TAHOE WATER
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2021 Watershed Control Program Annual Report

2021 Watershed Control Program Annual Report
Prepared for Board Members of the Tahoe Water Suppliers Association (TWSA)
Published December 2021

Tahoe Water Suppliers Association Membership

Cave Rock Water System (Cave Rock; Douglas County)
Edgewood Water Company (Edgewood)
Glenbrook Water Cooperative (Glenbrook)
Incline Village General Improvement District (IVGID)
Kingsbury General Improvement District (KGID)
North Tahoe Public Utility District (NTPUD)
Round Hill General Improvement District (RHGID)
Skyland Water Company (Skyland; Douglas County)
Tahoe City Public Utility District (TCPUD)
Zephyr Water Utility (Zephyr; Douglas County)
Lakeside Park Association (LPA)
South Tahoe Public Utility District (STPUD)

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Take care.

TWSA WATERSHED CONTROL PROGRAM
ANNUAL REPORT
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Appendix A – record of raw water data is attached only for California Members TCPUD, NTPUD and LPA, and their regulatory agents. Please contact the TWSA Executive Director for additional information.

INTRODUCTION

- The purpose of this document is to review and report on the progress of the Association Members' Watershed Control Program between July 1, 2020 and June 30, 2021.
- This report contains extensive reference and documentation to significant Tahoe Basin watershed activities, threats and controls relative to overall water quality for the reporting year.

Annual Report Objectives and Goals

Eight areas have been identified as the focus of the WCP including: education, monitoring, data management, regulatory, mapping, administration, water conservation, and water rights.

Annual Report Purpose and Structure

The TWSA members all successfully met goals established during the reporting year and remained within Federal and State water quality standards.

- We are pleased to report that drinking water quality results remained well within state and federal guidelines during the reporting year. Tahoe's tap water remains some of the purest in the world. The water systems have met all drinking water standards for the past 15+ years.
- Based on the quality of the water source and protection programs in place, the TWSA members anticipate the ability to continue to meet the drinking water standards in the future.

The report reflects EPA requirements of an effective Watershed Control Program and includes: an action plan, action plan highlights, description of the water supply, and potential sources of pollution, controls, monitoring and data management.

Information specific to the individual purveyors is highlighted in the Agency Annual Data chapter.

The TWSA Watershed Control Program Action Plan and Timeline (in the next section) is updated annually to address TWSA objectives and goals.

Who We Are

The Tahoe Water Suppliers Association (TWSA) consists of public water suppliers in the Lake Tahoe Basin whose source of drinking water is Lake Tahoe. The purpose of the TWSA is to protect the quality of the purveyors' drinking water from waterborne contaminants that are potentially harmful to human health. Source water protection is an effective tool in a multi-barrier approach to protecting drinking water. In accordance with federal and state guidelines, members of the association have established a Watershed Control Program (WCP) and report annually on their progress.

Mission Statement

- The TWSA mission statement was created and adopted in June 2008:

"The mission of the Tahoe Water Suppliers Association is to develop, implement and maintain an effective watershed control program in order to satisfy recommendations in watershed sanitary surveys, advocate for the protection of Lake Tahoe as a viable source of drinking water, and to satisfy additional state and federal requirements."

Membership

For the past year, the Association included on the Nevada side: Cave Rock/Skyland Water Companies and Zephyr Water Utility District (Douglas County), Kingsbury General Improvement District, Round Hill General Improvement District, Incline Village General Improvement District, Edgewood Water Company and Glenbrook Water Cooperative. The California members include: Tahoe City Public Utility District, North Tahoe Public Utility District and Lakeside Park Association. South Tahoe Public Utility District joining as a full member in March 2017 but is in process to revert back to its prior status as auxiliary member (non-voting), scheduled for January 2022.

What is a Watershed Control Program (WCP) Annual Report?

The 1976 Safe Drinking Water Act regulates drinking water in the United States. Under the Act, the Environmental Protection Agency (EPA) has the authority to set standards for drinking water quality and oversee states, localities, and water suppliers. The 1986 Amendments to the Safe Drinking Water Act included the Surface Water Treatment Rule (SWTR) affecting surface water systems and set specific and measurable treatment standards for surface water purveyors.

Federal and state regulations infer that protecting sources of drinking water by implementing watershed control
programs can be an effective barrier in a multi-barrier potable water treatment process.

Surface water systems operating under an exemption to filtration (a.k.a. a non-filtration permit) must complete a Sanitary Survey and Watershed Control Plan (WCP) every 5 years with annual updates. The purpose of a WCP is to prevent contaminants potentially harmful to human health from entering sources of drinking water. The EPA considers an effective WCP to include, at a minimum, the following components:

a) Description of the watershed;
b) Identification and mechanisms to control potential contaminating sources; monitoring program to track existing and new detrimental activities;
c) Program to gain ownership or control of the watershed;
d) Annual reports (EPA 2003); and,
e) Consideration of cryptosporidium in control requirements: Interim Enhanced Surface Water Treatment Rule, Long Term Enhanced Surface Water Treatment Rule, Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR/LT2).

The State of Nevada adopted the Safe Drinking Water Act and subsequent updates in NAC 445 A. The regulating authority is Nevada Division of Environmental Protection Bureau of Safe Drinking Water. The previous sanitary surveys and Watershed Control Programs fulfilled the requirements of an effective watershed control program, and included: education and outreach, data management, water quality monitoring, mapping, and regional planning/regulation.

The recent requirements for compliance with the Long Term 2 Enhanced Surface Water Treatment Rule (LT2 rule) have been addressed by all TWSA members. Details are provided in later chapters of this report.

History of TWSA

In 2021, TWSA celebrated its 19th year as an Association.

