, hydrologic, and land use characteristics of the watershed. The Escondido-VID Water Treatment Plant is described.
- Section 3: Potential Contaminant Sources - This section describes the contaminant sources in the watershed, assesses the water quality implications of these sources, and describes existing watershed conditions management activities currently in place.
- Section 4: Water Quality - This section contains a brief update of the regulations. An evaluation of the source water and finished water quality data that have been collected in the last five years, and recommended monitoring improvements.

- Section 5: Conclusions - This section contains the key findings and summary of information from this sanitary survey.
- Section 6: Recommendations - This section provides a summary of recommendations for the previous 2016 WSS Update and current recommendations of best management practices to Escondido and VID.
- Section 7: A complete list of references used in the preparation of this WSS is included at the end of this report.

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Section 2

Watershed Study Area and Water Supply System

The primary focus of this section is to define and describe the study area for the WSS. The watershed system producing local water for Escondido and VID is divided into five watershed sub-areas based on the various reservoirs and transfer systems:

1. The Lake Henshaw Watershed sub-area
2. The San Luis Rey River Watershed sub-area
3. The Escondido Canal Watershed sub-area
4. The Lake Wohlford Watershed sub-area
5. The Dixon Lake Watershed sub-area

Figure 2-1 shows these sub-areas, major roads, and Indian Reservations within the watershed area.

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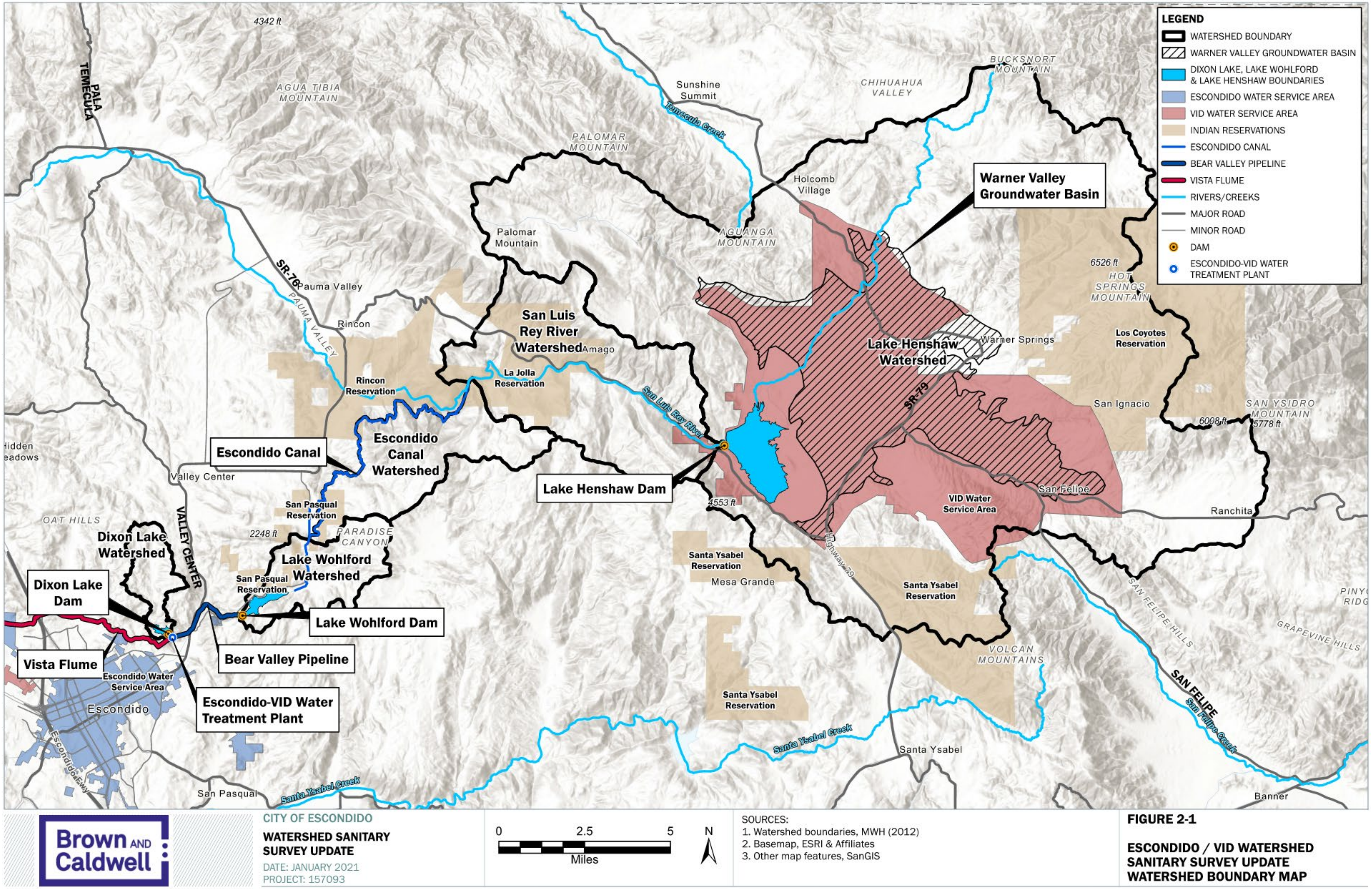

Figure 2-1. Watersheds contributing flows to Escondido-VID local water sources

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2.1 Watershed Sanitary Survey Study Area Description

Unlike many other water providers in San Diego County, Escondido and VID have a significant and valuable local water source. The Escondido-VID watershed system covers 260 square miles in the north-central portion of San Diego County. The watershed system's five watershed sub-areas are described and shown below.

(1) The Lake Henshaw Watershed, located primarily to the north and northeast of Lake Henshaw, covers approximately 131,800 acres (about 206 square miles). The outer edges of the sub-area have steep terrain, while the area above Lake Henshaw Dam includes 45 square miles of gently sloping surface under which lies the Warner Valley Groundwater Basin aquifer. The dam and reservoir are owned and operated by VID and the water is shared between VID, Escondido and Tribal Interests as described in agreements that make up the San Luis Rey Indian Water Rights Settlement Agreement (Settlement Agreement). Runoff flows onto alluvial fans that channel the water to Lake Henshaw and form forebays that recharge the aquifer. There is one groundwater aquifer in this watershed: Warner Valley Groundwater Basin. Six major contributing sub-watersheds to Lake Henshaw are Buena Vista-San Ysidro, West Fork, Agua Caliente, the San Luis Rey, Carrista, and Matagual. Figure 2-2 pictures Lake Henshaw viewed from the Henshaw Scenic Vista Observation Site along East Grade Road in Cleveland National Forest.

Figure 2-2. Lake Henshaw from the Henshaw Scenic Vista Observation Site

(2) The San Luis Rey River Watershed, located south of Palomar Mountain, covers approximately 18,300 acres. Flow in the San Luis Rey River below Lake Henshaw Dam is comprised of runoff along with Lake Henshaw releases and spillway overflows. There are no minimum flow requirements for the release from Lake Henshaw into San Luis Rey River. Figure 2-3 shows images of the San Luis Rey River in mid-November 2021 with very minimal flow upstream of Rey River Ranch Campground and no flow downstream. The San Luis Rey River receives additional runoff from a 30-square-mile watershed before it reaches the intake to the Escondido Canal. Under the Settlement Agreement (VID, 2018), Escondido and VID are allowed to develop, divert, and use the waters of the San Luis Rey River basin (Local Water) substantially.

Figure 2-3. San Luis Rey River at Rey River Ranch Campground Downstream (left) and Upstream (right)

(3) The Escondido Canal Watershed, located southeast of Pauma Valley, covers approximately 8,200 acres, or about 13 square miles. The Escondido Canal, comprised of concrete lined earthen ditches, hard rock tunnels, and steel siphons, was constructed in the 1890's and enlarged in the 1920's to convey Local Water to Lake Wohlford. The canal is owned and operated by Escondido and conveys water for the benefit of the Settlement Parties as described in the Settlement Agreement. The Escondido Diversion diverts water from the San Luis Rey River to the Escondido Canal, and flow in the canal is subject to both losses (primarily leakage from the canal) and gains (primarily runoff that washes into the canal). About 3 square miles of the watershed draining to the canal consist of steep mountain slopes, and runoff from high intensity storms can fill the canal. Landslides occasionally destroy or block portions of the canal, resulting in spills and loss of water. Water is generally not diverted into the Escondido Canal during the months of October and November, when the canal is shut down for scheduled maintenance. Figure 2-4 presents a photograph taken in mid-November 2021 of a portion of the Escondido Canal that will be replaced as part of the San Pasqual Undergrounding project.

Figure 2-4. Escondido Canal segment near San Pasqual reservation, Downstream (left) and Upstream (right)

(4) The Lake Wohlford Watershed, located southeast of the City of Valley Center, consists of approximately 5,100 acres. The Escondido Canal discharges into Lake Wohlford, which is operated primarily as a re-regulating reservoir, with Lake Henshaw being the major surface storage facility. Lake Wohlford reaches its seasonal low water level by the fall, is filled in the winter and early spring, and stabilized during bass spawning in late spring. Maximum releases are made during the summer months. Lake Wohlford was at 73 percent capacity with 2,042 acre-feet of storage as of late September 2021 (SDCWA, 2021). The Lake Wohlford Dam Replacement Project, described briefly in Section 2.3.3, will increase the lake's storage capacity and surface area but is not anticipated to have a significant effect on water quality. Figure 2-5 shows Lake Wohlford as viewed from a boat in mid-October 2021.

Figure 2-5. Lake Wohlford by boat at approximately 70 percent capacity in October 2021

(5) The Dixon Lake Watershed, located north of Escondido, consists of approximately 2,100 acres. The watershed includes portions of a natural preserve called Daley Ranch and part of the Dixon Lake recreational area. Daley Ranch is a more than 3,000-acre conservation area owned by Escondido providing habitat for a diverse range of plant and animal communities along with over 25 miles of multipurpose trails for visitors (Escondido, 2021a). Dixon Lake recreation area is a 1,600-acre campground offering boat rentals and fishing owned and managed by Escondido (Escondido, 2021b). Figure 2-6 presents Dixon Lake photographed from the Dixon Lake Dam, located adjacent to the Escondido-VID WTP.

Figure 2-6. Dixon Lake Overview

2.1.1 Water quality overview

Although water quality can vary with imported water inflows and surface water contamination events, overall water quality within the watershed is good and provides a reliable source of drinking water. One of the most significant water quality issues that affect the raw water supply are algae blooms, which can create taste and odor problems, or generate algal toxins. Algae blooms are typically caused by runoff containing nutrients and build-up of those nutrients in local reservoirs. Harmful algal blooms (HABs) observed in Lake Henshaw in 2020 prevented normal water deliveries. As of November 2021, VID and Escondido are working with a consultant team to prepare a Harmful Algal Bloom Management and Mitigation Plan for Lake Henshaw and Lake Wohlford. Indicator bacteria are also present in the watershed, and sources may include grazing animals, wildlife, septic tanks, or unauthorized activities in recreation areas.

2.1.2 Existing Hydrology

The Lake Henshaw catchment area is the primary water producing area in the system. The reservoir has a capacity of approximately 51,800 acre-feet (ac-ft) behind the Lake Henshaw Dam.

VID augments the natural runoff into Lake Henshaw with groundwater that is pumped into the lake from the Warner Valley Groundwater Basin (VID, 2020). The Warner Valley Basin aquifer has an estimated usable storage volume of 400,000 ac-ft, and approximately 150,000 ac-ft are available for extraction using existing wells. VID has 16 production wells and median groundwater production between 1960 and 2017 has been approximately 7,730 AFY (VID, 2017). The California Department of Water Resources (DWR) classified the Warner Valley Basin as a “very low” priority basin as part of the Sustainable Groundwater Management Act, as it is not considered at risk of overdraft.

Water quality of groundwater used as a water supply is assessed as part of the Groundwater Ambient Monitoring and Assessment (GAMA) Program. The State Water Resources Control Board (SWRCB), in collaboration with USGS and Lawrence Livermore National Laboratory, studied ground water quality in the Warner Valley Groundwater Basin in 2004, 2007, 2014, and 2019. None of the regulated constituents monitored were found at concentrations exceeding maximum contaminant levels (MCLs) for the Warner Basin samples. VID conducts bi-annual sampling of groundwater wells and monitors samples for Nitrate.

Water from Lake Henshaw and the other four sub-areas is treated at the Escondido-VID Water Treatment Plant (WTP) and delivered to VID, Escondido, and the Rincon del Diablo Municipal Water District. Raw water is also delivered to Rincon Band of Luiseño Indians under terms of several governing contracts. While the amount of water delivered to each party depends on annual hydrologic conditions, average local water deliveries from Lake Henshaw to VID since 1960 have been approximately 6,130 AFY (VID, 2020). Escondido is entitled to water from Dixon Lake, Lake Wohlford, and a portion of the water from Lake Henshaw. Local supply availability varies and can provide up to 30 percent of Escondido’s supply in wet years (Escondido, 2020). Under the conjunctive use program by VID, groundwater is pumped from its Warner Valley Groundwater Basin wellfield into Lake Henshaw and released from the lake as needed during dry years. In wet years, surface water supply is used and groundwater pumping operations cease, permitting the basin to recharge and groundwater levels to rise (VID, 2020).

The average rainfall in the past 10 years for Lake Henshaw is approximately 22 inches (VID, 2020). The lake is generally at 20 percent capacity during the wet season and is then slowly drawn down to its lowest level, typically in October of each year. Figure 2-7 presents the average monthly storage within Lake Henshaw between 2016 to 2021 (CDEC, 2016-2021).

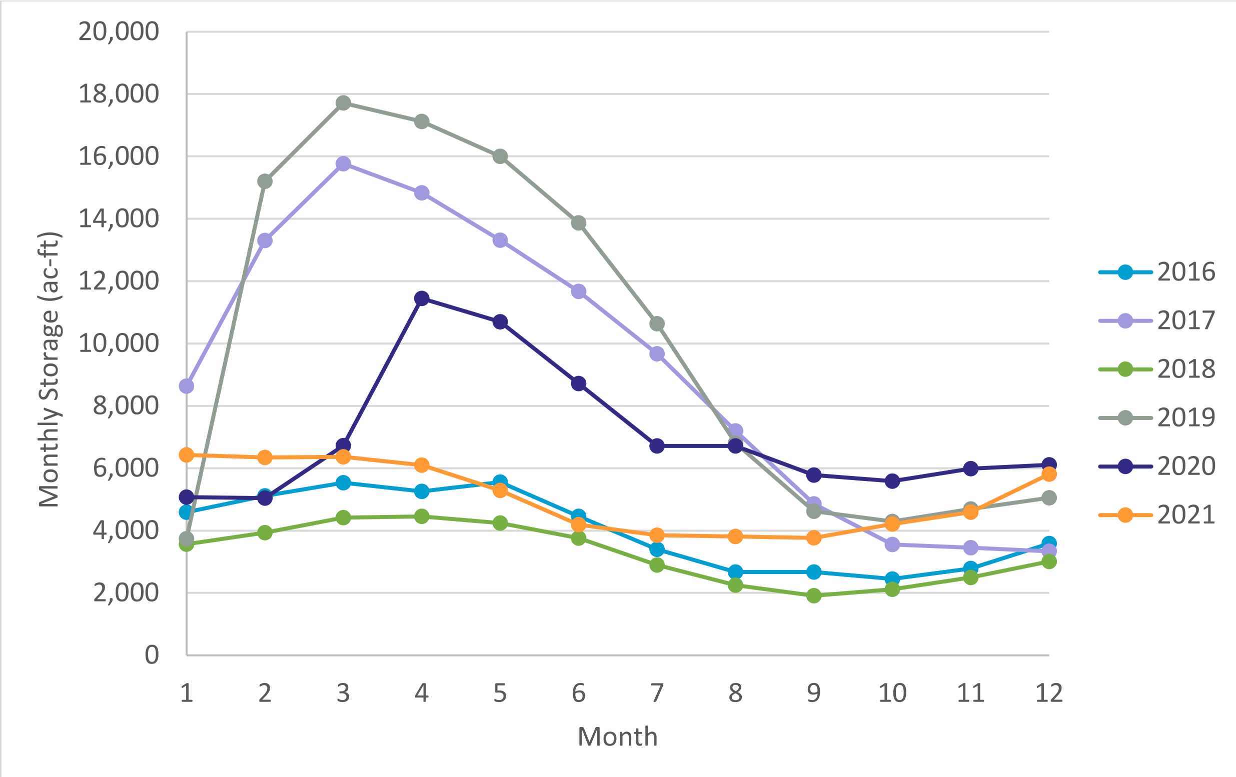

Figure 2-7. 2016-2021 Lake Henshaw Monthly Storage (CDEC, 2016-2021)

Within the Escondido-VID watershed, the primary stream is the San Luis Rey River. The flow of the San Luis Rey River downstream of Henshaw Dam has been regulated by Lake Henshaw since 1923. A longstanding dispute over the use of the waters of the San Luis Rey River was resolved with the implementation of the Settlement Agreement, which became effective on May 17, 2017. This agreement among the United States of America, La Jolla, Rincon, San Pasqual, Pauma, and Pala Bands of Mission Indians, San Luis Rey Indian Water Authority (SLRIWA), Escondido, and VID secures the long-term rights of the Settlement Parties to divert and use the water of the San Luis Rey River and the Warner Valley Groundwater Basin (VID UWMP 2020).

Figure 2-8 shows average monthly discharge from the San Luis Rey River at the City of Oceanside for 2016-2021 in cubic feet per second (cfs) (USGS, 2016-2021).

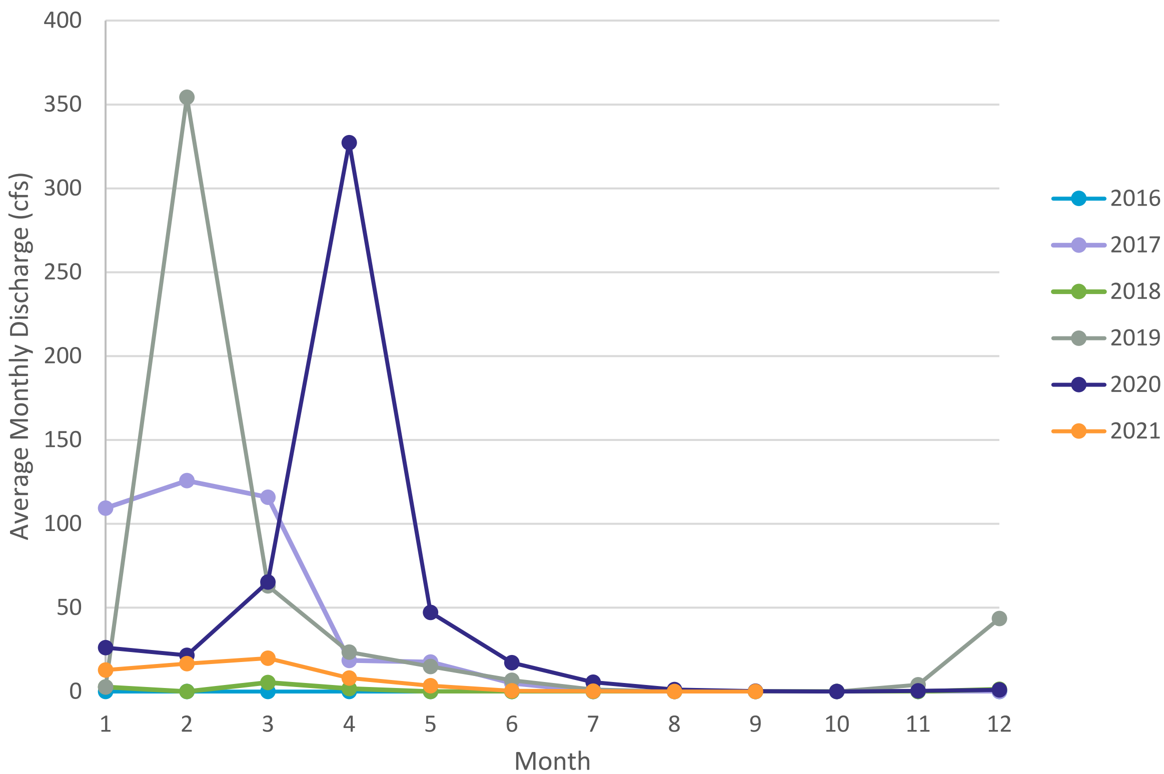

Figure 2-8. 2016-2021 San Luis Rey River Average Monthly Discharge (USGS, 2016-2021)

2.1.3 Geology

The Escondido/VID watershed lies within the foothills and mountains in northeast San Diego County. The foothills region, where Dixon Lake and Lake Wohlford are located, consists of winding valleys, rolling hills, and contains a few areas with very steep slopes. The mountainous region, where Lake Henshaw, the San Luis Rey River, and Escondido Canal are located, is characteristically more rugged, with steep mountain ridges that follow the northwest-southeast trend along the Agua Caliente and Elsinore Fault Zones. The watershed consists primarily of granitic rock overlain by soils ranging from sandy loams to coarse sandy loams, all of which are well drained to excessively drained.

The natural setting of the watershed system is steep and mountainous in several areas (e.g., Palomar Mountain, Paradise Mountain), and soils are very erodible in most of the watershed (e.g., decomposed granodiorite). These features contribute to the ease of contaminant transport in the watershed, and combined with the noted potential sources, result in an overall increase in the potential for contaminants to reach surface water bodies.

2.1.4 Land Use and Population

The Escondido-VID watershed encompasses a mix of public lands and recreation areas, residential, Native American Indian reservations, and small portions of commercial and industrial land. 2020 land use data for the watershed area were obtained from San Diego Association of Governments (SANDAG) and are shown in Figure 2-9.

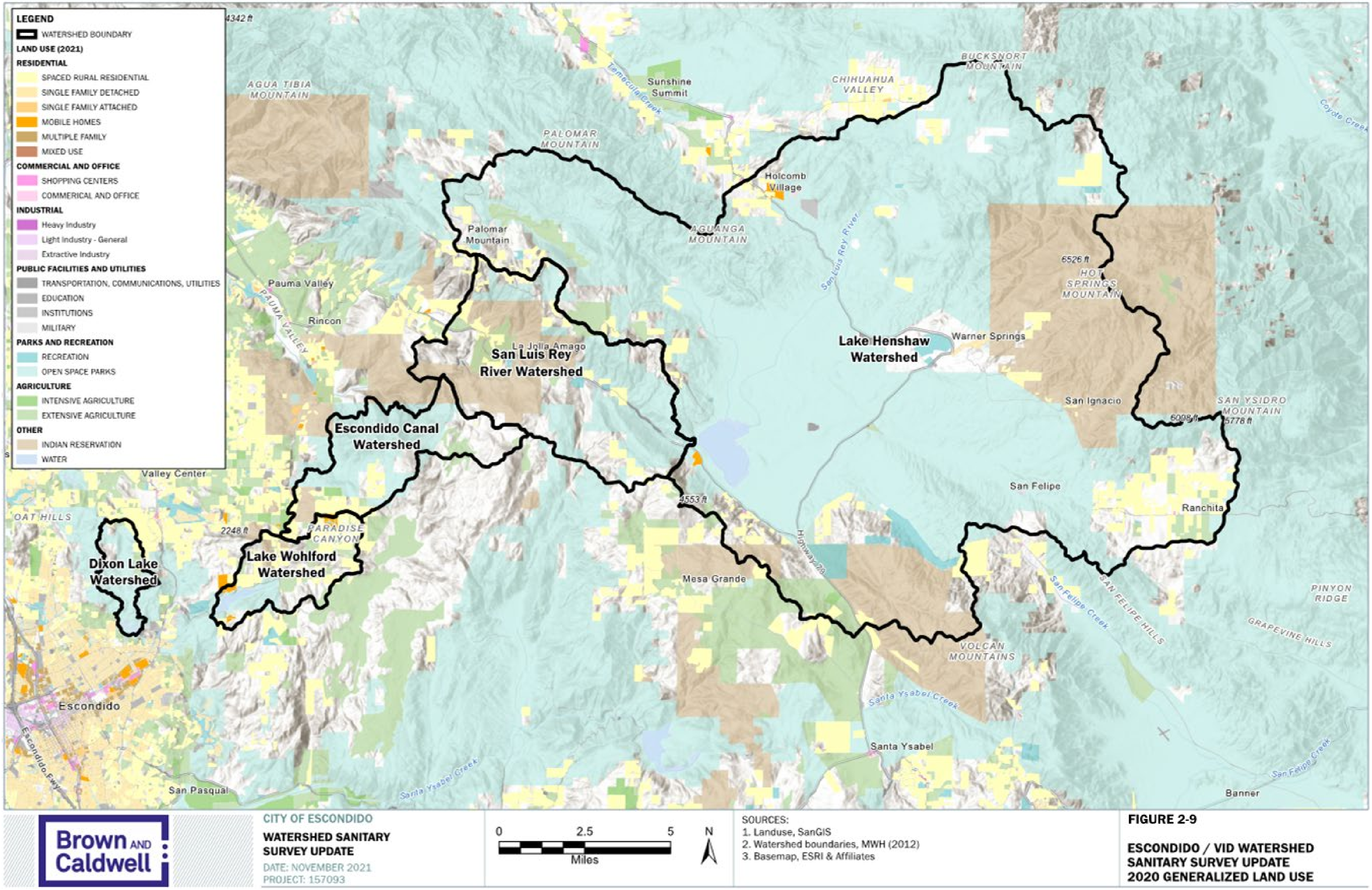

Figure 2-9. 2020 Land Use in the Escondido-VID Watershed

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Table 2-1 provides the area of each land use type and percentage of total study area within the watershed. Over 70 percent of land use is recreation/park lands or undeveloped.

Table 2-1. 2020 Land Use in the Escondido-VID Watershed [a]

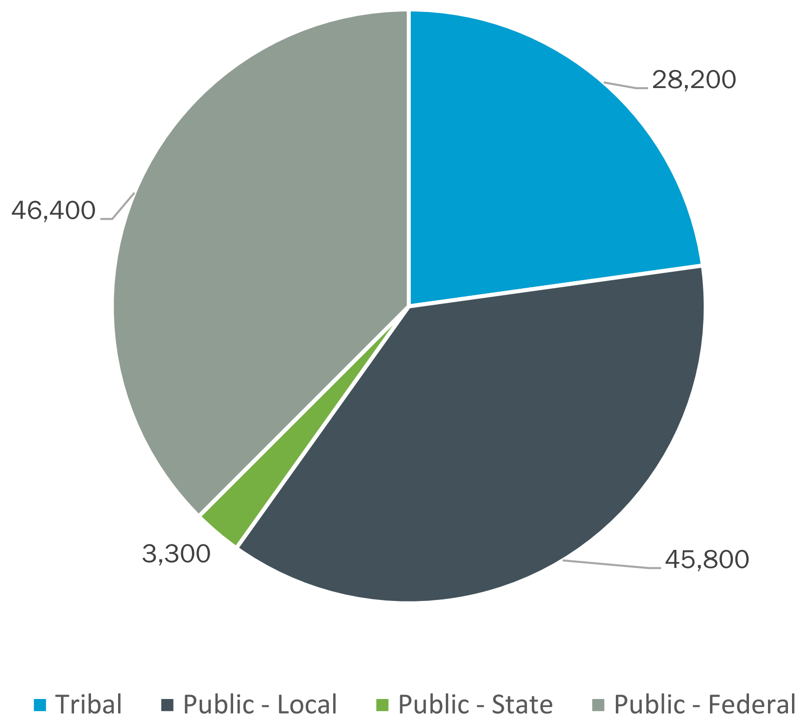
Land Use	Area (acres)	Percentage of Total Study Area
Agriculture	5,960	4%
Commercial	20	<0.1%
Industrial	10	<0.1%
Public - Parks and Recreation	97,500	59%
Public – Other Facilities and Utilities	1,360	1%
Residential	10,500	6%
Tribal – Indian Reservations	28,200	17%
Public - Water Bodies	1,580	1%
Undeveloped	20,500	12%
Total	166,000[b]	100%

a. *Data retrieved from SANDAG, 2020*

b. *Total rounded to the nearest thousand (and all areas above rounded to three significant figures).*

2.1.4.1 Public Land Ownership

As shown in Table 2-1, parks and recreation land makes up about 60 percent of the watershed area, and is generally owned by public agencies. Public agency or tribal land in the watershed includes a mix of local, state, federal, and Native American Indian tribal ownership. Local ownership encompasses cities, counties, sanitation districts, school districts, and water districts. State ownership includes other state land and state parks. Native American tribal ownership is shown as Indian reservations. Federal ownership includes Bureau of Land Management (BLM) and United States Forest Service (USFS). Figure 2-10 presents the number of acres of public land and proportion owned by local, state, federal, and tribal governments as of 2019 (SANDAG, 2021). The majority of public land is locally and federally owned and used for recreation/park land. Figure 2-11 shows locations of public or tribal land ownership in and around the watershed as of 2019 (SANDAG, 2021).



Note: Area values are rounded to the nearest 100 acres.

Figure 2-10. 2019 Public Land Ownership in Acres in the Escondido-VID Watershed (SANDAG, 2021)

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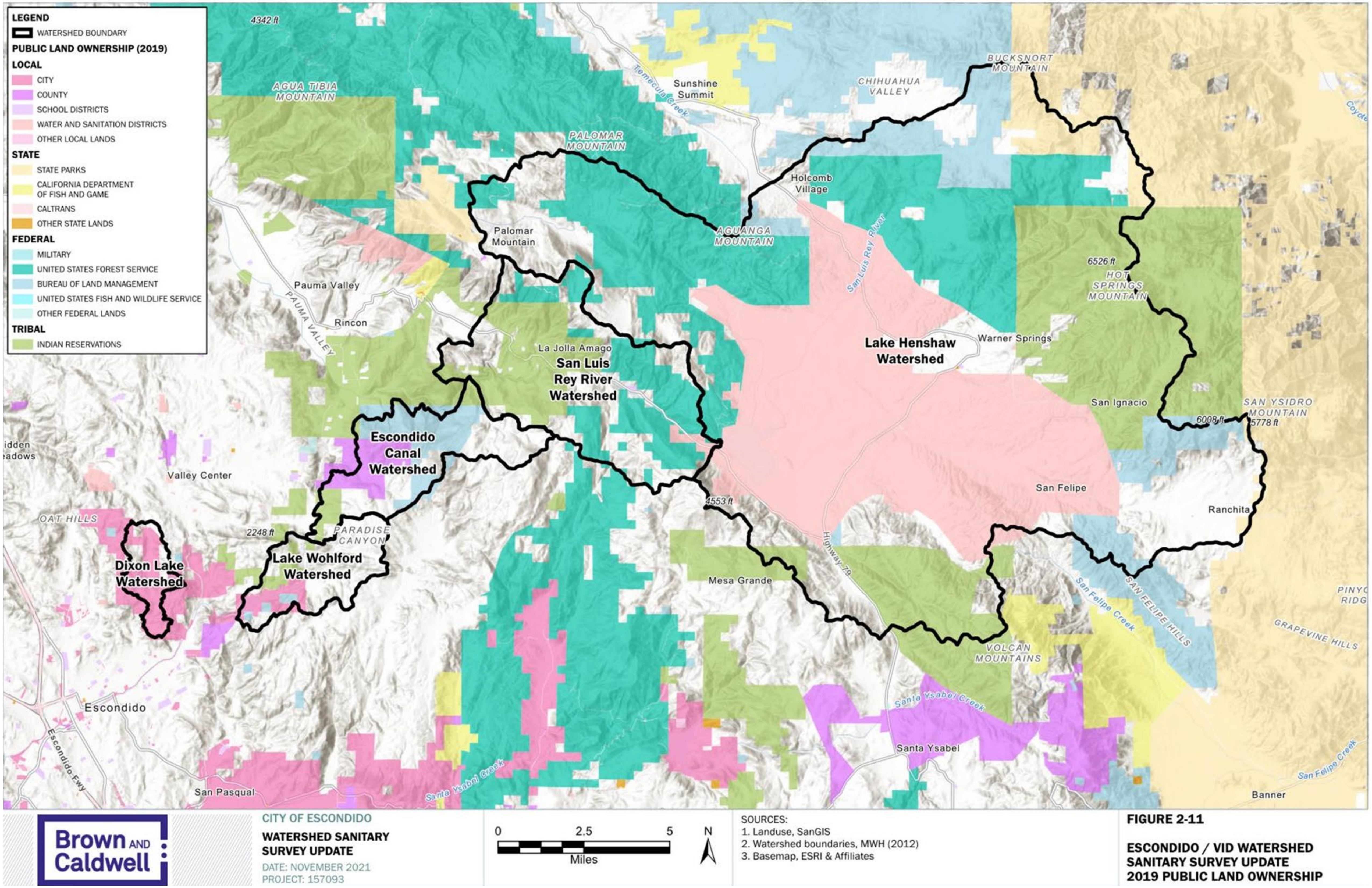

Figure 2-11. Planned Land Use in 2050 (SANDAG, 2021)

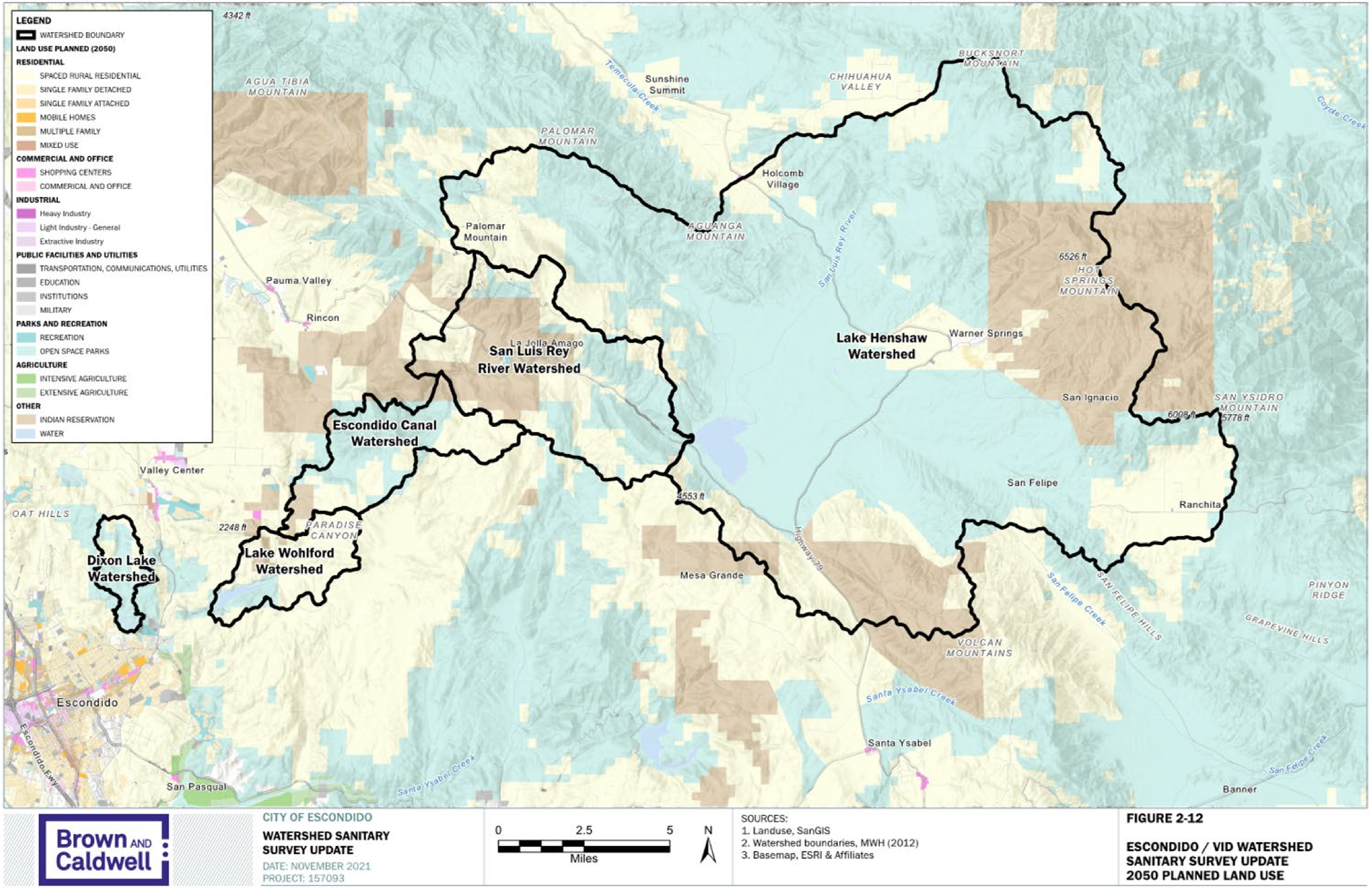

Figure 2-12. Public or Tribal Land Ownership in the Escondido-VID Watershed

2.1.4.2 Planned Land Use

According to SANDAG, residential land use is planned to make up 25 percent of the watershed by 2050. Planned land uses in 2050 are shown in Figure 2-12 (SANDAG, 2021).

Table 2-2 summarizes the 2050 planned land uses by area and percent of the watershed (or study area). 2050 land use projections were last updated in 2013. Residential land use is projected to rise from 6 percent in 2020 to 25 percent in 2050. Agricultural and a portion of parks/recreation land uses are projected to become residential. Tribal land is not anticipated to change, while industrial land use will go away, and commercial land use will grow slightly.

Table 2-2. 2050 Land Use in the Escondido-VID Watershed [a]

Planned Land Use	Area (acres)	Percentage of Total Study Area
Agriculture	0	0%
Commercial	40	<0.1%
Industrial	0	0%
Parks and Recreation	92,800	56%
Public Facilities and Utilities	1,000	1%
Residential	42,000	25%
Tribal - Indian Reservation	28,200	17%
Water Bodies	1,580	1%
Total	**166,000[b]**	**100%**

a. *Data retrieved from SANDAG, 2020*

b. *Total rounded to the nearest thousand (and all areas above rounded to three significant figures).*

The watershed areas are sparsely populated. A small portion of Escondido's incorporated land area surrounding Dixon Lake is part of the watershed. Portions of unincorporated communities in the watershed include the following community plan areas (CPAs): North County Metropolitan (North County Metro), North Mountain (including Palomar Mountain), and Paula-Pauma. Using population totals from 2019 census tracts overlapping with the Escondido-VID watershed geographically, BC estimates fewer than 24,000 people resided in the watershed as of 2019. Appendix A includes an overview of the population calculation method using federal Census Bureau data.

As shown on Figure 2-1, state route (SR) 76 and SR-79 traverse the watershed system. SR-76 is a highway running adjacent to and south of Lake Henshaw. SR-79 lies about 2.7 miles east of Lake Henshaw.

2.2 Water Supply System

Escondido and VID have several sources of water: Lake Henshaw, Lake Wohlford, Dixon Lake, minor flows from Escondido Canal and San Luis Rey River, and San Diego County Water Authority (SDCWA) Aqueduct. SDCWA aqueducts deliver imported water from northern California and the Colorado River, via the Metropolitan Water District of Southern California, to San Diego County. SDCWA provides raw and treated water, where the raw water is treated at the Escondido-Vista WTP and served to the Escondido and VID service areas. VID receives water treated by the Escondido-Vista WTP via the Vista Flume, and VID has five (SDCWA treated) turnouts along with the Vista Flume that supply water directly to VID's service area (Escondido, 2012). In 2017, Escondido and VID began receiving raw water deliveries as part of the San Luis Rey Indian Water Rights Settlement Act (Settlement Act) through the SDCWA aqueducts. The Settlement Act was passed by Congress in 1988 to settle disputes between the Settlement Parties (Escondido UWMP, 2020). SDCWA supply is subject to separate watershed sanitary surveys.

Lake Henshaw and Lake Wohlford store local water supply from precipitation in the Upper San Luis Rey River watershed. VID augments the natural runoff into Lake Henshaw with groundwater that is pumped into the lake from the Warner Valley Groundwater Basin. After release from Henshaw Dam, local water travels in the San Luis Rey River for about ten miles, then diverted into the Escondido Canal. The Escondido Canal conveys water to Lake Wohlford, where it is stored and released to Escondido via the Wohlford Penstock, the Bear Valley Hydroelectric plant, and associated pipelines. Raw water from SDCWA is stored at Dixon Lake and then treated at the WTP to serve to the Escondido and VID service areas. Treated water from the WTP is released into the 11.25-mile-long Vista Flume for delivery to VID's service area (VID, 2018).

Figure 2-13 presents a schematic view of Escondido and VID's local water system.

