



Watershed Sanitary Survey
October 2016



Mammoth Community Water District
Data Collected Between July 2011 and July 2016

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Executive Summary

The Mammoth Community Water District (District or MCWD) has prepared the 2016 Watershed Sanitary Survey (WSS) of the Lake Mary Watershed to meet the California Code of Regulations Requirements for Watershed Sanitary Surveys. The purpose of the survey is to identify actual or potential sources of contamination that may adversely affect the quality of surface water used for domestic drinking water and summarize water quality constituent findings.

This WSS covers the Lake Mary Watershed located in the Lakes Basin sub-unit of the Mammoth Basin Watershed. The Lakes Basin subunit includes Lake Mary, the source of surface water for the District, three main watercourses feeding into the Lakes Basin, and thirteen additional lakes. The U.S. Forest Service is the primary landowner in the watershed and the area is used primarily for recreation.

The District obtains surface water supplies from Lake Mary and treats the raw water at the Lake Mary Water Treatment Plant (LMWTP), located near the lake. Since the last WSS, plant modifications to reduce the corrosivity of the water have been completed. The District also owns and operates the wastewater collection system in the Lakes Basin that serves all the developed areas with the exception of ten private cabins.

Potential sources of contamination in the watershed are the wastewater collection system, recreation, roads, and mining. The District conducts routine water quality testing of the raw water entering the LMWTP and the treated effluent leaving the plant to ensure that drinking water standards are met. The U.S. Forest Service and the District both work to ensure that risks to drinking water are minimized through a variety of control activities.

Overall, there are minimal contamination threats to the Lake Mary Watershed due to its location near the top of the watershed on U.S. Forest Service land and because land use is limited to recreation. However, mining activity in an adjacent watershed has recommenced and may expand in the future. To ensure management activities in the watershed do not affect the high quality of the water from Lake Mary, the District meets regularly with the U.S. Forest Service to review their activities in the Lakes Basin and to provide input as appropriate.

Section 1 - Introduction and Purpose

This Watershed Sanitary Survey (WSS) covers the Lake Mary Watershed. Lake Mary is the sole source of the District's surface water supplies. Information contained in this survey was collected by obtaining water quality data from the past five years, reviewing previous years' reports and contacting pertinent agencies for updates and changes that occurred in the Lakes Basin since the 2006 report. The initial WSS was completed in 1996 and this report is the fourth 5-year update of that survey.

1.1 Watershed Sanitary Survey Requirements

The California Surface Water Treatment Rule, Title 22 of the State Code of Regulations, requires every public water system using surface water to conduct a comprehensive sanitary survey of its watersheds every five years. This section of the Code is located in the California Code of Regulations (CCR) Title 22, Division 4, Chapter 17, Article 7, Section 64665, Watershed Sanitary Surveys. The purpose of the survey is to identify actual or potential sources of contamination, which may adversely affect the quality of water used for domestic drinking water.

1.2 Objectives

The main objectives of this WSS update are to:

1. Provide a hydrogeological description of the watershed (Section 2);
2. Identify and assess existing and potential sources of contamination in the watershed (Section 3);
3. Describe any significant changes that occurred since the last survey that could impact the source water (Section 3);
4. Summarize water quality monitoring data of the surface water source and evaluate the system's ability to meet State surface water treatment requirements (Section 4);
5. Provide a general description of the existing watershed control and management practices (Section 5); and
6. Provide recommendations for any necessary corrective actions (Section 6).

Section 2 - The Lakes Basin

The Mammoth Basin Watershed is located on the eastern side of the Sierra Nevada Mountain range. The Mammoth Basin is the watershed of Mammoth Creek and is located in the Long Valley Hydrologic subunit of the Owens hydrologic unit of the Lahontan drainage province. The Basin is bounded on the south by the drainage divide of Convict Creek; on the west, by the Mammoth Crest; on the north by the drainage divide of Dry Creek; and on the east extending along the watershed of Hot Creek. Surface elevations range from about 12,500 feet at Bloody Mountain in the southern part of the Basin to about 6,900 feet at the far eastern extreme of the Basin. The 71-square mile Mammoth Basin is divided into seven sub-units as shown in Figure 1.

The Lake Mary Watershed, reviewed in this WSS, is located within the northern portion of the Lakes Basin sub-unit of the Mammoth Basin, see Figures 1 and 2. It lies in the higher elevations of the Mammoth Basin, originating at the Mammoth Crest at elevations of 11,600 feet and extending to the outlet of Lake Mary at an elevation of 8,875 feet. The entire Lake Mary Watershed encompasses approximately 8 square miles and includes Mammoth Creek, Coldwater Creek, and George Creek. The Lake Mary Watershed includes thirteen lakes in addition to Lake Mary and three major drainage courses.