Nevada members of TWSA first started working together during the state adoption of the 1986 amendments to the Safe Drinking Water Act (SDWA) and the creation of the Surface Water Treatment Rule (SWTR). Together, the Nevada purveyors were successful in including the following language in the Nevada state code, NAC445A.525 Filtration: Avoidance of requirements. (NRS445A.860): 1. A supplier of water may apply to the Division to operate without installing a system for filtration. For the Division to determine the adequacy of a watershed control program for a system located at Lake Tahoe, the supplier must demonstrate that a level of protection which minimized the potential for contamination by *Giardia lambia* cysts, viruses and *Cryptosporidium* is provided by the location of the intake structure and a watershed control program." Thus began a partnership now in its third decade. The partnership adopted the essential elements of an integrated water management approach for high-quality source water not requiring filtration including: frequent monitoring, watershed controls, demonstrated history devoid of waterborne disease outbreaks, adequate storage in the event of higher turbidity excursions, and flexibility and redundancy in disinfection process (AWWA). The purveyors also completed the first of three sanitary surveys and control programs (1992) and pilot studies to determine trihalomethane formation potential and ozone disinfection design criteria. As a result, the Nevada State Board of Health granted five suppliers "filtration exemptions," while one supplier (Round Hill) implemented filtration.

In 2002, the Nevada Tahoe Water Suppliers Association (NTWSA) was formed. The Tahoe Water Suppliers Association (TWSA), changed the NTWSA name in December 2005 with the addition of the first California water purveyor, North Tahoe Public Utility District; followed quickly by Tahoe City PUD, Lakeside and South Tahoe PUD.

The 1992 plan, and subsequent updates, identified potential risks to source water quality including: sanitary sewer overflows, urban run-off, development, and hygiene practices of summer boaters and visitors. The idea of forming an agency to deal with source water protection issues was presented in 1992; but was not implemented until completion of the 2002 ten-year update plan.

In 2002, with encouragement from State Health officials, six purveyors from the original partnership formed an association under a multi-party agreement to address federal and state source water protection regulations, and fulfill recommendations of previous sanitary surveys. Appointed staff members from each agency form the TWSA board. The largest partner, IVGID, offers its Resource Conservationist as the association's Executive Director. The agreement stipulates cost sharing of expenses incurred by IVGID on behalf of the association. Members pay an annual fee, in part proportional to the size of their service areas and in part, in equal amounts representing common administrative costs. The TWSA budget averages $150,000-$175,000, annually, for staff/operating costs.

Current TWSA source water protection programs include: extensive consumer awareness campaigns, a multitude of regional pollution prevention partnership projects, and representation at regional working groups regarding aquatic invasive species, sustainable recreation, emerging contaminants, mutual aid support and other watershed topics.

I. TWSA ACTION PLAN

TWSA members use the following 'Action Plan' to accomplish the goals of the Watershed Control Program.

PROGRAM	ACTION	RESPONSIBLE PARTY AND PARTNERS	TIMELINE
Education			
1.0	Continue to improve the TWSA education program by redefining the theme and message.	TWSA, TRPA, NTCD, HOAs, USFS	2006-ongoing
1.1	Provide current information, education materials and reports on TWSA websites (www.TahoeH2O.org and www.DrinkTahoeTap.org).	TWSA	Updated quarterly, 2004-ongoing
1.2	Create and distribute posters, flyers, brochures, inserts, web media, reminder stickers, booth materials, and print and radio media.	TWSA, NTEEC, NTCD, HOAs, USFS, Local and State officials/agencies and PIO's	2005-ongoing
1.3	Include source water protection information in current customer information mailings, CCRs, new customer mailings, BMP/Water Auditing.	TWSA, member agencies	2005-ongoing
1.4	Distribute information at community events for example: regional Earth Days, chamber mixers, community meetings, etc.	TWSA, HOA's, community partners and environmental groups	2006-ongoing
1.5	Participate in industry level source water protection efforts (American Water Works Association, WEFTEC, others). Provide local professional development opportunities for TWSA members.	TWSA	2006-ongoing
1.6	Track customer responses, outreach efforts, web visits, and summarize activities.	TWSA	2005-ongoing
1.7	Participate in 2nd Drinking Water Forum.	TWSA, EPA—Region 9, TRPA, NRWA, NTCD	tabled
1.8	Incorporate parameters of concern to TWSA partners into surface water monitoring programs in the Lake Tahoe Basin.	TWSA, UNR, LTEEC, NTCD, TRPA, NDEP Lahontan RWQCB	2005-ongoing
1.9	Incorporate Aquatic Invasive Species (Quagga Mussel/ NZ mudsnail/plants) information in TWSA outreach.	TWSA, TRCD, TRPA	2008-ongoing
Monitoring			
2.0	Improve current surface water monitoring programs by improving the sampling programs, refining analyses, and reporting success.	TWSA, UNR, LTEEC, NTCD, TRPA, NDEP,TCS	2005-ongoing

2.1	Incorporate potential parameters of concern into surface water monitoring programs in the Lake Tahoe Basin.	TWSA, UNR, NTEEC, NTCD, TRPA, NDEP, LRWQCB	2005-ongoing
2.2	Prepare a project proposal to study climatic effects on source water quality and potential sources of pollution.	TWSA, UNR, DRI, TSC, TERC	Microplastics grant 2019-22; Other research being conducted (DRI, TSC,TERC,UNR)
2.3	Research potential grant funding for monitoring programs.	TWSA, UNR,USACE	Ongoing
2.4	Define the elements of a surface water risk assessment. Provide information to local planning agencies.	TWSA, TERC, AWWA Source Water Protection, Black and Veatch	Phase 2 completed June 2014 with funding from NDEP and TWSA. Posted on website. Phase 1 was completed Oct. 2008.
Data Management			
3.0	Improve reporting process for intake samples; annual submission of Watershed Control Plan.	TWSA board and staff	2003-ongoing
3.1	Gather, track, and report regularly on TWSA partners' operations, management, project, planning or other changes that may affect water quality.	Planning agencies, local water districts, environmental education programs, recreation facilities.	2003-ongoing
Regulatory			
4.0	Participate in regional planning efforts, including general and technical committees, TRPA Shorezone Ordinance Amendment process, Lahontan Regional Water Quality Control Board Amendment Process.	TWSA staff and board, partners, regulating authorities	2004-ongoing
4.1	Promote TWSA objectives and goals by attending stakeholder meetings and offering presentations or testimony.	Planning agencies, local water districts, environmental education programs, recreation facilities	2006-ongoing
4.2	Set trigger for water supplier notification during a plan review that includes activities that may affect drinking water quality.	TRPA, TWSA, NDEP, LRWQCB	2007-ongoing
4.4	Public comment and working group involvement in Aquatic Invasive Species management plans and projects.	Planning agencies, TWSA, other local water districts, TKPOA, HOAs, environmental education programs	2006-ongoing