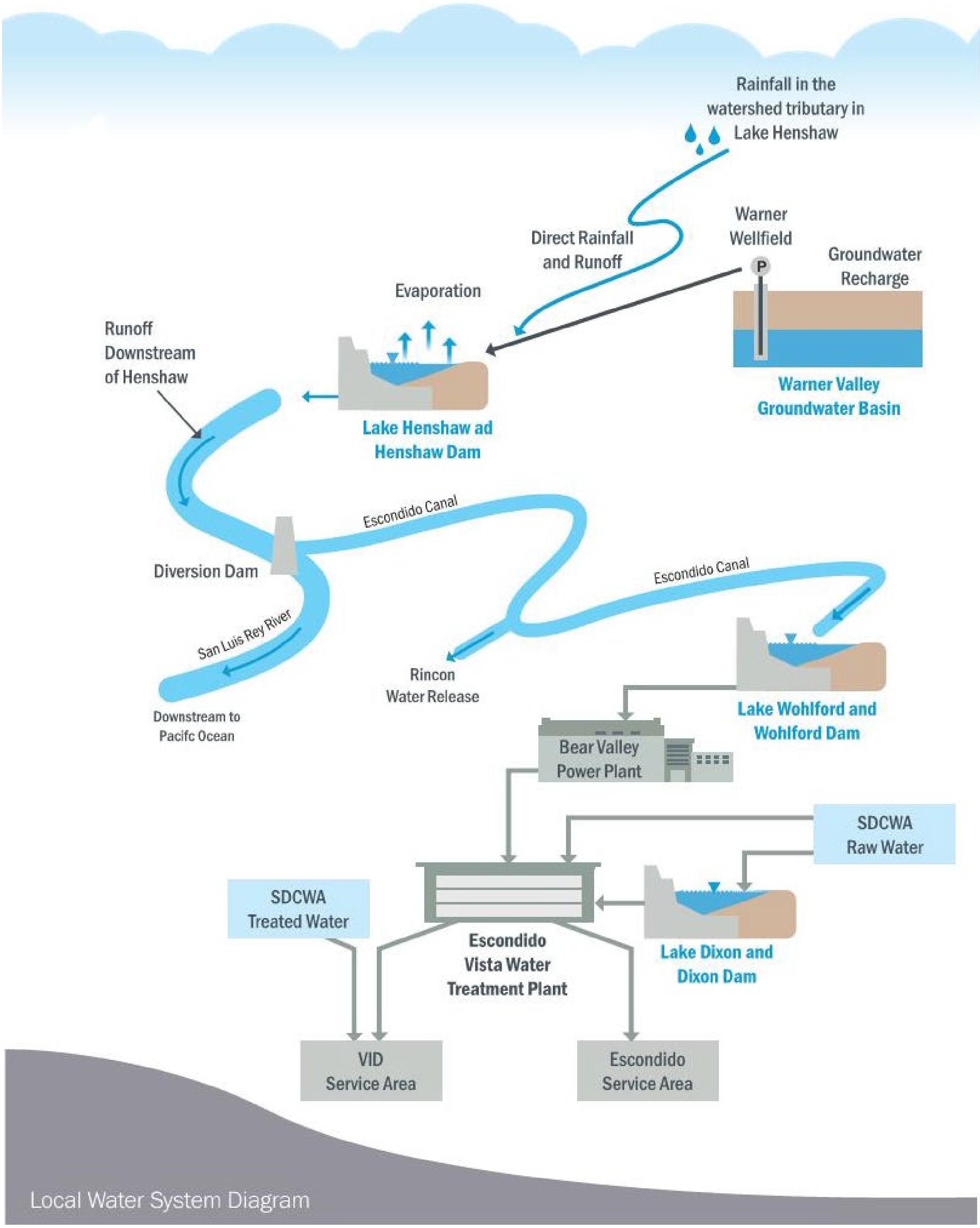

Figure 2-13. Escondido-VID Water System Schematic

Source: based on VID's water system schematic

Figure 2-14 shows Lake Henshaw groundwater pumps for Warner Valley Groundwater Basin.

Figure 2-14. Lake Henshaw Groundwater Pumps

2.2.1 Service Areas

Escondido provides drinking water to approximately 26,800 residential, commercial, industrial and agricultural meters serving a population of approximately 138,000 (SWRCB, 2021). Escondido's water service area, which is not aligned with Escondido's incorporated boundary, is comprised of a variety of land uses including residential, commercial, industrial, agricultural, open space, and orchards. Water is supplied to Escondido and its sphere of influence, as defined by the Local Area Formation Commission, by five water agencies: Escondido Water Department, the Vallecitos MWD, the Valley Center MWD, Rincon MWD, and VID. Escondido also maintains service exchange agreements with Vallecitos MWD, VID, and Valley Center MWD.

VID serves potable water to a population of around 135,000 through approximately 28,900 metered residential, agricultural, commercial, and industrial connections (VID, 2020). VID encompasses a service area of over 21,000 acres in North San Diego County, approximately 30 miles north of downtown San Diego. It serves water to the entire City of Vista, unincorporated areas of the County of San Diego and portions of the cities of Escondido, Oceanside, and San Marcos. Surrounding water agencies include the City of Oceanside to the west, Vallecitos MWD to the east and south, the Carlsbad MWD to the southwest and Rainbow MWD to the north.

2.2.2 Service Area Facilities

All drinking water provided by Escondido and much of the drinking water provided by VID is treated at the Escondido-Vista WTP (VID also receives treated water from the SDCWA). As part of its service area, Escondido operates and maintains over 420 miles of pipe ranging in diameter from 4-inch to

42-inch; eleven water reservoirs with a total capacity of about 24 million gallons (MG), and five pump stations. (Escondido, 2012).

VID operates and maintains twelve reservoirs, with a total capacity of over 46 MG, seven pump stations, and 429 miles of pipeline, ranging in diameter from 4-inch to 42-inch (VID, 2020a).

2.2.3 Escondido-Vista Water Treatment Plant

The Escondido-Vista WTP treats a blend of raw water from SDCWA and local reservoirs, then delivers treated effluent to both Escondido and VID customers. The water system schematic in Figure 2-13 illustrates how water sources are conveyed to the WTP: water from SDCWA is pumped through a 42-inch pipeline with fluctuating flow, water from Dixon Lake flows by gravity to the WTP at up to 80 MGD through a 54-inch pipeline, and water from Lake Wohlford enters the WTP by way of Bear Valley Power Plant with a maximum flow of 50 MGD. All sources are blended prior to treatment (VID, 2018).

The WTP was completed in 1975 and expanded in 1984. Designed for 90 MGD, the WTP is currently permitted to produce 75 MGD due to restrictions placed by the SWRCB Division of Drinking Water (DDW) on the plant's filtration system. Treatment includes coagulation, sedimentation, filtration and disinfection. Bacteriological, physical and chemical tests are performed on water samples to confirm compliance with drinking water regulations. Treated water is delivered to the 5.4 MG WTP Clearwell and then either to Escondido's distribution system or to a covered pipeline called the Vista Flume for delivery to VID.

VID's portion of treated water from the Escondido-Vista WTP is conveyed to VID's 20 MG Pechstein Reservoir via an 11-mile gravity conveyance called the Vista flume. The Vista Flume, owned, operated and maintained by VID, consists of both covered flume and siphon sections. The flume portion of the alignment totals 5.5 miles in length and consists of 11 bench sections. The siphon system is 5.75 miles in length and is comprised of five riveted steel sections, three concrete sections, one high density polyethlylene (HDPE) section, and a 0.25-mile-long hard rock tunnel section. This system is the sole means of delivering portable water to VID from the Escondido-Vista WTP and is necessary to obtain water from VID's local supply at Lake Henshaw.

VID owns capacity rights for treatment of 18 MGD of the 75 MGD rated capacity; Escondido owns the remainder. Escondido's water service area demand on the plant averages approximately 25 MGD, with a peak demand of approximately 40 MGD. During the summer, the instantaneous peak demand can increase to 70 MGD.

In 2017, the Escondido-Vista WTP was upgraded to enhance the security, safety, and reliability of the overall water treatment process. These improvements included the installation of on-site sodium hypochlorite and chlorine dioxide generation and emergency power generators capable of managing the demands of the redesigned WTP during a power outage.

2.2.4 Emergency Plans

Escondido and VID each have an emergency response plan and a water quality emergency notification plan (WQENP), per DDW requirements, for their municipal water systems. The WQENP outlines procedures for notifying water users in the event of a possible contamination event. Immediate and secondary actions that must be taken are described for both a system-wide problem and localized/isolable emergency. The plan includes notices to be issued in the event of bacteriological and chemical water quality emergencies. At least two operators are present at the WTP 24 hours per day.

2.2.5 Water Treatment Plant Sanitary Survey

Separate sanitary surveys are conducted by the SWRCB to evaluate the adequacy of the water source, facilities, equipment, operations, and maintenance to produce and distribute safe drinking water. WTP sanitary surveys cover the following eight elements: water sources, treatment processes, distribution system, finished water storage facilities, pumping facilities, water quality monitoring, management and operations, and operator compliance. Like the WSS, WTP sanitary surveys are conducted every five years (22 CCR Section 64255(c)).

2.3 Related Projects and Plans in the Watershed

Two large projects are currently underway in the watershed, the San Pasqual Undergrounding Project (SPUP), and the Lake Wohlford Dam Replacement Project, described in more detail below. Additionally, VID and Escondido are preparing a HABS mitigation and monitoring plan to develop algae control and testing protocols, and VID recently prepared an Aquatic Pesticide Application Plan (APAP) for Lake Henshaw and Warner Ranch. Section 3 includes other changes that have occurred in the watershed broken up by contaminant source type.

2.3.1 San Pasqual Undergrounding Project (SPUP)

Escondido and VID are jointly undertaking the San Pasqual Undergrounding Project (SPUP). SPUP is early in the construction phase as of November 2021, and involves the removal, relocation, and replacement of a 2.5-mile portion of the Escondido Canal with a covered canal, culvert, and underground pipeline. SPUP will construct a new desilting basin within the existing 100-foot canal right-of-way near the northern boundary of the San Pasqual Indian Reservation (SPIR). Downstream of the desilting basin, SPUP will replace approximately 0.5 miles of existing open canal with a shallow buried 60-inch wide by 48-inch-high precast concrete box culvert. Following the culvert, SPUP will divert canal flows into a buried 60-inch diameter, 1.5-mile pipeline traversing SPIR and private parcels, and under Lake Wohlford Road (Escondido-VID, 2016). SPUP is designed to convey 55 cfs of water diverted from the San Luis Rey River approximately 10 miles through the Escondido Canal to the northern boundary of SPIR. Figure 2-15 is a project overview map available on Escondido’s website.

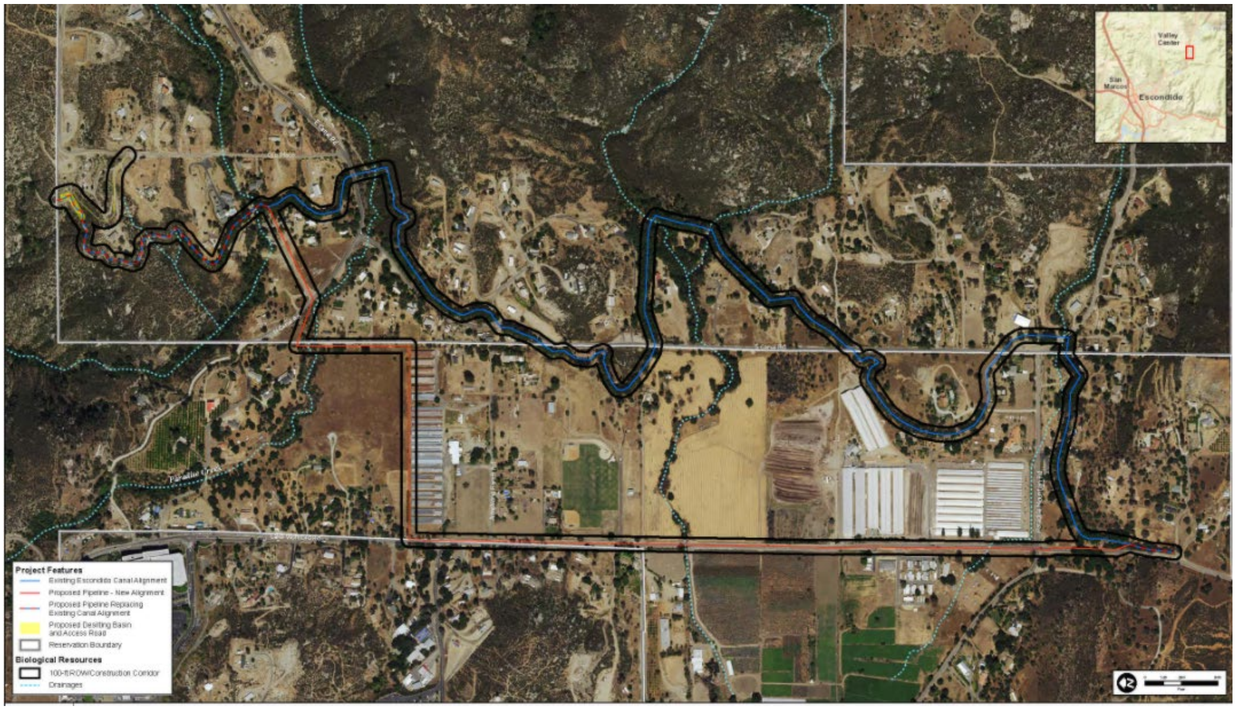

Figure 2-15. San Pasqual Undergrounding Project Overview Map

Source: Figure created by Atkins for City of Escondido

By covering portions of the canal, implementation of the SPUP may result in a reduction of area in the Escondido Canal sub-area that drains to the canal and downstream drinking water sources. As a result, the SPUP has the potential to reduce contaminants reaching raw water sources and to reduce the total flow captured from the Escondido Canal Watershed.

2.3.2 Lake Wohlford Dam Replacement Project

The City of Escondido is planning to replace Lake Wohlford Dam to restore reservoir capacity and improve dam safety. Lake Wohlford Dam was originally constructed as a rockfill dam in 1895. In 1924, the dam was raised using hydraulic fill to expand reservoir storage capacity to approximately 6,500 ac-ft and a surface area of approximately 225 acres. In 2007, a seismic analysis identified stability concerns for the 1924 hydraulic fill areas of the dam, and the lake level was lowered to reduce the risk of dam failure as a result of an earthquake (VID, 2018). Since Escondido lowered lake levels, available storage capacity has been approximately 40 percent of Lake Wohlford's full capacity.

The Lake Wohlford Dam Replacement Project would raise the dam crest approximately 120 feet above the foundation grade to an elevation of 1,490 feet, and the crest would span approximately 775 feet. The new roller compacted concrete dam will be located approximately 200 feet downstream of the existing dam and will inundate areas that have been dry since 2007 (Escondido-VID, 2016). Potential water quality impacts are not expected to be significant according to the project's September 2020 Final EIR but may warrant additional sampling before and after implementation of the project and an increased surveillance of water quality data obtained as water level increases. Figure 2-16 shows a photograph of construction on the Lake Wohlford Dam Replacement project.

Figure 2-16. Lake Wohlford Dam Replacement Construction

2.3.3 Harmful Algal Blooms Mitigation and Monitoring

As of November 2021, VID and Escondido are working with a consultant team to prepare a Harmful Algal Bloom Management and Mitigation Plan for Lake Henshaw and Lake Wohlford.

2.3.4 Aquatic Pesticide Application Plan for Lake Henshaw and the Warner Ranch

Escondido and VID occasionally require the use of aquatic algaecides and/or aquatic herbicides as part of a larger program for managing water resources, maintaining designated beneficial uses, and controlling nuisance growths of algae and aquatic vegetation within the water system (seen in Figure 2-17). Management of water resources via the occasional use of chemicals must be undertaken carefully so that their use does not impair the resources they strive to protect. Regulatory background and methods of aquatic pesticide application are described in an Aquatic Pesticide Application Plan (APAP). Although VID's APAP, approved in 2021, is described here, Escondido has an APAP from 2014 and has been treating algae in Lake Wohlford, Dixon Lake, and Escondido Canal for taste and odor control.

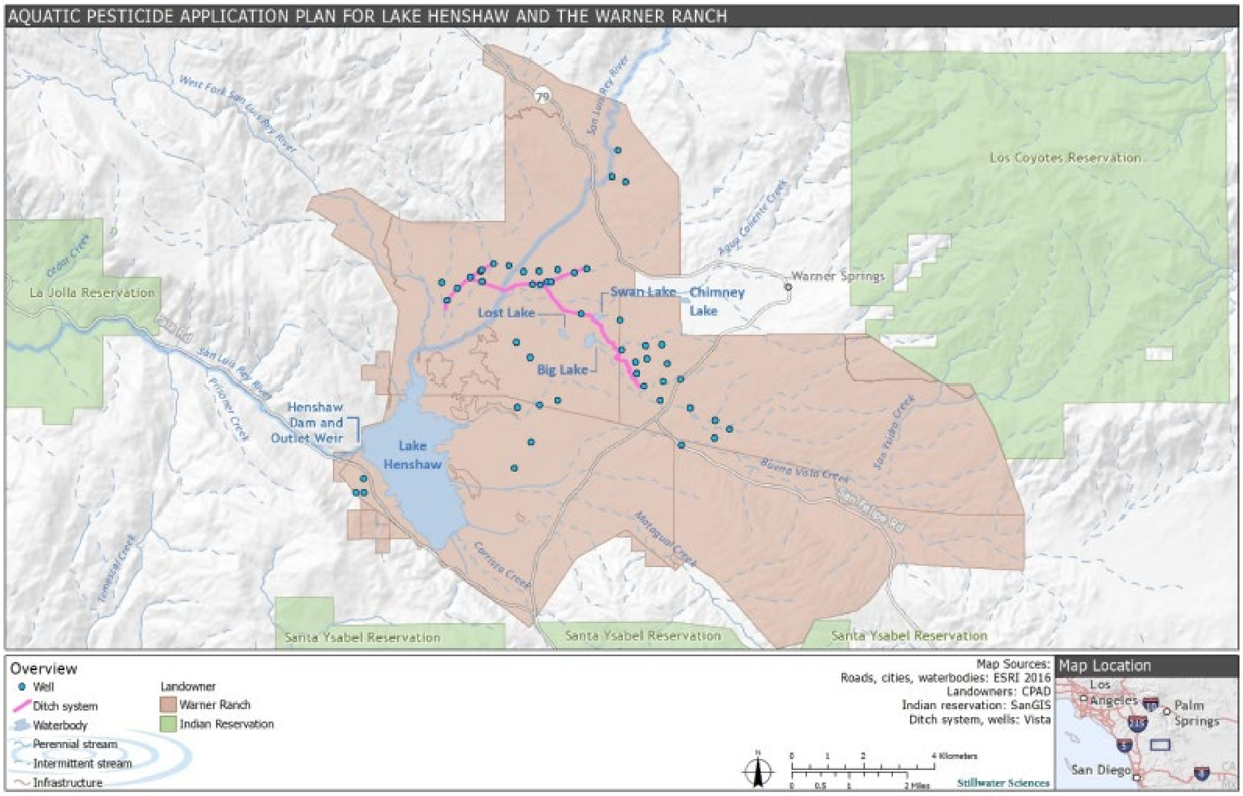

Figure 2-17. Vista Irrigation District water system, including Warner Ranch groundwater wells and ditches, Lake Henshaw, and Henshaw Dam (APAP, 2021)

The APAP describes the best management practices (BMPs) and precautions that will be implemented to protect surface waters within the Warner Ranch, and Lake Henshaw, while maintaining sufficient storage in the lake to meet water delivery demands. The APAP addresses the application of algaecides/herbicides for controlling algae and aquatic weeds in VID's water supply system (APAP, 2021).

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Section 3

Potential Contaminant Sources

This section describes potential contaminants that were identified within the watersheds, the relative significance of these potential contaminant sources, anticipated population growth within the watersheds, and projected changes in the sources of contaminants.

3.1 Survey Methods

BC conducted this WSS by collecting and reviewing available information from government agencies and other stakeholders in the watershed. BC, Escondido, and VID staff also conducted a field survey of the Lake Wohlford and Dixon Lake watersheds on October 21, 2021, and portions of the San Luis Rey and Lake Henshaw watersheds on November 16, 2021. The field survey consisted of a driving and walking tour along the shoreline and upland roads surrounding the lakes as well as boating on Lake Wohlford. BC did not conduct a field survey of watersheds supplying SDCWA raw water, which are covered by the 2015 Colorado River WSS and the 2016 State Water Project WSS. Assessments were made of all surrounding activities, including but not limited to agricultural use, urban areas, grazing animals or feedlots, recreational areas, construction locations, and fire locations.

BC evaluated potential and existing contaminant sources from publicly available reports and maps, along with public agency file documents from Escondido and VID and telephone conversations with Escondido and VID staff.

3.2 Potential Contaminant Sources in the Escondido-VID Watershed

The project team used information from the site visit, past studies, and data queries using the California Environmental Protection Agency (CalEPA) Regulated Site Portal[1] to obtain information about potential contaminant sources in the watershed. The significance of each source is re-assessed from previous sanitary surveys based on the updated information.

The various potential contaminant sources in the watershed are pulled from the CalEPA Regulated Site Portal, including permitted wastewater and group septic systems marked as “Waste Discharge Requirements;” agricultural/grazing animal sites with documented discharges, solid and hazardous waste disposal sites marked as either solid waste and recycle sites, land disposal, or land disposal site; hazardous materials storage facilities including aboveground petroleum storage, chemical storage facilities, underground storage tanks (containing fuel or other hazardous chemical), and leaking underground storage tank cleanup sites; and unregulated sites consisting of two former solid waste disposal sites that have been closed for more than 15 years.

[1] The CalEPA Regulated Site Portal combines data about environmentally regulated sites and facilities in California into a single, searchable database and interactive map of regulated activities including hazardous materials and waste handling, state and federal cleanups, impacted ground and surface waters, and toxic materials handling. The portal combines information from nine databases. This survey found potential contaminant sources from six of the nine databases. The six databases are the California Environmental Reporting System (CERS), California Integrated Water Quality System (CIWQS), EnviroStor System, GeoTracker, Stormwater Multiple Application and Report Tracking System, and Solid Waste Information System (SWIS).

Figure 3-1 provides the locations of all CalEPA regulated sites except for WDR facilities. See Figure 3-2 for WDR facility locations. Appendix B includes more information about each of the Cal EPA regulated sites, including WDR facilities.

3.2.1 Wastewater

Residential and recreation facilities in the watershed rely mostly on dispersed septic tanks. Five packaged wastewater treatment facilities are present in the watershed, four at camps/resorts and one at the La Jolla Reservation serving about 700 tribal members. In addition, three group septic systems are used by camps/resorts.

3.2.1.1 Water Quality Concerns

Wastewater treatment facilities collect, treat, and dispose of human waste and can pose a variety of water quality risks when they fail or are operating improperly. Failure of these systems may result in the introduction of disease-causing microorganisms to raw water supplies and/or lead to an increase in the nutrient loading to the watershed. Municipal and industrial sewage effluent can contain synthetic organic chemicals, metals, microorganism, and significant organic matter that challenge potable water treatment processes and impact treated water quality. For the Escondido-VID watershed, key contaminants of concern are pathogenic organisms, nutrients, and oxygen demanding substances.

3.2.1.2 Watershed Management

Small septic tanks at the individual residences, package treatment facilities or group septic systems at the resort areas and camps discharge effluent through leach fields, spray irrigation fields, and percolation ponds. Wastewater treatment facilities and group septic systems in the watershed require Waste Discharge Requirement (WDR) permits for operation issued by the San Diego Regional Water Quality Control Board (SDRWQCB). There are no permitted discharges to surface waters and no sewer system overflows within the Escondido-VID watershed.

3.2.1.3 Watershed-Specific Concerns

Within the 2016-2021 period there were no additional facilities constructed that required WDR permits issued by the SDRWQCB. In September 2021, the SDRWQCB issued Order No. R9-2021-0150 rescinding order No. 93-13 regarding WDR permits for the Warner Springs Ranch Resort LLC, Warner Springs Ranch Resort Wastewater Treatment Plant, San Diego County. There are seven active wastewater discharge facilities in the watershed that are regulated by the SDRWQCB through a WDR permit and presented in Table 3-1. The La Jolla Reservation wastewater facility is regulated under a separate permit. These facilities are isolated sites with relatively concentrated populations, such as mobile home parks, resorts, or campsites. Two are publicly-owned treatment works, and five are privately-owned facilities. Table 3-1 lists characteristics of the WDR facilities and their locations (by watershed sub-area and Basin Plan Hydrologic Sub-Area). Figure 3-2 shows the locations of the WDR facilities in the watershed.

Warner Springs Ranch, Warner Springs Ranch Resort, Warner Springs Mobile Estates, and Puerta La Cruz Conservation Camp are operating under updated WDRs. The updated WDR listed in the 2016 WSS Update for Oakvale Park was terminated on December 8th, 2020. The remaining three facilities are still operating under the same WDRs noted in the 2016 WSS Update.

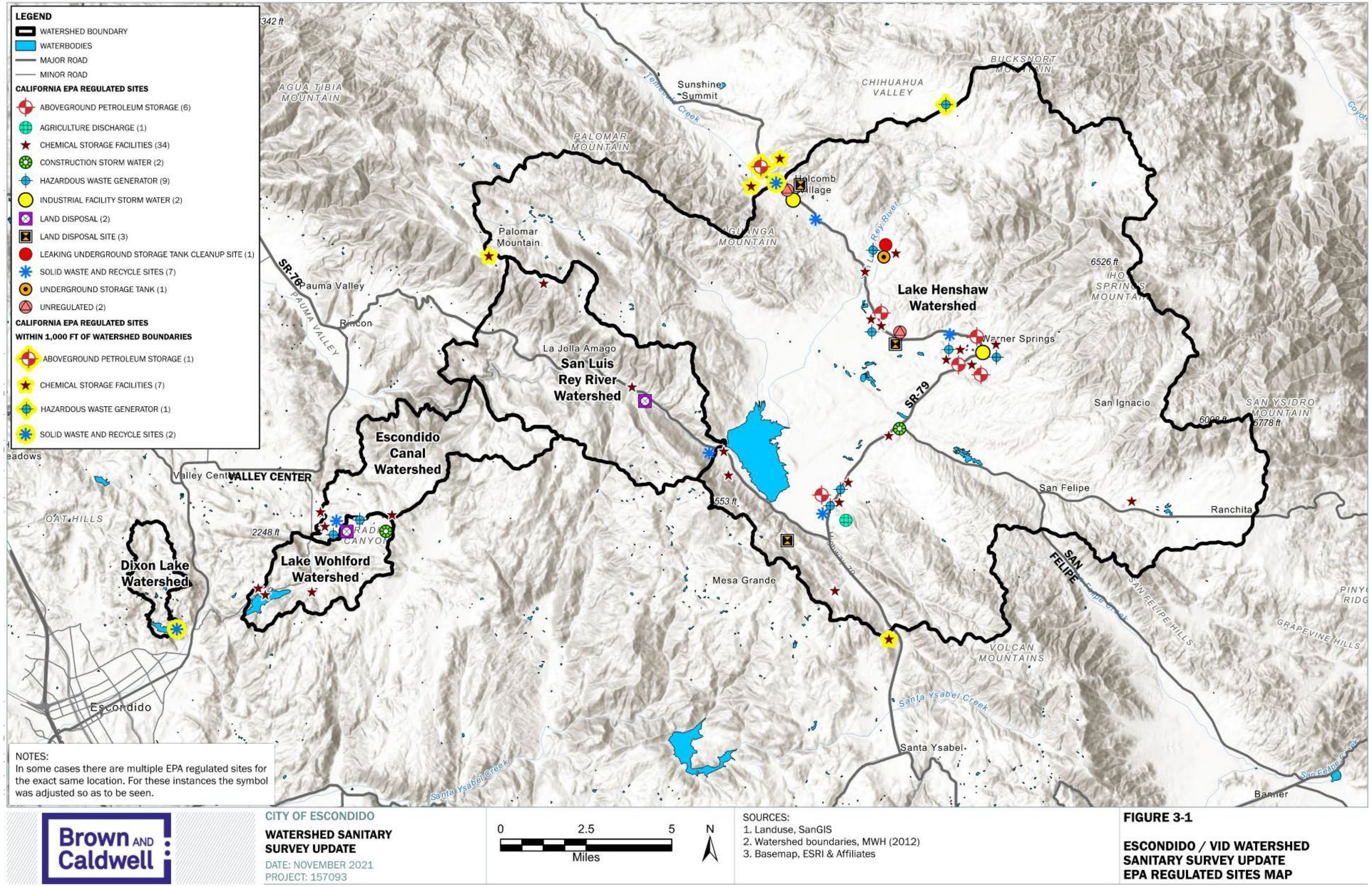

Figure 3-1. CalEPA regulated sites, excluding WDR permitted sites, within the Escondido-VID Watershed

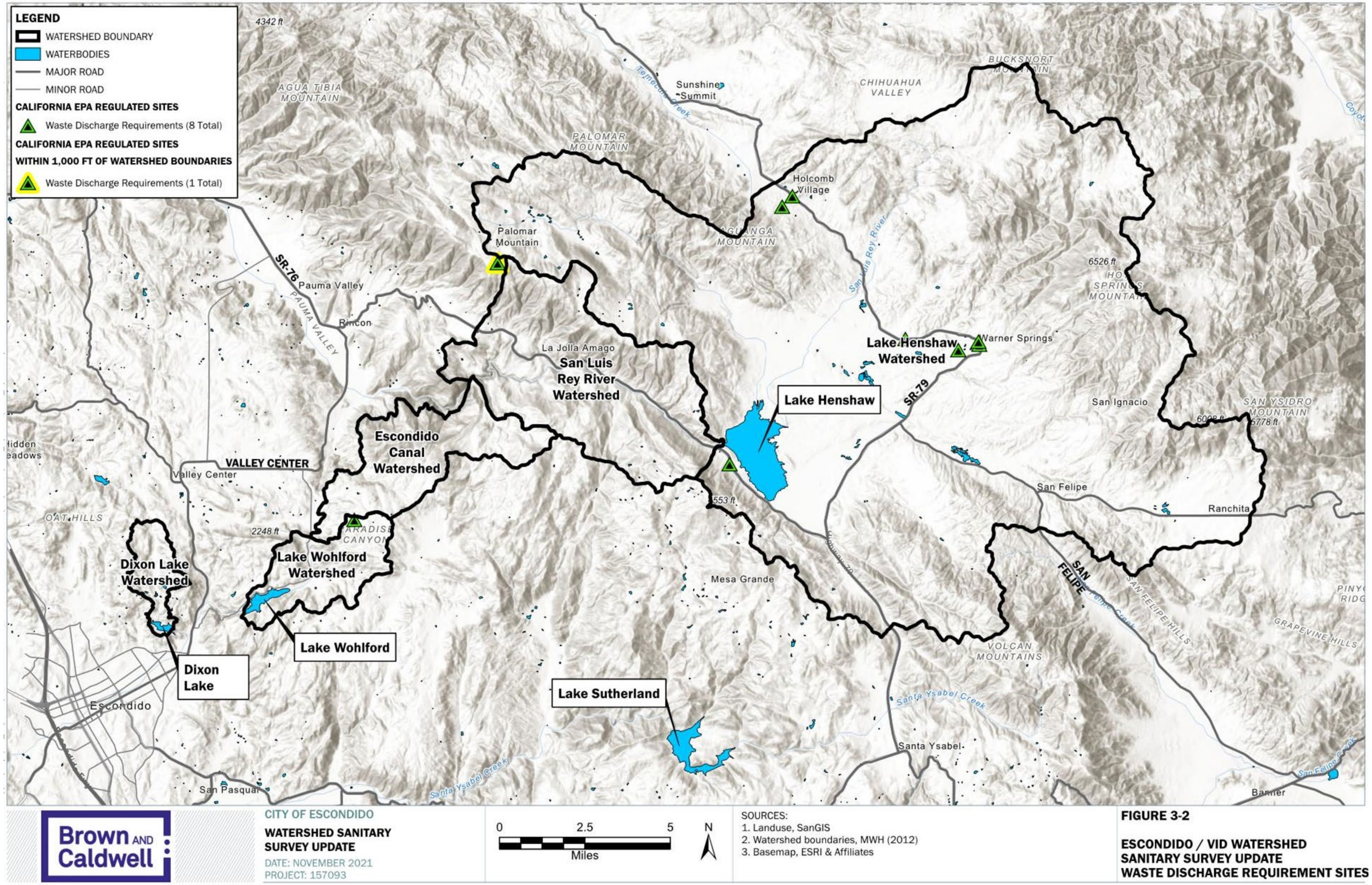

Figure 3-2. WDR Facilities within the Escondido-VID Watershed

Table 3-1. WDR Permits in the Escondido-VID Watershed [a]

Facility Name	Lake Henshaw Resort	Skyline Ranch Country Club	US Navy Remote Training Site Warner Springs OWTS [b]	Shadows Mountain Vineyard (inactive)	Warner Springs Ranch Resort	Warner Springs Mobile Estates	Puerta La Cruz Conservation Camp	Warner Springs Ranch
Basin Plan Hydrologic Sub-Area	903.23	904.63/903.22[c]	903.31	903.31	903.31	903.31	903.31	903.31
Watershed Sub-Area	San Luis Rey River	Lake Wohlford	Lake Henshaw	Lake Henshaw	Lake Henshaw	Lake Henshaw	Lake Henshaw	Lake Henshaw
Agency	Mendenhall, Frank & Janice	Skyline Ranch Country Club LLC	US Navy San Diego	McGeary, Alexander & Pamela	Warner Springs Ranch Resort LLC	Warner Springs Estates Homeowners Association	Ca Dept of Forestry Warner Springs CalFire	Warner Springs Ranch Resort LLC
Project Type	Campground	Wastewater Treatment Facility	Wastewater Treatment Facility	Wastewater Treatment Facility	Campground	Wastewater Treatment Facility	Domestic Site NEC	Wastewater Treatment Facility
Waste Discharge ID	9 000000096	9 000000223	9 000000235	9 000000799		9 000000176	9 000000033	9 000000262
Effective Date	2/10/1994	11/9/2005	2/11/2015	4/9/1997	7/28/2015	5/8/2019	9/9/2020	9/8/2021
Expiration Date	2/10/2014	11/9/2014	2/11/2030	N/A	5/8/2024	9/23/2029	9/23/2029	9/7/2026
SDRWQCB Order	94-003	R9-2005-0258	R9-2015-0012	97-021	R9-2019-0005W3	2014-0153-DWQ	2014-0153-DWQ	2014-0153-DWQ
Treatment & Disposal	Septic tanks and percolation ponds	Package treatment plant and irrigation	Package treatment plant and spray irrigation		Septic tanks and percolation ponds	Package treatment plant and spray irrigation	Septic tanks and percolation ponds	Package treatment plant and percolation ponds
Design Flow (MGD)	0.01	0.04	0.01			0.045	0.01	0.025
# Enforcement Actions within 5 Years	0	2	0	0	0	0	1	1
# Violations within 5 Years	0	6	2	0	0	0	2	0

a. *Data retrieved from the California Integrated Water Quality System (CIWQS), November 2021*

b. *Onsite Wastewater Treatment Systems (OWTS)*

c. *Collection facilities located in first hydrologic sub-area; effluent disposal in second hydrologic sub-area*

3.2.2 Septic Tanks

As described above, facilities in rural areas such as the Escondido-VID watershed are generally too dispersed to be served by wastewater treatment plants and instead use septic leach fields or individual septic tank systems. In the unincorporated area outside of VID and Escondido, residents use an individual septic system, i.e., anaerobic digestion in a septic tank and liquid overflow to a septic leach field. Table 3-1 above lists the three facilities that use septic tanks and percolation ponds for treatment and disposal within the watershed.

Four Indian Reservations within the watershed also rely on individual septic systems are the San Pasqual, Santa Ysabel, Los Coyotes, and Rincon reservations (San Diego County, 2019). There is also a trailer park, the Lake Wohlford Resort, located on the shores of Lake Wohlford that relies on an independent septic system. Finally, about a dozen portable and fixed toilets are located in the Dixon Lake Watershed and about half of them are located close to the lake.

3.2.2.1 Water Quality Concerns

The contribution of contaminants by properly-operating septic systems may be minimal, but a plugged leachfield or septic tank can send untreated sewage directly into a waterbody or into the groundwater. In a household with a septic system, improper disposal of household chemicals including substances containing, metals, pesticides, or herbicides can lead to contamination from the leachfields. These concerns apply to the septic systems present in the Escondido-VID watershed.

3.2.2.2 Watershed Management

On June 19, 2012, SWRCB adopted Resolution No. 2012-0032, the Water Quality Control Policy for Siting, Design, Operation, and Maintenance of Onsite Wastewater Treatment Systems (OWTS) Policy (OWTS Policy). The OWTS Policy took effect in 2013 and establishes a statewide, risk-based, tiered approach for the regulation and management of OWTS including septic leach fields or individual septic tank systems. SDRWQCB approved the creation of a Local Agency Management Program (LAMP) through resolution #R9-2015-008 allowing San Diego County Department of Environmental Health (DEH) to issue OWTS permits for OWTS that meet requirements to protect groundwater quality and public health. Prior to issuing a permit, DEH reviews systems for soil conditions; system separation from seasonal high groundwater depth; density of other OWTS in the surrounding area; the type, size, and specific design features of system; and other requirements spelled out in the LAMP documentation (DEH, 2015).

3.2.3 Urban and Industrial Runoff

Urban and industrial areas are small relative to other land uses within the Escondido-VID watershed, and therefore are not likely to contribute significant contamination to the watershed. Sources of urban and industrial runoff within the watershed include storm water runoff from Indian Reservations (containing residential, commercial, agricultural, limited industrial, and other uses) and transportation corridors.

3.2.3.1 Water Quality Concerns

Urban runoff has the potential to contain numerous contaminants from vehicle emissions, vehicle maintenance wastes, outdoor washing, outdoor material storage, landscaping chemicals, household hazardous wastes, pet wastes, trash, and other manmade waste sources. Fertilizer or pesticide usage in urban areas contributes nutrients to urban runoff. Natural organic materials such as leaves, woody debris, and animal wastes can also contribute organic compounds, bacteria, and nutrients to receiving waters. Urban runoff may also contain heavy metals and volatile organic compounds (VOCs).

Industrial runoff tends to contribute similar water quality contaminants to surface water as urban runoff, although specific contaminants depend on the type of industries that are present. Industrial constituents of concern generally include metals, organics, sulfates, nitrates, phosphates, and inorganics.

Industrial areas make up a very small fraction of the watershed and are anticipated to be converted to residential area in the future, according to San Diego County planning projections. Two industrial sites have industrial stormwater permits within the watershed. Specific urban runoff pollutant concerns in the watershed are described in Section 3.2.3.3.

3.2.3.2 Watershed Management

The Federal Clean Water Act (Clean Water Act) regulates point source discharges into water bodies using National Pollutant Discharge Elimination System (NPDES) permits (USEPA, 2021). The NPDES stormwater program regulates stormwater discharges from three potential sources: municipal separate storm and sewer systems (MS4s), construction activities, and industrial activities.

The SDRWQCB regulates discharges from Phase 1 MS4s under the San Diego Regional NPDES MS4 Permit (Regional MS4 Permit). The Regional MS4 Permit covers 39 municipal, county government, and special district entities in San Diego County, southern Orange County, and southwestern Riverside County. The Regional MS4 Permit requires municipalities, special districts, and counties to create and regularly update Jurisdictional Runoff Management Program (JRMP) plans to detect and eliminate non-storm water discharges and reduce sources of pollutants in stormwater runoff. Programs include Construction Site Operations, Development Planning, and Industrial and Commercial Facilities. Watershed Management Areas (WMAs) in the San Diego region must also create and regularly update Water Quality Improvement Plans (WQIPs) to describe activities and projects to improve water quality and how annual improvements will be monitored.

The Escondido-VID watershed overlaps with parts of the San Luis Rey and Carlsbad WMAs, as shown in Figure 3-3. Each of the two WMAs has its own WQIP and staff from local agencies monitor surface water quality, stormwater, and non-stormwater discharges. Project Clean Water was initiated in 2000 as a forum for exploring water quality issues of regional significance in San Diego County, and today serves as a regional clearinghouse for water quality information (Project Clean Water, 2021). The Project Clean Water website has links to MS4 permits, WQIPs, watershed maps, and JRMP documents.