2.1 Source Water

The Mammoth Community Water District diverts surface water directly from Lake Mary through an intake structure and pipeline located near the northern shore of the lake. The intake is located about 20 feet below the lake surface and 340 feet from the shore. Raw water flows by gravity into the intake structure, passes through a valve vault on the shore and is then piped approximately 1,300 feet to the Lake Mary Water Treatment Plant (LMWTP). The location of Lake Mary and the treatment plant is shown in Figure 2.

The District is currently entitled to divert a maximum of 2,760 acre-feet of water annually from Lake Mary at a maximum diversion rate of 5 cfs (cubic feet per second) from November 2 to April 30. From May 1 to November 1, a maximum diversion rate of 5.039 cfs is allowed. The State Water Resources Control Board has imposed several constraints and conditions on the water permit and licenses that have been issued to the District.

Surface water storage rights are limited to 660 acre-feet annually, of which 606 acre-feet may be collected between April 1 and June 30, and 54 acre-feet between September 1 and September 30 of each year. The District is also limited to a maximum drawdown in Lake Mary of 3.0 feet during the period between June 1 and September 15, and a total maximum annual drawdown of 5.7 feet.

The Mammoth Community Water District obtains about 40 to 60 percent of its annual water supplies from surface water. However, water content of the annual snowpack, volume of demand, and timing of demand can significantly influence the annual source of water supply. For example, in 2015, during a severe drought, surface water supply was limited to about 3% of the total supply. Surface water supply is supplemented by groundwater extracted from nine production wells located within the developed portion of the community.