Mapping			
5.0	Mapping of potential contaminating sources.	TRPA/Counties/ TWSA staff	2004-ongoing
Administration			
6.0	Develop a plan to incorporate new members into TWSA. Notes: New contract and financial system established July 2007. Bylaws revision finalized for March 2017.	TWSA	2005-ongoing
6.1	Review other agencies to improve the annual reporting process	TWSA	2006-ongoing
6.2	Submit Annual Report to NDEP –BSDW; CA DDW; members and other regulators. Post on website.	TWSA	Annual December
6.3	Review TWSA Association goals	TWSA	Annual March 2009-ongoing
Water Conservation			
7.0	Incorporate water conservation and source water protection information into packets and education programs	TWSA, NTCD, TRCD	2005-ongoing
7.1	Research current water use and water conservation programs in the Lake Tahoe Basin	TWSA	2005-ongoing
7.2	Develop collaborative water conservation program/plan	TWSA, NTCD, other partners	2005-ongoing
7.3	Research potential grant funding	TWSA, NTCD, other partners	2005-ongoing
Water Rights			
8.0	Review Tahoe annual diversions report prepared by the Nevada State Engineers office	TWSA, member agencies	ongoing

Acronyms

AWWA: American Water Works Association
BMP: Best Management Practices
BSDW: Bureau of Safe Drinking Water (NV)
CCR: Consumer Confidence Report
DDW: Division of Drinking Water (CA)
DRI: Desert Research Institute
EPA: Environmental Protection Agency
HOA: Home Owners' Association
IWMP: Integrated Weeds Management Plan
LRWQCB: Lahontan Regional Water Quality Control Board (CA)
LT2ESWTR: Long Term 2 Enhanced Surface Water Treatment Rule
NRWA: Nevada Rural Water Association
NDEP: Nevada Department of Environmental Protection
NTEEC: North Tahoe Environmental Education Coalition
NTCD: Nevada Tahoe Conservation District
PIO: Public Information Officer
TCS: Tahoe Science Consortium
TKPOA: Tahoe Keys Property Owners Association
TRPA: Tahoe Regional Planning Agency
TRCD: Tahoe Resource Conservation District
TWSA: Tahoe Water Suppliers Association
UNR: University of Nevada, Reno
USEPA: United States Environmental Protection Agency
USFS: United States Forest Service
USACE: US Army Corps of Engineers

Tahoe Water Suppliers Association

Protect the Source

2020-2021
Executive Summary & Action Plan Highlights

The Tahoe Water Suppliers Association (TWSA) Annual Report compiles water quality data and water utility activities for the 11 members (with Tahoe intakes) of the Association. It also provides an annual compilation of regional watershed relevant activities such as research and pollution control programs. It has been continuously published since 2003 and can be referenced at: https://www.yourtahoeplace.com/public-works/water/source-water-protection/documents-links .

This Executive Summary provides details on TWSA Programs and Partner Projects. TWSA has provided a unified voice for source water protection and watershed protection, developed strong relationships with local research and regulatory agencies and offered professional development opportunities for member staff. Below is a sampling of these accomplishments in the past year.

TWSA received 2 national awards in 2020.

2020 Exemplary Source Water Protection Award
https://sourcewatercollaborative.org/highlights/member-awwa-recognizes-three-water-systems-with-2020-exemplary-source-water-protection-awards/ .



TWSA's long-standing watershed protection outreach and activities were recognized with the 2020 national **Exemplary Source Water Protection Program Award** (for small systems) from the American Water Works Association. **"**The award for small source water system (serving less than 50,000 population) went to Tahoe Water Suppliers Association, California/Nevada**.** The Tahoe Water Suppliers Association (TWSA) is a partnership of 12 California and Nevada municipal water agencies operating around Lake Tahoe. Their primary drinking water source is Lake Tahoe, although several members have auxiliary groundwater sources. Lake Tahoe is one of the deepest and clearest lakes in the world and a popular destination for recreation, tourism and home ownership. TWSA's source water quality goals are clarity and exceptional water quality. Source water challenges include storm water runoff, urban development, air quality and

erosion. TWSA's Watershed Control Program focuses on education, monitoring, data management, regulation, mapping, administration, water conservation and water rights.

2020 Spirit of TRPA Award - 50th Anniversary - Tahoe Regional Planning Agency

www.trpa.org

http://southtahoenow.com/story/11/30/2020/trpa-awards-recognize-50-years-collaboration



The Tahoe Water Suppliers Association was selected by TRPA staff and board members as one of the 2020 Spirit of TRPA award recipients to represent the group of Public Utility Districts and General Improvement Districts who work so hard to protect Lake Tahoe. All recipients were acknowledged at the virtual TRPA Governing Board meeting on November 18, 2020. Honoring individuals by the decades – from the 1960s through present day was the line up at this 50-year celebration.

The Tahoe Regional Planning Agency (TRPA) today recognized individuals who, over the agency's 50-year history, worked tirelessly to protect the spectacular environment of the Lake Tahoe Region and to create more resilient communities.

During its online governing board meeting (Nov. 18,2020), the agency bestowed "Spirit of TRPA" awards on scientists, agency representatives, organizations, and community and legislative leaders who embody the essence of collaboration in the basin. Reflecting on its half-century legacy, TRPA honored people who have made significant achievements through each decade, beginning in the 1960s with the work to create a first-of-its kind bi-state compact between Nevada and California.