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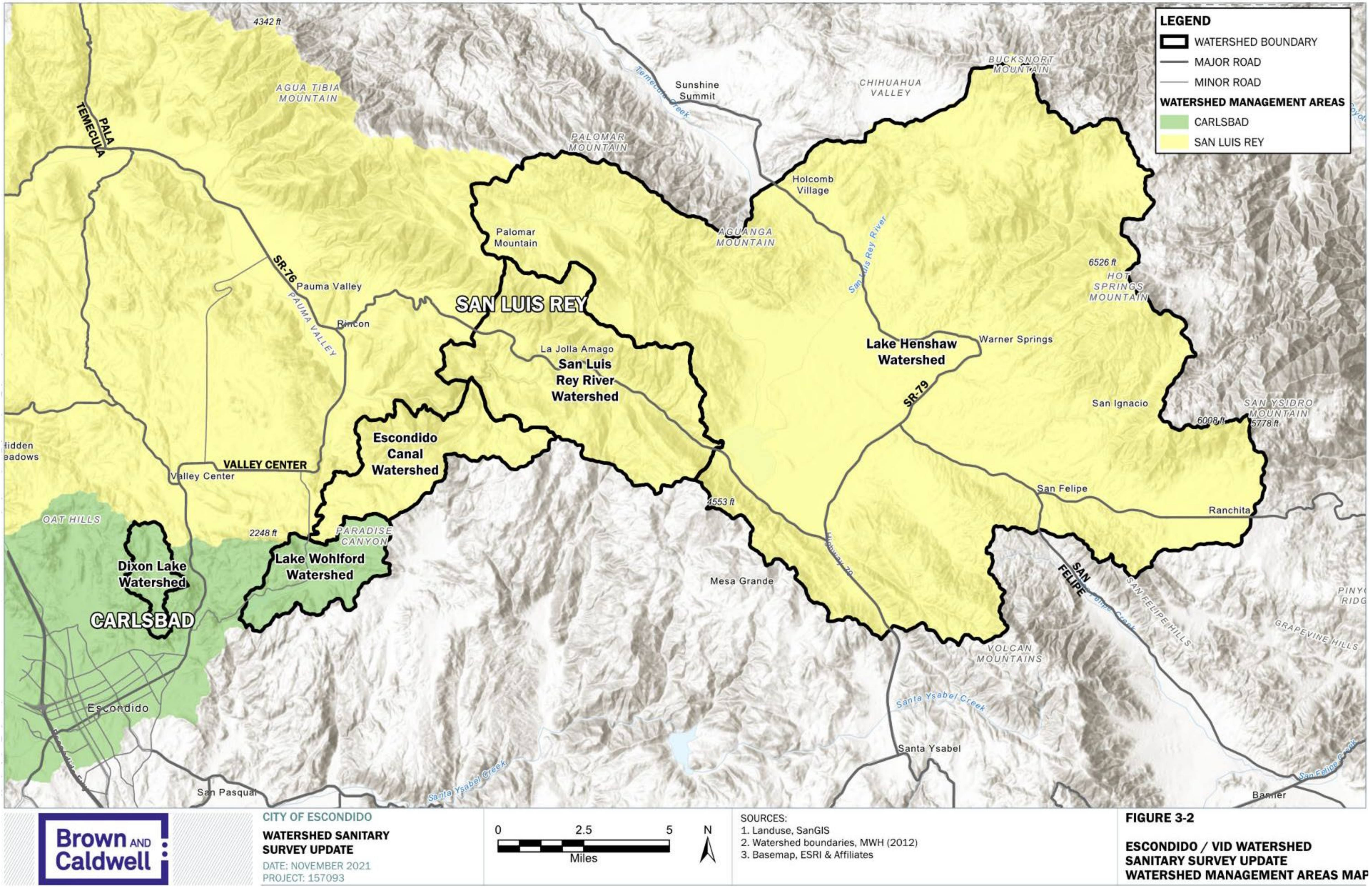

Figure 3-3. Watershed Management Areas in the Escondido-VID Watershed

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Escondido enforces stormwater management as part of its municipal code in accordance with the Regional MS4 permit, implements a local JRMP, and contributes to the Carlsbad and San Dieguito Watershed Management Area WQIPs. Escondido's MS4 area covers part of the Dixon Lake watershed and water quality management practices for the MS4 area are described in Escondido's JRMP (City of Escondido, 2017).

In addition to MS4 permits, state law requires Construction General Permits for dischargers with projects that disturb one or more acres of soil under the General Permit for Dischargers of Storm Water Associated with Construction Activity (Construction General Permit Order 2009-0009-DWQ). Activities subject to this permit include clearing, grading, and disturbances to the ground such as stockpiling or excavation, but do not include regular maintenance activities performed to restore the original line, grade, or capacity of the facility. The SDRWQCB has issued two active Construction General Permits in the past five years.

Industrial storm water and authorized non-storm water discharges from industrial facilities in California are regulated through the Industrial General Permit. The Industrial General Permit is called a general permit because many industrial facilities are covered by the same permit but comply with its requirements at their individual industrial facilities. The SWRCB and SDRWQCB implement and enforce the Industrial General Permit. There are two active Industrial General Permits within the Escondido-VID Watershed.

Table 3-2 summarizes the relevant storm water permits in and near the watershed and provides information on when each was issued or updated.

Table 3-2. Storm Water Permits in the Escondido-VID Watershed [a]

WDID	Facility Name	Owner/Operator Name	Type	Watershed Sub-area	Status	Date of Last Update
9 37M1000310	Phase I MS4	Escondido City	Phase I MS4 (under Regional MS4 Permit)	Dixon Lake	Active	7/11/2017
9 37C386431	FiRM Warner Sub Yard	San Diego Gas & Electric Co	Construction	Lake Henshaw	Active	3/28/2019
9 37C390739	C1030 Phases 1 2A 2B and DUG	San Diego Gas & Electric Co	Construction	Lake Wohlford	Active	7/7/2020
9 37NEC000508	Sierra Roble Winery and Vineyard LLC	Sierra Roble Winery and Vineyard LLC	Industrial	Lake Henshaw	Active	8/31/2015
9 37I001773	Warner Unified School District	Warner Unified School District	Industrial	Lake Henshaw	Active	3/30/1992

a. *Data retrieved from the Stormwater Multiple Application and Report Tracking System, 2021*

Although not described in Table 3-2, the La Jolla Indian Reservation has a water quality monitoring program and a nonpoint source pollution control program under Sections 106 and 319 of the Clean Water Act and participates in Source Water Assessment Planning to protect local water resources.

3.2.3.3 Watershed-Specific Concerns

Transportation corridors of concern are SR-76 west of Lake Henshaw near Lake Henshaw Resort and in the San Luis Rey River Watershed, and SR-79 east of Lake Henshaw in Warner Springs. Lake Wohlford Road is also of concern due to its proximity to the lake. Hazardous materials spills and traffic accidents are discussed in Section 3.2.10.

Indian Reservations located within the Escondido-VID watershed include the San Pasqual, La Jolla, Rincon, Santa Ysabel and Los Coyote Reservations. Construction was completed on a new casino on the Santa Ysabel Indian Reservation, in the southern portion of the Lake Henshaw watershed. The Santa Ysabel Casino opened in 2007 and was subsequently closed in early 2014.

During the site visit, the project team observed a new residential development being built on one of the reservations near the northeast side of Lake Wohlford. The team also saw a small private airport nearby, just north of Lake Wohlford. According to Escondido staff, the airport is seldom used and does not have refueling facilities. In the Escondido-VID Watershed, there is also the Warner Springs Air Park and Gliderport located near Lake Henshaw, which includes refueling facilities. An accident could potentially contribute contaminants to the water bodies that supply Escondido and VID and would constitute a hazardous materials spill or traffic accident, discussed in Section 3.2.10.

Until 2020, VID staff prevented well casing scaling by adding hexametaphosphate (a form of polyphosphate) to four groundwater wells that supply water to Lake Henshaw. Staff suspended the practice due to concerns over phosphate input that could increase algae growth in the lake. Although it is not known whether there is a correlation between the use of well scale control chemicals and algal growth, it is recommended VID document past application of hexametaphosphate to allow more informed decisions in the future about how to prevent well scaling. VID and Escondido are planning to implement additional algal bloom monitoring to help understand how algae characteristics vary over time.

Filter backwash water from the Escondido-VID WTP is returned to Dixon Lake and could concentrate contaminants and increase sedimentation in the lake.

3.2.4 Agricultural Activities

Agricultural land is a very small portion in the Escondido-VID Watershed. Water management and source control practices implemented by agricultural landowners in the watershed prevent contaminants from seeping into the water supply.

Agricultural lands within the Escondido-VID watershed can be categorized into three primary land use types: intensive agriculture, field crops, and orchard or vineyard. According to San Diego County land use definitions, intensive agriculture includes nurseries, greenhouses, flower fields, dairies, poultry farms, livestock feed lot, row crops, and year-round grain cultivation. Field crops include pasture and fallow land growing alfalfa, oat, wheat, and similar crops that do not require pesticides or irrigation and are grown in the wet winter months. Orchards and vineyards include apples, apricots, avocados, citrus fruits, and wine grapes. Figure 3-4 presents agriculture land uses by area in 2019, broken down by individual watershed sub-area (SANDAG, 2021).

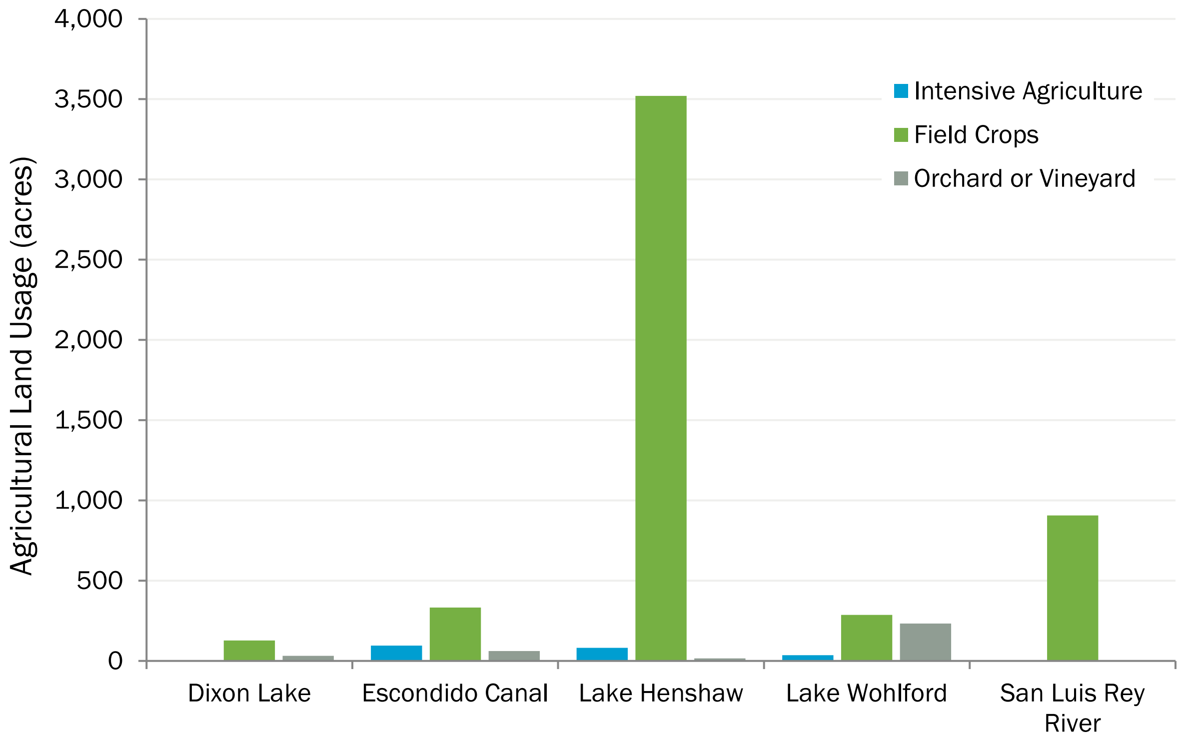

Figure 3-4. 2019 Agricultural Land Uses within the Escondido-VID Watershed Sub-Areas

The majority of Escondido-VID Watershed agricultural land is used for field crops, and the largest portion of total agricultural land in the watershed is located in the Lake Henshaw sub-area. Figure 3-5 shows the breakdown of agricultural land uses within the Escondido-VID watershed.

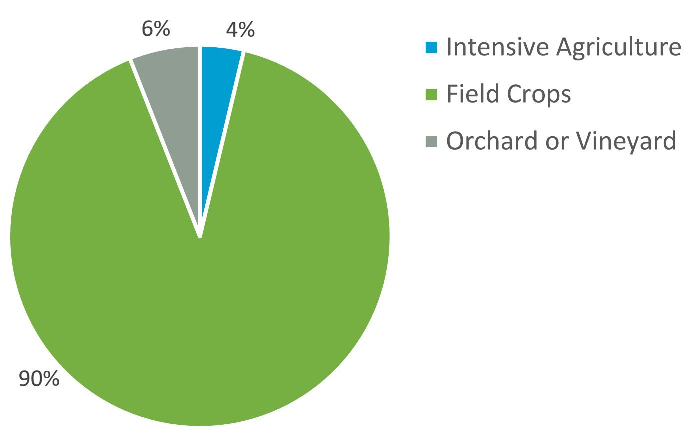

Figure 3-5. Total Percentage of Agricultural Land Uses with within the Escondido-VID Watershed

Pesticides are applied seasonally, either during the irrigation or the dormant season. During the dormant season occurring between late fall and early spring, pesticides are carried to surface water by storm water runoff. Pesticide residues deposited on trees and on the ground migrate with runoff water during rain events. During the irrigation season between spring and early fall, pesticides migrate with irrigation water, and occasionally storm water, from agricultural fields and enter water bodies. During both seasons, localized drift from pesticide applications and atmospheric deposition can also contribute to pesticides being introduced into surface water.

In addition to use along highways and on field crops, regulated pesticides and herbicides have historically been used for landscape management at the Warner Springs Ranch and Skyline Ranch Country Club golf courses. Warner Springs Ranch is located in the Henshaw Watershed about 6.5 miles northeast of the Lake Henshaw shoreline along SR-79 (and is shown with aboveground petroleum storage and other regulated activities on Figure 3-1). Skyline Ranch Country Club is located in the Lake Wohlford Watershed about 2 miles northeast of the Lake Wolford shoreline. Unregulated pesticide use is difficult to quantify, but it may be a significant contaminant source. Residential areas are potential sources of pesticide runoff, but with the exception of Lake Wohlford and Paradise Mountain, residential areas are located relatively far from surface water bodies.

In January 2019, the Iipay Nation of the Santa Ysabel Reservation opened a marijuana cultivation site and dispensary inside what once was the tribe's casino off SR-79 south of Lake Henshaw. The dispensary is not required to have a license from the California Bureau of Cannabis Control, provided the tribe only sells marijuana that is grown on the reservation. There is one known cannabis site located within the watershed outside of an Indian Reservation, San Diego Tree Company (WDID 9 37CCU426120). This site is currently unregulated (CIWQS 2021).

The California Department of Public Health maintains an agricultural pesticide use web mapping service called Agriculture Pesticide Mapping Tool. A review of this mapping service was conducted and there was no significant agricultural use of pesticides reported. Between 2016 and 2018, all pesticide use within the Escondido-VID Watershed was less than 2,232 pounds (Agriculture Pesticide Mapping Tool, 2016-2018).

3.2.4.1 Water Quality Concerns

Agricultural nonpoint source pollution enters receiving waters by direct runoff to surface waters or seepage to groundwater. Runoff of nutrients can result from excessive application of fertilizers. Farming activities can cause erosion, which results in sediment entering receiving waters. Improper use and over-application of pesticides and herbicides can result in these contaminants being discharged to adjacent waterways. Chemical tanks storing pesticides, herbicides, or liquid fertilizers have the potential to leak and contaminate water bodies. Over-irrigating can cause runoff of sediments and pesticides to enter surface water or seep into groundwater.

3.2.4.2 Watershed Management

Programs established to control nonpoint source pollution from agriculture in California include joint efforts by local, state, and federal agencies. The United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) and the University of California Cooperative Extension Service provide technical and financial services for farmers. NRCS provides conservation assistance through a nationwide network of resource conservation districts and local offices. Resource conservation districts also provide guidance, training, and technical assistance.

NRCS works through the local conservation districts and others to help landowners, as well as federal, state, tribal, and local governments, and community groups, conserve natural resources on private land. The NRCS has three strategies to implement their goals of high quality, productive soils, clean and abundant water, healthy plant and animal communities, clean air, an adequate energy supply, and working farms and ranchlands:

- Cooperative conservation: seeking and promoting cooperative efforts to achieve conservation goals.
- Watershed approach: providing information and assistance to encourage and enable locally-led, watershed-scale conservation.
- Market-based approach: facilitating the growth of market-based opportunities that encourage the private sector to invest in conservation on private lands.

The SWRCB, the California Coastal Commission, and other state agencies have identified seven management measures to address agricultural nonpoint source pollution of state waters: (1) erosion and sediment control, (2) animal waste, (3) nutrient management, (4) pest and weed management, (5) grazing management, (6) irrigation water management, and (7) groundwater protection. The management measures consist of a suite of plans, practices, technologies, operating methods, or other alternatives that may be used in combination to control nonpoint source pollution. Associated with each management measure are management practices that are designed to reduce the quantities of pollutants entering receiving waters. Many of the practices have been approved for use by NRCS.

The California Department of Pesticide Regulation (CDPR) protects human health and the environment by regulating pesticide sales and use and by fostering reduced-risk pest management. CDPR requires full reporting of all agricultural pesticide use and structural pesticides applied by professional applicators. CDPR works closely with the county's Department of Agriculture, Weights, and Measures (AWM), who serve as the primary enforcement agents for state pesticide laws and regulations.

In the County of San Diego, AWM Pesticide Regulation Program (PRP) protects human health and the environment by regulating pesticide use, and by fostering reduced-risk pest management through permits, outreach, inspections, and illness investigations, and enforcement.

In addition to monitoring activities, PRP conducts outreach to raise industry and public awareness of pesticide safety laws and regulations supporting increased regulatory compliance. Inspectors conduct numerous outreach events to local industry members including fieldworkers, pesticide applicators, pest control advisors, and businesses. PRP also conducts outreach to the public to educate residents on safe use and storage of registered household pesticides and cleaning agents.

PRP's use monitoring responsibilities involves inspecting agricultural operations, pest control businesses, pesticide dealers, and pest control advisors. In addition to regulating pesticide use in agriculture, PRP also regulates structural pesticide use. This includes monitoring pest control companies that tent and fumigate homes and other structures for termites and treat yards for common household pests such as fleas, ticks, and spiders. PRP is also responsible for investigating all pesticide-related illnesses and complaints that occur in the county. PRP is required to take appropriate corrective actions when non-compliances are found. The severity of the non-compliances may warrant various potential actions, such as issuing administrative civil penalties, issuing warning letters, prohibiting harvest of a crop that contains illegal residues, and referring cases for license suspension or revocation, or civil prosecution.

3.2.4.3 Watershed-Specific Concerns

Runoff from agricultural locations has the potential to discharge fertilizers, pesticides, or herbicides downstream and contribute pollutants water bodies. In the Lake Henshaw watershed sub-area, where algal blooms are an ongoing concern, and VID and Escondido outreach to agricultural land users about fertilizer use may be useful.

3.2.5 Grazing Animals and Confined Animal Facilities

Grazing animals and confined animal facilities (CAF) may contribute to erosion, and can be a source of pathogenic microorganisms, especially if large numbers have access to creeks and reservoirs or if there is considerable runoff from grazing and CAF areas. Unobstructed grazing practices become problematic at a point when livestock congregate in close proximity to or within creek channels and/or contributing drainages where manure accumulates. The preferable method for mitigating grazing affects is to establish riparian buffer standards, which outline minimum setback requirements.

3.2.5.1 Water Quality Concerns

Livestock grazing in a watershed can be a significant contaminant source due to the potential for the animals to be carriers of *Giardia* cysts, *Cryptosporidium* oocysts, and other pathogenic microorganisms. Animal waste can directly enter stormwater runoff and from improper storage of animal waste can contribute nutrients, bacteria, viruses and oocysts. Improper grazing management and/or direct cattle access to waterbodies, can cause erosion, soil compaction, and excessive nutrients, all of which impair sensitive areas.

3.2.5.2 Watershed Management

Grazing sites in the Escondido-VID Watershed are managed through private or county leases or through the BLM or USFS for sites located on federal land.

SWRCB and NRCS programs were established to control nonpoint source pollution from agriculture. SWRCB management measures for protecting range, pasture, and other grazing lands are:

- Implementing one or more of the following to protect sensitive areas (such as streambanks wetlands, estuaries, ponds, lake shores, and riparian zones): (a) exclude livestock, (b) provide stream crossings or hardened access to watering areas, (c) provide alternative drinking water locations away from surface waters, (d) locate salt and additional shade, if needed, away from sensitive areas, or (e) use improved grazing management (e.g., herding) to reduce the physical disturbance and reduce direct loading of animal waste and sediment caused by livestock; and
- Achieving either of the following on all range, pasture, and other grazing lands not addressed under (1) above: (a) implement the range and pasture components of a Conservation Management System as defined in the USDA NRCS Field Office Technical Guides by applying the progressive planning approach of the USDA NRCS to reduce erosion, or (b) maintain range, pasture, and other grazing lands in accordance with activity plans established by the BLM of the U.S. Department of the Interior or the USDA Forest Service or the California Rangeland Water Quality Management Plan.

3.2.5.3 Watershed-Specific Concerns

The land surrounding Lake Henshaw is licensed by VID to ranchers for cattle grazing. The grazing area is approximately 25,000 acres, almost 20 percent of the Lake Henshaw sub-area, and the cattle are limited to a maximum of 2,500 head/month. During a site visit attended by BC and VID staff in the Lake Henshaw sub-area, BC observed cattle drinking from the portion of the San Luis Rey River that feeds Lake Henshaw. Additional fencing is planned for installation and VID is working with grazing licensees to eliminate cattle access to pumped water flowing to the lake. Current fencing prevents the access of cattle to Lake Henshaw. Limited grazing allotments and livestock areas are also designated in parts of the Cleveland National Forest. No CAFs currently exist in the Escondido-VID Watershed.

3.2.6 Wild Animals

Wild animals congregate near bodies of water, similar to domestic animals, and can contribute to increased nutrients, pathogenic organisms, viruses, and sediment levels in the water.

3.2.6.1 Water Quality Concerns

Wild animals are a potential source of *Giardia*, *Cryptosporidium*, viruses, bacteria, and other pathogenic microorganisms. Birds can be a significant source of pathogens to water bodies because of the direct nature of their deposits, and their tendency to roost in large numbers on water surfaces. Birds are a particular concern if there is a large year-round population of waterfowl (as opposed to a migratory bird population).

3.2.6.2 Watershed Management

Management of wild animals in the watershed occurs through the California Department of Fish and Wildlife (CDFW), county animal control officers and the USFS.

3.2.6.3 Watershed-Specific Concerns

Wild animal species present in the watershed may include mountain lions, bobcats, coyotes, mule deer, ground squirrels, kangaroo rats, rabbits, feral pigs, possums, and birds.

3.2.7 Recreation

Recreational use of a waterbody poses a wide range of water quality risks, depending on the specific activity.

3.2.7.1 Water Quality Concerns

Recreational use of the reservoir and shoreline can result in pathogenic organisms and sediment loading to the reservoir. Both body contact and non-body contact recreation on surface waters can lead to higher total and fecal coliforms. Additionally, higher *Giardia* and *Cryptosporidium* levels, as well as other pathogens, may also occur if a contaminated individual does not use a proper restroom facility. Waterside camping and picnicking along the river can also lead to elevated coliform, *Giardia*, and *Cryptosporidium* counts, even if proper restroom facilities are used. Other contaminants associated with sediment, such as nutrients and organic carbon could also be introduced to the reservoir. Boating accidents can lead to elevated levels of oil or petroleum products. If invasive mussel species are introduced via watercraft, they can eventually clog intakes and water supply conveyance systems[2]. Currently invasive mussels are not present in Lake Henshaw and VID prevention methods have been working. Although invasive mussels are not problematic at Lake Wohlford, Escondido has noted the presence of quagga mussels at Dixon Lake and has to clean its intake regularly each year.

3.2.7.2 Watershed Management

Park rangers and Escondido-VID staff receive training and information seminars about watershed protection including ditch maintenance, litter collection, spill cleanup procedures, and the use of boat battery storage boxes.

Lake Henshaw. Lake Henshaw is managed by VID Water Resources personnel. The 66-square mile area owned by VID that includes Lake Henshaw and its surroundings is fenced, and access is restricted by locked gates. "No Trespassing" signs are posted frequently along the fence. Fishing from boat and shore are allowed; swimming and body contact activities are prohibited. Access to the dam and intake areas is limited by on-shore fences and in-water buoy lines. The fences, over 200 miles in length total, are maintained by the ranchers as part of their grazing lease with VID. The ranchers' presence also provides additional surveillance of this major watershed area. Figure 3-6 and Figure 3-7 show the boat docking area and a warning sign for algae toxins (respectively) taken during the site visit.

[2] At Lake Henshaw, lake users that bring their own boat are asked where they have been before Lake Henshaw. Boats are inspected, and if needed, they are steam cleaned before given access to the lake to prevent the introduction of quagga mussels.

Figure 3-6. Lake Henshaw Boat Docking Area

Figure 3-7. Lake Henshaw Educational Signage

Lake Wohlford. Lake Wohlford is owned and managed by the City of Escondido. Direct management and surveillance at the lake are provided by park rangers. No swimming or body contact is allowed. Access to Lake Wohlford is limited to the north and south shores. In-water buoy lines and on-shore fences restrict access to the dam and intake areas, and to the lake inflow areas. Figure 3-8 shows the Lake Wohlford boat docking area and Figure 3-9 presents signage on prohibited activities.

Figure 3-8. Lake Wohlford Boat Docking Station

Figure 3-9. Lake Wohlford Educational Signage

Dixon Lake. Dixon Lake is owned and managed by the City of Escondido. Access to Dixon Lake is restricted in the vicinity of the dam and intake by in-water buoys and on-shore fences. Direct management and surveillance at the lake are provided by park rangers. No swimming or body contact is allowed. A campground is located on a hill on the southwest side of the lake. During storm events, campground runoff could make its way to Dixon Lake. Figure 3-10 shows the Dixon Lake recreation area, Figure 3-11 presents signage on prohibited activities, and Figure 3-12 shows the boat docking area.

Figure 3-10. Dixon Lake Recreational Area

Figure 3-11. Dixon Lake Education Signage

Figure 3-12. Dixon Lake Boat Docking Station

3.2.7.3 Watershed-Specific Concerns

Recreational uses of the Escondido-VID watershed include camping, hiking, horseback riding, golf, boating, and fishing. Cleveland National Forest, owned by the BLM, has five campgrounds, picnic areas, and trails for hiking and horseback riding. The San Luis Rey River Picnic Grounds are adjacent to the river, while a small picnic area at the Dixon Lake Ranger Station is near the Dixon Lake shoreline as well. Activities on BLM land are dispersed and therefore are likely to pose minimal risk of contamination. The Los Coyotes Indian Reservation maintains a campground within the watershed, along with hiking and off-road vehicle trails. The La Jolla Indian Reservation contains a campground, waterpark, and motocross park. The waterpark includes a section of the San Luis Rey River, where park-goers use inner tubes and rafts to float downstream. Foot traffic along the riverbank where tubing starts and ends may lead to minor erosion. Off-road vehicle use is limited within the reservations and is restricted at all National Forest lands within the watershed system.

Two golf courses, several resorts, and a shooting range are also present in the watershed. The golf courses located at Warner Springs Ranch and Skyline Ranch Country Club use some pesticides and herbicides and could contribute limited amounts of these contaminants to runoff. Motorboat refueling at Lake Wohlford, Dixon Lake, and Lake Henshaw, storage of boat batteries on the dock at Dixon Lake, and unauthorized activities (described in 3.2.13) are the highest risk activities associated with boating in the watershed.

Two airports are also present in the watershed near Lake Henshaw and Lake Wohlford. These facilities are described in Section 3.2.3.3.

3.2.8 Solid and Hazardous Waste Disposal Facilities

Authorized solid waste facilities and solid waste landfills are permitted and monitored, and thus, are unlikely to be significant source of contamination under normal operation.

3.2.8.1 Water Quality Concerns

Improper maintenance, negligent operation, or natural disasters, such as earthquakes or fires, may lead to a release of leachate containing bacteria, pathogens, metals, or other contaminants. Leachate from solid and hazardous waste disposal facilities can contain a variety of contaminants of concern to drinking water supplies, such as iron, lead, dissolved solids, nutrients, and a variety of organic chemicals. Facilities that are no longer active can still leak contaminants to the watershed.

3.2.8.2 Watershed Management

The California Department of Resources, Recycling, and Recovery (CalRecycle) is the agency that manages solid waste facilities and solid waste landfills within California. CalRecycle defines “Solid Waste Facility" as a solid waste transfer or processing station, a composting facility, a transformation facility, and a disposal facility. “Solid Waste Landfill" means a disposal facility that accepts solid waste for land disposal. The Waste Permitting, Compliance and Mitigation Division oversees, manages, and tracks waste generated each year.

CalRecycle provides funds to clean up solid waste disposal sites and co-disposal sites (those accepting both hazardous waste substances and nonhazardous waste). These funds are available when the responsible party cannot be identified or is unable or unwilling to pay for a timely remediation, and where clean-up is needed to protect public health and safety or the environment.

JMD Composting Operations and Caltrans Henshaw Limited Volume Transfer Operation (LVTO) are the only two active solid waste facilities in the watershed. JMD Composting Operations is a compost operation for green materials and wood waste. CalRecycle conducts approximately quarterly inspections of the JMD Composting Operations facility. On its reports, CalRecycle cites potential areas of concern or violations of CCR. Areas of concern list required corrective actions and ignored corrective actions can lead to violations of CCR. JMD Composting Operations has been cited four times by CalRecycle with areas of concern between 2016-2021, but it has not received any violations. Table 3-3 details the four citations with the inspection date, regulation, regulation title, comment, and corrective action.

Table 3-3. Areas of Concern Citations for JMD Composting Operations in 2016-2021 [a]

Inspection Date	Regulation	Title	Comment
9/5/2017	14 CCR 17868.3(c)	Windrow/Aerated Static Pile Temperature Monitoring	Facility records indicated that compost piles recorded as undergoing pathogen reduction were not being turned five times within 15 days. Corrective action issued to increase turning frequency.
12/28/2017	14 CCR 17868.3(c)	Windrow/Aerated Static Pile Temperature Monitoring	Facility records indicated that compost piles recorded as undergoing pathogen reduction were not being turned five times within a minimum of 15 days. Temperatures were not taken on a daily basis on windrows undergoing pathogen reduction. Corrective action issued to increase turning frequency and institute daily temperature readings.
3/28/2019	14 CCR 18103.1	Enforcement Agency Notification Filed	JMD Composting's records indicated that green waste was received on 1/5/19 (Saturday), which is outside of the days of operation listed on the EA Notification of Monday-Friday.
4/23/2020	14 CCR 17866	General Design Requirements	Based on the topography that surrounds the retention basin, the natural barrier that surrounds this basin was not tall enough to contain the excessive rainfall, even though there are straw wattles around the top of the berms of the retention pond. Corrective action issued to improve design of the operation controls.
	14 CCR 17867(a)(13)	Leachate Control	There is evidence that leachate was discharged offsite from the windrows of this composting operator. Corrective action issued to control offsite leachate discharge.

a. *Data retrieved from Cal Recycle Solid Waste Information System (SWIS), 2021*

Caltrans Henshaw LVTO is a transfer station operated by Caltrans Region 1 that receives solid waste and transfer it into vehicles or containers to be moved to a landfill or transformation facility. CalRecycle conducts approximately bi-annual inspections of the Caltrans Henshaw LVTO facility. Caltrans Henshaw LVTO has been cited twice by CalRecycle with areas of concern between 2016-2021, but it has not received any violations. Table 3-4 details the two citations with the inspection date, regulation, regulation title, comment, and corrective action.

Table 3-4. Areas of Concern Citations for Caltrans Henshaw LVTO in 2016-2021 [a]

Inspection Date	Regulation	Title	Comment
5/29/2020	14 CCR 17414(h)	Recycling and Disposal Records	The solid waste removal tickets from the dumpster pick up/removal and the corresponding disposal site receipts (dump tickets) were not available for review at the time of the inspection. There are no records to show that that the waste in the dumpsters is being removed on a bi-weekly basis. The solid waste daily logs indicate 0.2 to 0.5 tons per month of waste are added to their dumpster, primarily from waste picked up from the nearby highways. The site is allowed to generate up to 15 tons per day. Corrective Action: Ensure that the dump tickets and pick-up slips are received on a regular basis.
11/23/2020	14 CCR 17414(h)	Recycling and Disposal Records	The site did not have any dump tickets/records of trash removal/disposal for the period of August 29 through November 23, 2020 (date of the inspection). In addition, the solid waste monthly logs for September and October were not available for review. Corrective Action: Ensure that the dump tickets and pick-up slips are received on a regular basis, and the dumpster is emptied at least every 14 days. Ensure that the monthly solid waste monthly logs are completed and available for review.
	14 CCR 17410.1	Solid Waste Removal	CALTRANS recently changed waste haulers. They terminated service with Anton's Disposal in late August and did not get a pick-up of waste from late August (August 28) until November 5th when Anton's came to remove their bin. According to regulations, waste is required to be picked up from LVTO's every 14-days, and this site apparently went approximately 69 days without a waste pick up. The most recent dump ticket on file was for August 28, 2020. The new waste hauler, Republic Services, dropped off their trash bin at the site on November 6, 2020. Republic had not yet conducted a pickup as of the time of the inspection, but one was scheduled for November 25, 2020 (19-days after drop off of bin). Pickups are reportedly scheduled on an every 14-day basis. Corrective Action: Ensure that the dump tickets and pick-up slips are received on a regular basis, and the dumpster is emptied at least every 14 days.

a. Data retrieved from Cal Recycle Solid Waste Information System (SWIS), 2021

"Solid Waste Disposal Sites", usually referred to as landfills, are subjected to SDRWQCB waste discharge requirements. SWRCB defines "Solid Waste Disposal Site" as the tract of land that is used or has been used for the disposal of solid waste.

The SWRCB regulates waste discharges to land through the Land Disposal Program. These wastes include solid wastes or liquid wastes that that have the potential to impact water quality. Regulated facilities such as landfills, mines, surface impoundments, and waste piles require containment and monitoring in order to protect surface water and groundwater quality. The Water Boards issue WDRs for waste treatment, storage, or disposal sites, Water Boards staff conduct inspections to confirm compliance with WDRs. The goals of the program are primarily preventative. However, the program includes a response action component to ensure adequate protection of water quality.

3.2.8.3 Watershed-Specific Concerns

Within the watershed, there are six solid waste facilities, summarized in Table 3-5. Four of the six facilities are listed as closed. The Sunshine Summit Burn Site, Warner Springs Ranch facility, and Caltrans Henshaw LVTO facilities are respectively located about 6 miles, 5 miles, and 2 miles from Lake Henshaw. The Lake Henshaw Resort and Dixon Dam are located adjacent to the Lake Henshaw and Dixon Lake, respectively. The JMD Composting Operations began operating on June 23, 2021, within the Escondido Canal watershed sub-area.

Table 3-5. Solid Waste Facilities in the Watershed [a]

SWIS Number	Facility Name	Activity	Watershed Sub-Area	Regulatory Status	Operational Status
37-AA-0993	JMD Composting Operations	Green Material Composting Operation	Escondido Canal	Notification	Active
37-AA-0983	Caltrans Henshaw LVTO	Limited Volume Transfer Operation	Lake Henshaw	Notification	Active
37-CR-0042	Lake Henshaw Resort	Solid Waste Disposal Site	Lake Henshaw	Pre-regulation	Closed
37-CR-0112 / 37-CR-0057	Sunshine Summit Burn Site	Solid Waste Disposal Site	Lake Henshaw	Pre-regulation	Closed
37-CR-0082	Warner Springs Ranch	Solid Waste Disposal Site	Lake Henshaw	Pre-regulation	Closed
37-CR-0019	Dixon Dam	Solid Waste Disposal Site	Dixon Lake	Unpermitted	Closed

a. Data retrieved from Cal Recycle Solid Waste Information System (SWIS), November 2021

Table 3-6 provides the five solid waste landfills within the watershed. Two landfills are active, and three are closed with monitoring. The locations for landfills and solid waste facilities are shown on Figure 3-1.

Table 3-6. Landfills in the Watershed

Facility Name	Regulatory Type (Order Number)	Watershed Sub-Area	Status
Lake Henshaw Resort Landfill	Land Disposal Site [a]	Lake Henshaw	Closed/With Monitoring as of 11/17/2021
Sunshine Summit	Land Disposal Site [a]	Lake Henshaw	Closed/With Monitoring as of 11/17/2021
Warner Springs Ranch Burn Site	Land Disposal Site [a]	Lake Henshaw	Closed/With Monitoring as of 10/22/2013
Cleveland National Forest San Diego Gas and Electric Company (SDGE) TL 682	Land Disposal Program [b] (R9-2019-0005W8)	San Luis Rey River	Active – Expires 05/08/2024
JMD Composting Operations	Land Disposal Program [b] (2015-0121-DWQ)	Escondido Canal	Active – No expiration date

a. *Data retrieved from SWRCB Geotracker, November 2021*

b. *Data retrieved from the California Integrated Water Quality System (CIWQS), November 2021*

3.2.9 Hazardous Materials Storage

Due to the rural nature of the Escondido-VID watershed, there are relatively few underground storage tanks within the watershed. Leaking Underground Storage Tanks (LUST) and Permitted Underground Storage Tanks (USTs) can pose a threat to water quality if gasoline or chemicals are released above/adjacent to groundwater basins. The RWQCB requires a permit to install any UST.

Aboveground Storage Tanks (ASTs) storing petroleum hydrocarbons and other chemical storage facilities also pose a threat to water quality, as runoff could carry leaking petroleum or hazardous chemicals to surface water.

3.2.9.1 Water Quality Concerns

The storage of hazardous materials in underground/aboveground tanks and chemical storage facilities could pose a risk to the water quality of the water bodies within the watershed depending on the size of the leak and proximity to the local water body.

Petroleum hydrocarbons encompass a wide range of compounds including, but not limited to, fuels, oils, paints, dry cleaning solvents, and non-chlorinated solvents that are widely used in industrial, commercial, and residential settings. USTs and ASTs that store petroleum are common sources of contamination into soils and groundwater. The presence of such contamination is typically identified during removal of these tanks. USTs and ASTs are often found at service stations and convenience stores that sell fuels to the public, or at sites where fuel is privately used, such as fleet service operation facilities or agricultural sites. Leaking USTs can result in vapor intrusion to buildings if VOCs seep into the soil and groundwater, travel through soil as vapor, and enter buildings through cracks in the foundation. While vapor intrusion is uncommon, it should be considered when there is a known source of soil or groundwater contamination nearby (2018, SDC HMP).

3.2.9.2 Watershed Management

A Certified Unified Program Agency (CUPA) is the agency responsible for the implementation and regulation of the Unified Program. The Unified Program is the consolidation of six state-regulated environmental programs into one program under CalEPA. The six programs are the Aboveground Petroleum Storage Act (APSA) Program, California Accidental Release Prevention (CalARP) Program, Hazardous Materials Business Plan (HMBP) Program, Hazardous Materials Management and Inventory Program, Hazardous Waste and Hazardous Waste Treatment Program, and Underground Storage Tank (UST) Program. All unified program facilities must submit their facility information through California Environmental Reporting System (CERS).

The DEH Hazardous Materials Division (HMD) is the CUPA for County of San Diego and is responsible for regulating facilities that:

(1) Handle or store Hazardous Materials in HMBP reportable amounts

(2) Are part of the CalARP

(3) Generate or treat Hazardous Waste in any amount

(4) Generate or treat Medical Waste in any amount

(5) Are subject to the APSA

(6) Own or operate UST

Generators of hazardous waste are required by CalEPA to report to their local regulator the hazardous waste they produce using CERS. Different regulations apply to hazardous waste generators depending on the amount of hazardous waste produced each month. Each generator class is subject to different regulations for employee training, training documentation and written contingency plans.

The SDRWQCB typically handles cases in which a leaking storage tank or an aboveground petroleum storage tank is involved. Cases are monitored closely for remediation activities and are not closed until the leak or petroleum discharge is properly remediated.

3.2.9.3 Watershed-Specific Concerns

Table 3-7 presents a list of LUSTs closed between 2016 and 2021 and currently permitted (active) USTs in the Escondido-VID Watershed.

Table 3-7. Leaking and Permitted Underground Storage Sites in the Escondido-VID Watershed (2016-2021) [a]

Facility Name	Facility Type	Watershed Sub-Area	Status
Warner Springs Ranch Service Station	Permitted Underground Storage Tank	Lake Henshaw	Active
Barrett Station	Permitted Underground Storage Tank	Lake Henshaw	Active
CDF Puerta La Cruz	Leaking Underground Storage Tank	Lake Henshaw	Completed – Case Closed as of 7/27/2016

a. *Data retrieved from SWRCB Geotracker, November 2021*

There are 5 aboveground petroleum storage tanks, 9 hazardous waste generators, and 28 chemical storage facilities located within the watershed, shown in Figure 3-1.

3.2.10 Hazardous Materials Spills and Traffic Accidents

Hazardous materials spills include fuel spills from traffic accidents, the rupture of containerized hazardous materials under transport, as well as those resulting from non-vehicle-related sources.

3.2.10.1 Water Quality Concerns

Water quality concerns related to highways, railroads, and airports include road surface runoff that contains metals, oil, grease, solvents, and other hydrocarbons from general automobile use, and potentially herbicides used in weed control along right-of-ways. These types of contaminants are further discussed in section 3.2.3. A more acute threat to water quality posed by transportation corridors and facilities is from potential accidents that can occur near waterbodies, because of the immediate potential for spilled material into surface water.