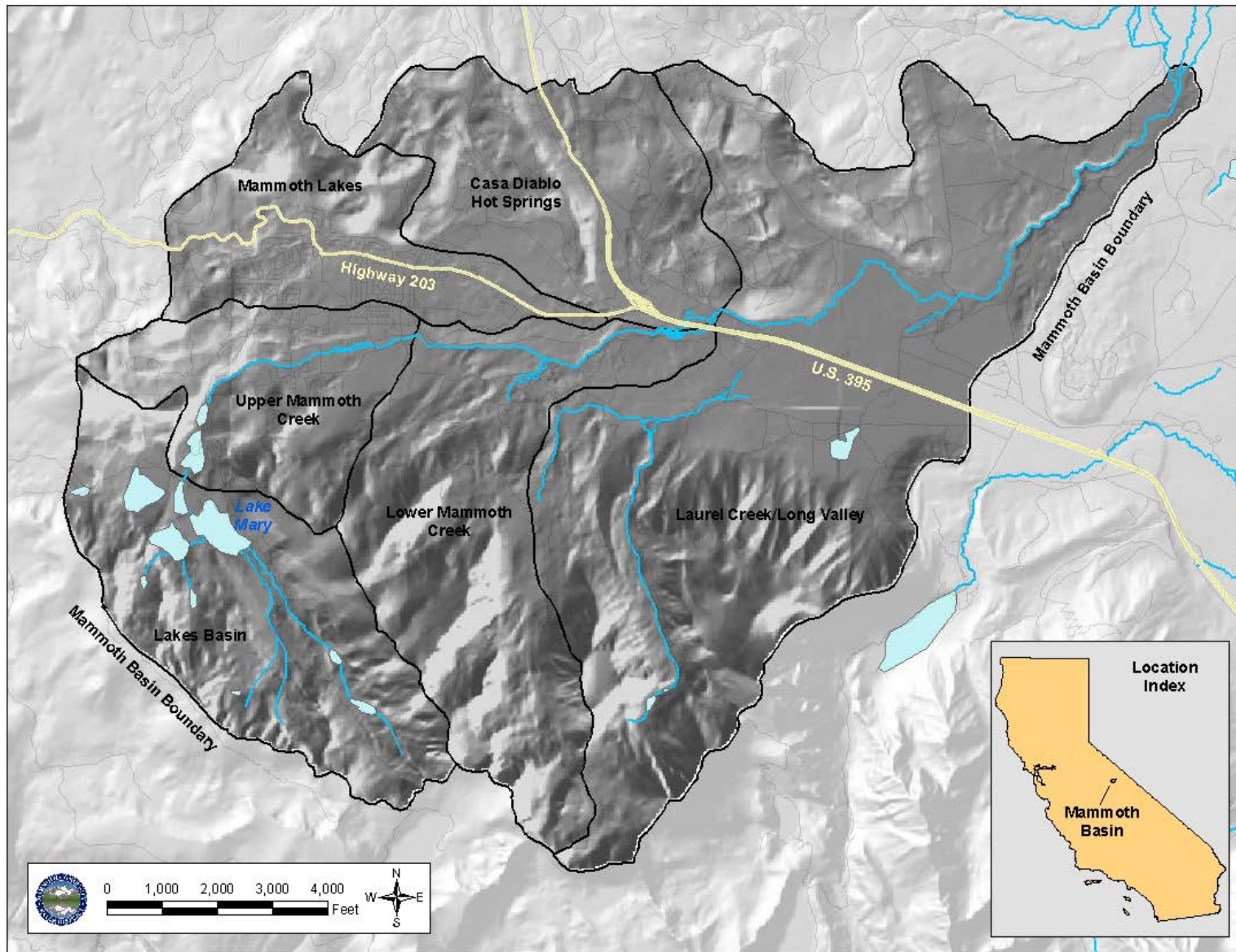


Figure 1 Mammoth Basin and Sub-units

Section 3 - Existing and Potential Sources of Contamination in the Watershed

The Lake Mary Watershed is most vulnerable to contamination from the infrastructure to support its use as a recreational area and from accidents resulting from recreational activities. The U.S. Forest Service estimates that current visitor days experienced in the Lakes Basin totals about 500,000 people annually. Potential contamination could result from a failure of the wastewater collection system or gasoline spill from a vehicle or boating accident. In addition, runoff from roads, campgrounds, and other recreational facilities may contribute contaminants to the surface water supply, see Figure 2. The Mono County Environmental Health Department records currently show that no businesses in the Lakes Basin are registered in the hazardous materials program.

3.1 Changes Since the 2011 WSS That Could Impact Surface Water Quality

The Lake Mary Watershed remains a year-round recreational area. A potentially adverse change since the last Watershed Sanitary Survey is the construction of a multi-use path along the outlet of Lake Mary. Construction of the multi-use path occurred in 2016. The path runs parallel to the existing road over the Lake Mary outlet/dam. The 0.75 mile path will eventually continue to the Lake George parking area. Construction of the asphalt path required a new bridge to cross the outlet and realignment of the main vehicle road crossing the outlet.

3.2 Wastewater Collection System

The developed area within the Lake Mary Watershed is served by a wastewater collection system operated by the District with the exception of ten cabins. Although, the cabins and businesses are generally utilized from June through October, some winter occupancy requires the wastewater collection system to function properly through the winter season.

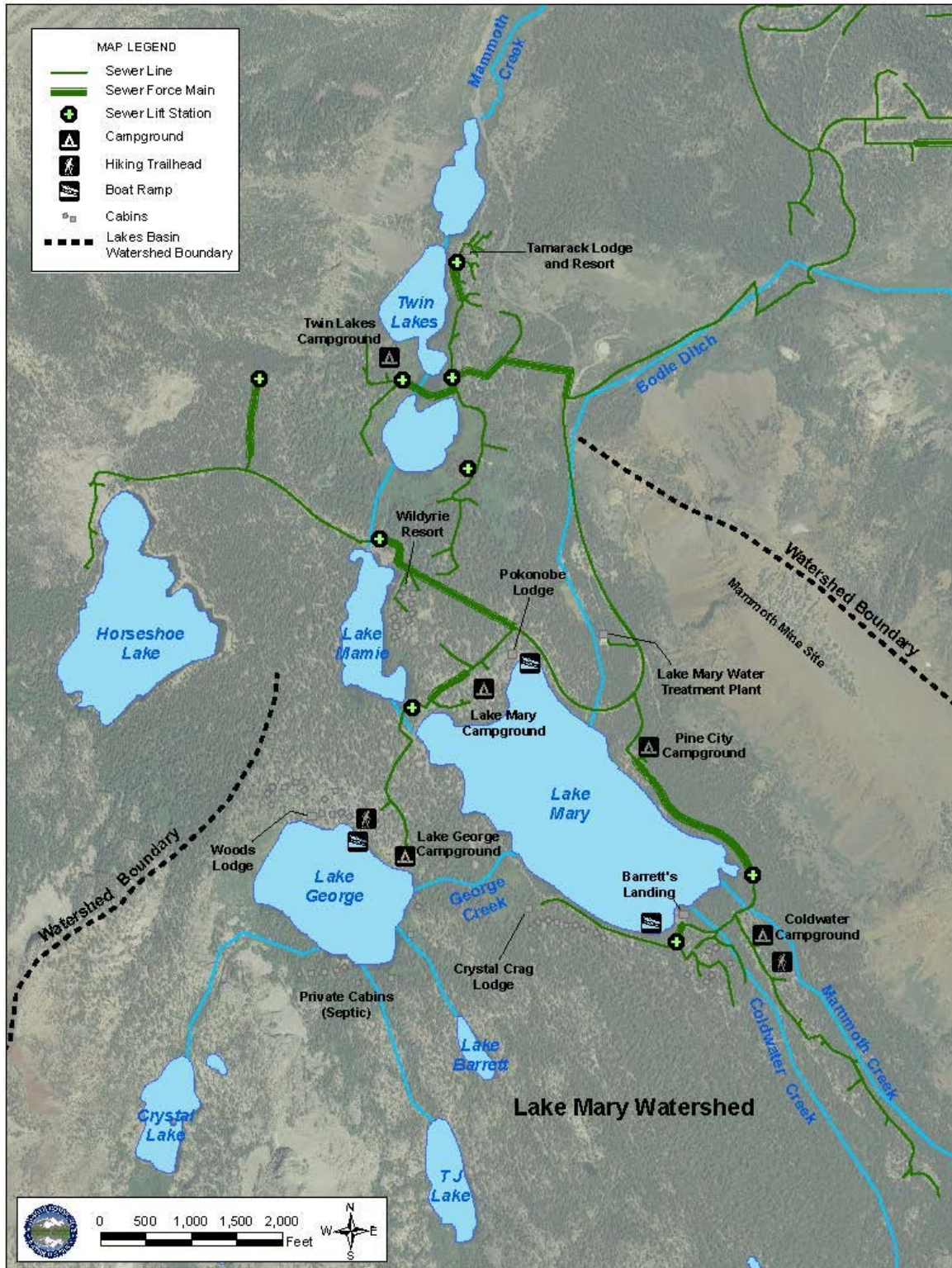
The Lakes Basin wastewater collection system consists of about four miles of sewer transmission lines, three associated lift stations, and about 60 manholes. These main lines were installed by the U.S. Forest Service and were taken over by the District upon completion of construction. The laterals to restrooms and campgrounds are still owned by the U.S. Forest Service.