"There is a spirit of collaboration and partnership that has resounded in the Tahoe Basin ever since these two states came together to protect one of the most pristine alpine lakes in the world," TRPA Executive Director Joanne S. Marchetta said. "Through brilliance, hard work, and cooperation, these awardees and many others have made these protections possible."

TWSA's award excerpt follows:

For the 1970s, the agency recognized Dr. Charles Goldman for his long-standing contributions to science-based decision-making; and the **Tahoe Water Suppliers Association was recognized on behalf of all the regional water and wastewater utilities, which provide critical environmental services to our communities and protect our drinking water.**

<u>Community Education and Professional Development</u>
Continue to improve the TWSA education program; theme and message.

The **TWSA mission statement** was adopted in June, 2008:
"The mission of the Tahoe Water Suppliers Association is to develop, implement and maintain an effective watershed control program in order to satisfy recommendations in watershed sanitary surveys, advocate for the protection of Lake Tahoe as a viable source of drinking water, and to satisfy additional state and federal requirements."

TWSA 2021 Membership:
There are 12 water system members in the Association, providing water as a municipal or community utility. Each member has one vote in Association business through its designated representative. The TWSA Board meets quarterly: March, June, Sept. and December. TWSA updated its bylaws in 2017, revising its organizational structure and purpose.

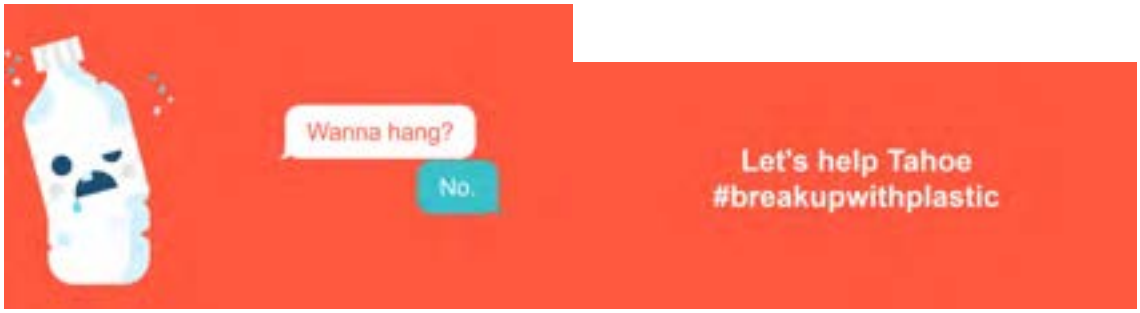
Cave Rock Water System
Edgewood Water Company
Glenbrook Water Cooperative
Incline Village General Improvement District
Kingsbury General Improvement District
North Tahoe Public Utility District
Round Hill General Improvement District
Skyland Water Company
Tahoe City Public Utility District
Zephyr Water Utility
Lakeside Park Association
South Tahoe Public Utility District

TWSA's organizational website = www.Tahoe H2O.org
Drink Tahoe Tap / Take Care Storyboard site = www.DrinkTahoeTap.org
Facebook = https://www.facebook.com/DRINK-TAHOE-TAP-160029390585
Instagram = https://www.instagram.com/where2fill and https://www.instagram.com/drinktahoetap

Provide local professional development opportunities for TWSA members.
TWSA staff members maintain professional water industry certifications; all hold AWWA Water Efficiency Practitioner level 1 certifications. Regional training opportunities by AWWA, NvRWA, WEF and state agencies are shared with all members. TWSA staff are trained 'Eyes on the Lake' team members for identifying aquatic invasive species (AIS). Staff members also attended ongoing trainings such as Project WET and Project WILD curriculum training classes. In addition, staff self-learn constantly, on emerging topics through independent research.

Provide educational materials
TWSA's long-running outreach program focuses on educational messaging on watershed protection, water quality, sustainability choices, and the exceptional quality and value of local tap waters. New topics (such as micro-plastics) are integrated as they emerge. TWSA staff promotes multiple messages, including trademarked slogans, through wide-ranging event and presentation schedules (now online). TWSA also employs other communication methods such as video, web and print media.

Covid-19 Pandemic Modifications – Outreach 2020-22 restructured
Prior to March 2020 and the resulting Covid-19 shutdown protocols, the Tahoe Water Suppliers Association staff members (TWSA) maintained an extensive outreach schedule of events and programs in order to provide community education and technical services in watershed protection and water conservation areas. This was modified to respond to the shutdown of physical outreach events. Staff pivoted quickly and began an increased offering of online, virtual and remote outreach sessions; partnering with multiple agencies as we moved through these environmental education challenges. Prior to March 2020, we estimated 200,000+ persons annually received the TWSA and IVGID Waste Not messages through various physical and online outreach methods.









<u>Educational and Action Based Partner Projects</u>

Focus Topic: TOURISM: Litter and Trash Impacts in the Watershed

Litter and trash issues at Lake Tahoe have received increased regional, even national attention, for the high visitation influx creating extreme pressure on limited public lands and community resources. The League to Save Lake Tahoe, Tahoe Environmental Research Center, Desert Research Institute and other partners are maintaining databases on trash impacts in the watershed Lake Tahoe is the most visited national forest in California. Regional agencies in Tahoe estimate as many as 20 million people visit every year. In 2020, the region saw a shift in the focus of tourism promotional efforts towards a sustainable recreation model. Various agencies are now shifting to address recreation, land use and water quality impacts from and land use.

TWSA staff and organization are active partners with the following efforts:

Take Care Tahoe

A workgroup of more than 60 participating agencies, this group coordinates custom environmental stewardship messaging for the Tahoe region. Many of the TWSA main outreach topics are in this messaging pool.

www.takecaretahoe.org

Lake Tahoe Sustainable Recreation Working Group
https://www.trpa.gov/programs/sustainable-recreation/
The Lake Tahoe Sustainable Recreation Working Group (formed in 2017) is a multi-sector working group of conservation and recreation professionals, private and nonprofit partners, and recreation stakeholders. The primary goal, and ultimate desired outcome is to provide high-quality outdoor recreation experiences, while preserving and restoring the outstanding natural and cultural resources of the Lake Tahoe Basin.