Factors that influence the level of risk for vehicle spills include overall traffic volume, volume of hazardous materials in transit, highway characteristics, and weather conditions. While more stringent regulations have been applied to hazardous material transport vehicles, the volume of materials being transported has steadily increased over the years.

Railroad companies are allowed to transport any goods over railway lines as long as they follow the Federal Department of Transportation guidelines on transportation of hazardous materials.

3.2.10.2 Watershed Management

The City of Escondido and the Escondido-Vista WTP will be contacted by the sheriff’s dispatch center, CDFW, Caltrans, DEH HMD, or the San Diego County Office of Emergency Services (SDCOES) in case of a hazardous material spill. The Escondido-Vista WTP has an emergency response plan that can either change treatment methods or shut down the plant so that the City can continue to provide clean water to its customers.

DEH HMD, in collaboration with SDCOES and the City of San Diego Fire-Rescue Department, developed the San Diego County Operational Area Hazardous Materials (HAZMAT) Area Plan (HAZMAT Area Plan) to describe the system currently being used within the County of San Diego for managing hazardous materials emergencies.

3.2.10.3 Watershed-Specific Concerns

Two highways cross the Escondido-VID watershed system and its tributaries upstream of the Lake Henshaw Reservoir in the following locations:

- SR-76 west of Lake Henshaw near Lake Henshaw Resort
- SR-79 east of Lake Henshaw in Warner Springs
- County Route S2 south of Warner Springs along San Felipe Road
- County Route S7 northwest of Lake Henshaw along East Grade Road
- Other roads border water bodies, including Lake Wohlford Road.

Under the current Spill Prevention, Control, and Countermeasure Plan, Escondido-VID WTP staff will report any large spill events to DEH HMD and coordinate with them to handle any spills that could contribute contaminants to surface waters. Only one documented spill occurred in the Escondido-VID Watershed since 2016 that has entered the water supply system. The spill was reported to VID and DEH HMD on November 20, 2019 and consisted of a dead steer observed in the streambed of Verde Creek, a tributary to Lake Henshaw, approximately 7 miles from the Lake Henshaw shoreline (CalEPAm 2021). VID and DEH HMD determined potential water quality impacts to be minimal, and VID worked with ranchers to remove the deceased animal.

A small, seldom-used airport and a gliderport are present in the watershed and could represent a potential spill hazard, as mentioned in Section 3.2.3.3.

Escondido and VID field staff regularly monitor areas surrounding the lakes. VID reported cleaning up a small fuel spill of fewer than two gallons in the Henshaw watershed sub-areas since 2016.

There is also a U.S. NAVY training facility near Well W61 that supplies Lake Henshaw. It is unknown whether PFAS have been used at this facility in the past, but if they were, they may make their way into Lake Henshaw.

3.2.11 Fires

Wildfires are a major hazard to water quality because they often result in erosion and can be a source of sediment and contaminants to adjacent water bodies.

3.2.11.1 Water Quality Concerns

Fires and fire-fighting can be potential sources of contamination in the watershed. Wildfires can result in loss of soil surface cover and forest duff, such as needles and small branches, and make the watershed more vulnerable to erosion. Erosion can bring in sediments and contaminants—such as microbes, organics, and inorganics— to adjacent water bodies. Increased sediment loads following a fire can impact both ecological health of water bodies and drinking water operations by increasing turbidity, total suspended and dissolved solids. Nutrient loads into water bodies, particularly phosphorus and nitrogen have also been reported to increase after wildfires. The ash from a wildfire consists of fine, small particles that are very difficult to remove with conventional water treatment processes.

Fire-fighting foams have the potential to introduce contaminants to water sources. Perfluoroalkyl and Polyfluoroalkyl substances (PFAS) containing firefighting foam is a source of drinking water contamination and may pose a risk to communities near locations where such firefighting foam is used and to the firefighters that use the foam. PFAS-containing fire-fighting foams were recently regulated by the state of California in October 2020, although some foams may still contain PFAS until as late as 2032. In May 2016, the United States Environmental Protection Agency (US EPA) issued a lifetime health advisory for PFOS and PFOA for drinking water, advising municipalities that they should notify their customers of the presence of levels over 70 parts per trillion (ppt) in community water supplies. US EPA recommended that customer notifications include information on the increased risk to health, especially for susceptible populations.

Fire-fighting activities can also bring invasive species in water bodies if fire-fighting planes are not properly cleaned between fire events.

3.2.11.2 Watershed Management

California Department of Forestry and Fire Protection (CAL FIRE) has primary responsibility for wild land fires and counties have primary responsibility for structural fires. After a wild land fire, CAL FIRE assists with hydroseeding, mulching, and other slope stabilization techniques. CAL FIRE attempts to restore the disturbed area. Erosion mitigation response conducted after a wildfire depends on how much vegetation was removed, soil type, steepness of slope, and other factors. CAL FIRE monitors the use of PFAS at designated facilities and issues waivers to refineries and terminals for fixed suppression systems meeting identified criteria.In the City of Escondido portion of the Dixon Lake Watershed, the City of Escondido, retains primary jurisdiction because this is the Local Responsibility Area. In San Diego County, CAL FIRE has primary jurisdiction because the watershed land is in a State Responsibility Area.

3.2.11.3 Watershed-Specific Concerns

The predominant land use in the Lake Henshaw Watershed is recreation. According to the CAL FIRE's Fire Hazard Severity Zone (FHSZ) Viewer, Daley Ranch Park in the Dixon Lake watershed is listed as a "Very High" FHSZ. State-owned recreation areas in Lake Henshaw, San Luis Rey River, Escondido Canal, and Lake Wohlford watersheds are also listed as "Very High" FHSZs. Ash and other particles from fires can be carried downstream and their contaminants can impact watersheds nearby. Loss of vegetation after a fire can also cause erosion and sediment transportation into local waterways that eventually make their way to the lakes.

According to VID staff, an area that burned near San Felipe (likely the Wilson Fire in 2012) continues to bring debris to local roads during rain events. Figure 3-13 presents all the fires that have occurred within the Escondido-VID Watershed since 2010.

Water from Lake Henshaw and Lake Wohlford can be drawn to combat fires. If planes are improperly cleaned between fire events, the drawing process can bring invasive species in these water bodies.

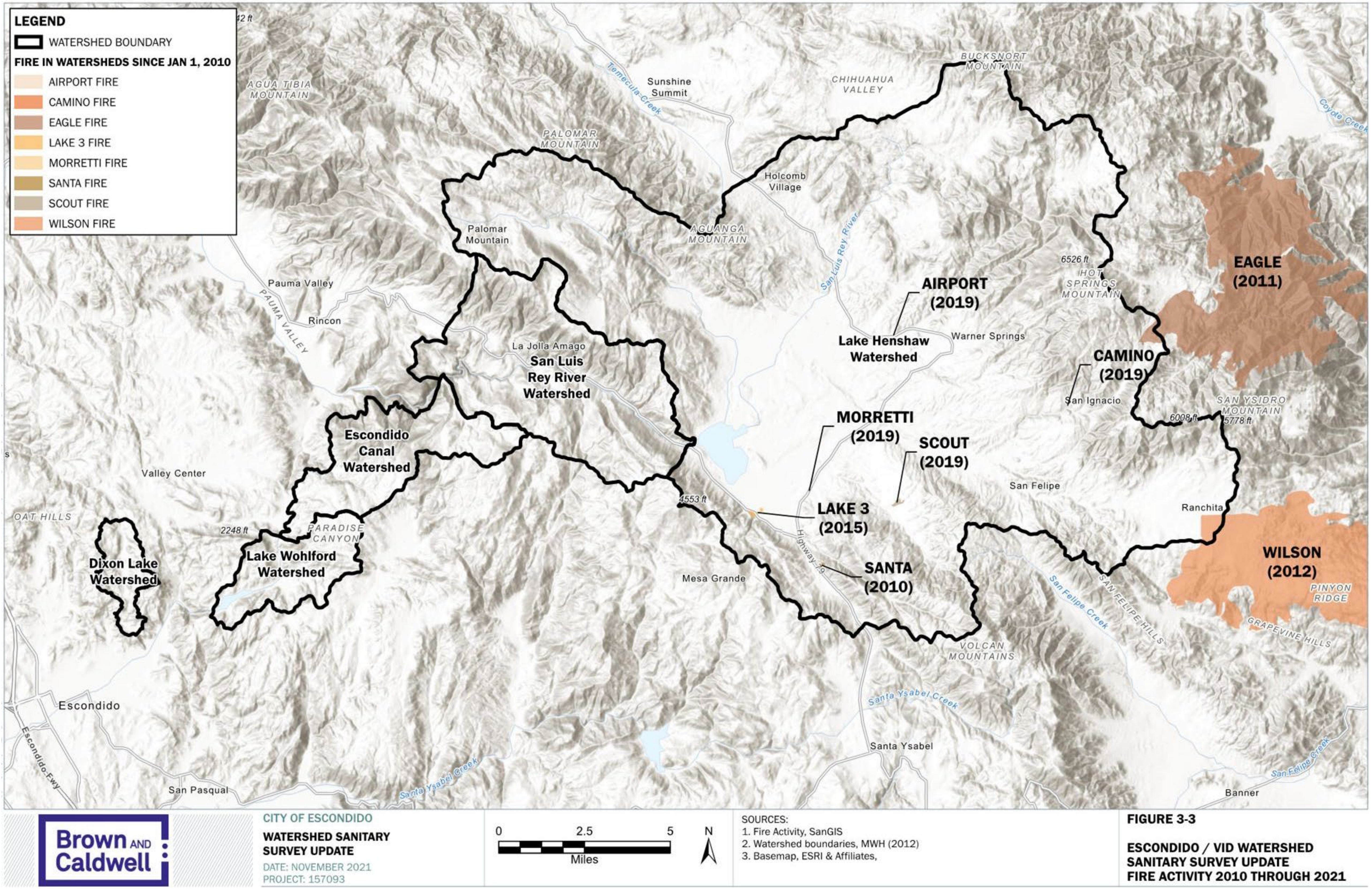

Figure 3-13. Fire events in the watershed (2010 – 2021)

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3.2.12 Geologic Hazards

Earthquakes and landslides are the primary geologic hazards of concern in the Escondido-VID watershed.

3.2.12.1 Water Quality Concerns

Earthquakes and landslides have the potential to introduce higher levels of sediment into the water. Turbidity, organic carbon, and nutrients can increase in the raw water supply as a result. Earthquakes also have the potential to damage the water supply infrastructure, resulting in disruptions in service.

3.2.12.2 Watershed Management

Geologic hazards in the watershed are managed by various San Diego County departments. In the case of a geologic hazard, each department would follow its emergency response plan to alert the Escondido-VID WTP if the hazard has the potential to impact raw water quality. Escondido and VID has the ability to shut off WTP service of raw water to its customers and rely on its emergency supply for an extended period of time if an earthquake were to occur.

3.2.12.3 Watershed-Specific Concerns

The primary geologic hazards in the watershed include:

1. Earthquakes—Potential seismic activity is generally along the Elsinore and Agua Caliente Fault Zones which both cross the Lake Henshaw sub-area. The peak horizontal acceleration with 10% probability of exceedance in 50 years for the Lake Henshaw sub-area is approximately 0.33% (2018, SDC HMP).
2. Landslides or slope failures — Landslides and landslide prone sedimentary formations are present throughout the coastal plain of western San Diego County. Most of the Escondido-VID watershed has soil slip susceptibility of steep slopes greater than 25% (2018, SDC HMP).

3.2.13 Unauthorized Activity

Unauthorized activities can be a potential contaminant source, but these activities are inherently difficult to track or quantify.

3.2.13.1 Water Quality Concerns

Illegal dumping and illegal camping can lead to food waste, hazardous materials, sanitary waste, and other erodible materials that may contaminate runoff or water bodies directly.

3.2.13.2 Watershed Management

San Diego County is required to implement a program to prevent and detect illicit discharges and connections to the MS4. The County's program activities addressing this requirement are the core of the Illicit Discharge Detection and Elimination Component.

County field staff are trained to recognize illicit discharges so that, during their normal inspection or maintenance activities, they can identify signs of previous, current, or potential non-stormwater discharges and/or connections—or illegal dumping into the storm drain system. Once such incidents are discovered, the field staff notifies their respective supervisors so that the incidents can be validated, prioritized, and investigated in a timely manner. Obvious illicit discharges (i.e., color, odor, or significant exceedances of action levels) must be investigated immediately.

In addition, County contractors are required to assist in identification of illicit discharges and connections while conducting contracted activities. The County also operates a public hotline to facilitate public reporting of illicit discharges or water quality impacts associated with discharges from residences, businesses, and other sources.

3.2.13.3 Watershed-Specific Concerns

Escondido and VID staff are not aware of unauthorized activities occurring in the watershed. Any of the following unauthorized activities have the potential to contribute contaminants: illegal dumping, unauthorized off-road vehicle use or camping, marijuana cultivation, and illegal drug manufacture and disposal. Escondido is in process of installing surveillance cameras on the Lake Wohlford Ranger Station and outlet structure, and plans to install surveillance cameras near Dixon Lake, which may help track unauthorized activities in that sub-area. The area surrounding Lake Henshaw is large, although access roads to the area are locked. Only utilities staff are allowed access, and unauthorized activities may be monitored by ranchers in the area. The San Luis Rey River has easier access and could pose a greater threat for unauthorized activities.

3.3 Anticipated Growth within the Watershed

No significant growth or changes in contaminant sources are expected within the next five years. Section 2.1.3 includes current and future land uses reported by the County planning division. These maps indicate land in the watershed will slowly be converted from agricultural to residential use in the Lake Wohlford, Escondido Canal, and Lake Henshaw watershed sub-areas. Growth or change in much of the watershed is limited or restricted because of land ownership by VID, Escondido, and federal, state, and county agencies.

Figure 3-14 presents a comparison of land use area percentages in 2020 vs. 2050. Parks and recreation land use is predicted to decrease by 3 percent by 2050. Residential land use is predicted to increase by 21 percent by 2050. It is important for Escondido and VID to ensure best managements practices (BMPs) are implemented for any developed within the watershed.

Brown AND Caldwell

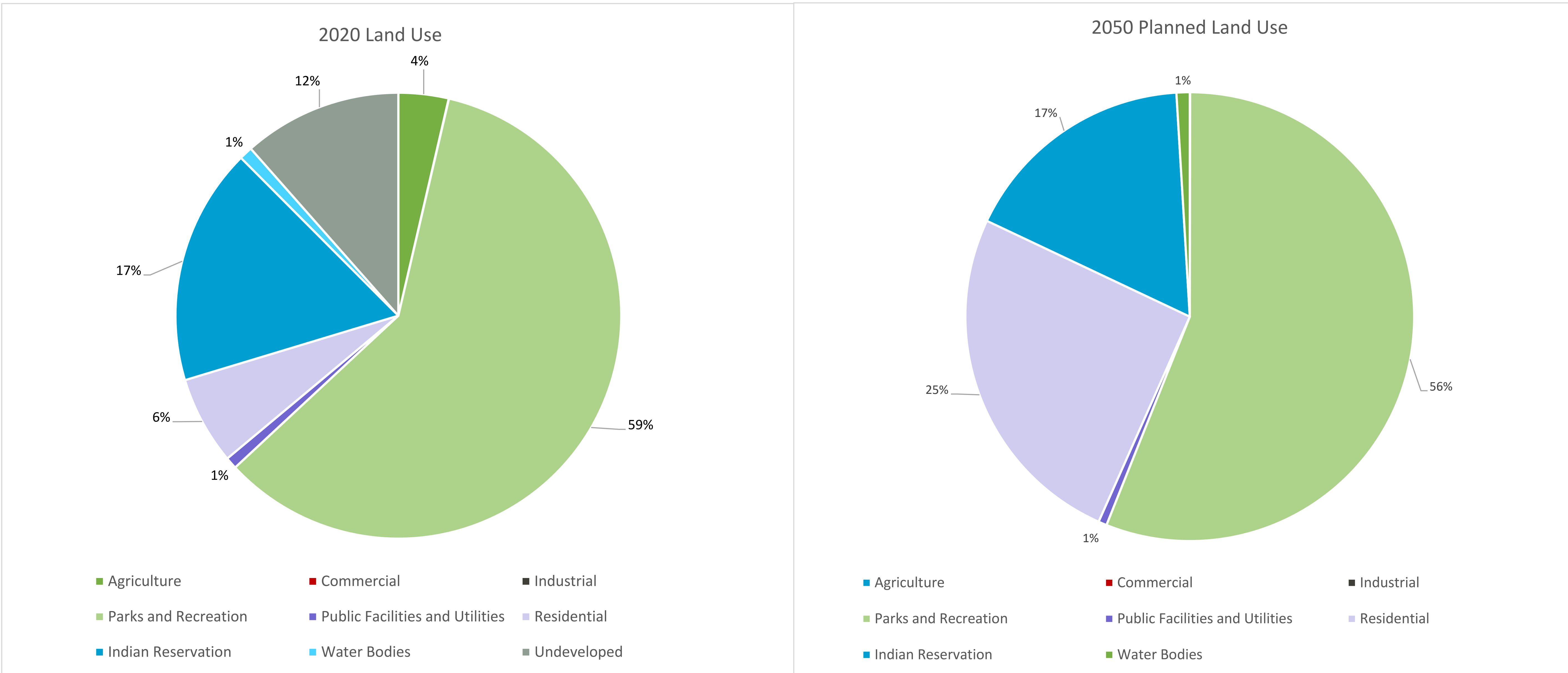

Figure 3-14. 2020 Land Use versus 2050 Planned Land Use

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3.4 Watershed Protection Regulatory Update

Federal and state laws protect water quality from point and nonpoint sources. The federal Clean Water Act requires states to adopt water quality standards and to submit those standards for approval by the US EPA. Clean Water Act Section 303(d) requires states to list surface waters not attaining (or not expected to attain) water quality standards after the application of technology-based effluent limits, and states must prepare and implement a Total Maximum Daily Load (TMDL) for all listed waters. For point source discharges to surface water, the Clean Water Act authorizes US EPA or approved states to administer the NPDES Program. In California, SWRCB and RWQCBs administer many of the Clean Water Act's provisions.

The Porter-Cologne Water Quality Control Act is the principal state law governing water quality regulation in California. The Escondido-VID watershed falls under the jurisdiction of the San Diego RWQCB. The RWQCBs regulate point source discharges primarily through issuance of NPDES and waste discharge requirement permits. The SWRCB and RWQCBs also have numerous nonpoint source-related responsibilities.

Most of the surface water bodies that are currently listed as impaired on the state's Section 303(d) list are impaired due to nonpoint source discharges. Over the past several years, SWRCB and RWQCB programs have shifted from focusing on site-specific problems to a watershed-based approach targeting non-point sources of pollution.

As part of the new watershed-based approach, the state is identifying impaired water bodies pursuant to the Clean Water Act. In addition, TMDL development, which focuses on river reaches, has begun to be used to address runoff. Basin Plan amendments are designed to establish water quality objectives for specific pollutants in lieu of focusing on only the particular water bodies where impairment has been caused by a particular pollutant. The SWRCB and RWQCB have developed a Watershed Management Initiative to integrate programs and control both point and nonpoint sources within a watershed. These programs are described further below.

3.4.1 Clean Water Act Section 303(d) List and TMDL Development

Under Section 303(d) of the Clean Water Act, California is required to compile a list of impaired waters that fail to meet applicable water quality standards or that cannot support their designated beneficial uses. Water bodies are listed due to deleterious impacts from a pollutant or pollutants and may be delisted when evidence reveals that such impacts have ceased or never existed. The waters on the list do not meet water quality standards, even after point sources of pollution have installed the minimum required levels of pollution control technology. Applicable water quality standards include the designated beneficial uses, the adopted water quality objectives, and the state's antidegradation policy.

For 303(d) listed water bodies, a pollutant watershed budget is established, which defines the maximum amount of pollutants, or TMDL, that can be assimilated by that water body. The RWQCBs must establish priority rankings for water bodies on the lists and submit the Section 303(d) list and TMDL priorities to the US EPA for approval. The RWQCBs developed this list in 2010, and the US EPA gave final approval to California's Section 303(d) List of Water Quality Limited Segments in October 2011.

Based on a review of the US EPA-approved 2018 California 303(d) List and its associated TMDL Priority Schedule from the 2014 and 2016 California Integrated Report, Escondido Creek and Upper San Luis Rey River have been identified as 303(d) listed impaired water bodies. Escondido Creek is located downstream of the watershed, but the Upper San Luis Rey River is a tributary to Lake Henshaw.

Table 3-8 summarizes the water bodies on the 303(d) final list and the expected TMDL completion date.

Table 3-8. Section 303(d) List of Water Quality Limited Segments [a]

Water Body Segment	Pollutant/Stressor	Potential Sources	Expected TMDL Completion Date
Escondido Creek[b]	Bifenthrin	Source Unknown	2027
	Dichlorodiphenyltrichloroethane (DDT)	Source Unknown	2019
	Indicator Bacteria (Total Coliform, Enterococcus, Fecal Coliform)	Source Unknown	2019
	Malathion	Source Unknown	2027
	Manganese	Source Unknown	2019
	Nitrogen	Source Unknown	2019
	Phosphate	Source Unknown	2019
	Selenium	Source Unknown	2019
	Sulfates	Source Unknown	2019
	Total Dissolved Solids (TDS)	Source Unknown	2019
	Toxicity	Source Unknown	2019
Upper San Luis Rey River	Indicator Bacteria (Total Coliform, Enterococcus, Fecal Coliform)	Source Unknown	2025
	Phosphorous	Source Unknown	2023
	Total Nitrogen as N	Source Unknown	2021

a. *Data retrieved from the CA EPA SWRCB Impaired Water Bodies, November 2021*

b. *Escondido Creek is located downstream of the Escondido-VID watershed.*

The TMDL program serves as the RWQCB's focal point for addressing California's most difficult, long-term surface water quality problems. TMDL planning activities are closely coordinated with the RWQCB's regulatory programs to ensure compatibility with those programs and feasibility of implementation. TMDLs are incorporated into water quality control plans. The US EPA requires that NPDES permits be revised to be consistent with any approved TMDL (40 CFR 122). The TMDL program is also coordinated with the agricultural waiver program.

3.4.2 Watershed Management Initiative

The SWRCB and RWQCB developed the Watershed Management Initiative to integrate surface and groundwater regulatory programs within a watershed, to control both point and nonpoint sources, and to draw solutions from all interested parties within a watershed. The SWRCB and RWQCB developed this initiative to protect water quality within a watershed context, considering a mix of point and nonpoint source discharges, ground and surface water interactions, and water quality/water quantity connections.

In 1996, the SWRCB, the RWQCBs and the US EPA prepared a Watershed Management Initiative Plan. The plan is now updated as needed by the RWQCB or by a directive from the SWRCB. The San Diego RWQCB Watershed Management Initiative Integrated Plan State of the Watershed for San

Diego County and parts of southwestern Riverside County and southern Orange County was last updated in 2001 but sections have been updated as needed, last in January 2002.

3.4.3 Regulation of Point Sources of Potential Contaminants

It is the responsibility of the SWRCB and RWQCBs to preserve and enhance the quality of the state's waters through the development of water quality control plans and the issuance of waste discharge requirements. The RWQCBs regulate point source discharges (i.e., discharges from a discrete conveyance) under the Porter-Cologne Act primarily through issuance of NPDES and waste discharge requirement permits. NPDES permits serve as waste discharge requirements for surface water discharges. Waste discharge requirements and NPDES permits in the study area fall under the jurisdiction of the SDRWQCB.

An NPDES permit is required for municipal, industrial and construction discharges of wastes to surface waters. Typically, NPDES permits are issued for a five-year term, and they are generally issued by the RWQCBs. An individual permit (i.e., covering one facility) is tailored for a specific discharge, based on information contained in the application (e.g., type of activity, nature of discharge, receiving water quality). A general permit is developed and issued to cover multiple facilities within a specific category

The beneficial uses and receiving water objectives to protect those uses are established in the Water Quality Control Plan for the San Diego Basin of 11 major hydrologic units (HU), known as the Basin Plan (SDRWQCB, 1994) and most recently revised in 2021.

3.4.4 Regulation of Non-Point Sources of Potential Contaminants

Currently, discharges from nonpoint sources such as agriculture, silviculture, urban runoff, past mining activities, dairies, and individual wastewater disposal systems (i.e., septic systems) cause the most significant and widespread surface and groundwater quality problems. Nonpoint source pollution is not typically associated with discrete conveyances; it includes landscape scale sources such as storm water and agricultural runoff, and dust and air pollution that find their way into water bodies.

Urban runoff in the San Diego Region is regulated by the SDRWQCB through municipal separate storm sewer system (MS4) NPDES permits. These permits require large (greater than 250,000 population) and medium (100,000 to 250,000 population) municipalities to develop storm water management plans and conduct monitoring of storm water discharges and receiving waters. The City of Escondido is the only city or unincorporated town in the Escondido-VID watershed that has a storm water management plan.

Some of the most significant surface water quality problems result from nonpoint source discharges from agricultural lands. The nonpoint source pollutants typically associated with agriculture are nutrients, animal waste, sediments, and pesticides. Agricultural nonpoint source pollution enters receiving waters by direct runoff to surface waters or seepage to groundwater. Runoff of nutrients can result from excessive application of fertilizers and animal waste to land, and from improper storage of animal waste. Farming activities can cause excessive erosion, which results in sediment entering receiving waters. Improper use and over application of pesticides cause pesticide pollution. Improper grazing management can cause erosion, soil compaction, and excessive nutrients, all of which impair sensitive areas. Over application of irrigation water can cause runoff of sediments and pesticides to enter surface water or seep into groundwater. Sediment, pesticides, and excess nutrients all affect aquatic habitats by causing eutrophication, turbidity, temperature increases, toxicity, and decreased oxygen.

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Section 4

Water Quality

The purpose of this section is to identify changes in raw water quality that may impact the ability of the City to meet current and anticipated regulations. An additional goal is to identify water quality changes that may indicate deterioration of the source waters. This chapter is divided into four sections: (1) a regulatory review, (2) monitoring program, (3) an evaluation of raw water quality data, and (4) an evaluation of finished water quality data

4.1 Overview of Federal and State Regulations

The U.S. Environmental Protection Agency (US EPA) is responsible for developing and implementing drinking water regulations under the federal Safe Drinking Water Act (SDWA) of 1974. The SDWA was amended in 1986 and again in 1996. Under the SDWA, states are given primacy to adopt and implement drinking water regulations, as long as they are no less stringent than the federal regulations, and to enforce those regulations. For California, the State Water Resources Control Board is the primacy agency with this authority.

The Division of Drinking Water (DDW) of the SWRCB establishes Maximum Contaminant Levels (MCL), action levels (ALs), maximum residual disinfectant levels (MRDLs), treatment requirements, and performance standards for a wide variety of physical, chemical, biological, and radiological constituents to ensure that water is safe for public consumption. These standards are at least as stringent as the federal MCLs established by the EPA.

The following sections summarize the federal and state regulatory requirements for potable water systems. Section 4.1.1 presents an overview of federal drinking water regulations along with the process for reviewing existing regulations and adding new regulations. Section 4.1.2 presents state regulations (some of which are consistent with existing federal regulations and some which are more stringent) for contaminants applicable to Escondido and VID.

4.1.1 Federal Regulations and U.S. EPA Process for Updating Regulations

The federal drinking water regulations that are relevant to Escondido and VID are summarized in Table 4-1.

Table 4-1. Summary of Major Federal Water Quality Regulations	
Regulation	**Major Requirements**
National Primary Drinking Water Regulations	• Currently set for 87 contaminants, including turbidity, 6 microorganisms, 4 radionuclides, 16 inorganic contaminants, 3 disinfectants, 4 disinfection byproducts (or groups), and 53 organic contaminants (the California drinking water regulations include additional contaminants, as described in Section 4.1.2). • 77 of the contaminants have maximum contaminant levels (MCLs) and maximum contaminant level goals (MCLGs), with treatment technique requirements for the remaining 10. • Established monitoring with specific analytical methods and reporting requirements.
Surface Water Treatment Rule, 1989	• Requires that a detectable disinfectant residual be present in all portions of the distribution system (heterotrophic plate count [HPC] less than 500 colony forming units [CFU]/mL equivalent to a detectable residual). • Requires 3-log *Giardia* inactivation/removal. Conventional systems receive a 2.5-log credit and direct filtration systems receive a 2-log credit for meeting filter effluent turbidity requirements. Remaining requirements must be met through disinfection. • Requires 4-log virus inactivation/removal. Conventional systems receive a 2-log credit and direct filtration systems receive a 1-log credit for meeting filter effluent turbidity requirements. Remaining requirements must be met through disinfection. • Requires combined filter effluent turbidity not exceed 0.5 NTU (nephelometric turbidity units) in more than 5 percent of samples each month.
Total Coliform Rule, 1989; Revised Total Coliform Rule (rTCR), 2013	• Requires that less than 5 percent of distribution samples collected each month be positive for total coliform. • Establishes MCLs and MCLGs for *Escherichia coli*, a total coliform treatment technique requirement, Level 1 and Level 2 assessments, and monitoring requirements, including requirements for seasonal systems and for assessment and corrective actions. • Requires a detectable disinfectant residual at all points in the distribution system; HPC less than 500 CFU/mL is considered equivalent to a detectable residual.
Interim Enhanced Surface Water Treatment Rule (IESWTR), 1998; Long-term 1 Enhanced Surface Water Treatment Rule (LT1ESWTR), 2002; and Long-term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR), 2006	• Establishes an MCLG of zero for *Cryptosporidium.* • Assigns utilities to one of four "bins" based on raw water *Cryptosporidium* concentrations, where each bin has associated requirements for additional *Cryptosporidium* treatment. • Includes a toolbox of options for receiving *Cryptosporidium* reduction credits, including watershed control, disinfection, and filtration. • Requires combined effluent turbidity of less than 0.3 NTU in 95 percent of samples collected each month. • Establishes requirements for individual filter effluent turbidities, with associated requirements for a Comprehensive Performance Evaluation of underperforming filters. • Requires that new finished water reservoirs be covered. • Requires sanitary surveys at three-year intervals. • Requires disinfection benchmarking.
Stage 1 Disinfectants/ Disinfection By-Products Rule (DBPR), 1998; and Stage 2 DBPR, 2006	• Establishes MCLs for the following disinfection byproducts (DBPs): trihalomethanes [THMs] (0.080 mg/L), haloacetic acids [HAAs] (0.060 mg/L), bromate (0.010 mg/L; for WTPs that use ozone) and chlorite (1 mg/L; for WTPs that use chlorine dioxide). • Establishes MCLGs for bromate (zero), chlorite (0.8 mg/L), and individual THMs and HAAs • THM and HAA5 MCL compliance is based on a location running annual average at each distribution system sampling site. Chlorite compliance is based on a monthly average. • Establishes maximum residual disinfectant levels (MRDLs) for free chlorine (4 mg/L), chloramines (4 mg/L), and chlorine dioxide (0.8 mg/L). • Free chlorine and chloramine compliance is based on running annual averages compute quarterly, of monthly averages of all distribution system sites. • Establishes enhanced coagulation requirements for total organic carbon (TOC) removal based on raw water TOC and alkalinity to optimize removal of DBP precursors.

Table 4-1. Summary of Major Federal Water Quality Regulations	
Regulation	**Major Requirements**
Lead and Copper Rule, 1991 with revisions in 2000, 2004 and 2007, and Long-Term Revisions (LCRR) in 2021	• Establishes MCLGs (0 mg/L for lead and 1.3 mg/L for copper) and action levels [ALs] (0.015 mg/L for lead and 1.3 mg/L for copper). • Compliance requires that 10 percent or less of distribution system samples exceed action levels. • Establishes additional requirements, including water quality parameter monitoring, source water monitoring or treatment, corrosion control treatment, lead service line replacements, public education, etc. • The LCRR introduces a Trigger Level for lead of 0.010 mg/L, requirement to develop inventories of service line materials focusing on lead service lines (LSL), requirement to revise in-home sampling sites based on LSL inventories, requirement to revise in-home sampling methods, strengthen the requirements to replace LSLs, establishes a find-and-fix approach to optimize corrosion control treatment, establishes requirements to collect lead samples in schools and childcare facilities, and updates the language for public education and customer notification. The LCRR became effective on December 16, 2021 and the compliance date is October 16, 2024.
National Secondary Drinking Water Regulations, 1979	• Currently set for 15 contaminants that may cause cosmetic effects, aesthetic effects, or technical challenges (e.g., scaling). • Non-mandatory, non-enforceable guidelines at the federal level, but most of these contaminants are enforceable in California.

From the United States Environmental Protection Agency, 2021

As illustrated in Figure 4-1, the U.S. EPA relies on the Contaminant Candidate List (CCL) and the Unregulated Contaminant Monitoring Rule (UCMR) Program to establish regulations for contaminants that are currently unregulated. These processes are described in Sections 4.1.1.2 and 4.1.1.3 below. For currently regulated contaminants, the U.S. EPA relies on the Six-Year Review process to ensure that the current regulations continue to protect public health, and this process is described in Section 4.1.1.1.

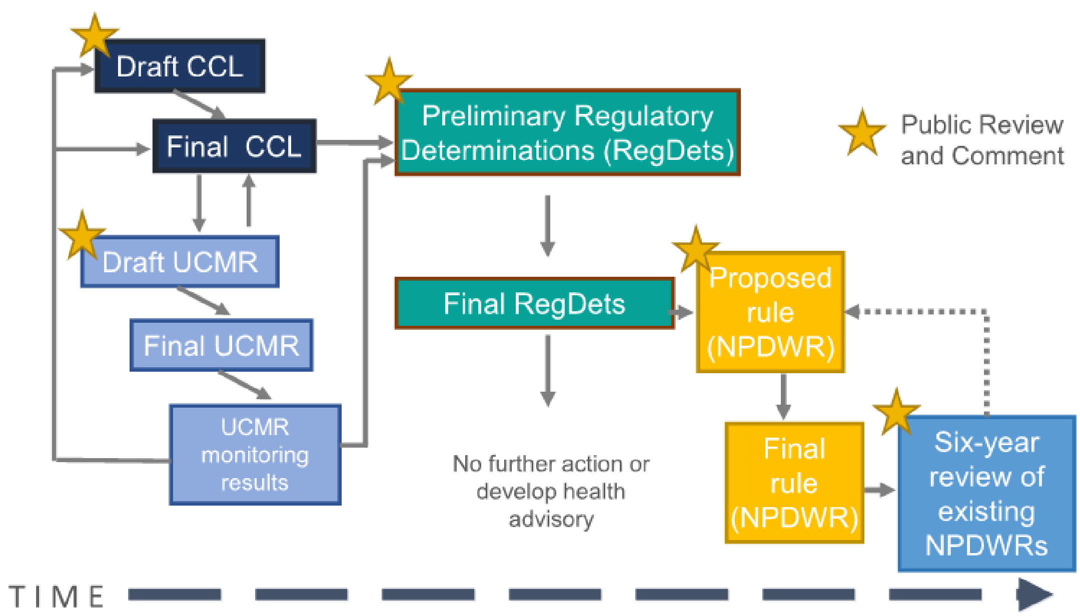

Figure 4-1. SDWA Regulatory Process (Roberson, 2021, Current and Future Regulatory Challenges for Plant Operators, AWWA OpShow, November 4, 2021)

4.1.1.1 Six-Year Review

The 1996 Amendments to the SDWA require the U.S. EPA to review, and revise if necessary, each drinking water regulation in a six-year review cycle. This review needs to consider newly available data, health effects, changes in technology and analytical methods, and factors that will improve public health protection. The following decisions have been made since the last WSS was completed in 2016:

- The results of the Six-Year Review 3 were announced in January 2017. For this cycle, the USEPA is reviewing the following contaminants as candidates for potential regulatory revisions: chlorite, *Cryptosporidium parvum*, *Giardia lamblia*, HAA5, heterotrophic bacteria, *Legionella*, THMs, and viruses.
- Completion of Six-Year Review 4 is anticipated for 2023.

The U.S. EPA has combined the review of the microorganisms and DBPs identified during the Third Review under a potential Stage 3 Microbial and DBP Regulation (M/DBPR). As part of this effort, the U.S.EPA has conducted eight virtual public workshops on specific topics between October 2020 and November 2021 to gather information and feedback from the water industry. Some of the key outcomes of these workshops are as follows:

- Considerations for improving control of brominated and nitrogenous DBPs
- Setting a numeric requirement for distribution system disinfectant residual
- Implementing better distribution system management practices
- Considerations for consecutive systems
- Controlling *Legionella* and other microorganisms, as well as biofilms
- Consideration for improvement of water quality in building water systems.

4.1.1.2 Contaminant Candidate List

The Contaminant Candidate List (CCL) is a list of contaminants currently not subject to any proposed or promulgated Federal regulations but known or anticipated to occur in water systems and may require future regulation. The second amendment of the SDWA requires the U.S. EPA to publish the CCL every five years. Each list is not limited by a fixed number of contaminants; however, the U.S. EPA must make regulatory determinations for at least five contaminants from each list. Regulatory determinations may include: 1) a positive determination when a regulation is deemed necessary for a contaminant, 2) a negative determination when a regulation is not needed, or 3) in need of further research pertaining to one or more of the following—health effects, treatability, analytical methods, and occurrence. Occurrence data are typically obtained from the UCMR Program.

Four rounds of CCLs have been completed thus far, as listed here, and more information is provided for activities that have been undertaken since completion of the last WWS in 2016:

- CCL 1 was published in March 1998
- CCL 2 was published in February 2005
- CCL 3 was published in October 2009
- CCL 4 was published in November 2016 and included 97 chemicals and 12 microorganisms. The regulatory determination for CCL4 was published in January 2021 and included a positive regulatory determination for PFOA and PFOS.

On July 19, 2021, the U.S. EPA published the Draft CCL 5. An extensive list was proposed including 66 chemicals, 3 chemical groups (PFAS, cyanotoxins, and DBPs), and 12 microbes. When this document was prepared, the U.S. EPA had not finalized the CCL 5.

Although the CCL does not impose any immediate requirements on water systems, it is the most tangible tool that Escondido and VID have access to for identifying contaminants that are likely to undergo a regulatory development process by the U.S. EPA.

4.1.1.3 Unregulated Contaminant Monitoring Program

The 1996 Amendments to the SDWA required the U.S. EPA to establish criteria for a monitoring program for unregulated contaminants, and to publish, once every five years, a list of no more than 30 contaminants to be monitored by water systems. Four rounds of UCMR monitoring have been completed thus far, and the fifth round is in progress, as summarized in Table 4-2. The final UCMR 5 was published on December 27, 2021; it includes lithium and 29 PFAS with a 12-month monitoring period between January 1, 2023 and December 31, 2025.

Table 4-2. Summary of UCMR Monitoring

UCMR	Published	Monitoring
Round 1	September 1999	12 months between 2001 and 2003
Round 2	January 2007	12 months between January 2008 and December 2010
Round 3	May 2012	12 months between January 2013 and December 2015
Round 4	December 2016	4 consecutive months between March 2018 and November 2020
		12 months between January 2018 and December 2020 for List 1 Additional Contaminants
Round 5	December 2021	12 months between January 2023 and December 2025

4.1.2 State Regulations

As mentioned above, DDW implements drinking water regulations for the state of California. These regulations are set forth in the CCR, Title 22, Division 4.

DDW has to enforce the regulatory requirements of the U.S. EPA, at a minimum, and has also introduced additional requirements over the years. The combined federal and state requirements that apply to Escondido and VID are described in this section.

4.1.2.1 1,2,3-Trichloropropane

1,2,3-trichloropropane (1,2,3-TCP) is exclusively a man-made chlorinated hydrocarbon, typically found at industrial or hazardous waste sites and often present at sites contaminated by other chlorinated solvents. It was included in CCL 3 and UCMR 3 (refer to Sections 4.1.1.2 and 4.1.1.3 for a description of these programs).

On December 14, 2017, the SWRCB adopted a regulation promulgating an MCL of 0.005 micrograms per liter (µg/L, or 5 parts per trillion or 5 ppt) for 1,2,3-TCP.

4.1.2.2 *Cryptosporidium*

Reduction of *Cryptosporidium* is regulated under the LT2ESWTR. Source water monitoring required under this rule resulted in utility assignment to one of four “bins” according to average levels of *Cryptosporidium* in their source water. As shown in Table 4-3, the bin assignments have associated treatment requirements ranging from no additional treatment to a required 2.5 logs. The treatment requirements listed in Table 4-3 apply to the water purveyors if a conventional or direct treatment process is used. As mentioned in Section 4.3 below, *Cryptosporidium* and *Giardia* were not detected in 2016 and 2017, i.e., during the second round of sampling for LT2ESWTR compliance. Thus, the Escondido-VID WTP should fall in Bin 1 and should not require additional treatment.

