



EXECUTIVE OFFICER’S REPORT
Covers July 1, 2023 – July 31, 2023

Contents

1. Personnel Report – *Sandra Lopez*..... 1
2. Lake Tahoe TMDL and Water Quality Update – *Melissa Thaw and Brian Judge* 2

1. Personnel Report – *Sandra Lopez*

Promotions

- Christina Guerra, Senior Engineering Geologist, Land Disposal Unit, Victorville. This position will assign and direct the work of the unit, provide daily supervision, review work products, prepare annual work plans, and track budget expenditures.

Vacancies

- Water Resource Control Engineer, Wastewater & Agricultural Unit, Victorville. This position provides regulatory oversight of projects involving discharges to groundwater or surface waters and projects intended to restore and/or enhance water quality in the Waste Discharge Requirements (WDRs), National Pollutant Discharge Elimination System (NPDES), and Site Cleanup Programs.
- Senior Water Resource Control Engineer, Wastewater & Agricultural Unit, Victorville. This position will assign and direct the work of the unit, provide daily supervision, review work products, prepare annual work plans, and track budget expenditures.
- Senior Engineering Geologist, Department of Defense Unit, Victorville. This position will assign and direct the work of the unit, supervise staff performing tasks related to department of defense and site cleanup program sites, prepare annual work plans, and track budget expenditures.

- Engineering Geologist, Land Disposal Unit, Victorville. This position will oversee waste discharges to land and site investigation/cleanup at various types of regulated and unregulated facilities including landfills, mines, composting facilities, cement plants, and site clean-up sites.

Departures – None

2. Lake Tahoe TMDL and Water Quality Update – *Melissa Thaw and Brian Judge*

Implementation of the TMDL continues to reduce inputs of pollutants that affect Lake Tahoe’s famed clarity. Research has found that addressing urban stormwater, responsible for over 70% of the Fine Sediment Particle (FSP) load, is the best way to control FSP pollution and achieve the program’s load reduction goals. Annually, Water Board staff conduct inspections to ensure Tahoe municipalities are effectively implementing stormwater controls to reduce delivery of FSPs to Tahoe. Photo 2.1 demonstrates some of the road operations and maintenance work that municipalities do to reduce FSP inputs.



Photo 2.1: As part of maintaining stormwater infrastructure, Vactor trucks are used to clean sediment out of sand traps, culverts, and rock-lined swales. Here, a Vactor truck is shown transferring material to a decanting facility. El Dorado County Yard inspection, June 12, 2023.

Agencies integrate adaptive management into TMDL management, which includes consideration of new scientific findings. The Water Board and Nevada Division of Environmental Protection (NDEP) jointly prepare documents for annual TMDL adaptive management. The Performance Report, which is typically released before the Annual Lake Tahoe Summit, highlights the basin-wide accomplishments and challenges of the TMDL Program. Then NDEP and Water Board staff prepare the Findings and Recommendation Memo (Memo) which provides an overview of new, important and relevant scientific and technical information and key and new findings that may support adjustments to the TMDL Program or related policies. The Memo contains TMDL Program adjustment recommendations influenced by information collected throughout the year and seeks program improvement opportunities by including feedback from TMDL-implementing entities, scientists and others. This year, the Tahoe Science Advisory Council (Science Council) will do an in-depth review of data and recent scientific findings to contribute key recommendations to the Findings and Recommendations Memo.

Tahoe Science and the UC Davis State of the Lake Report

A [report](#)¹ released in late 2022 evaluated important factors related to lake clarity and outlined several key findings: (1) particles within the 1.0-4.6 μm size class have a greater impact on clarity compared to the 1-16 μm sized particles, which the Lake Tahoe TMDL currently focuses on, (2) algae species of a smaller size, called *Cyclotella*, considerably affect clarity, (3) climate change has led to changes in physical in-lake dynamics leading to less lake mixing and (4) changes in mixing can worsen summer clarity. Recent media attention has focused on dramatic improvements in some individual lake clarity measurements in 2022; scientists have some strong hypotheses on some of the potential causes, including several years of drought and in-lake biological changes. There is currently not enough evidence for scientists to reach a consensus on these dynamic processes. This topic has sparked significant interest in understanding the complex variables leading to recent changes in the lake. The Water Board is working with the Tahoe Regional Planning Agency (TRPA), NDEP, and the Science Council to determine if changes are needed to current monitoring parameters to more accurately capture changes in water quality and clarity. Additional monitoring parameters could provide insight in changes into biological, chemical, and physical changes affecting clarity that were not previously considered.