The most vulnerable portion of the wastewater collection system in the Lake Mary Watershed is the lift stations. Failure of a pump, motor, or control instrumentation would eventually result in an overflow of wastewater from a lift station or from a nearby manhole. To improve management of the wastewater system, the District is equipped to deliver a portable generator to the Lakes Basin lift stations during electrical outages year-round.

Typically, infiltration and inflow (I&I) into the collection system occurs during the spring runoff, around April and May, when groundwater enters the pipelines through cracks and joints and inflow occurs as surface flow enters manholes and other facilities. I&I has not resulted in any overflow of the collection system, but it can cause unnecessary pumping and treatment of essentially clean water.

The ten cabins not serviced by the District are located on the southern side of Lake George. These cabins were evaluated by Mono County Environmental Health about twelve years ago. The County determined there were no obvious concerns to be addressed and does not conduct any regular monitoring of the waste systems for the cabins (pers. comm. L. Molina, Director of Environmental Health, 10/3/2016).

Figure 2 Lake Mary Watershed Boundary and Facilities



Three lift stations that could potentially contribute contaminants are the Coldwater Lift Station, East Mary Lift Station, and West Mary Lift Station and located adjacent to Lake Mary. Both the Coldwater Lift Station and the East Mary Lift Station have the potential to contaminate source water in Lake Mary if they were to overflow.

The East Lake Mary Lift Station is located on the south shore of Lake Mary about 170 feet from Lake Mary. This lift station receives wastewater from gravity collection pipelines serving about 40 cabins and the Crystal Crag Lodge. Wastewater is pumped from the East Mary Lift Station through approximately 150 feet of force main to an elevation of 8,920, a lift of about 6 feet. From that point, sewer flow is fed by gravity to the Coldwater Lift Station.

The Coldwater Lift Station is located on the northeast shore of Lake Mary about 150 feet from the lakeshore. This lift station receives wastewater from the Coldwater Campground, the Lake Mary Store, several private cabins, and discharge from the East Mary Lift Station. Wastewater is pumped from the Coldwater Lift Station through approximately 1,875 feet of force main to an elevation of 8,931, a lift of about 17 feet. It then flows by gravity to the District's wastewater treatment plant facility.

The West Lake Mary Lift Station is located on the northwest shore of Lake Mary about 190 feet from the lake and about 10 feet from Mammoth Creek as it flows from Lake Mary to Lake Mamie. This lift station receives wastewater from the Lake George Campground, Woods Lodge, and a portion of the Lake Mary Campground. Wastewater is pumped from the West Mary Lift Station through approximately 600 feet of force main and then flows by gravity to the District's wastewater treatment plant. The West Mary Lift Station is located at a lower elevation than the lake and an overflow at this location would not compromise source water quality.

3.3 Recreational Use

Recreation development and activities are another potential source of contamination to the Lake Mary Watershed. The entire watershed is under the land ownership and management of the U.S. Forest Service with a few exceptions. Private parcels in the watershed include, Pokonobe Lodge, on the north shore of Lake Mary, and two individual parcels located on the ridge to the east of Lake Mary.