Table 4-3. Bin Assignment for *Cryptosporidium* Reduction Requirements

Bin number	Average *Cryptosporidium* concentration	Additional treatment requirements[a]
1	<0.075/L	No additional treatment
2	≥ 0.075/L and < 1.0/L	1-log additional treatment
3	≥ 1.0/L and < 3.0/L	2-log additional treatment[b]
4	≥ 3.0/L	2.5-log additional treatment[b]

a. For conventional treatment systems in full compliance with the SWTR, IESWTR, and LT1ESWTR

b. Utilities falling under Bins 3 or 4 must meet 1.0 log of the required treatment using ozone, UV, membranes, bag filtration, cartridge filtration, or bank filtration.

The *Cryptosporidium* Action Plan (CAP) was implemented in 1995 to promote protection of public health through the optimization of the performance of water treatment plants. In April 2019, DDW released a revised *Cryptosporidium* Action Plan (CAP)/Surface Water Treatment Optimization, as an update to the April 1995 CAP, to facilitate comprehensive compliance with the SWTR. The 2019 CAP discusses the following components to protect drinking water from *Cryptosporidium* contamination:

- Watershed control and sanitary survey: Water systems need to protect and monitor source water by establishing a Watershed Control Program Plan as described in USEPA's Long-Term 2 ESWTR Toolbox Guidance Manual. The CAP reminds systems that they need to conduct sanitary surveys of their watershed(s) every five year, in accordance with the SWTR.
- Source bacteriological monitoring: The 2019 CAP explains the importance and significance of the source water monitoring rounds required by the Long-Term 2 ESWTR. It also reminds water systems that they need to monitor *E. coli* concentrations on a monthly basis at a minimum. *Giardia* and viruses may be considered on a case-by-case basis.
- Optimizing surface water treatment: The 2019 CAP emphasizes the need to monitor (using calibrated turbidimeters), operate and optimize each treatment unit. It also endorses the following guidelines:
  - Maximum filter effluent turbidity goal of 0.1 NTU, as proposed in American Water Works Association's (AWWA) Partnership for Safe Water
  - A turbidity goal of 1 to 2 NTU in settled water
  - Monitoring of individual filter effluent turbidity on a continuous basis with intermittent grab samples
  - A goal of 0.3 NTU or less after filter backwash.
- The 2019 CAP also discusses the need to optimize the performance of filter backwashes so that water with a turbidity less than 2.0 NTU are returned to the WTP headwork.
- Operations plan: These plans should include a statement that the goal of the water system is to optimize performance of all plant unit treatment processes and maximize the turbidity removal. The treatment optimization practices recommended above should be included within water systems' Operations Plans. In addition, filtration plants like the Escondido-VID WTP should demonstrate a minimum turbidity reduction of 80 percent from the monthly average raw water turbidity through the filters.
- Reliable treatment processes: The 2019 CAP states that WTPs should have: 1) operating alarms to warn of potential coagulation, filtration and disinfection failures; 2) standby replacement equipment for these same treatment units; 3) continuous turbidity monitoring and recording of combined filter effluent; and 4) sufficient filtration capacity to have redundant filters. Water

systems should also evaluate life expectancy of all process units and have a plan in place to replace aging infrastructure.

- Alternative treatment technology to receive *Cryptosporidium* removal credit, if needed, using membrane filtration, chlorine dioxide, ozone and ultraviolet (UV) disinfection.
- Consumer Confidence Report: The 2019 CAP reminds water systems that they need to deliver an annual consumer confidence report by July 1 each year, and include specific language if *Cryptosporidium* is monitored and detected in their source or finished water.

4.1.2.3 *Giardia* and Viruses

Giardia and viruses are regulated under the California SWTR; removal requirements are based on source water total coliform levels, as shown in Table 4-4. Systems using conventional treatment that meet filter effluent turbidity requirements receive treatment credits of 2.5-log for *Giardia* and 2-log for viruses. Credits for direct filtration systems are 2.0-log *Giardia* and 1-log virus. Credits for alternative filtration technologies are determined by DDW.

Table 4-4. Reduction Requirements for *Giardia* and Viruses

Median monthly total coliform concentrations (MPN/100 mL)	*Giardia* cyst log reduction requirements	Virus log reduction requirements
< 1,000	3	4
> 1,000 – 10,000	4	5
>10,000 – 100,000	5	6

Source: Surface Water Treatment Rule Guidance Manual available at http://www.epa.gov/safewater/disinfection/lt2/compliance.html

4.1.2.4 Turbidity

Turbidity is a concern in drinking water because it can reduce the effectiveness of disinfection by shielding microorganisms. It is also used as a surrogate measure for potential pathogenic contamination and as a measure of filtration performance.

The IESWTR included requirements for filtered water turbidities. In particular, it introduced monitoring of individual filter effluents, rather than just combined filter effluent. The rule requires that individual filter effluent turbidities not be greater than 1.0 NTU in any two consecutive (15-minute interval) samples at any time, or greater than 0.5 NTU after the filter has been in operation for 4 hours. Individual filters exceeding these standards are subject to a Comprehensive Filter Evaluation. The rule also requires that combined filter effluent turbidities be less than 0.3 NTU in 95 percent of samples collected each month, and the turbidity of the combined filter effluent must at no time exceed 1 NTU.

4.1.2.5 Contaminants with Notification Level and Response Level

DDW establishes health-based notification levels (NL) for selected contaminants for which MCLs have not yet been established but may present health risks. According to Section 116455 of HSC, water systems are required to notify DDW and their governing bodies when NLs are exceeded. In these circumstances, DDW recommends that systems notify their customers and consumers. DDW also establishes response levels (RL) for certain contaminants with NLs. When a contaminant is detected above its RL, DDW recommends removing a drinking water source from service or conduct additional sampling and notification. NL and RL are non-enforceable standards for drinking water systems, i.e., contaminants with NLs or RLs do not trigger mandatory monitoring, except for recycled water systems.

As of November 2021, 32 chemicals had NLs and 9 contaminants had RLs. Three of these contaminants are part of the per- and poly-fluoroalkyl substances (PFAS) group, as detailed in Table 4-5.

Table 4-5. Contaminants with Notification Levels and Response Levels in California

Chemical	Notification Level (mg/L)	Response Level (mg/L)
Boron	1	10 times the NL, 10
n-Butylbenzene	0.26	10 times the NL. 2.6
sec-Butylbenzene	0.26	10 times the NL, 2.6
tert-Butylbenzene	0.26	10 times the NL, 2.6
Carbon disulfide	0.16	10 times the NL, 1.6
Chlorate	0.8	10 times the NL, 8
2-Chlorotoluene	0.14	10 times the NL, 1.4
4-Chlorotoluene	0.14	10 times the NL, 1.4
Diazinon	0.0012	10 times the NL, 0.012 (12 µg/L)
Dichlorodifluoromethane (Freon 12)	1	10 times the NL, 10
1,4-Dioxane	0.001	35 times the NL, 0.035
Ethylene glycol	14	10 times the NL, 140
Formaldehyde	0.1	10 times the NL, 1
HMX	0.35	10 times the NL, 3.5
Isopropylbenzene	0.77	10 times the NL, 7.7
Manganese	0.5	10 times the NL, 5
Methyl isobutyl ketone (MIBK)	0.12	10 times the NL, 1.2
Naphthalene	0.017	10 times the NL, 0.017
N-Nitrosodiethylamine (NDEA)	0.00001 (0.01 µg/L)	10 times the NL, 0.0001 (0.1 µg/L)
N-Nitrosodimethylamine (NDMA)	0.00001 (0.01 µg/L)	30 times the NL, 0.0003 (0.3 µg/L)
N-Nitrosodi-n-propylamine (NDPA)	0.00001 (0.01 µg/L)	50 times the NL, 0.0005 (0.5 µg/L)
Perfluorobutanesulfonic acid (PFBS)	0.0005 (0.5 µg/L)	10 times the NL, 0.005 (5 µg/L)
Perfluorooctanoic acid (PFOA)	0.0000051 (5.1 ng/L)	100 times cancer risk, 10 ng/L
Perfluorooctanesulfonic acid (PFOS)	0.0000065 (6.5 ng/L	100 times cancer risk, 40 ng/L
Propachlor	0.09	10 times the NL, 0.9
n-Propylbenzene	0.26	10 times the NL, 2.6
RDX	0.0003	100 times the NL, 0.03
Tertiary butyl alcohol (TBA)	0.012	100 times the NL, 1.2
1,2,4-Trimethylbenzene	0.33	10 times the NL, 3.3
1,3,5-Trimethylbenzene	0.33	10 times the NL, 3.3
2,4,6-Trinitrotoluene (TNT)	0.001	100 times the NL, 1
Vanadium	0.05	10 times the NL, 0.5

4.1.2.6 Hexavalent Chromium

In July 2014, DDW published an MCL of 0.010 mg/L for hexavalent chromium. In May 2017, the Superior Court of Sacramento County issued a judgment invalidating the MCL on the basis that the Drinking Water Program who established the MCL had not properly considered the economic feasibility of complying with the MCL. As part of the next steps in reissuing an MCL for hexavalent chromium, DDW sought stakeholder involvement in developing options for evaluating economic feasibility during MCL development process. As such, DDW released a White Paper on “Economic Feasibility Analysis in Consideration for a Hexavalent Chromium MCL” early March 2020. When this report was completed, DDW had not provided information about a potential future MCL for hexavalent chromium.

4.1.2.7 Manganese

SWRCB has recently introduced new regulatory requirements for manganese, unlike other similar contaminants not discussed in detail in this section; these new requirements are detailed below.

In California, manganese has a secondary standard of 0.05 mg/L, an NL of 0.5 mg/L and an RL of 5 mg/L. At the federal level, manganese is regulated as a non-enforceable secondary standard at the same concentration than in California, i.e., 0.05 mg/L. In 2004, the U.S. EPA also established health advisories for adults of 1 mg/L for acute exposures of 1 and 10 days, and 0.3 mg/L for lifetime exposure. For infants younger than 6 months old, the health advisory is 0.3 mg/L for both lifetime and acute exposures of 10 days.

In November 2021, DDW began requiring public notification within 30 days when manganese concentrations greater than the secondary standard of 0.05 mg/L are detected at the entry point to the distribution system. DDW has developed templates for two types of notification: when concentrations are greater than the secondary standard but less than health advisory of 0.3 mg/L, and when concentrations are greater than 0.3 mg/L. These notification templates are available at https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/Notices.html.

4.1.2.8 Disinfectants and Disinfection Byproducts

Disinfection byproducts (DBPs) are produced through the reaction of chemical disinfectants with natural organic matter (NOM) present in the source water. DBPs are a concern due to a number of confirmed or suspected health effects, including increased rates of cancer, miscarriages and developmental defects. Trihalomethanes (THMs) and haloacetic acids (HAAs) are the two regulated DBP groups that apply to Escondido and VID.

The maximum contaminant levels (MCLs) for DBPs were shown in Table 4-1 and are summarized in Table 4-6. This table includes maximum residual disinfectant levels (MRDLs) which regulate the disinfectant concentrations in the distribution system.

Table 4-6. U.S. EPA Stage 1 and Stage 2 DBPRs	
Disinfectants By-Products	
DBP	Maximum contaminant level
Trihalomethanes (THMs) [a]	0.080 mg/L (80 µg/L)
Haloacetic acids (HAA5) [b]	0.060 mg/L (60 µg/L)
Chlorite (ClO_2^-)	
Disinfectants	
Disinfectant	Maximum residual disinfectant level
Total Chlorine Residual	4 mg/L as Cl_2

a. *Sum of 4 THMs: chloroform, bromodichloromethane, dibromochloromethane, and bromoform.*
b. *Sum of 5 HAAs: monochloroacetic acid, dichloroacetic acid, trichloroacetic acid. bromoacetic acid, and dibromoacetic acid.*

4.1.2.9 Total Organic Carbon Reduction Requirements

Total Organic Carbon (TOC) is an indicator of organic matter that can be a precursor to the formation of DBPs. TOC in raw water originates from both natural and manmade sources. TOC concentrations in raw water greater than 2.0 mg/L can trigger enhanced coagulation requirements under the Stage 1 and Stage 2 DBPRs, as shown in Table 4-7. Enhanced coagulation/enhanced softening are known to improve removal of DBP precursors for surface water systems using conventional filtration treatment or lime softening.

Table 4-7. TOC Removal Requirements According to the Stage 1 DBPR			
Source Water TOC (mg/L as C)	Source Water Alkalinity		
	0 – 60 mg/L as $CaCO_3$	> 60 – 120 mg/L as $CaCO_3$	> 120 mg/L as $CaCO_3$
> 2.0 – 4.0	35%	25%	15%
> 4.0 – 8.0	45%	35%	25%
> 8.0	50%	40%	30%

4.1.2.10 Water Quality Control Plan for the San Diego Basin

The Water Quality Control Plan for the San Diego Basin (Basin Plan) assigns beneficial uses to water bodies in the San Diego Region, sets water quality objectives, and describes implementation plans to protect beneficial uses. Beneficial uses include municipal water supply, various types of aquatic habitat, types of recreation, etc.

Table 4-8 presents water quality objectives for inland surface water for the hydrologic units included in the watershed based on beneficial uses, along with water quality objectives for relevant groundwater.

Table 4-8. Basin Plan Water Quality Objectives for Inland Surface Waters and Groundwater in mg/L unless otherwise specified (SDRWQCB, 2021)

Inland Surface Water or Groundwater	TDS	Chlorides	Sulfate	Percent Sodium	Nitrate	Iron	Manganese	Methylene Blue-Activated	Boron	Odor	Turbidity (NTU)	Color (Units)	Fluoride
Warner Valley – surface water	500	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
Escondido – surface Water	500	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
Warner Valley - groundwater	500	250	250	60	5	0.3	0.05	0.5	0.75	none	5	15	1.0
Escondido Creek - groundwater	1000	300	400	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0

a. *For surface waters, concentrations of nitrogen and phosphorus by themselves or in combination with other nutrients are included in the objective, rather than nitrate alone. These nutrients shall be maintained at levels below those which stimulate algae and emergent plant growth. Threshold total Phosphorus (P) concentrations shall not exceed 0.05 mg/l in any stream at the point where it enters any standing body of water, nor 0.025 mg/l in any standing body of water. A desired goal in order to prevent plant nuisances in streams and other flowing waters appears to be 0.1mg/l total P. These values are not to be exceeded more than 10% of the time unless studies of the specific body in question clearly show that water quality objective changes are permissible and changes are approved by the Regional Board. Analogous threshold values have not been set for nitrogen compounds; however, natural ratios of nitrogen to phosphorus are to be determined by surveillance and monitoring and upheld. If data are lacking, a ratio of N: P=10:1 shall be used. (SDRWQCB, 2021)*

On August 7, 2018, the State Water Board adopted statewide bacteria water quality objectives and implementation provisions to protect recreational users (REC-1 beneficial use) from the effects of pathogens in California water bodies. The Basin Plan, including updates through September 2021, establishes *Escherichia coli* (*E. coli*) as the sole indicator of pathogens in freshwater. The bacteria water quality objective for *E. coli* is a six-week rolling geometric mean of *E. coli* not to exceed 100 colony forming units (cfu) per 100 milliliters (mL), calculated weekly, and a statistical threshold value (STV) of 320 cfu/100 mL not to be exceeded by more than 10 percent of the samples collected in a calendar month, calculated in a static manner (SDRWQCB, 2021).

Source water total coliform levels are also used by the SWRCB to determine *Giardia* and virus removal requirements through treatment, as described in Table 4-4.

4.2 Monitoring Program

Table 4-9 summarizes the raw water quality monitoring locations and frequencies used for analysis. The City of Escondido sampled at Dixon Lake, Lake Wohlford, SDCWA, the Escondido Canal Outlet, and the Escondido-Vista WTP. Vista Irrigation District sampled at Lake Henshaw.

Table 4-9. Water Quality Sampling Overview[a]

Sampling Organization	Location	pH	Turbidity	Temper-ature	Alkalinity	TOC	TDS	Nutrients	DO	Metals	Total Coliform, *E. coli*	*Crypto-sporidium, Giardia*	Inorganics
City of Escondido	Dixon Lake	Q	Q	Q	Q		Q	Q	W	Q	W		Y
City of Escondido	Lake Wohlford	Q	Q	Q	Q		Q	Q	W	Q	W		Y
City of Escondido	SDCWA	Q	Q	Q	Q		Q	Q		Q	W		Y
Vista Irrigation District	Groundwater wells							SA[b]					
Vista Irrigation District	Lake Henshaw Outlet/Weir				SA		SA	SA		SA	W		
City of Escondido	Escondido-Vista WTP Raw	D	D			W[c]						M[d]	Y
City of Escondido	Escondido-Vista WTP Effluent	D	D	D	Q	W	Q	Q		Q			Y

a. *D = daily, W =* weekly, M = monthly, Q = quarterly, SA = semi-annually, Y = yearly

b. *Only nitrate was sampled at the groundwater wells.*

c. *TOC was measured weekly at the* WTP intake for all sources, including Dixon Lake, Lake Wohlford, and SDCWA.

d. *Cryptosporidium and Giardia were only sampled monthly between February 2016 and February 2017.*

4.3 Review of Water Quality Data

This section summarizes the results of raw water quality data collected for groundwater wells, Lake Henshaw, Lake Wohlford, Dixon Lake, and finished effluent water from the Escondido-VID WTP since the last WSS. For each reservoir, the following parameters are discussed: pH, temperature, alkalinity, total hardness, turbidity, nutrients, microbes, TOC, TDS, metals, and DO. Markers are shown on figures unless daily data is plotted.

4.3.1 Groundwater

VID has sampled three groundwater wells through the San Diego study unit of the GAMA Project. Well 58A was sampled on June 17, 2004 and April 22, 2014. Well 59 was sampled on June 29, 2004, September 11, 2007, April 22, 2014, and June 4, 2019. Well 79 was sampled on June 24, 2004, April 21, 2014, and June 4, 2019. All wells were tested for 43 analytes, including general water quality indicators, inorganics, nutrients, metals, radionuclides, VOCs, pesticides, geochemical tracers, microbiological constituents, and constituents of special interest. The only samples to meet or exceed a SMCL were field pH samples for Well 59 in 2019 and Well 79 in 2004, 2014 and 2019. The maximum exceedance was 0.2 units higher than the SMCL upper range of 8.5 units.

4.3.2 Lake Henshaw

VID is responsible for water quality monitoring at Lake Henshaw. Due to limited field sampling, pH and temperature data are not available. Sampling of TOC, DO, *Cryptosporidium*, *Giardia*, and inorganics was also not conducted during the 2016-2020 sampling period. Table 4-10a presents a summary of results obtained from 2016 to 2020. Table 4-10b summarizes parameters with multiple MCLs.

Table 4-10a. Lake Henshaw Water Quality Summary, 2016 to 2020

Analyte	Units	MCL	Minimum	Average	Maximum
Total Hardness	mg/L as $CaCO_3$		100	134	170
pH			-	-	-
Total Alkalinity	mg/L as $CaCO_3$		120	159	200
Nitrate	mg/L as N	10	ND	ND	ND
Fluoride	mg/L	2	0.36	0.62	0.81
Turbidity	NTU	5	15	21.2	34
Source Temperature	°C		-	-	-
E. coli	MPN/100 mL		2	70	2,366
Total Coliform	MPN/100 mL		198	6,674	48,400
Apparent Color (Unfiltered)	Units	15 *	15	62	100
Odor Threshold at 60'C	TON	3 *	2	16	67
MBAS	mg/L	0.5 *	-	-	-
Langelier Saturation Index-25'C			-1.40	0.62	1.20

Table 4-10a. Lake Henshaw Water Quality Summary, 2016 to 2020					
Analyte	Units	MCL	Minimum	Average	Maximum
Asbestos	MFL	7	-	-	-
Nitrite	µg/L as N	1,000	ND	ND	ND
Cyanide	µg/L	200	-	-	-
Calcium	mg/L		22.0	32.9	42.0
Magnesium	mg/L		8.50	12.7	17.0
Sodium	mg/L		37	70.3	100
Potassium	mg/L		3.40	4.87	6.00
Aluminum	µg/L	200 *	200	474	990
Antimony	µg/L	6	ND	ND	ND
Arsenic	µg/L	10	1.20	1.97	3.00
Barium	µg/L	1,000	53	71.4	94
Beryllium	µg/L	4	ND	ND	ND
Boron	µg/L		ND	ND	ND
Cadmium	µg/L	5	ND	ND	ND
Chromium, Total	µg/L	50	ND	ND	ND
Copper	µg/L	1,000 *	2.00	2.33	2.90
Iron	µg/L	300 *	0.37	0.64	1.20
Lead	µg/L			0.76	
Manganese	µg/L	50 *	39	110	250
Mercury	µg/L	2	ND	ND	ND
Nickel	µg/L	100	ND	ND	ND
Selenium	µg/L	50	ND	ND	ND
Silver	µg/L	100 *	ND	ND	ND
Thallium	µg/L	2	ND	ND	ND
Zinc	µg/L	5,000 *	-	-	-

Notes:

ND indicates the parameter was non-detect.

** Secondary MCL*

Table 4-10b. Lake Henshaw Water Quality Summary, 2016 to 2020, for Contaminants with Multiple MCLs							
Analyte	Units	MCL			Lake Henshaw		
		Recommended	Upper	Short-Term	Minimum	Average	Maximum
Sulfate	mg/L	250	500	600	27	54.4	96
Chloride	mg/L	250	500	600	25	48	71
Specific Conductance	µmohs/cm	900	1,600	2,200	210	551	720
TDS	mg/L	500	1,000	1,500	240	341	430

Alkalinity and Total Hardness

Figure 4-2 plots alkalinity and total hardness for Lake Henshaw. Both parameters fluctuate between approximately 100 and 200 mg/L as $CaCO_3$ with a clear increase in 2017 and 2018.

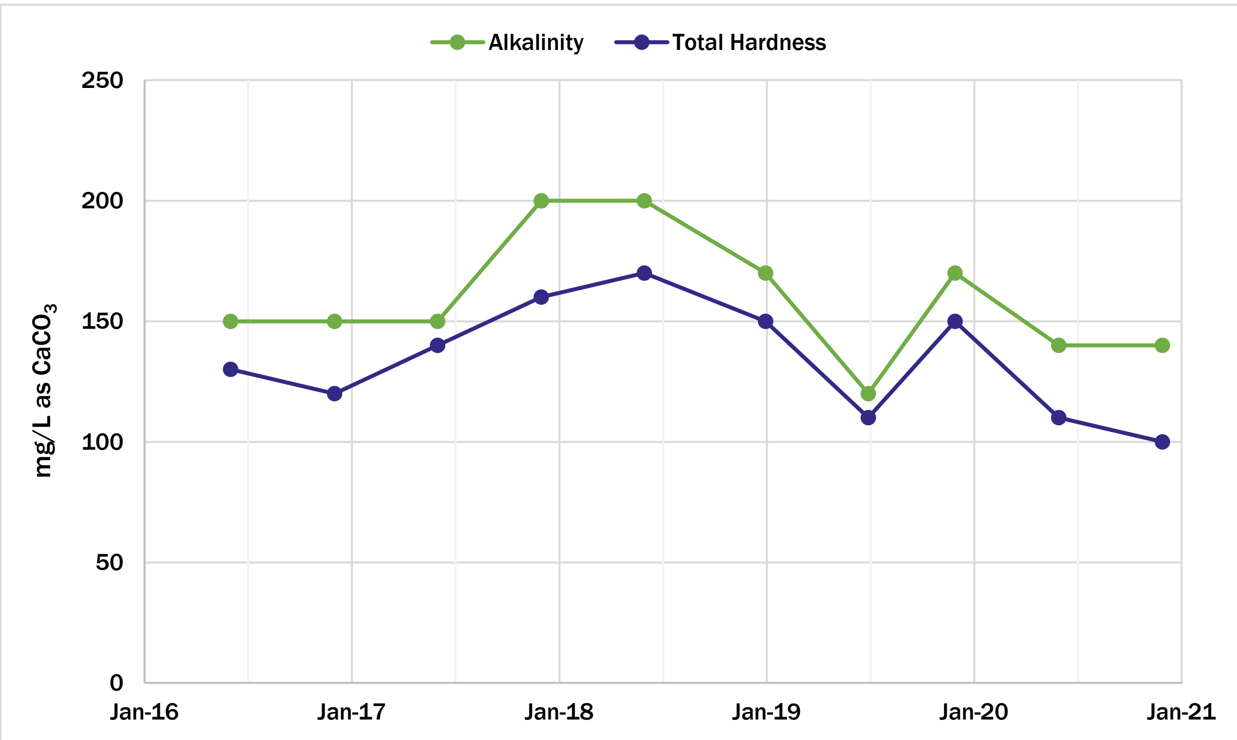

Figure 4-2. Alkalinity and total hardness for Lake Henshaw

Total Organic Carbon

Total organic carbon (TOC) is a measure of soluble and insoluble organic compounds in water that are primarily decaying NOM. TOC is a surrogate measure of DBPs. Total organic carbon was not sampled at Lake Henshaw during this sampling period.

Total Dissolved Solids

Total dissolved solids (TDS) are naturally occurring in water but can also be increased by runoff and agricultural activities.

Figure 4-3 plots TDS concentrations for Lake Henshaw, which peaked at 430 mg/L in January 2019. Like the other reservoirs discussed below, Lake Henshaw TDS concentrations followed a similar trend as alkalinity and hardness, although concentrations appear to decrease in 2019 and 2020. This sampling period had similar concentrations as the previous WSS, which averaged 381 mg/L and peaked at 500 mg/L.

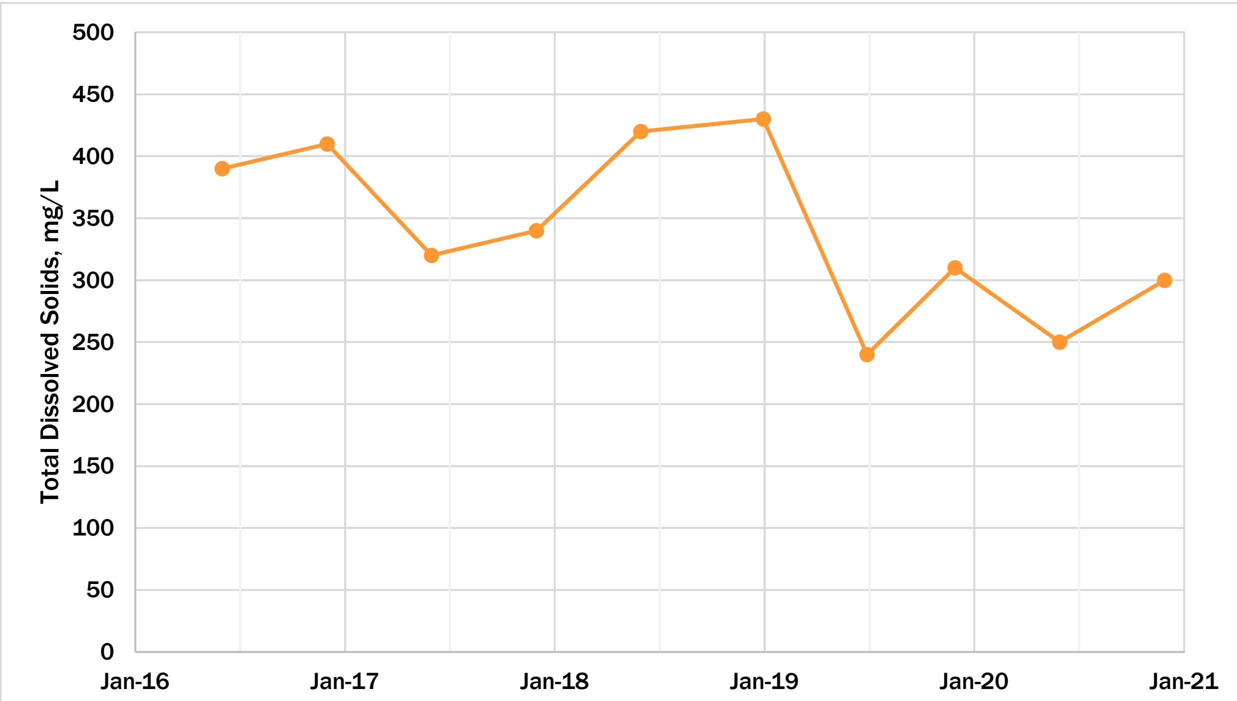

Figure 4-3. Total dissolved solids for Lake Henshaw

Nutrients

Nutrients including nitrogen and phosphorus can promote aquatic and algae growth that can adversely affect water quality. Most nutrients occur naturally in water and many are regulated with secondary MCLs.

VID sampled for nitrate, sulfate, potassium, calcium, and magnesium. See Table 4-11 for statistics on each water quality parameter. Nitrate was non-detect throughout the sampling period and sulfate peaked at 96 mg/L. Potassium, calcium, and magnesium do not have MCLs, but had maximums of 4 mg/L, 46 mg/L, and 17 mg/L, respectively.

Nitrate concentrations measured at individual groundwater wells are plotted in two figures for clarity. Figure 4-4 shows the wells with the greatest variations over time, whereas Figure 4-5 present the groundwater wells with the most stable nitrate concentrations.

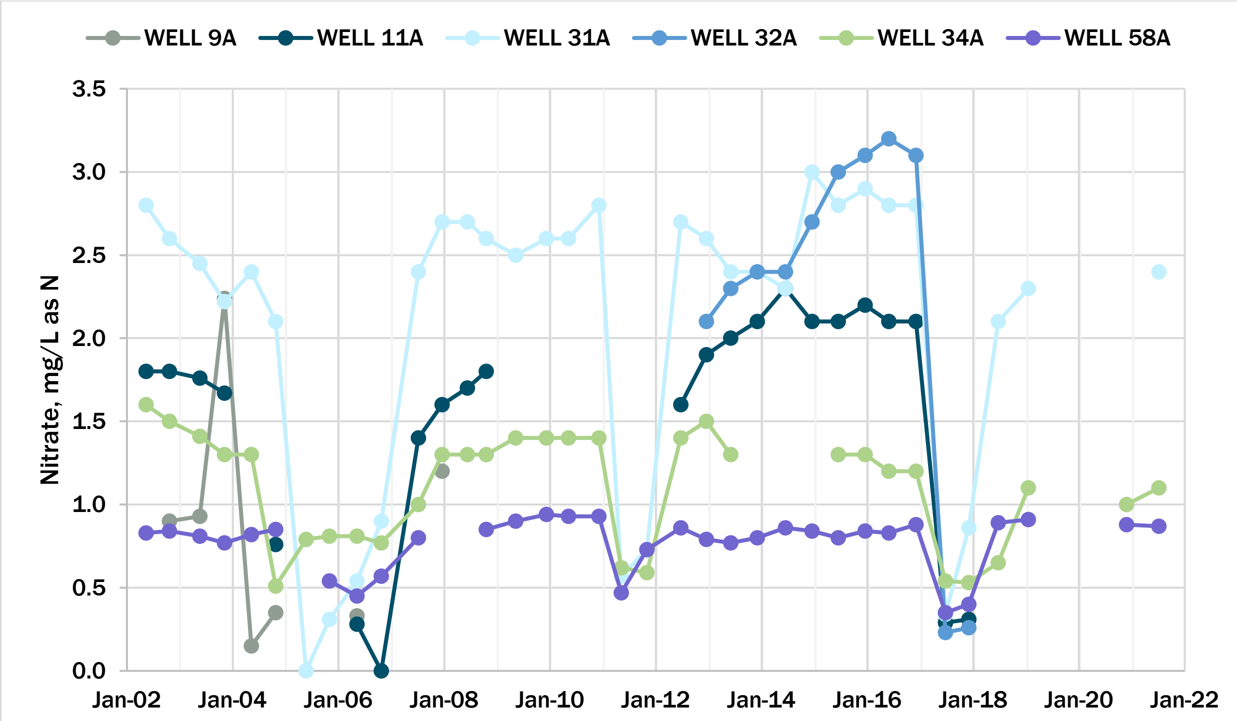

Figure 4-4. Nitrate concentrations in Wells 9A, 11A, 31A, 32A, 34A, and 58A[3]

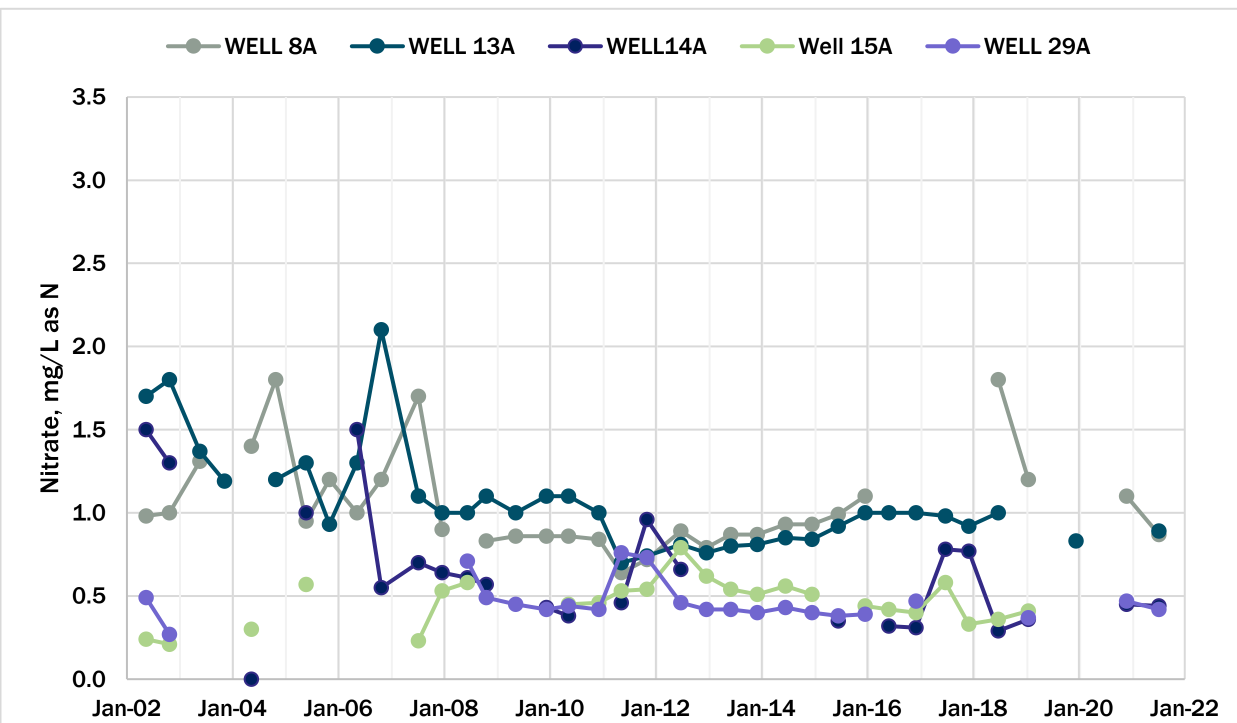

Figure 4-5. Nitrate Concentrations in Wells 8A, 13A, 14A, 15A, and 29A[3]

[3] Gaps indicate gaps in regular sample collection schedule.

Microbiological Constituents

Lake Henshaw had the highest concentrations of total coliform and *E. coli* of all the reservoirs in the Escondido-Vista Watershed, although it was only sampled between April and October of each year (Figure 4-6). *E. coli* concentrations peaked at 2,366 MPN/100mL in August 2018 and total coliform levels were at 48,400 MPN/100 mL for three straight weeks in September 2018. Grazing animals such as cattle are common around Lake Henshaw. *Cryptosporidium* or *Giardia* was not measured for Lake Henshaw.

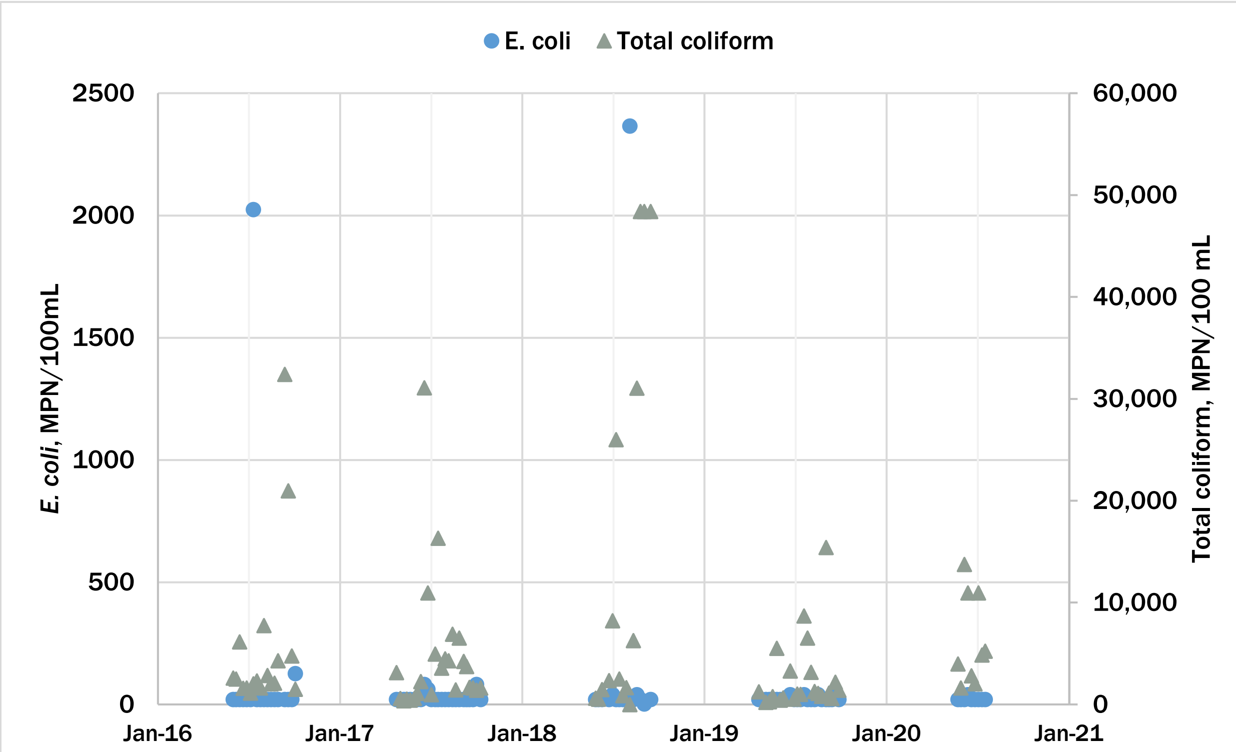

Figure 4-6. Average monthly concentration of *E. coli* and total coliform for Lake Henshaw

Metals

Statistics for 18 metals are listed in Table 4-11. The only parameters that exceeded their respective MCLs[4] were aluminum and manganese, which peaked at 990 µg/L and 250 µg/L, respectively. Aluminum has historically exceeded the secondary MCL with a maximum of 1,000 µg/L during the past WSS sampling period. Figure 4-7 shows aluminum and manganese concentrations in Lake Henshaw over time. The following metals were non-detect over the five-year sampling period: antimony, beryllium, boron, cadmium, chromium, mercury, nickel, selenium, silver, thallium, and zinc.

[4] The MCLs for metals apply to contaminant concentrations measured after treatment at the entry point to the distribution system, and not in source water. The MCLs were used in this evaluation as reference levels to assess relative concentrations of each contaminant.

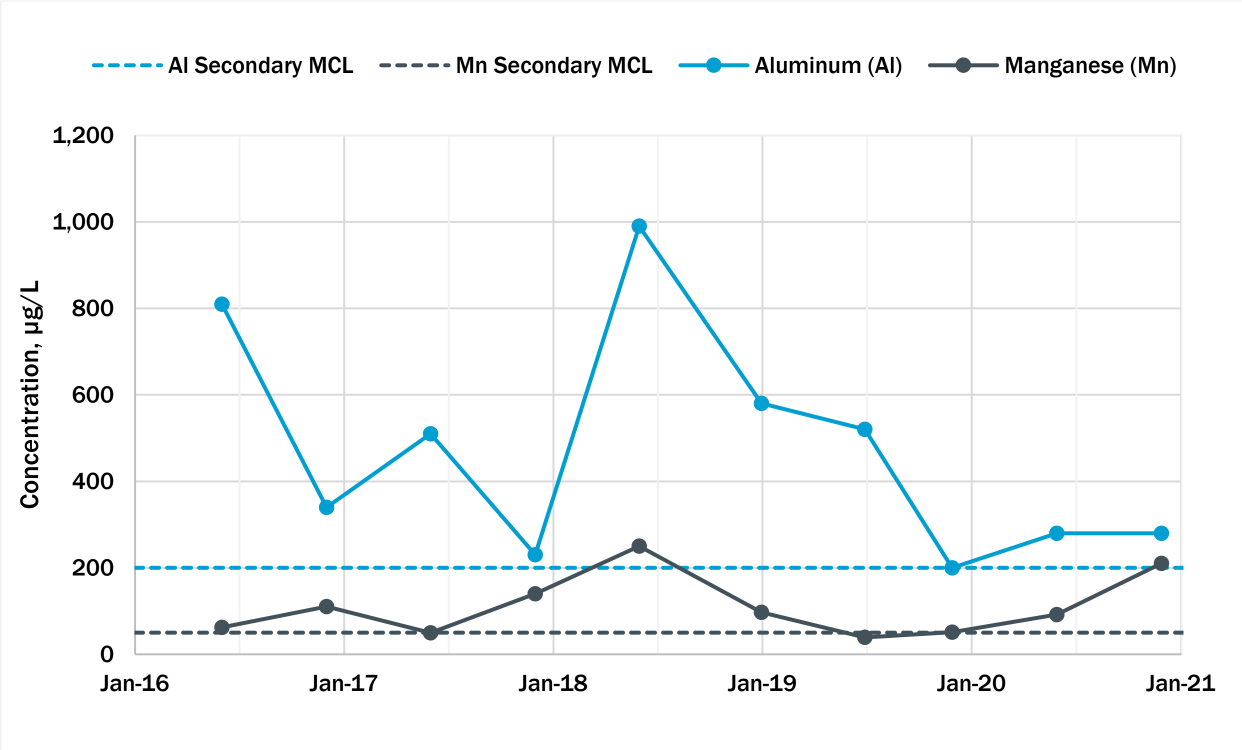

Figure 4-7. Metals in Lake Henshaw with historical MCL exceedances

Algae

For drinking water, a ten-day health advisory of 1.6 µg/L for total Microcystin with Microcystin-LR as a surrogate has been widely used as the basis for national standards or guideline values (EPA, 2015). The ten-day health advisory is considered protective of non-carcinogenic adverse health effects over a ten-day exposure to Microcystin in drinking water (EPA, 2015)

Since March 2020, VID has sampled seven Microcystin variants and Anatoxin-a weekly. For 2020, the average Microcystin concentration was 193 µg/L, with a maximum of 3,003 µg/L total Microcystin in August 2020.