The UC Davis State of the Lake report, released in July 2023, emphasized several key observations and conditions that occurred in 2022 and 2023, including improved clarity, notable biological changes and deep mixing. In 2022 the annual average Secchi depth was 71.7 feet (21.9 meters), a 10.7-foot improvement from the previous year. Changes in population densities and species of algae, zooplankton, and the invasive mysis shrimp were observed throughout 2022. Hypotheses on the relationships among these biological dynamics and clarity remain to be fully tested. The *following* year, on March 3,

¹ Seasonal and Long-Term Clarity Trend Assessment of Lake Tahoe, California–Nevada. Ramon Naranjo, Paul Work, Alan Heyvaert, Geoffrey Schladow, Alicia Cortes, Shohei Watanabe, Lidia Tanaka, and Sebnem Elci

2023, Lake Tahoe was observed to have mixed fully to a depth of 1,476 feet (450 m), the deepest on record. The duration of mixing was also the longest on record. The State of the Lake report also discussed UC Davis research on Lake Tahoe microplastics. The first step in this research was detecting and determining microplastic concentrations. The next steps planned will focus on the impacts of smaller particles, which may have a more significant impact on human and ecological health. The Water Board contributes funding toward the research behind the State of the Lake, as well as the production of the report itself.

Caldor Fire and Smoke

To understand Caldor Fire impacts, over 30 researchers, agencies, and NGO's, coordinated to fund and implement immediate, rapid-response research. Researchers included USGS, University of Nevada, Reno, UC Davis, and included examination of pollutants in tributaries and atmospheric deposition to the lake surface. The effort resulted in important findings on how the smoke and ash affected algae and particles in the lake and prompted new questions about lake processes and recommendations for future research and monitoring. Smoke and ash deposited directly onto the lake was heterogeneous in composition and amount through both time and space. The chemical composition of this atmospheric deposition varied in nutrient and toxic metal concentration and composition. The ash also varied in how completely the material was burned. Ash that was burned to a lesser extent had higher concentrations of metals including arsenic, chromium, and lead. Following deposition, ash was observed washing up onto beaches, which may have contributed to the nearshore nuisance algae that appeared after the fire. Smoke and ash were observed affecting algae in several ways including the effects on light, leading to changes in the position of algae in the water column, short-term increases in algal and bacteria productivity, and shifts in algae species dominance.

Additionally, an autonomous underwater glider was even deployed to measure the number of particles throughout the lake. Measurements taken with the glider indicated smoke and ash deposited onto the lake led to increases in particles. However, the number of particles rapidly declined, leading to the important question of what caused them to disappear. Settling, photodegradation, consumption and microbial dynamics could have contributed to their disappearance. Understanding these processes could shed light on the "life cycle" of particles in the lake during periods of time not influenced by heavy wildfire smoke. Recently funded Desert Research Institute research will focus on particle chemical composition and sources (what are the particles in the lake made of and where are they coming from).

Nearshore Program and SB630 Investments

The Lake Tahoe Nearshore Water Quality Program continues to guide investment in research and monitoring related to six focus areas: algae, aquatic invasive species, community structure, nearshore clarity, public health, and trash. The Water Board recently prioritized funding toward a lake-wide macrophyte survey, which will provide crucial information on where aquatic invasive plants need to be removed. The Water

Board contributed funding toward quantification of very small particles, which have the greatest optical influence on clarity. Following an informative peer-review of the multi-decade algae monitoring program, TRPA, the Science Council, the Water Board, and NDEP came to a consensus to execute an updated integrated algal monitoring program in which the Water Board has allocated SB630 funds toward. This monitoring program will include updated sampling methods and techniques. The Water Board will also be funding a review of nearshore science and monitoring to guide and inform research and monitoring priorities going forward. The review will be coordinated with the Science Council.

The nearshore program continues to invest in monitoring beaches for water quality related to human health. The Water Board collaborates with NDEP, TRPA, and Nevada Tahoe Conservation District to monitor popular nearshore areas for bacteria. Data collected from 2018 through 2022 have been compiled and are presented on a new [StoryMap](#) (see Photo 2.2) intended to provide information in a manner easily comprehensible to the general public. The monitoring program has shown that bacteria levels in Lake Tahoe's nearshore consistently meet the State Water Board Water Quality Objective, which is protective of recreational users from pathogens.