Common activities enjoyed by summer visitors to the Lake Mary Watershed include fishing, camping, biking, hiking, backpacking, and horseback riding. During the winter months, recreation declines significantly, as the access road to the area is closed due to snow. Winter recreation consists of cross-country skiers, backcountry skiers, and later in the season, snowmobiles.

A portion of the higher elevation land at the top of the watershed is located in the John Muir Wilderness Area. Wilderness areas do not contain human developments and all camping and recreational activities are conducted under primitive conditions. Overnight camping is controlled through the U.S. Forest Service permit system. Activities in the wilderness area are similar to other recreational activities in the Lake Mary Watershed with the exception of campground activities.

At elevations below the wilderness area, camping is restricted to organized campgrounds administered by the U.S. Forest Service. Drinking water is supplied to all campgrounds by the U.S. Forest Service. The District provides sewer service to all campgrounds, businesses, and cabins in the Lakes Basin; the ten cabins on the south side of Lake George are the only exceptions.

3.3.1 Campgrounds

There are four campgrounds located in the Lake Mary Watershed located at elevations between 8,600

feet and 9,000 feet and total 140 campsites. The seasonal campgrounds are owned by the USFS and are operated by a private company that operates and maintains campground facilities

Campground	Elevation	# of sites	Location	Other facilities
Coldwater	8,900	77	Several hundred feet from the south end of Lake Mary and bordered by Mammoth Creek to the north and Coldwater Creek to the south.	Trailhead parking for anglers, hikers, backpackers, and people accessing the wilderness by horseback is located at the upper end of the campground.
Lake Mary	8,900	48	On the north end of Lake Mary.	
Pine City	8,900	10	On the east side of Lake Mary.	
Lake George	9,000	15	On the north end of Lake George.	Paved trailhead parking for anglers, hikers, backpackers, and horseback riders is located near the campground.

3.3.2 Lodges, Cabins, and Stores

Name	Location	Facilities description	Rental cabins	Seasonal?
Pokonobe Lodge	At the north end of Lake Mary.	General store and marina with boat rentals.	None	Yes
Barrett's Landing	At the south end of Lake Mary.	Convenience store. Boat ramp and dock with boat rentals.	None	Yes
Crystal Crag Lodge	At the south end of Lake Mary.	Lodge with cabins and boats for rent. Has a boat launch.	21 cabins	Yes
Woods Lodge	At Lake George.	Cabins and boat launch with boat rentals.	25 cabins	Yes
Wildyrie Resort	At the northeast corner of Lake Mamie.	Boat rental in addition to cabin/lodge room rentals	5 lodge rooms and 11 cabins	Yes
Private cabins (10)	At the south end of Lake George	Access by foot or boat. The ww from the cabins were evaluated by Mono Co Environ. Health Dept. MCWD does not provide service to the cabins.		Yes

3.3.3 Boating

Boating is a popular activity in the Lakes Basin although the U.S. Forest Service does not allow waterskiing and jet skiing on any lakes in the Lakes Basin. Boats of all types, including paddle-boards and float tubes, are commonly used on the lakes and can be rented locally. Gas for boats is stored in above ground gas cans. No underground gasoline storage exists in the Lakes Basin.

3.3.4 Winter Sports

The road to the Lakes Basin is closed with a locked gate near Twin Lakes when the road becomes inaccessible due to snow. Tamarack Lodge, below Lake Mary operates a cross-country ski center from

November to April each year and grooms about 19 miles of ski trails. Cross-country skiing is the primary winter activity in the Lakes Basin. In addition, visitors utilize the area to walk, snowshoe or access backcountry skiing. After April 17th, snowmobiles are allowed to access non-wilderness areas. The U.S. Forest Service currently has no further restrictions on where snowmobiles are allowed to travel.

All restrooms in the Lake Mary Watershed connected to the District's sewer collection system are locked and closed for the winter because the U.S. Forest Service turns off their water system for the winter. However, the U.S. Forest Service has installed vault toilets in two locations for use by winter recreationalist.

3.3.5 Roads

There are approximately three miles of paved road surface and an additional four miles of a paved bicycle/pedestrian multi-use trail in the area around Lake Mary that may contribute to runoff. Peak use of the roadways and multi-use trail occurs during the summer tourist season from July through August.

The Lakes Basin does not have a stormwater collection system. All runoff from roadways is either discharged into a stream channel or lake, or channeled into ditches or low-lying areas to percolate into the soil. Contaminants associated with automobile emissions might be expected to be present in the runoff. However, the largest volume of runoff occurs during the spring in the form of precipitation and snowmelt. Therefore, any contamination is likely to be small and would not have a measurable impact on surface water supplies. The District monitors for automobile-related contaminants and none have been detected in water quality sampling.