Water has not been released to the San Luis Rey River during periods of high cyanobacteria concentrations. Advisory signage is posted near the Lake Henshaw boating dock as shown in Figure 3-6. Caution signage is posted above 0.8 µg/L, warning signage above 6.0 µg/L, and danger signage above 20.0 µg/L.

4.3.3 Lake Wohlford

The City of Escondido is responsible for water quality monitoring at Lake Wohlford and the Escondido-VID WTP influent. Table 4-11a presents a summary of results obtained from 2016 to 2020. Lake Wohlford raw water was used infrequently at the Escondido-VID WTP, thus samples measured at the WTP influent—pH, turbidity, and TOC—have large data gaps. Table 4-11b summarizes parameters with multiple MCLs.

Table 4-11a. Lake Wohlford Water Quality Summary, 2016 to 2020					
Analyte	**Units**	**MCL**	**Minimum**	**Average**	**Maximum**
Total Hardness	mg/L as $CaCO_3$		130	150	170
pH			8	8	9
Total Alkalinity	mg/L as $CaCO_3$		150	188	230
Nitrate	mg/L as N	10	0.00	0.07	0.50
Fluoride	mg/L	2	0.36	0.64	1.00
Lab Turbidity	NTU	5	3	7	10
Source Temperature	°C		10	19	27
E. coli	MPN/100 mL		1	5	62
Total Coliform	MPN/100 mL		112	1,946	48,784
Apparent Color (Unfiltered)	Units	15 *	8.00	40.5	60.0
Odor Threshold at 60C	TON	3 *	2.00	34.93	200
MBAS	mg/L	0.5 *	0.00	0.06	0.15
Langelier Saturation Index-25'C			-0.13	0.47	1.20
Asbestos	MFL	7	ND	ND	ND
Nitrite	µg/L as N	1,000	0.00	8.43	84.0
Cyanide	µg/L	200	ND	ND	ND
Calcium	mg/L		30.0	35.6	42.0
Magnesium	mg/L		11.0	14.4	17.0
Sodium	mg/L		42.0	75.4	130
Potassium	mg/L		4.10	5.10	6.00
Aluminum	µg/L	200 *	44.0	181	540
Antimony	µg/L	6	ND	ND	ND
Arsenic	µg/L	10	0.75	1.19	1.70
Barium	µg/L	1,000	52.0	60.8	75.0
Beryllium	µg/L	4	ND	ND	ND
Boron	µg/L		110	185	300
Cadmium	µg/L	5	ND	ND	ND
Chromium, Total	µg/L	50	0.00	0.45	1.40
Copper	µg/L	1,000 *	5.50	8.60	16.0
Iron	µg/L	300 *	72.0	214	470
Lead	µg/L		0.00	0.59	1.20

Analyte	Units	MCL	Minimum	Average	Maximum
Manganese	µg/L	50 *	26.0	77.1	110
Mercury	µg/L	2	0.00	0.04	0.22
Nickel	µg/L	100	0.77	1.67	3.30
Selenium	µg/L	50	0.00	0.37	0.63
Silver	µg/L	100 *	ND	ND	ND
Thallium	µg/L	2	ND	ND	ND
Zinc	µg/L	5,000 *	0.00	6.50	89.0

Table 4-11a. Lake Wohlford Water Quality Summary, 2016 to 2020

Notes:

ND indicates the parameter was non-detect.

** = secondary MCL*

Table 4-11b. Lake Wohlford Water Quality Summary, 2016 to 2020, for Contaminants with Multiple MCLs

Analyte	Units	MCL			Lake Henshaw		
		Recommended	Upper	Short-Term	Minimum	Average	Maximum
Sulfate	mg/L	250	500	600	31	56	96
Chloride	mg/L	250	500	600	29	52	85
Specific Conductance	µmohs/cm	900	1,600	2,200	475	638	858
TDS	mg/L	500	1,000	1,500	270	376	510

pH

Lake Wohlford pH was measured daily by online sensors at the WTP intake and quarterly by boat sampling at Lake Wohlford. Daily data fluctuated between 7.5 and 8.7 pH units between 2016 and 2020. Figure 4-8 shows daily and quarterly pH data.

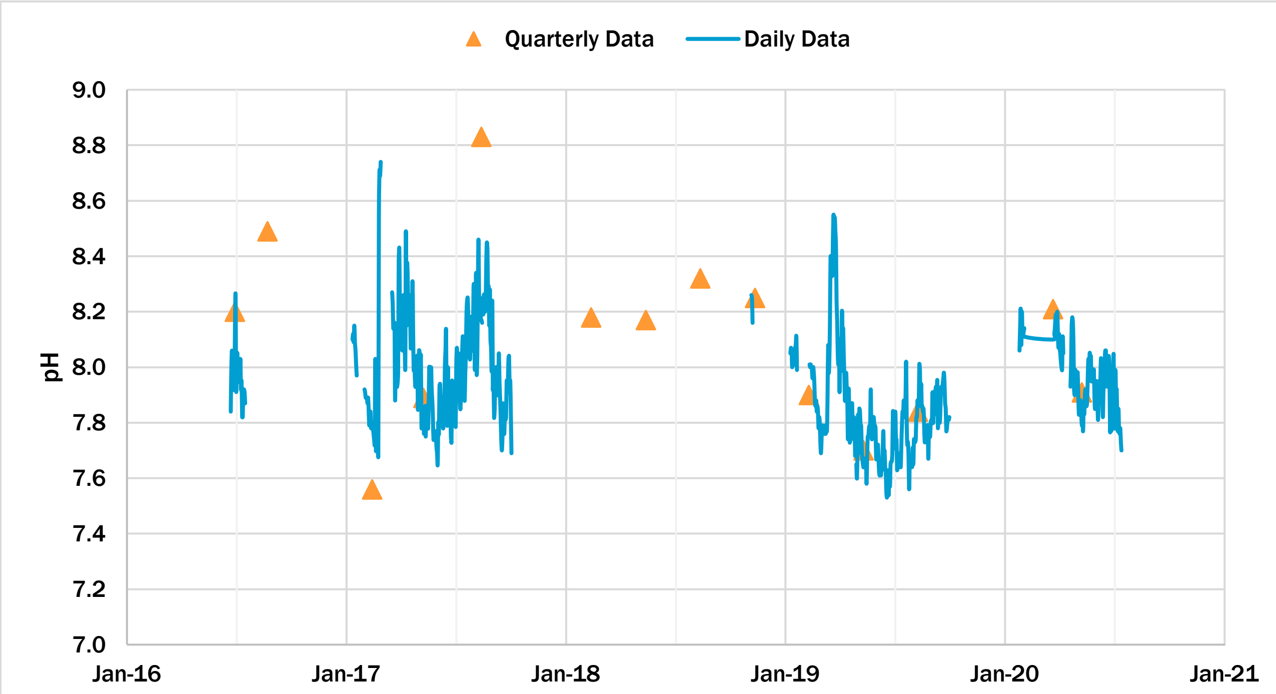

Figure 4-8. Lake Wohlford pH data

Water Temperature

Source temperature at Lake Wohlford is sampled quarterly, with a seasonal variation ranging from about 9 to 15°C in the winter and approximately 21 to 27°C for summer highs.

Alkalinity and Total Hardness

Figure 4-9 plots quarterly alkalinity and total hardness at Lake Wohlford. Unlike Dixon Lake, alkalinity concentrations were higher than total hardness, with an average of 188 mg/L as $CaCO_3$ and maximum of 230 mg/L. Lake Wohlford's high alkalinity levels indicate that the reservoir has a high pH buffering capacity. Lake Wohlford's total hardness ranged from 130 to 170 mg/L.

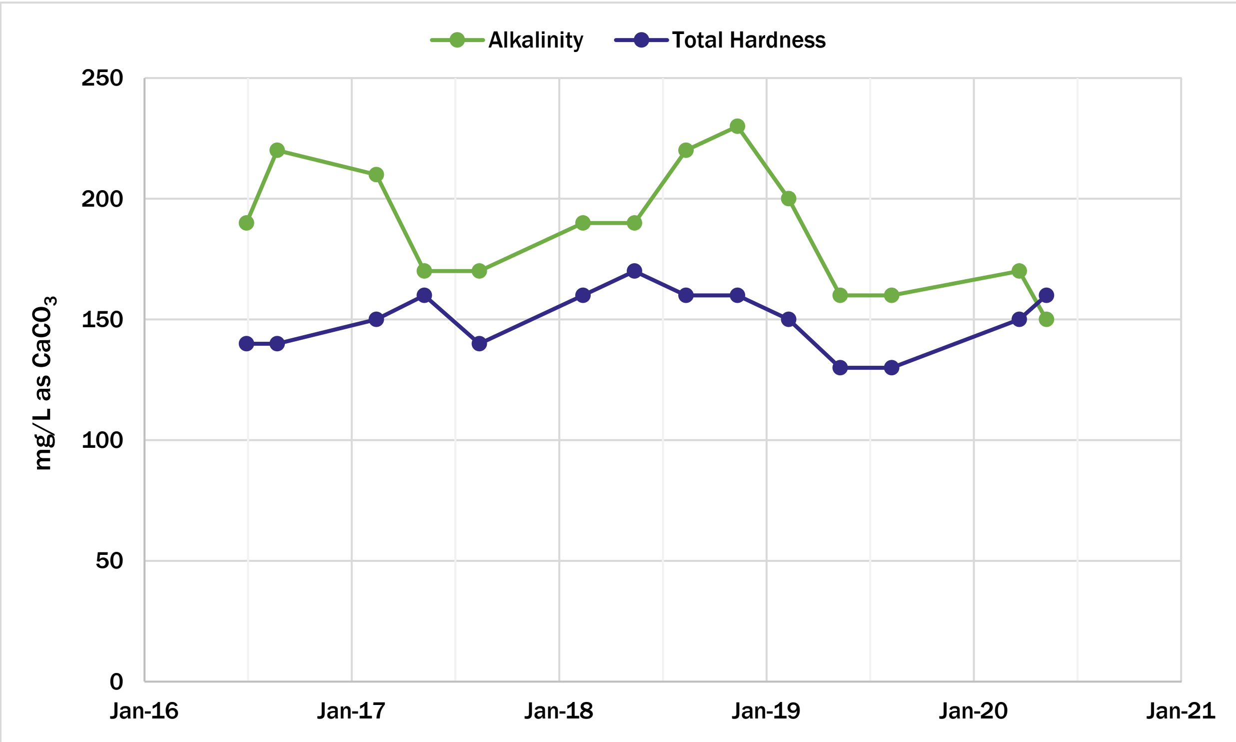

Figure 4-9. Alkalinity and total hardness for Lake Wohlford

Turbidity

Lake Wohlford turbidity was measured quarterly in the field and daily at the WTP when Lake Wohlford raw water was used. Lake Wohlford raw water was sparsely treated in 2016 and 2018 but peaked at 33 NTU in February 2019. Figure 4-10 shows daily and quarterly turbidity data.

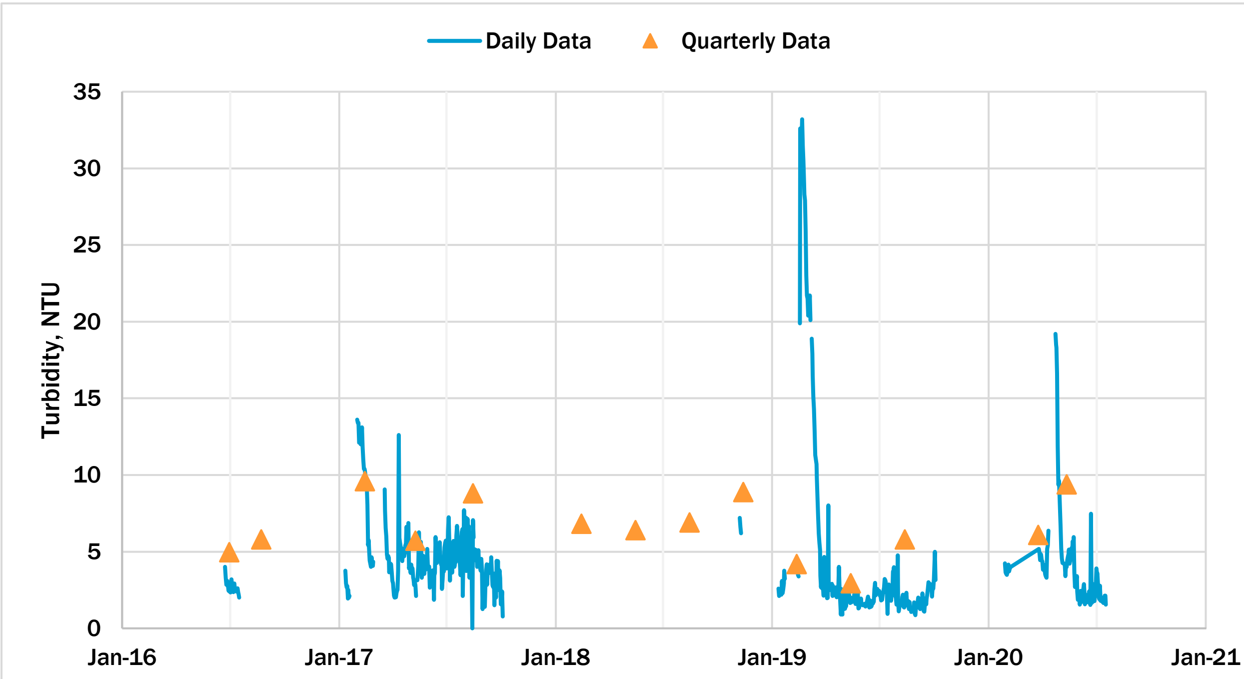

Figure 4-10. Lake Wohlford turbidity data

Nutrients

The City of Escondido sampled for nitrate, nitrite, sulfate, potassium, calcium, and magnesium at Lake Wohlford. See Table 4-10 for statistics on each water quality parameter. No nutrients exceeded regulatory limits.

Microbiological Constituents

Total coliform and *E. coli* were sampled weekly at Lake Wohlford. Figure 4-11 plots the distribution of total coliform samples from 2016 to 2020. All total coliform concentrations were below 2,500 MPN/100mL except for one high concentrations of 48,800 MPN/100mL in May 2020. *E. coli* samples also showed higher concentrations in 2020, peaking at 62 MPN/100mL in May. Lake Wohlford was only measured for *Cryptosporidium* or *Giardia* twice in 2017 when blended with Lake Dixon water at the WTP influent; all samples were zero.

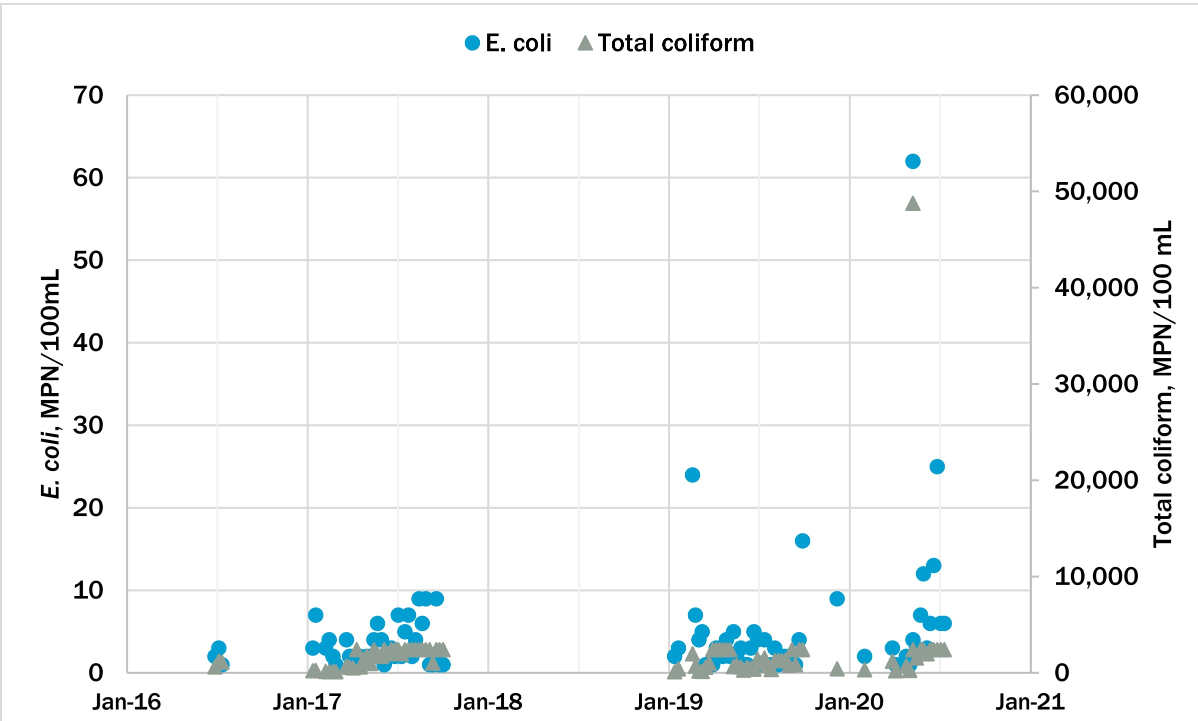

Figure 4-11. Distribution of Lake Wohlford total coliform samples

Total Organic Carbon

TOC was sampled weekly at the WTP influent when Lake Wohlford was treated at the Escondido-VID WTP. Lake Wohlford was sparsely online, with only 81 weekly samples during the five-year sampling period, mostly in 2017 and 2019. During that time, TOC concentrations typically vary 7.7 to 11.0 mg/L as C, with a peak concentration of 16 mg/L as C in March 2019.

Total Dissolved Solids

TDS concentrations averaged at 376 mg/L and peaked at 510 mg/L in 2016. This is very similar to statistics from the previous WSS, which averaged at 378 mg/L and had a maximum of 520 mg/L. Figure 4-12 plots TDS concentrations for 2016 to 2020. As mentioned above for Lake Henshaw, TDS concentrations in Lake Wohlford also appear to decrease over time.

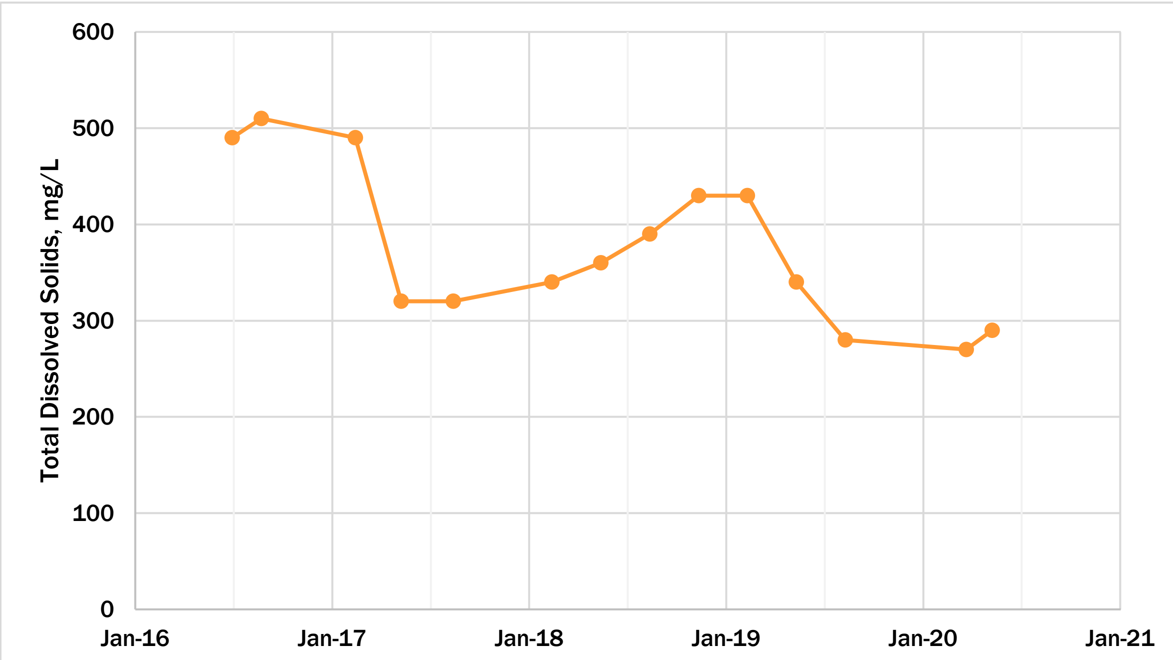

Figure 4-12. Total dissolved solids in Lake Wohlford

Metals

Statistics for 18 metals are listed in Table 4-10. Aluminum, iron, and manganese were the only parameters to exceed their respective secondary MCLs[5], with concentrations peaking at 540 µg/L, 470 µg/L, and 110 µg/L, respectively. Figure 4-13 shows aluminum, iron, and manganese concentrations in Lake Wohlford over time. The following metals were non-detect over the five-year sampling period: antimony, beryllium, cadmium, silver, and thallium.

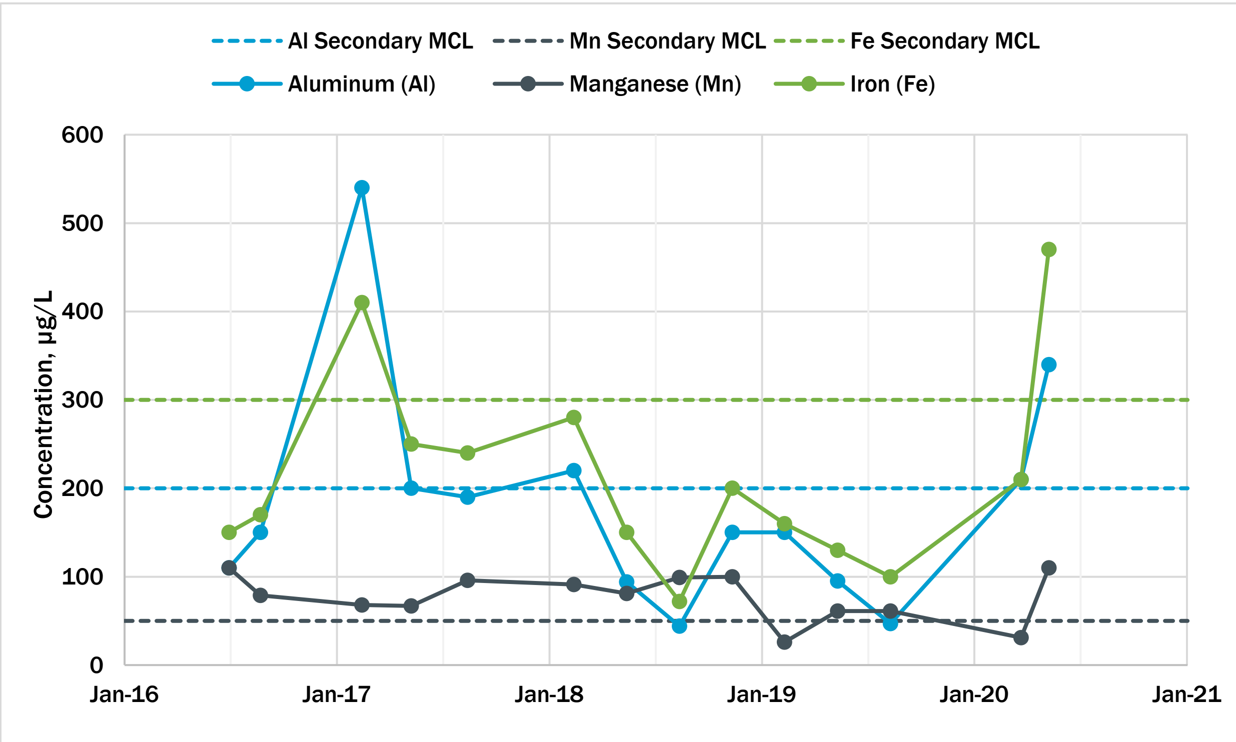

Figure 4-13. Metals in Lake Wohlford with historical MCL exceedances

Dissolved Oxygen

Dissolved oxygen (DO) was measured weekly at Lake Wohlford and was sampled from the surface down to 25 feet in 5-foot increments. Figure 4-14 shows distribution maps for monthly DO values by depth between 2016 and 2020. The reservoir shows turnover in late fall or early winter when dissolved oxygen is mixed into the lower depths of the lakes. Lake Wohlford experiences also experiences spring turnover, but generally does not stratify based on stable DO levels from the surface to lake bottom.

[5] The MCLs for metals apply to contaminant concentrations measured after treatment at the entry point to the distribution system, and not in source water. The MCLs were used in this evaluation as reference levels to assess relative concentrations of each contaminant.

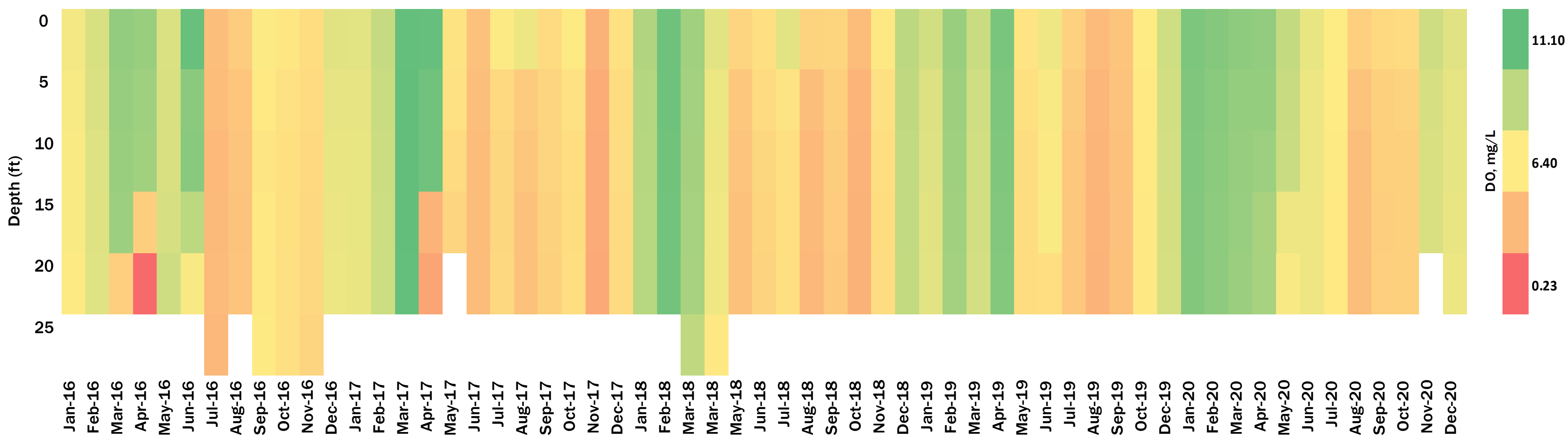

Figure 4-14. Dissolved oxygen levels across depth of Lake Wohlford from 2016-2020

4.3.4 Dixon Lake

The City of Escondido is responsible for water quality monitoring at Dixon Lake and the Escondido-VID WTP influent. SDCWA raw water can be mixed into Dixon Lake, thus water quality sampling at Dixon Lake includes any contaminants from the imported water. Changes in water quality in Dixon Lake can be attributable to changes in water source imported by SCDWA, i.e., Colorado River or State Project Water. Table 4-12a presents a summary of results obtained from 2016 to 2020. Table 4-12b summarizes parameters with multiple MCLs.

Table 4-12a. Dixon Lake Water Quality Summary, 2016 to 2020

Analyte	Units	MCL	Minimum	Average	Maximum
Total Hardness	mg/L as $CaCO_3$		130	206	300
pH			8	8	8
Total Alkalinity	mg/L as $CaCO_3$		85	111	140
Nitrate	mg/L as N	10	0.07	0.16	0.33
Fluoride	mg/L	2	0.16	0.28	0.41
Lab Turbidity	NTU	5	0	1	1
Source Temperature	°C		12	19	26
E. coli	MPN/100 mL		1	5	81
Total Coliform	MPN/100 mL		31	1,199	2,842
Apparent Color (Unfiltered)	Units	15 *	4.0	8.3	15.0
Odor Threshold at 60°C	TON	3 *	2.0	6.4	24.0
MBAS	mg/L	0.5 *	0.00	0.04	0.17
Langelier Saturation Index-25'C			-0.30	0.22	0.84
Asbestos	MFL	7	ND	ND	ND
Nitrite	µg/L as N	1,000	ND	ND	ND
Cyanide	µg/L	200	ND	ND	ND
Calcium	mg/L		30.0	48.8	65.0
Magnesium	mg/L		13.0	18.7	27.0
Sodium	mg/L		47.0	70.4	99.0
Potassium	mg/L		3.00	4.04	5.60
Aluminum	µg/L	200 *	0.00	6.72	20.0
Antimony	µg/L	6	ND	ND	ND
Arsenic	µg/L	10	1.20	1.86	2.40
Barium	µg/L	1,000	54.0	81.6	120
Beryllium	µg/L	4	ND	ND	ND
Boron	µg/L		110	133	180

Table 4-12a. Dixon Lake Water Quality Summary, 2016 to 2020					
Analyte	**Units**	**MCL**	**Minimum**	**Average**	**Maximum**
Cadmium	µg/L	5	ND	ND	ND
Chromium, Total	µg/L	50	0.00	0.42	2.30
Copper	µg/L	1,000 *	0.00	3.15	8.40
Iron	µg/L	300 *	0.00	47.3	360
Lead	µg/L		ND	ND	ND
Manganese	µg/L	50 *	8.80	49.9	700
Mercury	µg/L	2	ND	ND	ND
Nickel	µg/L	100	0.87	1.23	1.60
Selenium	µg/L	50	0.00	0.90	1.40
Silver	µg/L	100 *	ND	ND	ND
Thallium	µg/L	2	ND	ND	ND
Zinc	µg/L	5,000 *	4.70	11.2	17.0

Notes:

ND indicates the parameter was non-detect.

** = secondary MCL*

Table 4-12b. Lake Henshaw Water Quality Summary, 2016 to 2020, for Contaminants with Multiple MCLs							
Analyte	**Units**	**MCL**			**Lake Henshaw**		
		Recommended	Upper	Short-Term	Minimum	Average	Maximum
Sulfate	mg/L	250	500	600	69	148	220
Chloride	mg/L	250	500	600	56	77	91
Specific Conductance	µmohs/cm	900	1,600	2,200	541	770	1,028
TDS	mg/L	500	1,000	1,500	310	455	590

pH

pH was measured daily at the Escondido-VID WTP intake and quarterly via boat sampling at Dixon Lake. Daily data fluctuated between 7.5 and 8.4 pH units between 2016 and 2020. Figure 4-15 shows seasonal variations of daily and quarterly pH data.

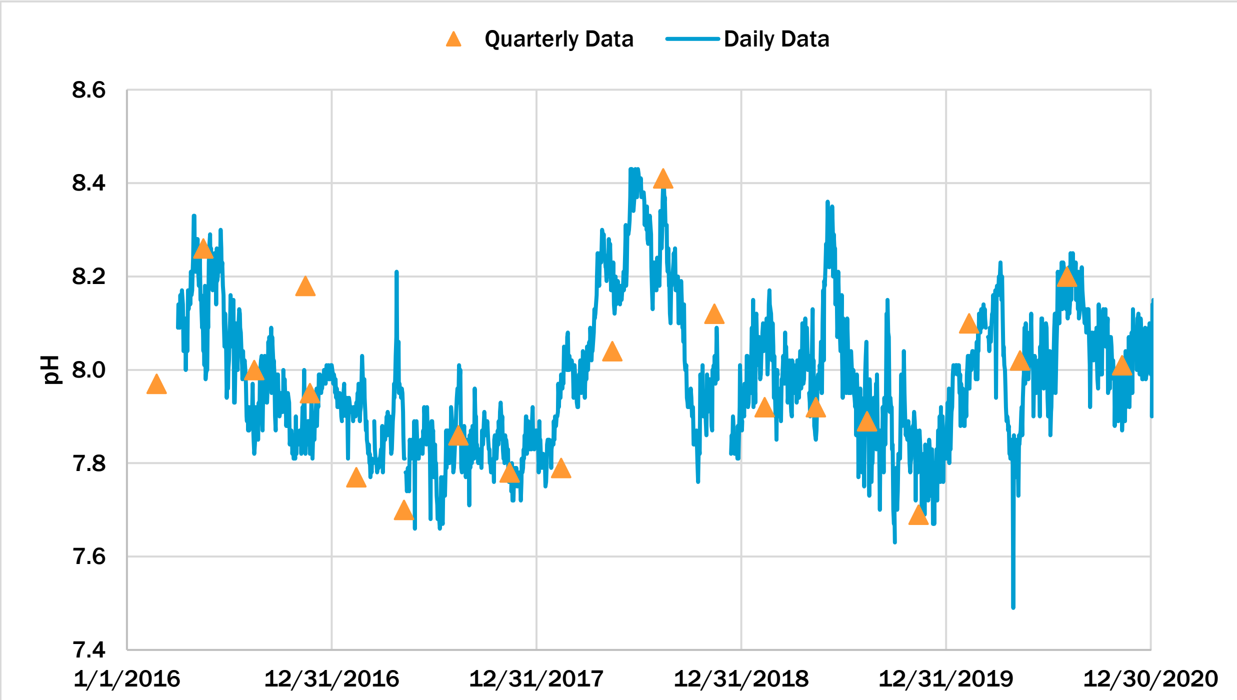

Figure 4-15. pH data for Dixon Lake

Water Temperature

Source temperature at Dixon Lake is sampled quarterly. Because of seasonal variation, temperature ranges from about 12 to 16°C in the winter and approximately 21 to 27°C in summer.

Alkalinity and Total Hardness

Figure 4-16 plots quarterly alkalinity and total hardness at Dixon Lake. Alkalinity was approximately 110 mg/L as $CaCO_3$ on average, with a maximum of 140 mg/L in early 2016. Dixon Lake's high alkalinity concentrations indicate that the reservoir has a high pH buffering capacity.

As also shown on Figure 4-16, Dixon Lake's total hardness ranges from 130 to 300 mg/L as $CaCO_3$, indicating the water has a high concentration of dissolved minerals such as calcium and magnesium. Figure 4-16 indicates that both parameters, and particularly hardness, have decreased since 2016, except in fall 2017 and winter 2018, when higher concentrations were measured.

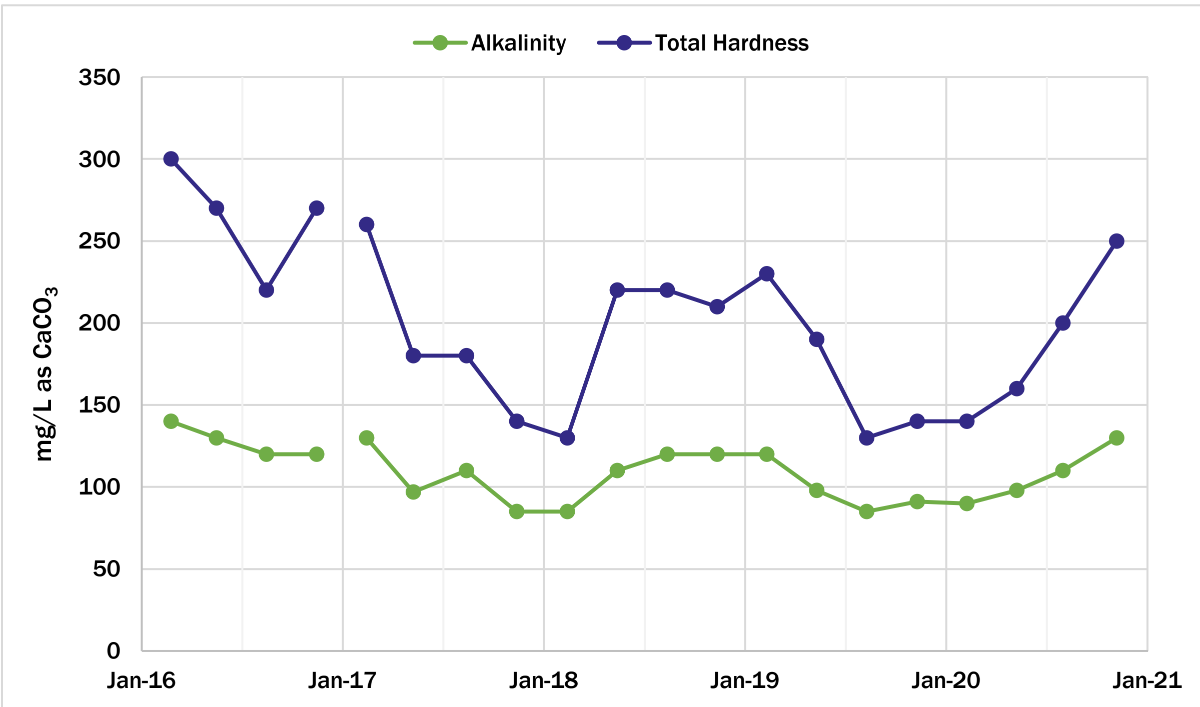

Figure 4-16. Alkalinity and total hardness at Dixon Lake

Turbidity

Turbidity was measured daily at the Escondido-VID WTP intake and quarterly via boat sampling at Dixon Lake. Daily data fluctuated between 0.2 and 8.3 NTU, with significant spikes in March 2017 and April 2020. Figure 4-17 shows daily and quarterly turbidity data.

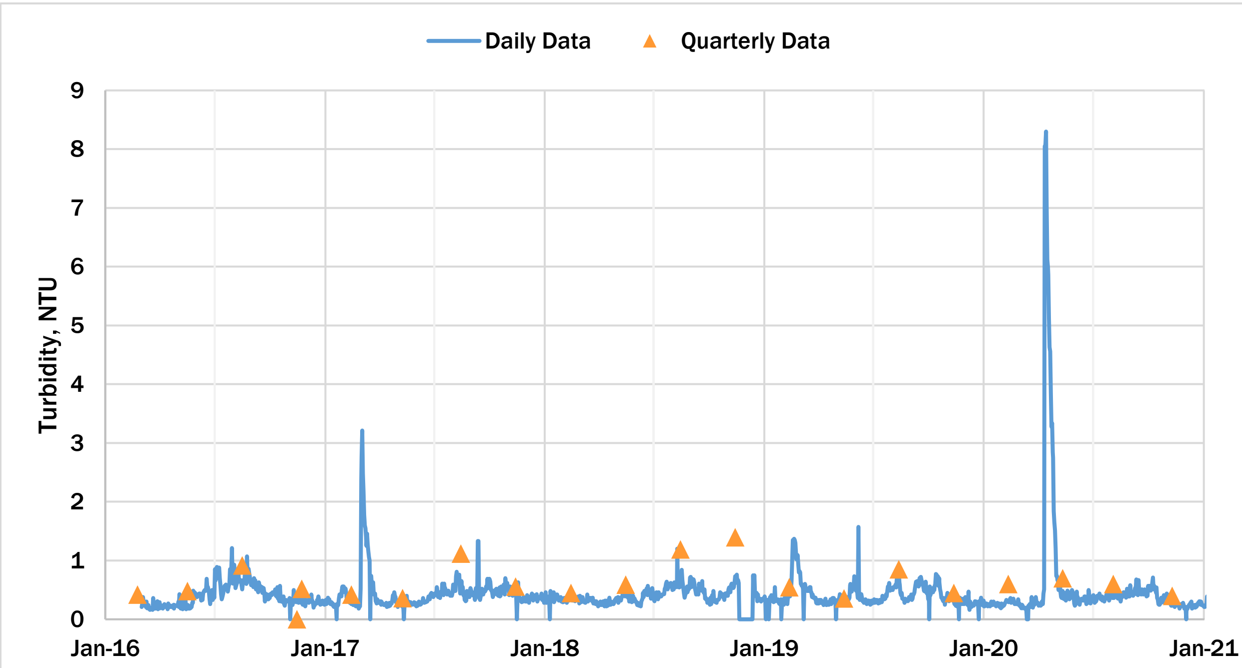

Figure 4-17. Turbidity data for Dixon Lake

Nutrients

Nitrate was sampled quarterly in the field and peaked at 0.33 mg/L as N, well below the MCL of 10 mg/L. Sulfate occurs naturally in drinking water and has a secondary MCL of 250 mg/L due to taste and odor concerns. Dixon Lake has high concentrations of sulfate, which are on average around 150 mg/L and peaked at 220 mg/L in the last five years. This is very similar to data from 2011 to 2015, which had an average sulfate concentration of 143 mg/L and maximum of 230 mg/L. Phosphorus was not measured during this sampling period.