Sustainable Recreation Pledge
https://www.gotahoenorth.com/sustainable-travel-pledge
Become A Steward of Lake Tahoe: Commit to exploring the Lake Tahoe region responsibly and help preserve our treasured spaces by leaving them better than you found them. Adhere to instructions and signage, rules are in place for your safety and the wellbeing of our environment. Lend a hand during one of our community clean-up days and volunteer through North Lake Tahoe's Ambassador program. Think like a local! Ride public transportation and support small businesses and events – tourism dollars help keep our communities vibrant and strong.

Tahoe Ambassadors https://www.tahoefund.org/news/new-take-care-tahoe-ambassador-programs-roll-out-across-the-tahoe-region
Programs designed to create new opportunities to educate visitors, encourage environmental stewardship and promote responsible recreation.

TAHOE CITY, Calif. (June 29, 2021) – Last summer, the Lake Tahoe Basin, Truckee and surrounding mountain communities saw a dramatic increase in visitation as travelers sought out the great outdoors. While the mountains provided a much needed respite, it quickly became evident that many visitors weren't familiar with Leave No Trace practices. Trash piled up outside of proper receptacles or was left behind altogether. Trails were heavily impacted, trail etiquette ignored, and wildlife disregarded. This summer, six organizations are launching ambassador programs in locations around the Lake Tahoe Region to directly address and reduce tourism-related environmental impacts the region regularly experiences.

Every weekend throughout summer 2021, up to 50 ambassadors will be positioned at popular recreation sites to provide information to Tahoe-Truckee area visitors about the importance of proper trash disposal, trail and wildlife etiquette, wildfire safety and other Leave No Trace principles. While each of the

programs are independently managed, ambassadors from each program will wear the same Take Care Tahoe branded uniform to demonstrate a united, consistent approach to the education effort.

Tahoe Blue Crews – More Volunteer Teams to Tackle Trash

In response to increased trash concerns, IVGID Waste Not's conservation team, who support TWSA efforts, increased clean-up activities by partnering with the League to save Lake Tahoe's Tahoe Blue Crew program (volunteers who commit to ongoing cleanups) and offering multiple, socially distant cleanup events for casual volunteers. Participants engaged on several levels: at in-person events, cleanup remotely or both, clean up any day, any time. Participants are also encouraged to report what you find while cleaning up using the Litter and Trash Report on the Citizen Science App (free to download at citizensciencetahoe.org) or by using a data card (provided in the cleanup kits or downloading it here) and either drop it off to the location you borrowed cleanup supplies from. Also, we encourage the use of the hashtags #TahoeBlueGooder #litterfreetahoe**.** These multi-day events are hosted by Clean Tahoe, Incline Village Waste Not, Jamie Anderson Foundation and the League to Save Lake Tahoe. See also: https://www.keeptahoeblue.org/news/events/tahoe-trash-pickup-challenge-2020

Clean Tahoe North Shore Program for trash and litter mitigation launches July 2021

In 2021, Clean Tahoe launched a north shore litter mitigation service; to parallel their long established south shore operations. Clean Tahoe is a nonprofit corporation, whose mission includes fostering public-private partnerships and resources for supporting litter and garbage management services in the Lake Tahoe Basin and surrounding areas.



More than $300,000 was put towards this pilot effort for 2021-22. Funding Partners wished to enhance litter and garbage abatement and reduce the negative effects of such litter and garbage in their respective communities; and recognized the advantage of a joint and coordinated effort to address litter and garbage abatement and recognized Clean Tahoe's success in providing these services in the South Lake Tahoe area. Each Funding Partner has a separate Agreement with Clean Tahoe for litter abatement and garbage services, each with specific services, terms, conditions, and compensation schedule.

These agencies joined together to support the Clean Tahoe Multi-Jurisdictional Program:
Clean Tahoe Program ("Clean Tahoe"), a California nonprofit corporation;
Placer County ("Placer"), a political subdivision of the State of California;
Town of Truckee ("Truckee"), a political subdivision of the State of California;
Incline Village General Improvement District ("IVGID"), a political subdivision of the State of Nevada;
Washoe County ("Washoe"), a political subdivision of the State of Nevada; and
Nevada Department of Transportation ("NDOT") an agency of the State of Nevada.
California Tahoe Conservancy ("CTC"), an agency of the State of California.

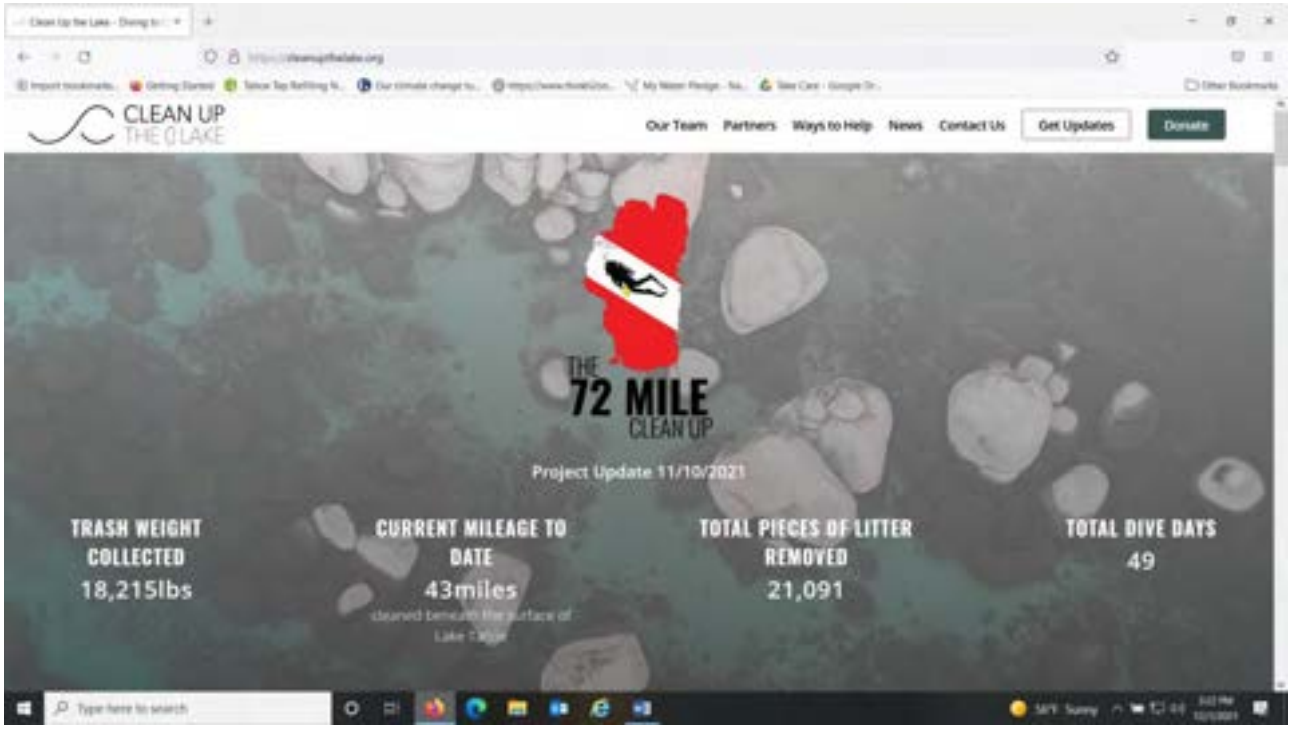
Clean Up the Lake's (CUTL) 72 mile underwater cleanup of Lake Tahoe