3.4 Mining

Within the Lakes Basin watershed, the remains of multiple historical gold mine sites exist that have been abandoned. These sites contain various amounts of remains from mining operations. Most of the mines operated in the late 1800s and were abandoned after just a few years due to lack of productivity.

The Beauregard Mine, historically known as the Old Mammoth Mine, is located downstream of Lake Mary near Mill City and in an adjacent drainage. In 2005, the U.S. Forest Service determined that there were no significant runoff concerns from the mine site. In 2011, the mine operators were approved to remove previously mined ore; however, this project was not implemented. A discharge permit for the activity was not required from Lahontan RWQCB provided that specific BMPs were implemented. Runoff from this mine would likely drain away from the Lake Mary Watershed. It is anticipated that the mine operators will develop a plan to expand the mining operations in the future. Any expansion will require the publication of required environmental review documents prior to implementing the project.

The abandoned Mammoth Consolidated Mine site is located near the Coldwater Creek Campground. The soil at the site was sampled by the U.S. Forest Service in the fall of 2006 and high levels of lead and arsenic were found in a limited area. There is no surface water adjacent to the site. The U.S. Forest Service removed contaminated soil at the site in 2007 (pers. comm. M. DeRose, USFS Mineral and Geology Program Manager 12/6/2011).

Section 4 - Watershed Control and Management Practices

This section describes management of the Lake Mary Watershed lands and activities and summarizes significant changes that have occurred since the last Watershed Sanitary Survey conducted in 2006. These changes cover facility upgrades, policy changes, and any other changes that could potentially influence water quality in the Lake Mary Watershed.

4.1 U.S. Forest Service Management

The Lake Mary Watershed is completely within the Inyo National Forest and, therefore, jurisdiction for management control rests almost entirely with the U.S. Forest Service. There is some limited authority granted to other agencies including the U.S. Fish and Wildlife Service and the CA Department of Fish and Wildlife who share responsibility for hunting and fishing activities. Additional authority is granted to the Town of Mammoth Lakes for police protection and the clearing of snow from the roadways.

The U.S. Forest Service administers the campgrounds, cabins and lodges in the Lakes Basin. Forest Service law enforcement officers patrol the Lakes Basin and report any unauthorized activity with the potential to harm surface water. In addition, recreational personnel and other Forest Service personnel are active in the Lakes Basin on a regular basis and report any spills or other unauthorized activity. In addition, the Forest Service must approve any new development or new activities in the watershed prior to construction or occurrence. The Forest Service controls reservoir operations through coordination with the District and the State Water Resources Control Board.

The Forest Service has several regulations that help protect water quality. First, 36 CFR 26.11 (c) prohibits placing any substance in a stream or lake that may pollute such a place. In wilderness areas, Forest Order 04-96-2 36 CFR 261.57 (g) prohibits washing, discharging soap, or depositing bodily waste within 100 feet of a lake or stream, 36 CFR 261.58 (aa) prohibits tying stock within 25 feet of a lake or stream, and 36 CFR 261.58 (e) prohibits camping within 25 feet of a lake or stream.

4.2 MCWD Control Activities

Improvements in infrastructure and maintenance of management procedures to reduce potential contamination of the surface water quality in the Lake Mary Watershed are ongoing. The District operates under a strictly defined maintenance and inspection schedule. Sewer lift stations are inspected on a weekly basis and lift stations and wet wells are cleaned and inspected annually. In addition, all sewer lift stations are connected to the District's SCADA system through radio telemetry. District personnel are able to monitor lift station pump status and the flow levels on a daily basis. In addition, the SCADA system is designed to alert District personnel in the event that a pump fails, a communication failure occurs, or particularly high or low levels of flow exist at the lift station.

District Operations staff also conducts regular cleaning and TV inspections of the sewer collection lines to prevent blockages and to ensure that pipes are not leaking. The Maintenance Department conducts pipe cleaning and inspection on a five-year schedule throughout the entire collection system in the community.

4.2.1 Lake Mary Treatment Plant

The results of the water quality assessment indicate that surface water from the lake is of high quality and that the treatment plant is capable of treating the water to state and federal standards with minor exceptions. The District recently improved the water treatment process at Lake Mary to reduce the corrosivity of the surface water supplies.

4.2.2 Wastewater Collection System

No failures of the wastewater collection system in the Lakes Basin has occurred during the last five years. The District's distribution and collection personnel of the operations department function under the California General Waste Discharge Requirements for Sanitary Sewer Systems (SWRCB Order 2006-0003-DWQ). These requirements include provisions for reporting any overflows to the Lahontan Regional Water Quality Control Board and the Mono County Health Department. In addition, the District has an Sewer System Management Plan that is updated every two years. The plan describes a program for cleaning and inspecting all sewer lines in the system in a five-year rotation schedule as well as an emergency response plan with contact information for pertinent agencies.