Microbiological Constituents

Total coliform and *E. coli* were sampled weekly at Dixon Lake. Figure 4-18 shows the distribution of total coliform and *E. coli* samples. About 40 percent of total coliform samples were below 500 MPN/100 mL and 35 percent were above 2,000 MPN/100 mL with a maximum of 2,842 MPN/100 mL. Ninety-four total coliform samples were marked as greater than 2,420 MPN/100mL; thus, real concentrations may be higher. The lowest concentrations are typically observed in December to May and the highest concentrations are typically measured in June to November. Approximately 90 percent of Dixon Lake *E. coli* samples were below 10 MPN/100 mL. *E. coli* for Dixon Lake peaked at 81 MPN/100mL in September 2019.

Cryptosporidium and *Giardia* were sampled in the Escondido-Vista WTP influent as part of the second round of sampling for LT2 ESWTR compliance in 2016 and 2017. All samples were zero.

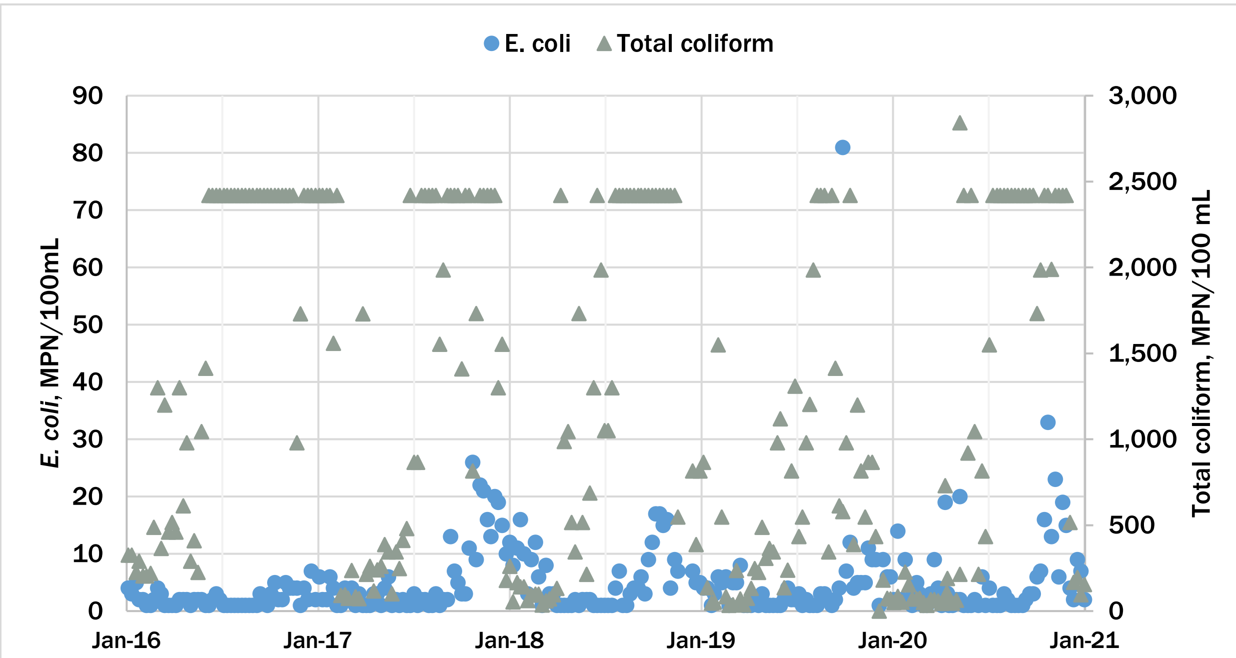

Figure 4-18. Total coliform and *E. coli* for Dixon Lake

Total Organic Carbon

At the intake of the Escondido-Vista WTP, TOC concentrations for raw Dixon Lake water ranged between 1.9 and 5.2 mg/L as Carbon, which requires enhanced coagulation requirements under Stage 1 DBPR as shown in Table 4-7 in Section 4.1.2.9. Figure 4-19 plots TOC data from Dixon Lake.

Figure 4-19. Total organic carbon in Dixon Lake

Total Dissolved Solids

Total dissolved solids (TDS) are naturally occurring in water but can also be increased by runoff and agricultural activities. Dixon Lake had an average TDS of 473 mg/L, with a maximum of 680 mg/L, which was measured in February 2016. These concentrations are consistent with data from the previous WSS, which had an average TDS of 476 mg/L and maximum of 660 mg/L. TDS and alkalinity show similar trends with increases in 2018 and late 2020. Figure 4-20 plots TDS data from 2016 to 2020.

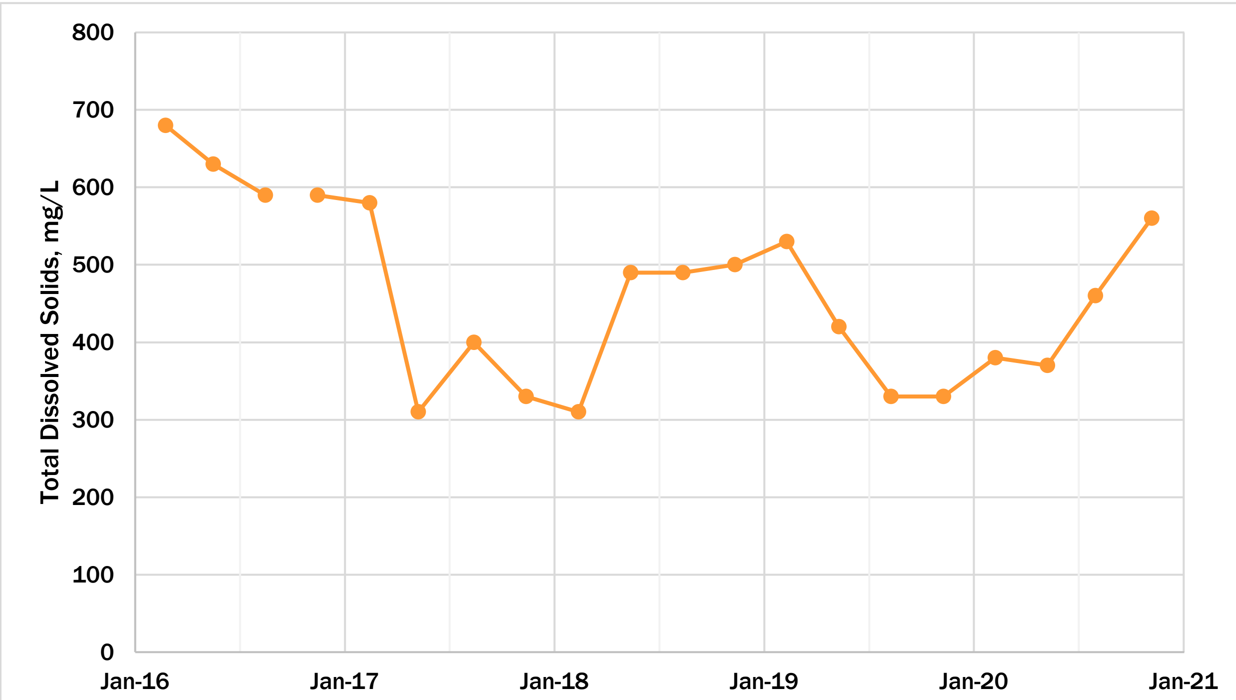

Figure 4-20. Total dissolved solids in Dixon Lake

Metals

Statistics for 18 metals are listed in Table 4-12. The only parameters to exceed their respective secondary MCLs[6] were iron and manganese, which peaked at the same time at 360 mg/L and 700 mg/L, respectively. Figure 4-21 shows iron and manganese concentrations in Dixon Lake over time. The following metals were non-detect over the five-year sampling period: antimony, beryllium, cadmium, lead, mercury, silver, and thallium.

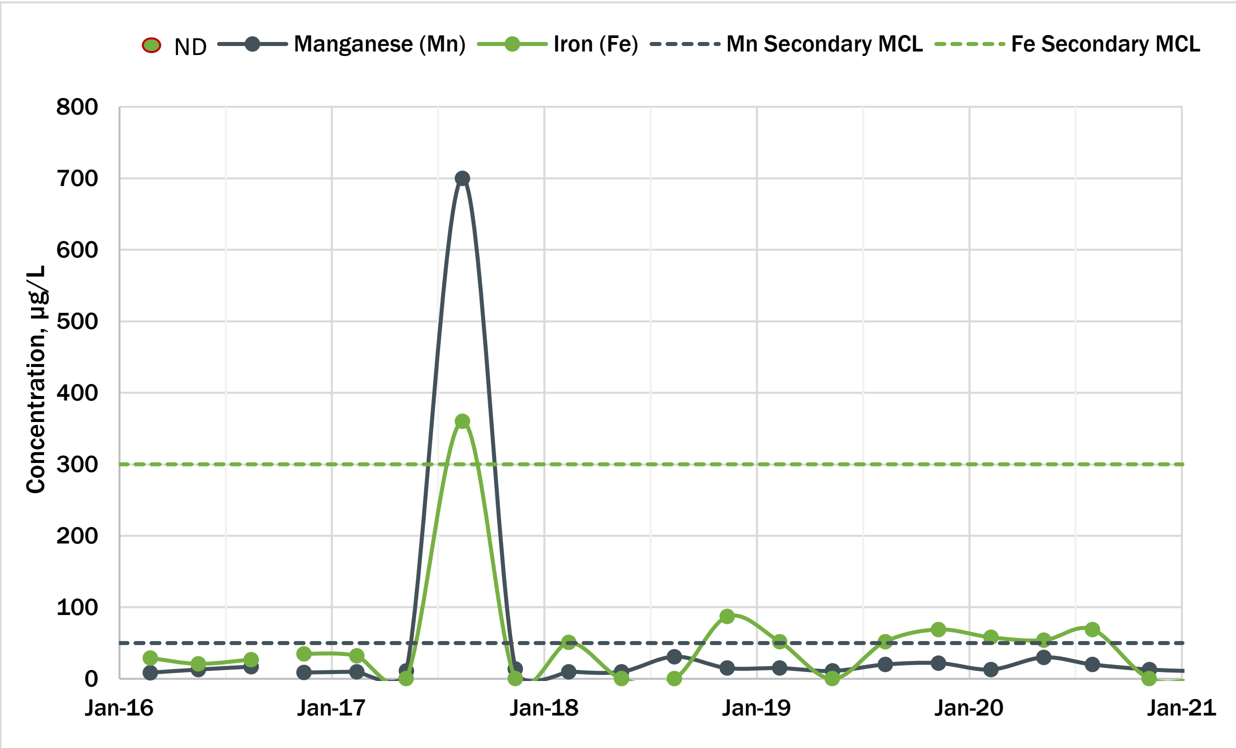

Figure 4-21. Metals in Dixon Lake with Historical MCL Exceedances

Dissolved Oxygen

Dissolved oxygen (DO) was measured weekly at Dixon Lake and was sampled from the surface down to 50 feet in 5-foot increments. Figure 4-22 shows distribution maps for monthly DO values by depth between 2016 and 2020. The reservoir shows turnover in late fall or early winter when DO is mixed into the lower depths of the lakes. Patches of red in Figure 4-22 at the lower 10 feet of Dixon Lake indicate the lake is stratifying in the spring. During these months, DO levels can be critically low in Dixon Lake, with 47 samples below 3 mg/L and 24 samples under 1 mg/L, or hypoxic conditions, over the last 5 years. Figure 4-22 suggests lower DO concentrations were measured in 2019, and even lower DO concentrations in 2020, which could indicate decreasing water quality.

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[6] The MCLs for metals apply to contaminant concentrations measured after treatment at the entry point to the distribution system, and not in source water. The MCLs were used in this evaluation as reference levels to assess relative concentrations of each contaminant.

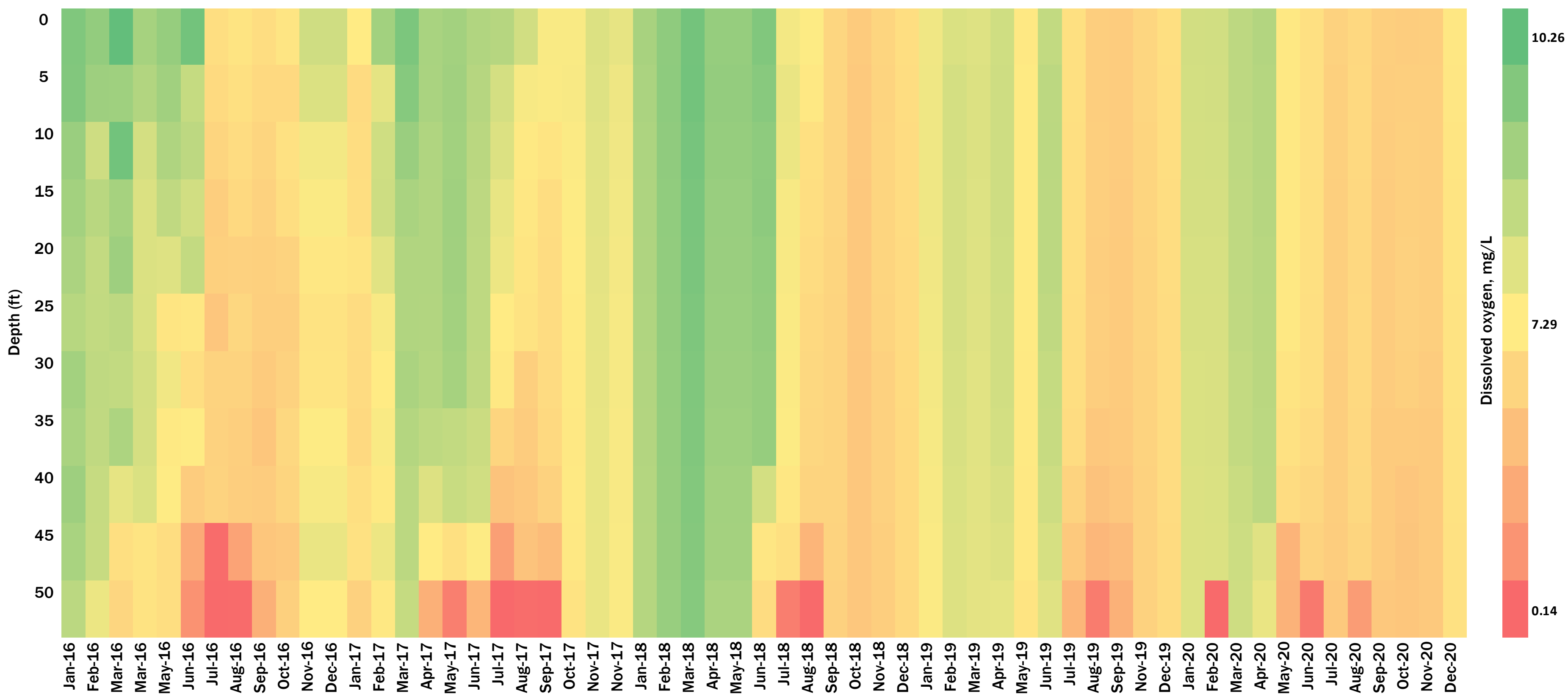

Figure 4-22. Dissolved oxygen levels across depth of Dixon Lake from 2016-2020

4.3.5 Finished Water Quality

This section describes water quality from the Escondido-VID WTP effluent water. Finished water was sampled by City of Escondido staff. Table 4-13a presents a summary of results obtained from 2016 to 2020. Table 4-13b summarizes parameters with multiple MCLs.

Table 4-13a. Escondido-VID Effluent Water Quality Summary, 2016 to 2020

Analyte	Units	MCL	Minimum	Average	Maximum
Total Hardness	mg/L as $CaCO_3$		130	202	300
pH			7.79	8.01	8.24
Total Alkalinity	mg/L as $CaCO_3$		83.0	110	140
Nitrate	mg/L as N	10	0.08	0.18	0.44
Fluoride	mg/L	2	0.57	0.67	0.70
Lab Turbidity	NTU	5	0.05	0.08	0.13
Source Temperature	°C		12.0	19.8	26.8
E. coli	MPN/100 mL		-	-	-
Total Coliform	CFU/mL		-	-	-
Apparent Color (Unfiltered)	Units	15 *		1.00	
Odor Threshold at 60C	TON	3 *		1.00	
MBAS	mg/L	0.5 *	0.00	0.01	0.06
Langelier Saturation Index-25'C			-0.22	0.23	0.65
Asbestos	MFL	7	ND	ND	ND
Nitrite as N	µg/L as N	1,000	ND	ND	ND
Cyanide	µg/L	200	0.00	0.26	2.60
Calcium	mg/L as Ca		31.0	47.7	64.0
Magnesium	mg/L as Mg		12.0	18.3	26.0
Sodium	mg/L		56.0	79.1	120
Potassium	mg/L		3.10	4.13	5.80
Aluminum	µg/L	200 *	0.00	2.59	11.0
Antimony	µg/L	6	0.00	0.12	1.20
Arsenic	µg/L	10	0.00	0.38	0.82
Barium	µg/L	1,000	51.0	75.9	110
Beryllium	µg/L	4	ND	ND	ND
Boron	µg/L		110	132	170
Cadmium	µg/L	5	ND	ND	ND

Table 4-13a. Escondido-VID Effluent Water Quality Summary, 2016 to 2020

Analyte	Units	MCL	Minimum	Average	Maximum
Chromium, Total	µg/L	50	0.00	0.25	0.90
Copper	µg/L	1,000 *	0.00	1.48	3.30
Iron	µg/L	300 *	ND	ND	ND
Lead	µg/L		ND	ND	ND
Manganese	µg/L	50 *	0.00	0.60	4.90
Mercury	µg/L	2	ND	ND	ND
Nickel	µg/L	100	1.30	1.84	2.40
Selenium	µg/L	50	0	0.78	1.50
Silver	µg/L	100 *	ND	ND	ND
Thallium	µg/L	2	ND	ND	ND
Zinc	µg/L	5,000 *	0.00	6.50	89.0

Notes:

ND indicates the parameter was non-detect.

** = secondary MCL*

Table 4-13b. Lake Henshaw Water Quality Summary, 2016 to 2020, for Contaminants with Multiple MCLs

Analyte	Units	MCL			Lake Henshaw		
		Recommended	Upper	Short-Term	Minimum	Average	Maximum
Sulfate	mg/L	250	500	600	79.0	161	290
Chloride	mg/L	250	500	600	55.0	85	130
Specific Conductance	µmohs/cm	900	1,600	2,200	584	809	1,035
TDS	mg/L	500	1,000	1,500	340	497	690

pH

Effluent water pH was measured daily at the Escondido-VID WTP. pH concentrations were stable over the sampling period, ranging from 7.8 to 8.3 pH units. Figure 4-23 summarizes pH data from 2016 to 2020.

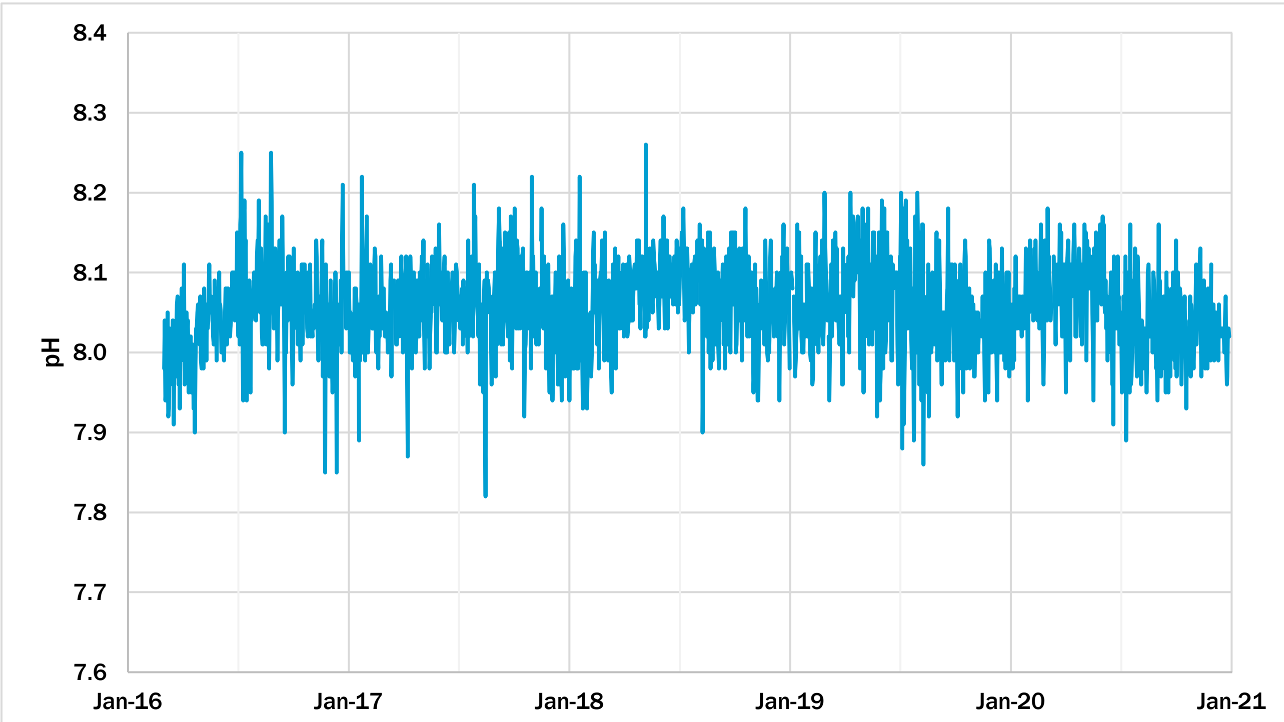

Figure 4-23. Escondido-VID WTP effluent pH

Alkalinity and Total Hardness

Alkalinity and total hardness concentrations in the WTP effluent water were very similar to Dixon Lake trends. Alkalinity ranged from 83 to 140 mg/L as $CaCO_3$ and total hardness ranged from 130 to 300 mg/L as $CaCO_3$. Dixon Lake also peaked at 140 and 300 mg/L for alkalinity and total hardness, respectively. Figure 4-24 summarized both parameters for 2016-2020.

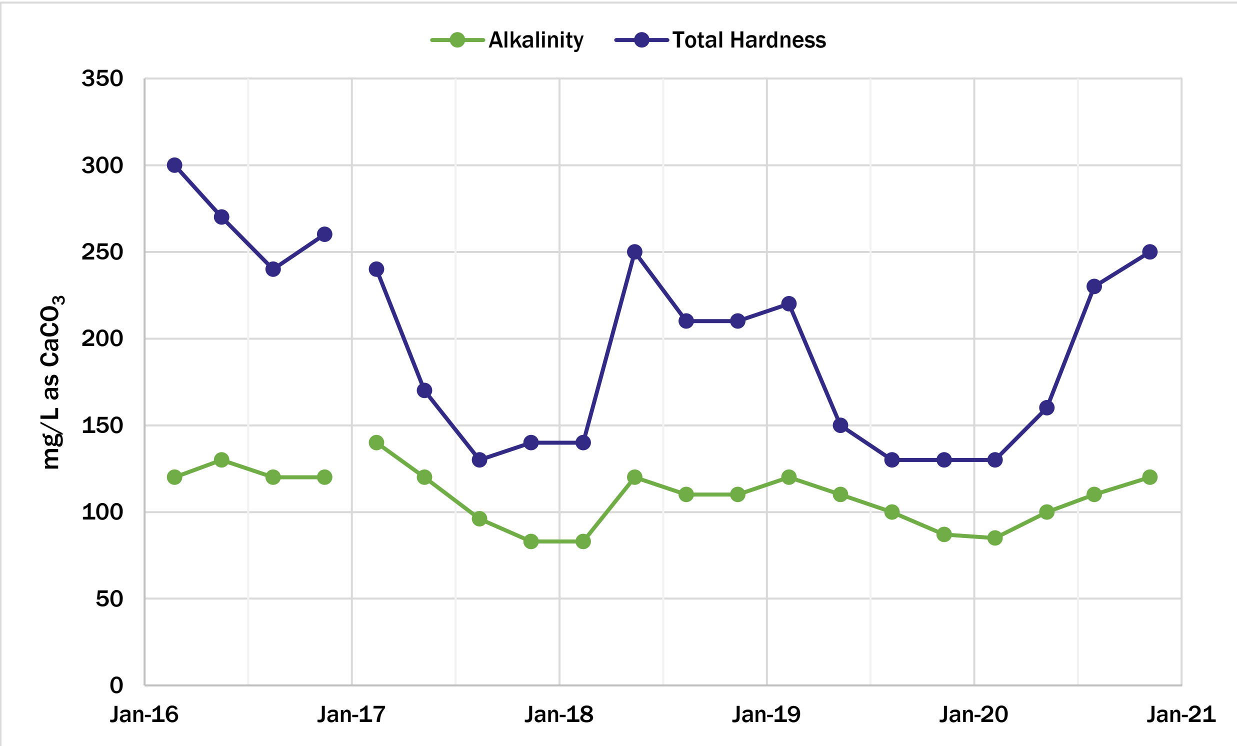

Figure 4-24. Escondido-VID WTP effluent alkalinity and total hardness

Turbidity

Turbidity concentrations in the effluent water ranged from 0.03 to 0.16 NTU over the sampling period. The spike in early 2017 aligns with a turbidity spike in Dixon Lake. All regulatory turbidity requirements stated in Section 4.1.2.7 were met. Figure 4-25 shows turbidity data over the last five years.

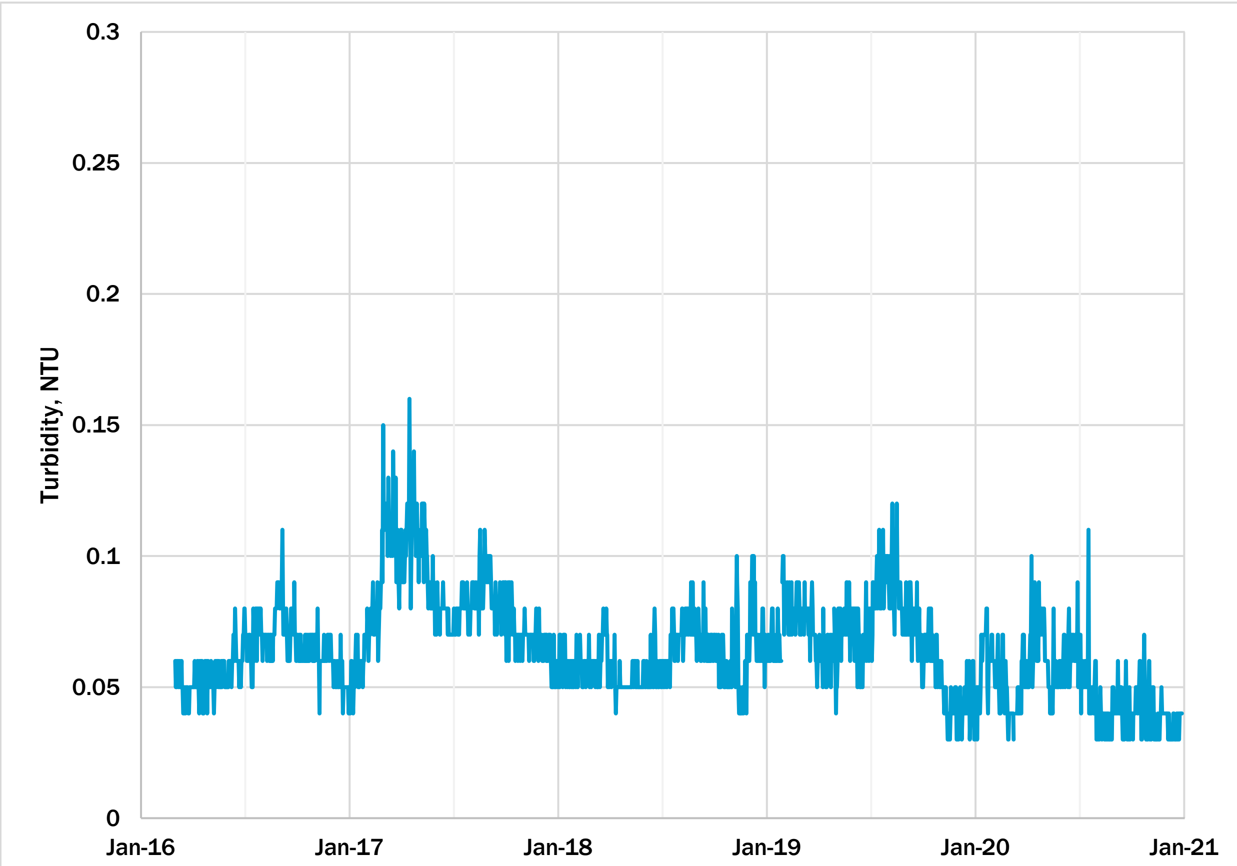

Figure 4-25. Escondido-VID WTP effluent turbidity

Microbiological Constituents

No microbiological parameters were tested in the effluent water at the Escondido-VID WTP during the sampling period.

Total Organic Carbon

At the Escondido-Vista WTP effluent, TOC concentrations ranged between 1.5 and 4.5 mg/L as C. Figure 4-26 plots TOC data from the WTP effluent. Figure 4-27 shows the actual TOC removed compared to the TOC removal requirement based on Stage 1 DBPR. The WTP TOC percent removed is calculated from the difference of raw and effluent TOC concentrations at the WTP and presented as the blue line. The removal requirement is calculated based source water TOC and alkalinity in Table 4-7. Escondido currently does not monitor for alkalinity at the WTP influent, thus the average alkalinity for each source online at the time of sampling was used. Periods where the blue line is below the removal requirement data points indicates the WTP removal did not meet Stage 1 DBPR requirements. Of the 19 removal requirement values calculated between 2016 and 2020, it appears that 37 percent may not have met compliance. However, these calculations assumed that the WTP was drawing equal flows of water from Lake Wohlford and Dixon Lake. Any deviation from this assumption would change the estimated alkalinity at the WTP influent, and the corresponding TOC removal requirement. When comparing Figures 4-26 and 4-27, periods with high TOC removal rates also corresponded to high TOC concentrations in the effluent.

Figure 4-26. Escondido-VID WTP effluent total organic carbon

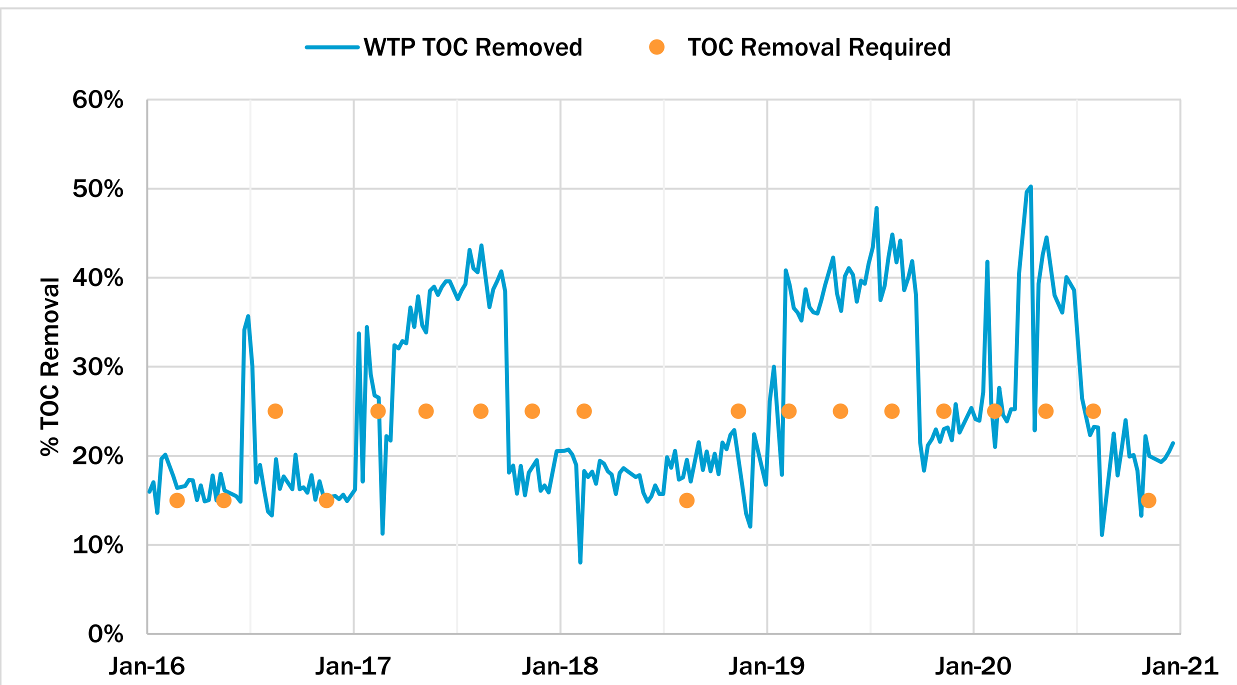

Figure 4-27. Escondido-VID WTP total organic carbon removed at the WTP and removal requirements

Total Dissolved Solids

The WTP effluent recorded the highest TDS concentration in the sampling period of all three raw sources with a maximum of 690 mg/L in early 2016. This trend closely resembles the Dixon Lake TDS trend, thus the treatment process had little effect on reducing TDS levels. The WTP effluent TDS also trends similarly to the effluent total hardness. Figure 4-28 plots the TDS concentrations in the finished water.

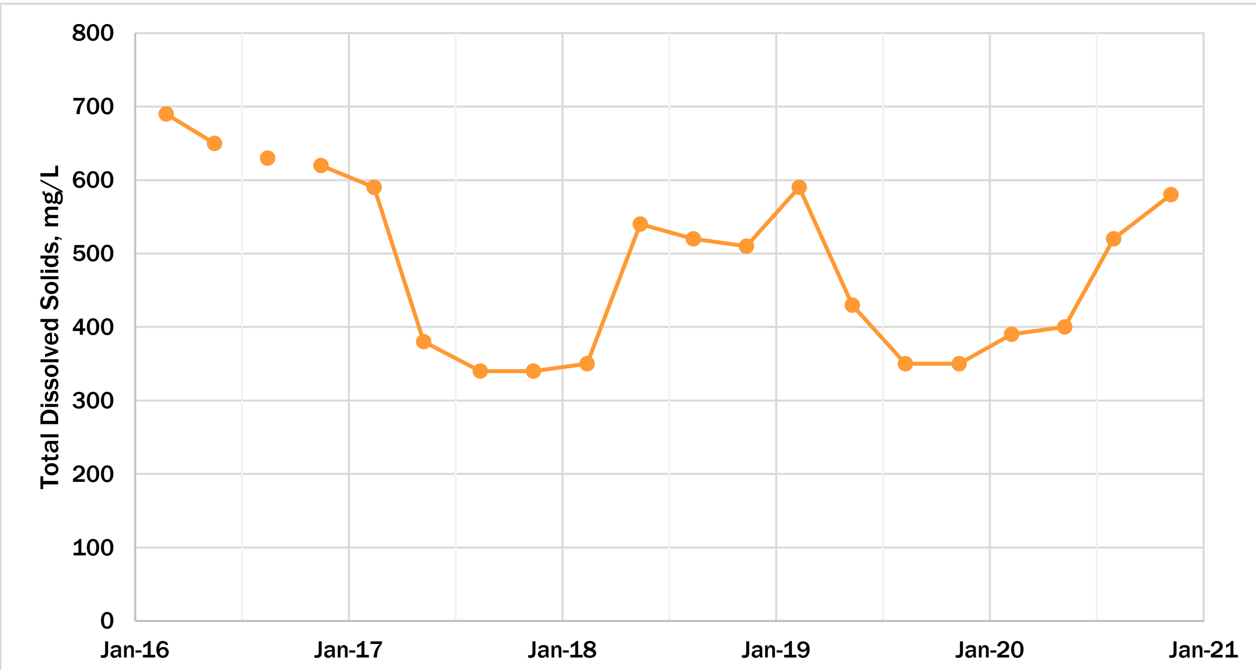

Figure 4-28. Escondido-VID WTP effluent total dissolved solids concentrations from 2016 to 2020

Nutrients

The City of Escondido sampled for nitrate, sulfate, potassium, calcium, and magnesium. See Table 4-13a and 4-13b for statistics on each water quality parameter. Nitrate peaked at 0.44 mg/L and potassium, calcium, and magnesium all had low concentrations. Figure 4-29 plots sulfate concentrations, which averaged a level of 161 mg/L but peaked at 290 mg/L, exceeding the Recommended MCL.

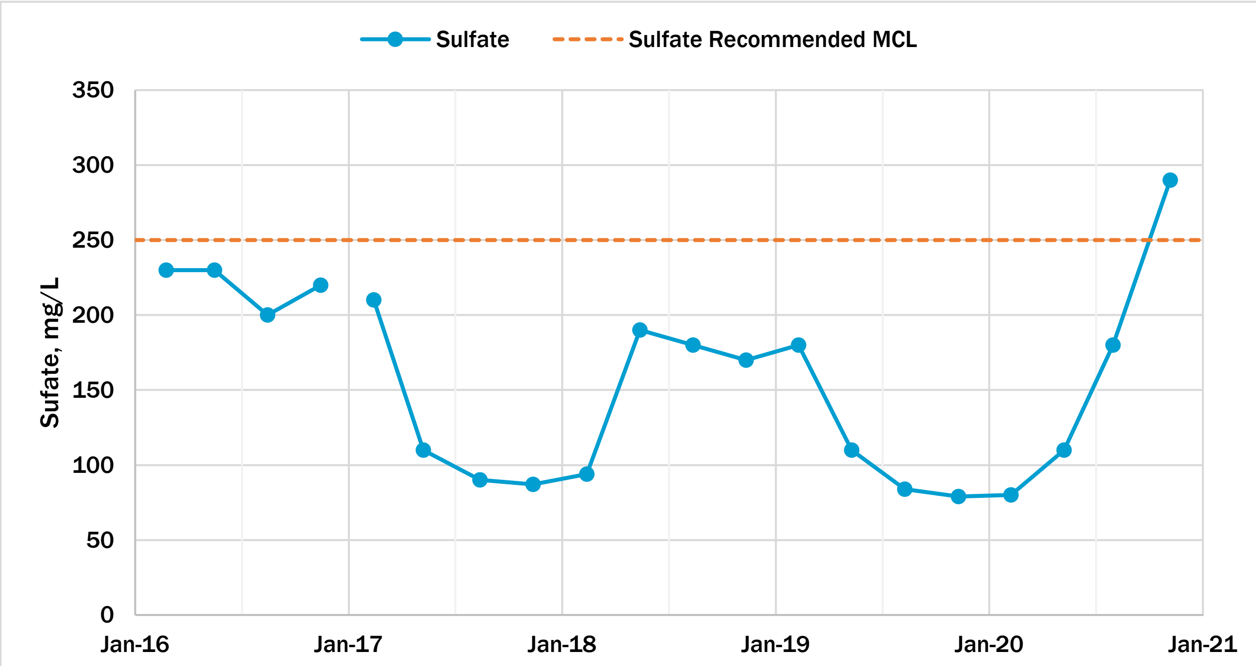

Figure 4-29. Escondido-VID WTP effluent sulfate concentrations from 2016 to 2020

Metals

Statistics for 18 metals are listed in Table 4-13a. The parameters that exceeded treated water MCLs in raw water sources—aluminum, iron, and manganese—were reduced to non-concerning levels after treatment. Table 4-14 summarizes the decreases in analytes of concern after treatment. The following metals were non-detect over the five-year sampling period: antimony, beryllium, cadmium, silver, and thallium.

Table 4-14. Effluent Water Maximums for MCL Exceedance Analytes in Raw Water, 2016 to 2020

Analyte	MCL	Raw Water Maximum[a]	Filtered Water Maximum[a]
Aluminum	200 µg/L	990 µg/L	11 µg/L
Iron	300 µg/L	470 µg/L	ND
Manganese	50 µg/L	700 µg/L	4.9 µg/L

a. *Maximums are calculated over the full sampling period.*

Section 5
Conclusions

This section summarizes potential contaminant sources and key water quality concerns in each watershed sub-area.

Figure 5-1 presents the percentage of potential contaminant sources located within each watershed sub-area, as defined by the number of CalEPA regulated sites (for example, facilities with a Waste Discharge Requirements permit, hazardous materials storage, MS4s, agricultural facilities with discharges, or waste disposal facilities).