https://cleanupthelake.org

CUTL has discovered pollution issues within the community and under the surface of numerous lakes in the Tahoe Basin including Lake Tahoe. Through data collection, collaborating with environmental scientists, extensive research dives and outreach in the community –CUTL utilizes a small staff and many volunteers to tackle these issues. CUTL performs scuba clean ups and implement litter mitigation strategies. TWSA offered in-kind support to the 2020 NDEP funded 6 mile underwater cleanup of Tahoe

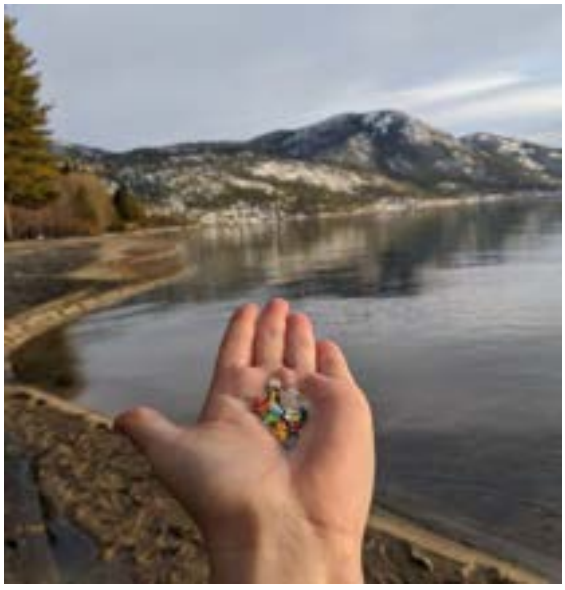
East Shore locations by collaborating with the Clean Up the Lake non-profit, Tahoe Environmental Research Center (TERC and Desert Research Institute (DRI) on the trash sort operations. Support includes: use of a utility trailer for debris collected storage, use of Public Works site for sorting and inventory operations, disposal costs for collected materials after inventory.

The TWSA Board has approved a $5,000 fundraiser match to be coordinated by CUTL/TWSA staff in 2022-23.



Partner Agency Research Support Projects

Micro-Plastics as an Emerging Contaminant
https://www.epa.gov/newsreleases/us-epa-awards-nearly-100000-address-microplastic-pollution-lake-tahoe



Plastic waste, and the resulting micro-plastic plastic fragments created from outdoor exposure, have emerged as a concerning contaminant in the ocean and freshwater environments. In California, the State Water Board has begun the regulatory process to define, monitor and potentially regulate a standard for drinking water systems. Due to the land and airborne loading nature of micro-plastics, drinking water systems reliant on surface water sources have the most potential to be impacted, rather than groundwater systems.

In 2019, The U.S. Environmental Protection Agency (EPA) awarded $97,000 in grants for projects to address microplastic pollution in Lake Tahoe. The projects include a study led by the UC Davis Tahoe Environmental Research Center (TERC) to gather more data on the movement and types of plastics in Lake Tahoe as well as a public education-focused, source-reduction pilot project led by the Incline Village General Improvement District,

in partnership with the Tahoe Water Suppliers Association and others. Both projects are managed by the Nevada Division of Environmental Protection (NDEP) with the aim of reducing sources of plastic pollution. Today's announcement coincides with the 24th Annual Lake Tahoe Summit, which will include participation from EPA Region 9 experts. "Lake Tahoe is an important natural resource for communities in California and Nevada**,"** said EPA Pacific Southwest Regional Administrator John Busterud. "EPA is pleased to support forward-looking projects which can reduce harmful microplastics in waters, thus protecting human health and the environment." "The Nevada Division of Environmental Protection, together with our partners, looks forward to carrying out these novel projects to address the emerging issue of microplastics in Lake Tahoe**,"** said Greg Lovato, Administrator of the Nevada Division of Environmental Protection. "A better understanding of microplastic sources, impacts, and controls is critical to keeping Lake Tahoe clean and ensuring it remains a healthy and vibrant ecosystem. Efforts like this shine as a prime example of the benefits of collaboration in conservation."

Microplastics are small plastic debris that can escape into the environment. They have been detected in drinking water in multiple locations worldwide and can be ingested by wildlife. Unlike plastic waste in the ocean, microplastics do not enter Lake Tahoe through wastewater or from commercial shipping operations. Rather, improperly disposed of litter found on Lake Tahoe's beaches is believed to be the lake's primary source of plastic pollution; followed potentially by road/tire debris and airborne particulates.