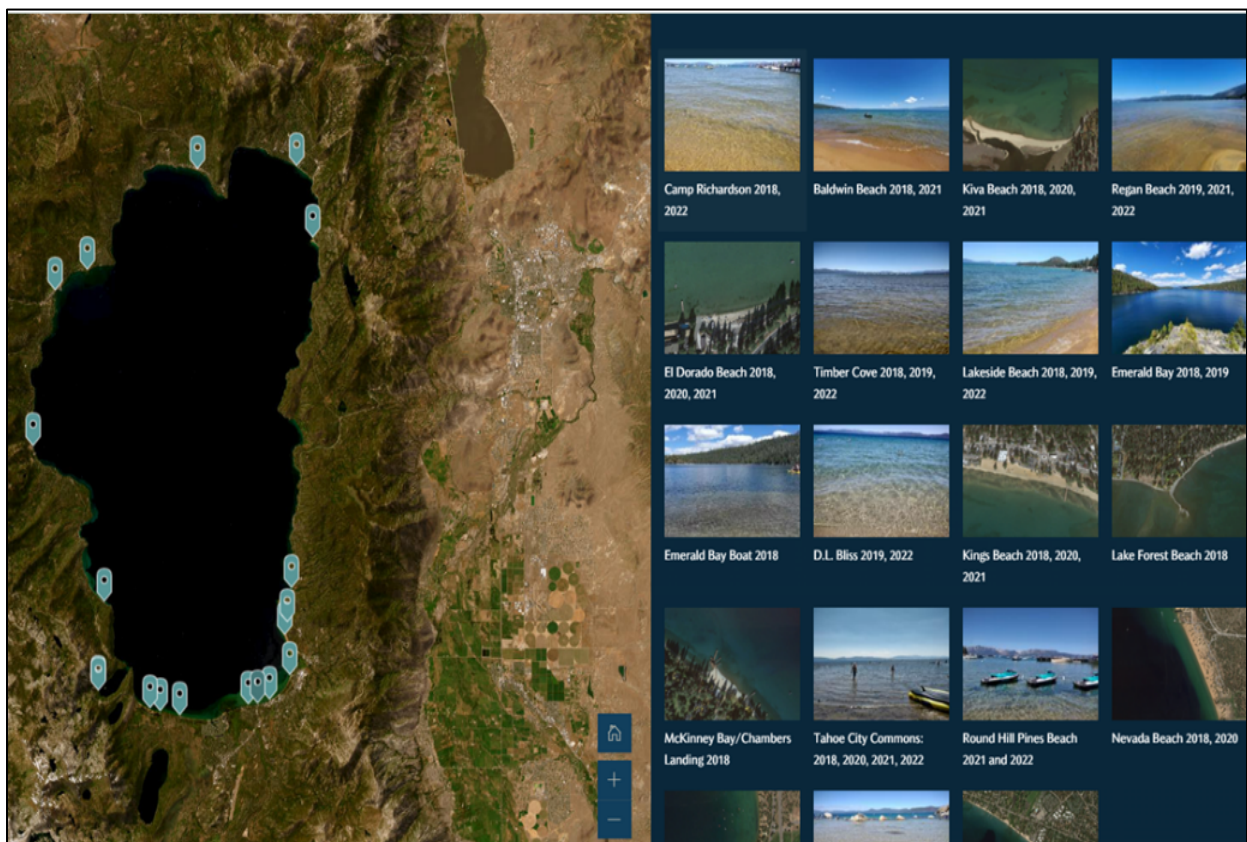


Photo 2.2: A new StoryMap features an interactive platform that the public can view bacteria data collected at beaches around Lake Tahoe. This monitoring program is funded with SB630 funds.

Trash and Plastic

Significant media attention has recently focused on microplastics and holiday trash in Lake Tahoe. A study in Nature published in July 2023 called attention to microplastic in Lake Tahoe. While this study was conducted on a global scale, comparing 38 lakes around the world, only three sample trawls were collected from the surface of Lake Tahoe which may not be representative of lake-wide conditions. Finer scale spatial and temporal sampling in Tahoe is needed to understand the magnitude of the problem in Tahoe. More research is needed to understand sources and toxicity levels. This summer, trash left on Tahoe beaches after the 4th of July holiday drew media attention. The Nearshore Agency Working Group (NAWG) is strategizing approaches on how to better manage and reduce shoreline trash. NAWG will be coordinating with other stakeholders and non-profit groups like the League to Save Lake Tahoe and Clean Up the Lake, to raise general awareness and promote improved conditions, especially during high-recreational use holidays and weekends.