District Operations staff have begun slip-lining sewer main lines within the collection system throughout Town and in the Lakes Basin. This plastic pipe lining cuts down on leaks and reduces I&I in saturated soils. This improvement to the wastewater system has reduced unnecessary flow into the wastewater treatment plant and has saved energy costs for both pumping and treating I&I water. Three locations in the Lakes Basin sewer collection system have been slip-lined since the last WSS. The locations of these pipes are near the Coldwater Campground and near the outlet of Lake Mary where they cross Mammoth Creek and near Twin Falls below Lake Mamie. The manhole near the Lake Mary outlet was also lined to avoid potential blockages at that location. The maintenance staff monitors pumping hours of the wastewater system during early spring when there are little to no residents or visitors in the Lake Mary Watershed. Pumping of the system during this time indicates high I&I into the wastewater lines and alerts personnel that slip-lining may be necessary. In addition, the District purchased a portable generator and a vehicle to transport the generator during winter conditions.

The District has slip-lined about 900 feet of pipeline and sealed manholes in critical locations to reduce infiltration and inflow (I&I) to the sewer collection system. Although I&I creates a need for unnecessary pumping and treatment of essentially clean water, it has not resulted in any overflow of the collection system. The slip-lining and manhole sealing projects have significantly reduced the I&I.

In addition, MCWD purchased a portable generator and over-the-snow vehicle to transport the generator to the Lakes Basin for periods of winter electrical outages that prevent the lift stations from operating.

The District's Mechanical Maintenance Department constantly monitors the system through a supervisory control and data acquisition system (SCADA) and through weekly visual inspections. These inspections include status of the lift stations and test runs of equipment such as pumps, motors, and blowers. Quarterly alarm tests are also conducted to ensure that alarm signals are received through the SCADA system. Annual cleaning and maintenance is also conducted at these facilities to ensure that they remain in proper working order.

Improvements to the surface-water treatment plant to reduce corrosivity of the effluent was completed in 2015, see section 4.1.

Section 5 - Water Quality Assessment

Surface water entering Lake Mary is primarily derived from snowmelt due to the lake's location high in the watershed. As a result, the water is of very low mineral content with excellent clarity. District staff performs regular water quality monitoring and analysis on samples collected from the raw water line that flows into the Lake Mary Treatment Plant. The frequency of water quality monitoring for surface water is summarized in Table 5-1 below.

5.1 Surface Water Treatment Facility

The Lake Mary Treatment Plant uses filtration and chemical treatment to remove suspended solids and biological contaminants and meets the CCR regulations for surface water treatment. Section 64652 of Title 22, Division 4, Chapter 17, Article 2 states that water supplies receiving permit approval from the California Department of Health Services must utilize treatment techniques that protect users from adverse health effects of microbiological contaminants. The treatment plant building was expanded in 2014 to house new corrosion control equipment necessary to meet California Department of Public Health water quality requirements.

5.2 Water Quality Assessment

The District has been collecting water quality data for the past 33 years; however, this report provides only a summary of data collected over the past five years, since the WSS was last updated. The District tests for numerous constituents in the raw water line to Lake Mary, but only the constituents that were detected are noted in this report.

The District also tests the treated drinking water that is delivered to the distribution system to ensure that drinking water standards are being met. For example, total and fecal coliform tests are conducted in the treatment plant effluent on a weekly basis and testing for THMs and HAAs are conducted in the distribution system on an annual basis. The drinking water standards described in this section provide a comparison between California Health Department standards and the District's source water, but are not enforceable standards in the source water since they only apply to drinking water supplied to customers.

The thirteen filters at the Lake Mary Treatment Plant are designed to reduce the number of Giardia cysts by 99.9% and the number of viruses by 99.99% through filtration and disinfection. In addition, the District must meet primary drinking water standards as described by the California Department of Health Services.

Table 5-1 Water Quality Monitoring Constituents and Frequency of Monitoring

Analysis	Frequency
Inorganic Chemical	Annual
Nitrate	Annual
General Mineral	Annual
General Physical	Annual
Gross Alpha	Every 9 years
MTBE	Annual
VOCs	Annual
Unregulated VOCs	Every 3
SOCs	Every 3 years

Analysis	Frequency
Unregulated SOCs	Every 3 years
Arsenic	Annual
Total and Fecal Coliform	Weekly
Color, Odor, Temperature, and pH	Weekly

5.2.1 Inorganic Chemicals

The two inorganic chemical detected during the last five years of surface water quality monitoring was arsenic and aluminum. These constituents were detected in one sample collected on July 19, 2011. The water sample result for arsenic was 0.005 mg/L. The MCL for arsenic in drinking water is 0.01 mg/L. Arsenic is an odorless and tasteless element that generally enters the drinking water supply from natural deposits in the earth. The aluminum measurement was 0.092 mg/L. The MCL for aluminum is 1.0 mg/L.