USEPA/NDEP funded projects to address microplastics in Lake Tahoe include:

RESEARCH: A Snapshot Study on the Fate and Type of Plastics in Lake Tahoe, EPA Grant $35,000.
This UC Davis project examines where micro plastics accumulate in Lake Tahoe and the potential for those plastics to be ingested by wildlife and humans. Samples will be collected from various depths throughout the lake, including from deep water sediments, to capture heavier plastics as they settle. To assess plastic pollution in drinking water sourced from the lake, samples are being collected from municipal water treatment facilities on the north and south shores of the lake. To examine the effects on wildlife, tissues will be collected from the Kokanee salmon and Asian clams, which are at a greater risk of ingesting microplastics as filter-feeding organisms. The results from this study will direct future research and supply agencies and policymakers with important baseline information for strategies to reduce plastic pollution in Lake Tahoe. TWSA is a project partner on this project, providing a $5,000 grant for sampling equipment and in-kind support.



OUTREACH: Pilot Project to Reduce Source Water Plastic Pollution at Lake Tahoe, EPA Grant $62,000.
This 2 year, multi-agency collaborative project includes: education and public outreach to achieve a behavior change in the region, with the ambitious goals of 1) raising awareness of plastic pollution, 2) increasing public understanding of the different types of plastics and 3) the impacts of their consumer choices,4) reducing the use of single-use plastic, and thereby 5) reducing the presence of plastic in Lake Tahoe's waters and beaches.

TWSA's "Drink Tahoe Tap®" Partnership with Take Care, Tahoe Environmental Research Center, and Sierra Watershed Education Partnership has just completed 2 years of work on this 'emerging contaminant' education project. This project focusses on education and public outreach to promote behavioral changes towards proper disposal of trash at Lake Tahoe. It promotes the reduction of the use of single-use plastic through research, local business partnerships, student engagement, public education, and awareness of drinking water and watershed protection.



Project highlights included:

Development of a complete suite of DRINK TAHOE TAP ® TAKE CARE outreach materials was commissioned and published regionally, in both web and print format. Messaging specifically focuses on reducing microplastics by reducing purchase of single use water bottles, and refilling instead. https://takecaretahoe.org/take-action/tahoe-tap

A new website was created as part of the Take Care Tahoe campaign along with a new page within the main Take Care Tahoe campaign and an update to an existing page: **http://www.drinktahoetap.org** (redirects to https://takecaretahoe.org/drink-tahoe-tap/) and https://takecaretahoe.org/take-action/tahoe-tap

The website features an interactive web storyboard, visually linking in a cartoon illustration style, eco-system impacts from single-use plastic waste, and litter in general.

Information and graphics on the high quality of Tahoe Tap waters was also developed. These graphics are used in regular rotation on social media postings, and a new storyboard website. Social content (hashtag, picture, caption) developed includes posting on billboards at I-80/Hwy 50, social media.



An Official DRINK TAHOE TAP Bottle & Partnership with Raley's Supermarket





The team also worked with the concept of building a brand presence for the "Tahoe Tap" product; marketing it as 'a luxury water offered free from the tap'. This concept brought forth the idea of an 'official Tahoe Tap refillable bottle'. Design products included multiple bottle designs, end cap design for Raley's grocery story, grocery store aisle blade, refill badge sign for businesses, signage at the water refill stations, and wayfinding blazes (store and shelf presence).

In July 2020, the DRINK TAHOE TAP ® / TAKE CARE special design bottles put on sale at the Raley's store in Incline Village, Nevada. Customer response was immediately positive. This was followed by expansion into seven regional stores in fall 2020. Raley's produced 11,000 custom bottles in 2021. Displays were created for 116 Raley's stores (outside the basin) throughout northern California and Nevada.



In July 2021; the **special character bottle "FILL M. UP" was produced and put on sale.** The character bottle has an Instagram page (#where2fill). In 2022-23 there will be a push on that platform…. as 'FILL goes on refill adventures'.

Tahoe Environmental Research Center Interactive Microplastics Exhibit - Linking Sourcewater Protection and Litter Reduction

The Tahoe Science Center developed a microplastics exhibit and nonpoint source and plastic pollution educational materials, informed by research. The exhibit was installed at the Tahoe Science Center in Incline Village, and opened in summer 2021. A new water fill station is included in the exhibit area, featuring DRINK TAHOE TAP custom messaging and graphics.

This exhibit and lesson topics include: 'Sources of Plastic at Lake Tahoe, From Macro to Micro: How Plastics Break Down, Quantifying Microplastics, and Where Do Microplastics End Up Around the Lake?'

Tahoe's Plastic Problem: A Day at the Beach (includes "Plastic Sorting" and "Resin Identification Code" details) Breaking up with Plastic; Microplastics in Lake Tahoe (includes "Zoom in on Microplastics"); It's Time for Solutions.

This project also produced similar traveling exhibits for use at events around the lake and locations including visitor centers, trailheads, and public beaches. The grant team is also collaborating with other regional partners to promote their plastics outreach efforts, such as California State Parks' 'Below the Blue' artwork displays made from underwater trash retrieved at their park locations.



This interactive exhibit will be mirrored in 2022 at the Sand Harbor Visitor Center.

Sierra Watershed Education Partnership TREC / Student Microplastics Education

As part of the grant, TERC and Sierra Watershed Education Partnership (SWEP) created a variety of online video lessons on plastic pollution and watershed impacts. In-person curriculum delivery remains on hold due to COVID-19. In the past year as part of this grant, SWEP created the "Beach Detectives" https://www.4swep.org/post/beach-detective virtual field program and associated Microplastics-Beach Detective Data Sheet. UC Davis created this video lesson to help guide student investigations.

New micro-plastics snippets created and web posted, see https://www.4swep.org/swep-snippets for all the sessions.