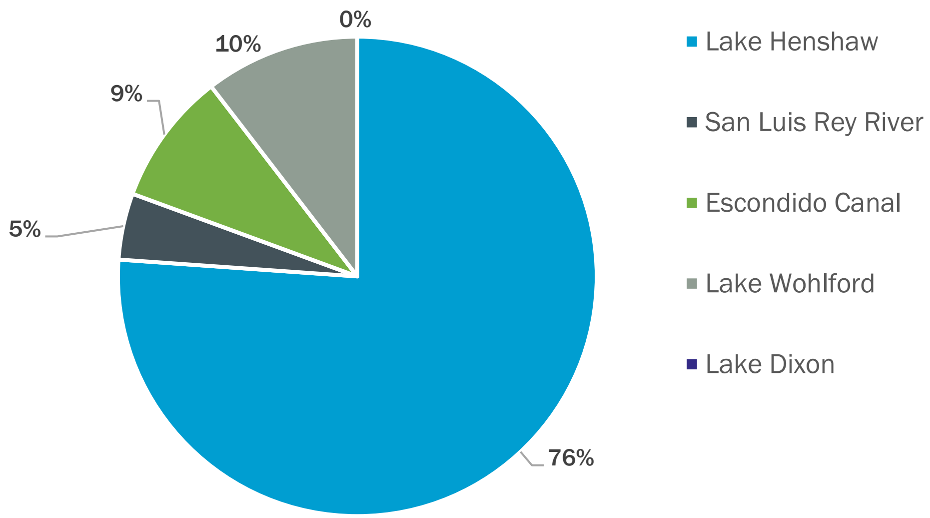

Figure 5-1. Distribution of potential contaminant sources across watershed locations

The Dixon Lake sub-area has no regulated sites, while the Lake Henshaw sub-area has the majority of sites. However, the number of sites is not as important as the type of site, whether the site is in compliance with regulatory requirements, and factors that may affect water quality.

5.1 Lake Henshaw

The Lake Henshaw watershed sub-area has the greatest number of CalEPA regulated sites within the watershed and likely has the highest risk of contamination of the five sub-areas due to the variety of land uses and activities occurring there. Parks and recreation land makes up the largest fraction of the Lake Henshaw sub-area land use, although agricultural land uses (mostly field crops) cover nearly 3,600 acres of land in the sub-area. Grazing also occurs on some of the recreation land. Nuisance growths of filamentous, benthic, and/or planktonic algae threaten drinking water quality (decaying organic matter, algal toxins), aesthetics, and recreational fishing (low dissolved oxygen, high pH, algal toxins) (APAP, 2021).

5.1.1 Potential Contaminant Sources

Lake Henshaw contains the following types (and number) of regulatory program sites:

- aboveground petroleum storage sites (5),
- chemical storage facilities (17),
- construction storm water permit (1),
- hazardous waste generators (6),
- industrial storm water permits (2),
- land disposal (landfill) sites (3),
- leaking underground storage tank cleanup sites (7),
- solid waste and recycle sites (4),
- underground storage tanks (1),
- unregulated sites that are closed waste disposal sites (2), and
- WDR facilities (7).

A majority of the sites are chemical storage facilities which are potential contaminant sources for hazardous materials storage.

Of the potential contaminant sources in the watershed, the project team assumes agricultural activities, grazing animals (i.e., cattle grazing), urban and industrial runoff, and potential future wildfires are the highest priority contaminant sources due to potential contributions of algae, microbiological constituents, and metals to the watershed. However, the relative contribution of contaminants by each source is unknown and other sources may also be important to consider in the future. As more residential areas are developed in the watershed, public education/outreach programs are recommended to raise awareness about watershed impacts of household activities such as fertilizer application.

5.1.2 Water Quality Concerns

In the five-year sampling period examined in this WSS, constituents of concern in Lake Henshaw were algae, microbiological constituents, and metals. Since algae monitoring began in March 2020, cyanotoxin concentrations have occasionally exceeded the recreational advisory level of 0.8 µg/L for total Microcystin (EPA, 2015), resulting in advisory signage (as recommended in the California Voluntary Guidance for Response to HABs in Recreational Inland Waters[7]) and paused release of Lake Henshaw water into the San Luis Rey River. Total coliform levels reached 48,400 MPN/100mL and *E. coli* concentrations peaked at 2,366 MPN/100mL. Cattle grazing near Lake Henshaw may be a factor in the high concentrations of microbiological constituents. Aluminum and manganese concentrations in the WTP effluent were well below their respective MCLs, but the raw water had the following concerning concentrations:

- average aluminum concentration for raw water was 474 µg/L with a maximum of 990 µg/L (treated water MCL of 200 µg/L).
- average manganese concentration for raw water was 110 µg/L with a maximum of 250 µg/L (treated water MCL of 50 µg/L)

The Warner Valley Groundwater Basin in the Lake Henshaw sub-area has approximately 40 inactive wells that are subject to being permanently abandoned. (personal communication with VID staff, November 2021). Inactive wells have the potential to contaminate groundwater since they provide a

[7] My Water Quality: California Harmful Algal Blooms (HABs).

direct channel to aquifers without natural filtration from soil or rock. VID is aware of the potential risk and has already abandoned some wells. VID has also hired a consultant to evaluate the well field and plans to continue abandoning wells after the evaluation is complete.

5.2 San Luis Rey River

San Luis Rey River watershed sub-area has a limited number of CalEPA regulated sites. Outside of USFS open space, the two primary land uses are tribal (the La Jolla Reservation) and agriculture. La Jolla Reservation is responsible for their own wastewater system.

5.2.1 Potential Contaminant Sources

San Luis Rey River contains the following CalEPA regulated sites:

- chemical storage facilities (2),
- land disposal (landfill) area (1).

The chemical storage facilities are managed by San Diego Gas and Electric Company (SDGE) and the County. The land disposal area is also managed by SDGE for the Cleveland National Forest Power Line Replacement Projects. There is one expired WDR permit for Lake Henshaw Resort that utilizes septic tanks and percolation ponds. In addition, there is one WDR facility within 1,000 feet of the San Luis Rey River watershed boundary below Palomar Mountain.

Recreation and unauthorized activities may occur next to the river, due to its easy access, and thus, more surveillance is needed. A lack of control over activities in the San Luis Rey River reduces the value of extensive monitoring and efforts conducted in Lake Henshaw. Increased monitoring could also help identify other contaminant sources of concern.

5.2.2 Water Quality Concerns

VID does not currently monitor for water quality at the San Luis Rey River inlet; however, the San Luis Rey River eventually feeds into Lake Wohlford, which is monitored. As mentioned above, increased surveillance, if possible, could help provide a faster response to potential unauthorized activities in or near the San Luis Rey River.

5.3 Escondido Canal

Escondido Canal watershed sub-area contains about 8 percent of the total CalEPA regulated sites. Most of the land use is County-owned or BLM-owned open space, followed by tribal land (the Rincon and San Pasqual Reservations), and intensive agriculture.

5.3.1 Potential Contaminant Sources

Escondido Canal contains the following types (and numbers) of regulatory program sites:

- chemical storage facilities (3),
- hazardous waste generator (1),
- land disposal area (1), and
- solid waste and recycle site (1).

The chemical storage facilities are managed by JMD Landscape, Verizon Wireless, and AT&T Mobility. The land disposal area and solid waste and recycle site is managed by JMD Composting Operations. JMD Landscape also manages the hazardous waste generator.

Concerning potential contaminant sources are septic tank systems, urban runoff, agricultural activities, solid and hazardous waste disposal facilities, and hazardous materials storage.

5.3.2 Water Quality Concerns

Escondido does not currently monitor for water quality at the Escondido Canal; however, the canal feeds into Lake Wohlford, which is monitored.

5.4 Lake Wohlford

Lake Wohlford watershed sub-area contains about 11 percent of the total CalEPA regulated sites. The land use is very diverse as it is residential, parks and recreation, agriculture, and the San Pasqual reservation.

5.4.1 Potential Contaminant Sources

Lake Wohlford contains the following types (and number) of regulatory program sites:

- chemical storage facilities (5),
- construction storm water permit (1),
- hazardous waste generator (1), and
- WDR facility (1).

The chemical storage facilities are managed by Escondido, Verizon Wireless, Green Valley Herbs, Skyline Ranch Country Club, and AT&T Mobility. Skyline Ranch Country Club also manages the hazardous waste generator. There is one expired WDR permit for Skyline Ranch Country Club that utilizes a package treatment plant and irrigation.

Concerning potential contaminant sources are septic tanks, urban and industrial runoff, grazing, and agricultural activities due to their potential to contribute turbidity, microbiological constituents, and metals. A new residential development is currently under construction on the San Pasqual Reservation to the northeast of Lake Wohlford. This is representative of the shift toward more residential area (and potential associated urban runoff).

5.4.2 Water Quality Concerns

In the five-year sampling period, constituents of concern in Lake Wohlford were TOC, total coliform, and some metals. Turbidity and TOC were measured daily at the WTP intake when raw Lake Wohlford water was treated. Raw water turbidity levels averaged around 4.5 NTU and peaked at 33 NTU in 2019; however, this did not affect treatment, which had an average turbidity of 0.06 NTU in the effluent. TOC in Lake Wohlford raw water ranged between 7.7 and 16 mg/L as C and did not decrease below Stage 1 DBPR requirements (shown in Table 4-7). Effluent TOC for the entire sampling period ranged from 1.5 to 4.5 mg/L as Carbon.

Total coliform also reached concerning levels, which peaked at 48,800 MPN/100mL; however only 1 percent of samples were above 2,500 MPN/100mL. While no metals in the effluent water exceeded their MCL, Lake Wohlford raw water entering the WTP had the following characteristics:

- average aluminum concentration for raw water was 181 μg/L with a maximum of 540 μg/L (treated water MCL of 200 μg/L)
- average iron concentration for raw water was 214 μg/L with a maximum of 470 μg/L (treated water MCL of 300 μg/L)
- average manganese concentration for raw water was 77 μg/L with a maximum of 110 μg/L (treated water MCL of 50 μg/L)

5.5 Dixon Lake

Dixon Lake watershed sub-area contains none of the CalEPA regulated sites. The land use is almost exclusively parks and recreation.

5.5.1 Potential Contaminant Sources

Potential contaminant sources in the Dixon Lake sub-area are limited to recreational uses and a small solid waste disposal facility within 1,000 feet of the watershed boundary at the Dixon Dam. The waste disposal facility is inactive: it received unpermitted construction debris in the early 1990s and has had regular inspections since that time. The most recent inspection of the site was in November 2021, and the site had no violations.

5.5.2 Water Quality Concerns

Water quality concerns for Dixon Lake were high TOC and metals concentrations. High TOC concentrations at Dixon Lake trigger TOC removal requirements by Stage 1 DBPR as shown in Table 4-7. When using Dixon Lake alkalinity as the source water alkalinity for TOC removal requirement calculations, some period did not meet removal requirements, as shown in Figure 4-27.

While no metals in the effluent water exceeded their MCL, Dixon Lake raw water entering the WTP had the following high concentrations:

- average iron concentration for raw water was 47 µg/L with a maximum of 360 µg/L (treated water MCL of 300 µg/L)
- average manganese concentration for raw water was 50 µg/L with a maximum of 700 µg/L (treated water MCL of 50 µg/L)

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Section 6

Recommendations

This section details a list of recommendations regarding watershed management measures that the Escondido and VID may take to help control potential contaminant sources, and to identify water quality constituents of concern. In addition, this section summarizes and reviews the completion of management practices in the 2016 Update of Watershed Sanitary Survey,

6.1 2016 Update of Previous Watershed Sanitary Survey Recommendations

In 2016, the City of Escondido, in conjunction with Vista Irrigation District, prepared a WSS for the local watershed. The survey assessed activities that had the potential to influence the quality of water delivered from Lake Henshaw, Dixon Lake and Lake Wohlford. While the survey identified a number of activities that have the potential to adversely affect water quality, including residential septic facilities, highway run-off, and agricultural and recreational activities, contaminants from these activities have not been detected in the local water supply in quantities that impact drinking water quality.

The 2016 Watershed Sanitary Survey concluded with recommendations regarding watershed management measures to help control potential contaminant sources. An update to the recommendations is presented in Table 6-1.

Table 6-1. 2016 Update of Previous Watershed Sanitary Survey Recommendations

Responsible Agency	Recommendation	Completed (Y/N)?
VID	Implement monitoring program at Lake Henshaw – San Luis Rey River inlet consisting of the following constituent categories: general/physical chemistry, microbial, inorganics (minerals and metals), and organics (SDWA Primary MCLs and pesticides).	N
VID	Implement monitoring program at Lake Henshaw – Carrizo Creek or nearby creek consisting of the following constituent categories: general/physical chemistry, microbial, inorganics (minerals and metals), and organics (SDWA Primary MCLs and pesticides).	N/A[a]
Escondido	Implement monitoring program at Lake Wohlford – Canal outlet (open channel reach near Paradise) consisting of the following constituent categories: general/physical chemistry, microbial, inorganics (minerals and metals), and organics (SDWA Primary MCLs and pesticides).	Y
Escondido	Implement monitoring program at Lake Wohlford –Escondido Creek (East Bridge) consisting of the following constituent categories: general/physical chemistry, microbial, inorganics (minerals and metals), and organics (SDWA Primary MCLs and pesticides).	Y
Escondido/VID	Educate park rangers at Lake Wohlford and Dixon Lake, and other staff members who provide vigilance of the reservoirs on watershed protection management through short training and informational seminars, usually available locally or through video-session.	Y
Escondido/VID	Educate the public on watershed protection management through the issuance of brochures or water bill inserts, and placement of signage around reservoirs.	Y
Escondido	Upgrade signage near reservoirs with information on how to report spills or illegal dumping.	Y
Escondido	Add information on how to report spills or illegal dumping in camper packages handed out at the entrance gate at Dixon Lake.	Y
Escondido/VID	Continue monitoring and vigilance to prevent gasoline or chemical contamination at the boating supply areas adjacent to the three reservoirs.	Ongoing
Escondido/VID	Work with landowners in the watershed to implement stormwater pollution prevention measures whenever possible.	Y

a. This recommendation has not been implemented due to ephemeral flow in Carrizo Creek – it is predominantly dry and cannot be sampled.

6.2 Current Recommendations

This section provides a list of recommendations regarding watershed management measures that Escondido and VID may take to help control potential contaminant sources, and to identify water quality constituents of concern.

Table 6-2. 2016 Update of Previous Watershed Sanitary Survey Recommendations	
Responsible Agency	**Recommendation**
Wastewater, Urban, and Stormwater Runoff	
Escondido/VID	In collaboration with regional partners, work with landowners in the watershed (including campground and resort operators and agriculture facilities, at a minimum) to implement stormwater pollution prevention measures if possible.
VID	If not already recorded, document details regarding historical well casing scale control with hexametaphosphate to inform possible future scale control. Include in documentation the frequency of application (specific dates), application dose, and start and end dates of application(s).
Agriculture and Grazing	
VID	Continue to work with ranchers or identify engineering solutions to prevent cattle from entering source flow to Lake Henshaw. Add fencing where cattle are known to enter waterways.
Recreation	
Escondido/VID	Increase surveillance in areas of the watershed that are close to water sources and readily accessible by members of the public, such as portions of the San Luis Rey River, Lake Wohlford and Dixon Lake.
Monitoring	
VID	Implement water quality monitoring program at Lake Henshaw – San Luis Rey River inlet. This site can serve as a reference or baseline for comparison with downstream sampling sites.
Escondido	Implement water quality monitoring program at Lake Wohlford – Escondido Canal outlet. Comparison of sampling results from the Lake Henshaw – San Luis Rey River inlet and from the Lake Wohlford – Escondido Canal outlet will allow Escondido-VID to distinguish between potential contaminant sources coming from the San Luis Rey River and Escondido Canal versus contaminants originating from runoff into Lake Wohlford.
Escondido/VID	Additional monitoring / investigation can be conducted to assess potential contaminant sources if there is a significant water quality difference between Lake Henshaw – San Luis Rey River inlet and Lake Wohlford - Escondido Canal samples.
Escondido/VID	Sampling should consist of general, physical, and chemical contaminants; microbial parameters; inorganics (minerals and metals); and organics (SDWA Primary MCLs and pesticides).
Escondido/VID	Increase training to institute standardized water sampling protocols for field staff.
Escondido/VID	Begin developing a water quality monitoring program for future wildfire incidents or hazardous materials spills that may be implemented when/where needed to understand impacts on water quality.
Escondido	Conduct additional sampling before and after the implementation of the Dam Replacement Project at Lake Wohlford and an increased surveillance of water quality data as water level increases.
Escondido	Ensure that the requirements of the 2019 *Cryptosporidium* Action Plan are respected, particularly with regards to filter backwash water that is returned to Dixon Lake.
Escondido	Monitor weekly for alkalinity at the blended raw water WTP influent to calculate TOC removal requirements.
Public Education and Outreach	
Escondido/VID	Increase the number of signs near reservoirs with information on how to report spills or illegal dumping, and check that signs are included at all parking areas and trails leading to reservoirs.
Escondido/VID	Coordinate with USFS and Indian Reservations to establish educational information postings on lands under their control.
Other	
Escondido/VID	Contact the U.S. Navy about historical use of fire-fighting foams that may contain PFAS at their training facility near Well W61. In the absence of a response, consider future PFAS monitoring.
Escondido/VID	Work with CalEPA to receive a notification of violations that occur at regulated sites in the watershed.
Escondido/VID	Discuss fire-fighting plane cleaning procedures with CalFire to minimize the input of invasive species in the watershed.
Escondido/VID	Establish electronic databases for all water quality data and prepare an annual review for trends and data excursions to have an immediate understanding of the quality of the water system.
Escondido/VID	Work with SWRCB, USGS, and Lawrence Livermore National Laboratory to implement a new ground water quality study for the Warner Valley Groundwater Basin before the next WSS update.

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Section 7

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Vista Irrigation District (VID), "Aquatic Pesticide Application Plan for Lake Henshaw and the Warner Ranch," *Other Publications*, April 2021, https://www.vidwater.org/files/cf8a74197/VID+APAP+Henshaw+and+Warner+Ranch_rev1_20210603.pdf (November 11, 2021).

Appendix A: Development of Total Population

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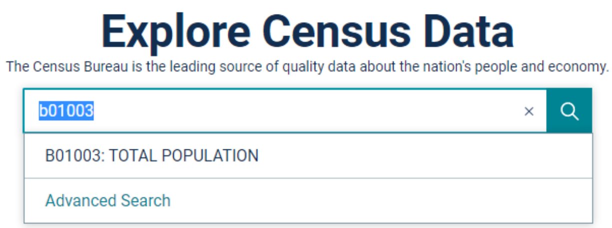
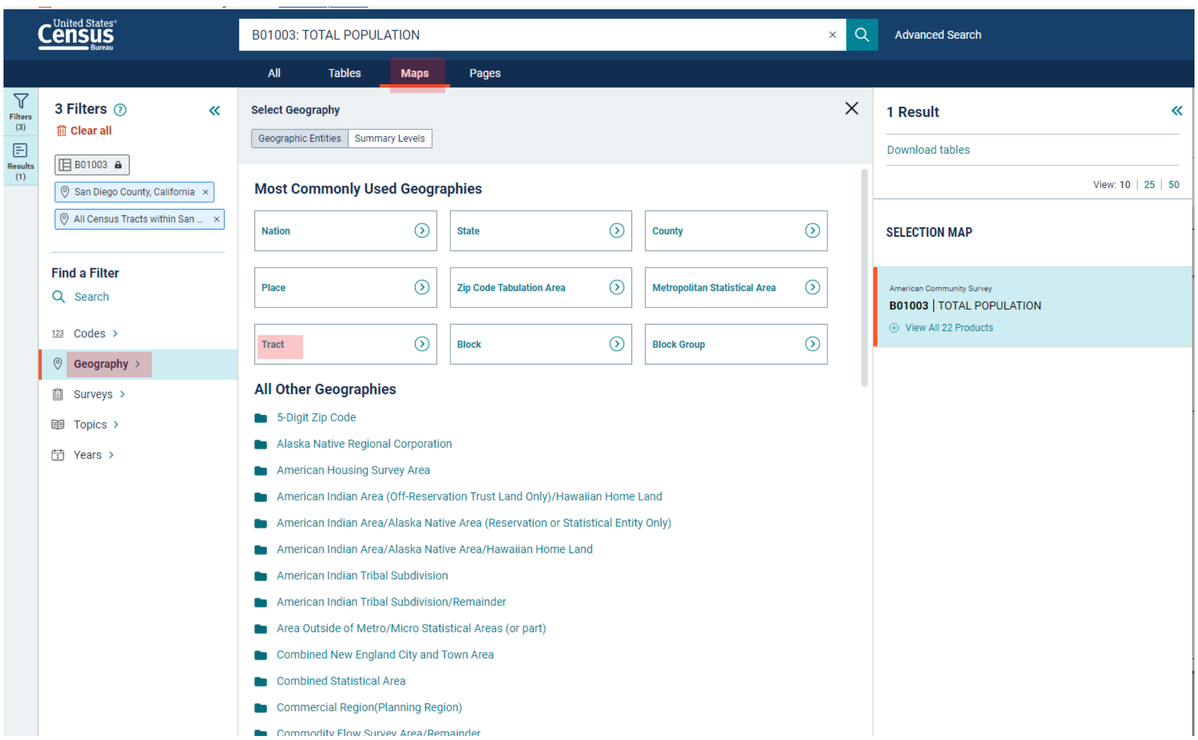
The total population was developed by using the 2019 Census Bureau with the following instructions:

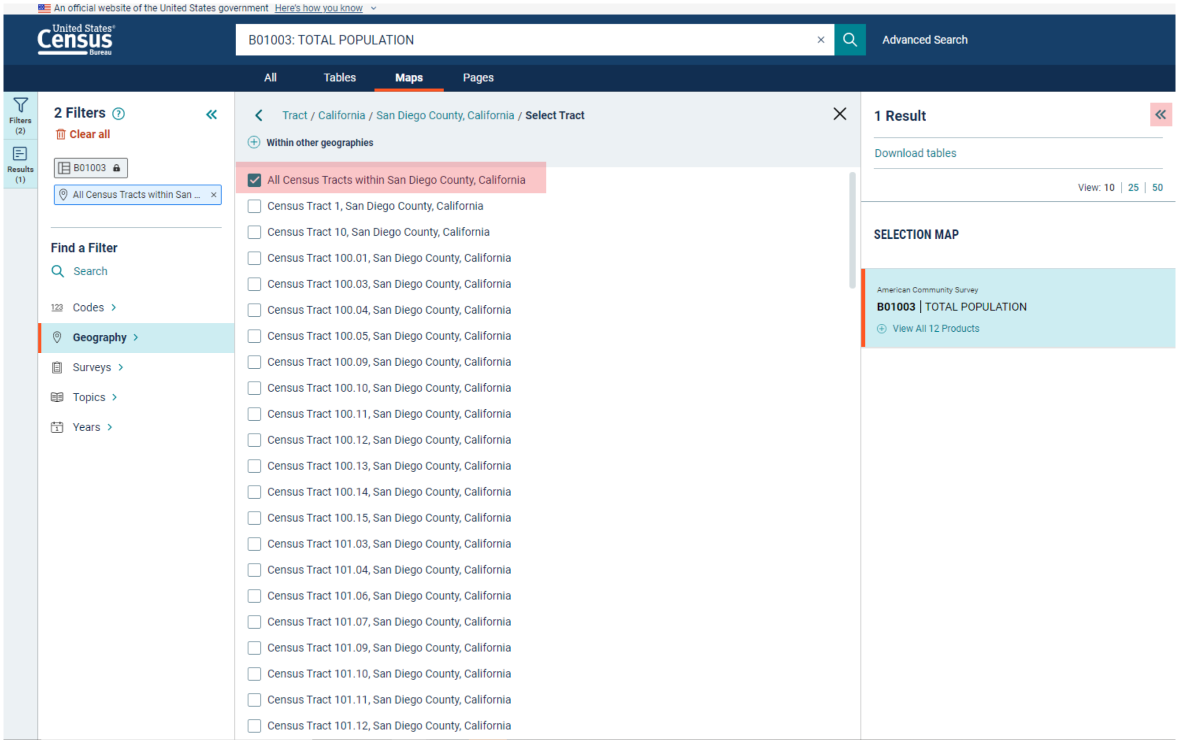
1. Go to https://data.census.gov/cedsci/.
2. Type in for "B01003" in the Search Text Box and click "B01003: TOTAL POPULATION".



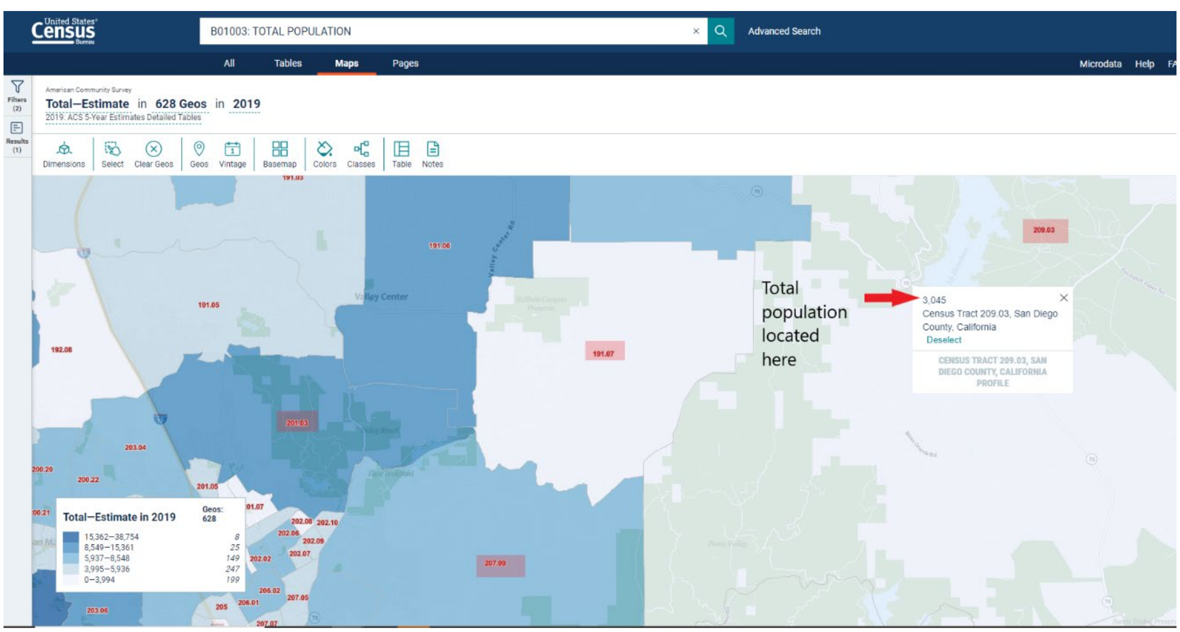
3. Click on "Maps" tab then "Geography" filter then click on "Tract" filter.



4. Select "California" then "San Diego County, California".
5. Select "All Census Tracts within San Diego County, California" then press double arrows in the upper right-hand corner.

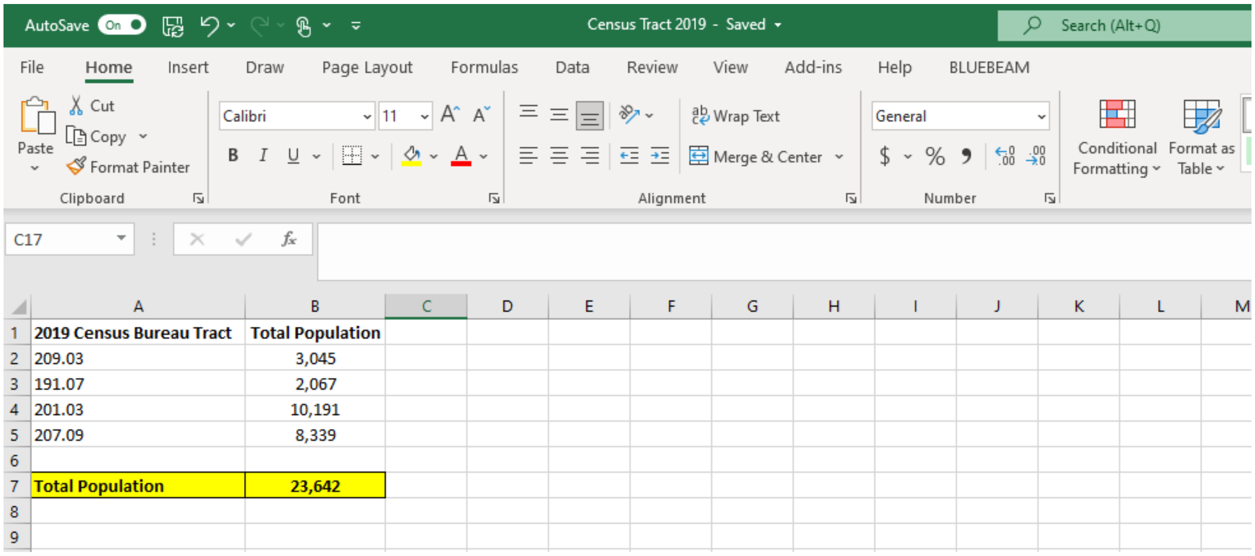


6. Press "Basemap" tab then select the "Detailed" map to see labels for lakes in the watershed.
7. Zoom into watershed area on map.
8. Click on each "209.03", "197.07", "207.09", and "201.03" labels and document total population for each census tract on Excelsheet.



9. Sum all populations for each census tract to calculate the total population within the Escondido-VID watershed.

Brown AND Caldwell



2019 Census Bureau Tract	Total Population
209.03	3,045
191.07	2,067
201.03	10,191
207.09	8,339
Total Population	**23,642**

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Appendix B: CalEPA Regulated Sites List

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Table B-1. CalEPA Regulated Sites [a]						
Site Name	Section Reference	Escondido-VID Watershed Sub-Area	EPA Regulatory Program	Latest Evaluation Inspection Date	# of Violations	# of Enforcements
AT&T Mobility - Mesa Grande (USID98956)	3.2.9	N/A	Chemical Storage Facilities	5/15/2018	0	0
Verizon Wireless: Santa Ysabel	3.2.9	N/A	Chemical Storage Facilities	7/12/2019	0	0
T-Mobile	3.2.9	N/A	Chemical Storage Facilities	N/A	0	0
Dixon Dam	3.2.8	N/A	Solid Waste and Recycle Sites	N/A	0	0
CITY OF ESCONDIDO - LAKE WOHLFORD	3.2.9	Lake Wohlford	Chemical Storage Facilities	12/16/2020	2	0
Verizon Wireless: Bottle Peak	3.2.9	Lake Wohlford	Chemical Storage Facilities	9/3/2019	0	0
GREEN VALLEY HERBS-AWM	3.2.9	Lake Wohlford	Chemical Storage Facilities	3/19/2021	0	0
CARRISITO RANCH - AWM	3.2.9	Lake Henshaw	Chemical Storage Facilities	9/25/2019	0	0
LAKE HENSHAW RESORT LANDFILL	3.2.8	Lake Henshaw	Land Disposal Site	N/A	0	0
JMD Composting Operations	3.2.8	Escondido Canal	Land Disposal	N/A	1	1
JMD Landscape	3.2.9	Escondido Canal	Chemical Storage Facilities	1/16/2020	2	0
JMD Landscape	3.2.9	Escondido Canal	Hazardous Waste Generator	1/16/2020	2	0
C1030 Phases 1 2A 2B and DUG	3.2.3	Lake Wohlford	Construction Storm Water	N/A	0	0
JMD Composting Operations	3.2.8	Escondido Canal	Solid Waste and Recycle Sites	N/A	0	0
SKYLINE RANCH COUNTRY CLUB LLC	3.2.9	Lake Wohlford	Chemical Storage Facilities	2/7/2019	8	0
SKYLINE RANCH COUNTRY CLUB LLC	3.2.9	Lake Wohlford	Hazardous Waste Generator	2/7/2019	8	0
AT&T Mobility - PARADISE RESERVOIR (USID99246)	3.2.9	Lake Wohlford	Chemical Storage Facilities	6/23/2017	0	0
Skyline Ranch Country Club	3.2.1	Lake Wohlford	Waste Discharge Requirements	3/22/2019	48	12
Susan Taylor Property	3.2.4	Lake Wohlford	Agriculture Discharge	N/A	0	0
Verizon Wireless: Valley View	3.2.9	Escondido Canal	Chemical Storage Facilities	9/16/2019	0	0
AT&T Mobility - VIAVISO & LAKE WOHLFORD RD (USID44414)	3.2.9	Escondido Canal	Chemical Storage Facilities	1/8/2019	0	0
Caltrans Henshaw LVTO	3.2.8	Lake Henshaw	Solid Waste and Recycle Sites	N/A	0	0
Caltrans-Lake Henshaw	3.2.9	Lake Henshaw	Aboveground Petroleum Storage	12/11/2020	2	0
Caltrans-Lake Henshaw	3.2.9	Lake Henshaw	Chemical Storage Facilities	12/11/2020	2	0

Table B-1. CalEPA Regulated Sites [a]						
Site Name	Section Reference	Escondido-VID Watershed Sub-Area	EPA Regulatory Program	Latest Evaluation Inspection Date	# of Violations	# of Enforcements
Caltrans-Lake Henshaw	3.2.9	Lake Henshaw	Hazardous Waste Generator	12/11/2020	2	0
Verizon Wireless: Ranchita	3.2.9	Lake Henshaw	Chemical Storage Facilities	7/12/2019	0	0
CAMP MATAGUAY- BSA	3.2.9	Lake Henshaw	Chemical Storage Facilities	11/17/2020	7	0
CAMP MATAGUAY- BSA	3.2.9	Lake Henshaw	Hazardous Waste Generator	11/17/2020	7	0
AT&T Mobility - LAKE HENSHAW (USID99300)	3.2.9	Lake Henshaw	Chemical Storage Facilities	5/26/2021	0	0
HENSHAW STATION USDA	3.2.9	Lake Henshaw	Chemical Storage Facilities	6/25/2021	1	0
Lake Henshaw Resort	3.2.8	Lake Henshaw	Solid Waste and Recycle Sites	N/A	0	0
FiRM Warner Sub Yard	3.2.3	Lake Henshaw	Construction Storm Water	N/A	0	0
SDG&E - WARNERS SUBSTATION	3.2.9	Lake Henshaw	Chemical Storage Facilities	8/22/2019	0	0
Cleveland National Forest SDG&E TL 682	3.2.8	San Luis Rey River	Land Disposal	N/A	0	0
SD CNTY CAMP DENVER FOX	3.2.9	San Luis Rey River	Chemical Storage Facilities	5/22/2019	1	0
CDF-WARNER SPRINGS STATION	3.2.9	Lake Henshaw	Aboveground Petroleum Storage	9/26/2019	0	0
CDF-WARNER SPRINGS STATION	3.2.9	Lake Henshaw	Chemical Storage Facilities	9/26/2019	0	0
WARNER UNION SCHOOL DISTRICT	3.2.9	Lake Henshaw	Aboveground Petroleum Storage	9/26/2019	14	0
WARNER UNION SCHOOL DISTRICT	3.2.9	Lake Henshaw	Chemical Storage Facilities	9/26/2019	14	0
WARNER UNION SCHOOL DISTRICT	3.2.9	Lake Henshaw	Hazardous Waste Generator	9/26/2019	14	0
Warner Unified School District	3.2.3	Lake Henshaw	Industrial Facility Storm Water	N/A	0	0
WARNER SPRINGS AIRPORT	3.2.9	Lake Henshaw	Aboveground Petroleum Storage	11/22/2019	0	0
WARNER SPRINGS AIRPORT	3.2.9	Lake Henshaw	Chemical Storage Facilities	11/22/2019	0	0
WARNER SPRINGS AIRPORT	3.2.9	Lake Henshaw	Hazardous Waste Generator	11/22/2019	0	0
Verizon Wireless: Warner Springs	3.2.9	Lake Henshaw	Chemical Storage Facilities	7/12/2019	0	0
Warner Springs Ranch Resort	3.2.9	Lake Henshaw	Chemical Storage Facilities	6/10/2021	3	0
Warner Springs Ranch Resort	3.2.1	Lake Henshaw	Waste Discharge Requirements	6/10/2021	3	0
AT&T Mobility - Warner Springs (USID98920)	3.2.9	Lake Henshaw	Chemical Storage Facilities	4/11/2019	0	0
Warner Springs Ranch	3.2.1	Lake Henshaw	Waste Discharge Requirements	12/20/2016	22	7

Table B-1. CalEPA Regulated Sites [a]						
Site Name	Section Reference	Escondido-VID Watershed Sub-Area	EPA Regulatory Program	Latest Evaluation Inspection Date	# of Violations	# of Enforcements
WARNER SPRINGS RANCH BURN SITE	5.1.1	Lake Henshaw	Unregulated	N/A	0	0
WARNER SPRINGS RANCH BURN SITE	3.2.8	Lake Henshaw	Land Disposal Site	N/A	0	0
US Navy Remote Training Site Warner Springs OWTS (Formerly SERE Camp)	3.2.1	Lake Henshaw	Waste Discharge Requirements	10/27/2021	32	11
Puerta La Cruz Conservation Camp	3.2.1	Lake Henshaw	Waste Discharge Requirements	4/17/2019	18	8
Warner Springs Ranch	3.2.8	Lake Henshaw	Solid Waste and Recycle Sites	N/A	0	0
Cal Fire-PUERTA LA CRUZ C C	3.2.9	Lake Henshaw	Aboveground Petroleum Storage	12/11/2018	6	0
Cal Fire-PUERTA LA CRUZ C C	3.2.9	Lake Henshaw	Chemical Storage Facilities	12/11/2018	6	0
Cal Fire-PUERTA LA CRUZ C C	3.2.9	Lake Henshaw	Hazardous Waste Generator	12/11/2018	6	0
AT&T Mobility - PUERTA LA CRUZ (USID144919)	3.2.9	Lake Henshaw	Chemical Storage Facilities	1/10/2020	0	0
SDG&E - PALOMAR MTN TELECOM	3.2.9	San Luis Rey River	Chemical Storage Facilities	N/A	0	0
Verizon Wireless: Puerta La Cruz	3.2.9	Lake Henshaw	Chemical Storage Facilities	N/A	0	0
Palomar State Park, New Well and Pump House Project	3.2.1	N/A	Waste Discharge Requirements	N/A	0	0
AT&T California - DBM05	3.2.9	N/A	Chemical Storage Facilities	3/1/2019	0	0
WARNER SPRINGS RANCH SERV STN	3.2.9	Lake Henshaw	Chemical Storage Facilities	1/7/2022	32	0
WARNER SPRINGS RANCH SERV STN	3.2.9	Lake Henshaw	Hazardous Waste Generator	1/7/2022	32	0
WARNER SPRINGS RANCH SERV STN	3.2.9	Lake Henshaw	Underground Storage Tank	1/7/2022	32	0
CDF PUERTA LA CRUZ	3.2.9	Lake Henshaw	Leaking Underground Storage Tank Cleanup Site	N/A	0	0
Sunshine Summit Burn Site	3.2.8	Lake Henshaw	Solid Waste and Recycle Sites	N/A	0	0
Shadows Mountains Vineyard	3.2.1	Lake Henshaw	Waste Discharge Requirements	N/A	0	0
Sierra Roble Winery and Vineyard LLC	3.2.3	Lake Henshaw	Industrial Facility Storm Water	10/19/2015	0	0
Warner Springs Mobile Estates	3.2.1	Lake Henshaw	Waste Discharge Requirements	5/4/2021	19	7
SUNSHINE SUMMIT	3.2.8	Lake Henshaw	Land Disposal Site	N/A	0	0
Sunshine Summit Burn Site	5.1.1	Lake Henshaw	Unregulated	N/A	0	0

Table B-1. CalEPA Regulated Sites [a]						
Site Name	Section Reference	Escondido-VID Watershed Sub-Area	EPA Regulatory Program	Latest Evaluation Inspection Date	# of Violations	# of Enforcements
Sunshine Summit Burnsite	3.2.8	N/A	Solid Waste and Recycle Sites	N/A	0	0
SUNSHINE SUMMIT market and gas	3.2.9	N/A	Aboveground Petroleum Storage	5/20/2020	4	0
SUNSHINE SUMMIT market and gas	3.2.9	N/A	Chemical Storage Facilities	5/20/2020	4	0
sunshine summit fire	3.2.9	N/A	Chemical Storage Facilities	9/11/2020	0	0
BOY SCOUTS OF AMERICA	3.2.9	N/A	Chemical Storage Facilities	10/21/2020	0	0
BOY SCOUTS OF AMERICA	3.2.9	N/A	Hazardous Waste Generator	10/21/2020	0	0
Lake Henshaw Resort	3.2.1	Lake Henshaw	Waste Discharge Requirements	6/16/2000	11	4

a. Data retrieved from the CalEPA Regulated Sites Portal, November 2021