5.2.2 Radioactivity

Gross alpha radioactivity was found in two samples collected in the past five years. The highest sample was found on July 13, 2010 at 0.626 pCi/L. The lowest was found on June 29, 2010 at 0.186 pCi/L. The MCL for gross alpha is 5.0 pCi/L. Gross alpha radioactivity originates from the erosion of natural deposits of certain minerals.

5.2.3 Volatile Organic Chemicals (VOC)

No VOCs were detected in any sample collected in the past five years.

5.2.4 Corrosivity

Corrosivity of Lake Mary water has remained relatively constant over the past 5 years ranging from 9.6 to 9.9, which are all highly aggressive. Corrosive water has the potential to remove iron and copper from water transmission pipes, may stain household fixtures, and may result in a metallic taste. The District conducts lead and copper monitoring in the community's drinking water twice a year. Water samples exceeded the action levels for lead and copper in 2007. The District conducted a study to develop methods for reducing corrosivity in the water from Lake Mary (HDR 2007). The recommendations from the study were approved for implementation by the California Department of Public Health and Safety in 2009. Construction for the improvements at the treatment plant started in 2011 and is expected to be completed in 2012.

5.2.5 Turbidity

Amounts of turbidity measured in raw water samples over the past several years have ranged from a minimum of 0.3 NTU on July 11, 2007 and a maximum of 1.8 NTU on July 19, 2011. Turbidity averages about 0.5 NTU and tends to fluctuate seasonally with the lowest measurements seen in the winter and early spring and the highest measurements seen in the summer and early fall. The secondary MCL for turbidity in drinking water is 5 NTU. Turbidity is a measure of the cloudiness of water and comes from soil runoff.

5.2.6 Total Dissolved Solids (TDS)

TDS have remained relatively constant over the last five years with a maximum of 42 mg/L on July 11, 2007 and a minimum of 14 mg/L measured on July 13, 2010. The secondary MCL in drinking water for TDS ranges from 500 mg/L to 1000 mg/L. Total Dissolved Solids refer to any minerals, salts, metals, cations or anions dissolved in water. Lake Mary water tends to be very low in TDS, which reflects the

high quality of this water source

5.2.7 Sulfate

Sulfate has remained relatively constant over the last five years with a maximum of 3.8 mg/L on July 11, 2007 and a minimum of 2.2 mg/L on July 19, 2011. The secondary MCL for sulfate in drinking water ranges from 250 mg/L to 500 mg/L. Sulfate is a naturally occurring substance in drinking water.

5.2.8 Total Coliform

The presence of coliform bacteria in source water is not a health threat itself, but is used to indicate whether potentially harmful bacteria may be present. Coliforms are naturally present in the environment, as well as feces. Fecal coliform and *E.coli* only come from human and animal fecal waste. The MCL for coliform in drinking water states that no more than 5% of samples may test coliform-positive in a month. For water systems like the District that collect fewer than 40 routine samples per month, no more than one sample can be total coliform-positive per month. The following table summarizes coliform data collected over the past 5 years from Lake Mary source water.

Table 5-2 Total Coliform and Fecal Coliform Summary in Raw Source Water.

Year	Maximum Total Coliform	Percent of Samples Containing Total Coliform	Percent of Positive Fecal Coliform
2012	9 MPN / 100 ml	65%	0%
2013	41 MPN / 100 ml	77%	2%
2014	>2419 MPN / 100 ml	100%	4%
2015	31 MPN / 100 ml	73%	9%
2016	>24195 MPN / 100 ml	76%	8%

Section 6 – Conclusions and Recommendations

Overall, the Lake Mary Watershed is situated in a location with minimal threats to water quality. While there are certain threats to surface water supplies from the sewer collection system, recreational activities, roads, and mine sites, these are controlled and managed by the U.S. Forest Service to minimize the risks to surface water supplies and to protect other natural resources. The Mammoth Community Water District also actively manages potential risks to surface water supplies to ensure that these resources are protected and maintained at a high level of quality.

The District plans to continue working with various agencies, landowners, and lessees in the Lake Mary Watershed to minimize threats to surface water supplies in the watershed. The wastewater system will continue to be maintained and improved if monitoring indicates high I & I concerns.

Literature Cited

HDR. 2007. Corrosion Control Evaluation and Recommendations: Lake Mary Water Treatment Plant. Draft Final, November 30, 2007. Report for Mammoth Community Water District.