These are plastic specific:
https://www.4swep.org/post/what-is-plastic
https://www.4swep.org/post/beach-detective
https://www.4swep.org/post/how-long-until-gone
https://www.4swep.org/post/upcycled-milk-jugs
https://www.4swep.org/post/zero-waste-lunch
https://www.4swep.org/post/litter-scavenger-hunt
https://www.4swep.org/post/upcycled-t-shirt-bags

Another student program component was to create partnerships between Eco-Action Teams and local businesses, which play a key role in products available to the community. The TERC staff and SWEP staff engaged Tahoe-Truckee students in the past year in a variety of ways. This program component was impacted by the Covid-19 restrictions; there was an inability to conduct in person interviews with customers. Instead, the students helped develop the on-line survey on water purchase / use habits; provided feedback on the water bottle and Take Care designs and copy; and created several on-line educational videos. For 2020-21 school year, the Tahoe-Truckee High School's combined Envirolution Club (facilitated by SWEP staff advisors) has created an on-line, community participation portal via Instagram. https://www.youtube.com/watch?v=nwFeMZfvPE0 .

Student Partnership with Raley's Supermarket
https://www.tahoedailytribune.com/news/tahoe-students-address-plastic-problem-inspire-change-in-raleys

In 2021, the students also had direct access to work with Raley's management on their sustainability measures, providing a youth feedback perspective. The group participated in several collaborations with the Raley's team facilitated by TERC and SWEP, and developed a four-part action plan for Raley's executive team to consider how they could reduce plastic waste locally.

"To support efforts to reduce plastic waste, students from environmental clubs at four high schools in the region partnered with staff from local nonprofits to learn about plastic reduction programs and how they can help take care of Lake Tahoe. On Earth Day 2021 their efforts, which began in the fall of 2019, came to fruition when the CEO of Raley's agreed to create lasting, sustainable changes at their stores.

When the initiative began, students from North Tahoe, Truckee, Incline and South Tahoe high schools learned about the prolific microplastics problem impacting Lake Tahoe from UC Davis Tahoe Environmental Research Center AmeriCorps member Elise Matera and staff members at Sierra Watershed Education Partnerships and the Tahoe Water Suppliers Association.

They learned that when plastic items are not properly disposed of — from single-use water bottles, sleds and other items — they break down into tiny toxic pieces that contaminate Lake Tahoe's pristine waters and beaches. The students were quickly brought up to speed on the microplastics crisis, the types of plastic, problems with recycling effectiveness, and sorting plastics into macro-, micro- and nano-plastics.

The North Tahoe and Truckee Envirolution Club members were inspired to make a difference and formed a plastics sub-committee to assess which of these problems could be solved.

With coaching by members of the plastic reduction collaboration (funded by a Nevada Division of Environmental Protection grant), the students surveyed their local Raley's stores to come up with a list of all the ways plastic waste could be reduced.

The students presented their findings to the Raley's executive team on Earth Day 2021 and highlighted three areas for improvement: plastic water bottles, plastic grocery bags and plastic sleds and other toys that break apart easily. Other suggestions the team made included moving away from distribution of straws, plastic to-go ware, and plastic souvenirs.

Inspired by the presentation, Raley's President and CEO Keith Knopf said, "We appreciate the students' hard work and dedication to reduce microplastics and their thoughtful solutions for Raley's to consider. We commit to several changes; eliminate plastic straws, switching to paper and reusable options; eliminate single use plastic silverware and switch to a compostable solution. We are proud to offer real silverware and plate options for people who purchase food to be consumed in our Truckee store."

Media Coverage of Trash and Plastics Issue - The microplastics project has received extensive media coverage. A sampling:
https://www.kolotv.com/2020/07/02/raleys-working-with-tahoe-organizations-and-uc-davis-to-reduce plastic-waste/
https://www.sierrasun.com/news/environment/microplastic-cleanup-research-continues-at-lake-tahoe/
https://www.tahoedailytribune.com/news/microplastic-clean-up-research-continues-at-lake-tahoe/?fbclid=IwAR0ZrNliqsQD21ULLd0GsJrFmsEffgh3r2lg8wG7EQQS01oMkzxNnuQQaTk
https://www.ktvn.com/story/42349550/incline-village-raleys-encourages-customers-not-to-buy-plastic-water-bottles-as-part-of-new-initiative

https://www.sierrasun.com/opinion/columns/darcie-goodman-collins-tina-dvon-gallier-save-lake-tahoe-from-single-use-plastics/
https://www.sierrasun.com/news/the-fate-of-plastics-in-lake-tahoe/
https://www.sierrasun.com/news/environment/clean-up-the-lake-pulls-more-than-8200-pounds-of-trash-from-tahoe-donner/
https://www.sierrasun.com/news/pack-it-in-pack-it-out-locals-protest-surge-of-litter-left-in-truckee-tahoe-area/
https://www.sierrasun.com/news/power-of-the-people-how-truckee-tahoe-locals-are-taking-to-beaches-to-clean-up-litter-left-by-visitors/
https://www.sierrasun.com/news/placer-county-temporarily-increases-trash-service-in-north-lake-tahoe/
https://www.sierrasun.com/news/environment/trash-problem-piling-up-around-lake-tahoe/
https://www.sierrasun.com/news/litter-mitigation-on-tap-at-truckee-town-council/
https://www.sierrasun.com/news/mitigating-microplastics-what-types-of-plastics-are-getting-into-lake-tahoe-and-landing-on-beaches/
https://www.sierrasun.com/news/community/moop-the-lake-collects-over-200-pounds-of-trash/
https://takecaretahoe.org/success-stories/raleys-is-first-tahoe-area-grocery-store-to-encourage-customers-not-to-buy-single-use-water-bottles/
https://www.tahoedailytribune.com/news/partnership-aims-to-get-more-people-drinking-tahoe-tap-water/



TWSA Long Term Education Projects

TWSA has a long history of projects related to community education and outreach on the focus topics of source water protection and an appreciation of municipal tap water. The following offers summary of some of these long term programs and partnerships.

"Drink Tahoe Tap" ® "I Drink Tahoe Tap!" ® Stickers and Bottles

TWSA completed the trademark registration process for "Drink Tahoe Tap" ® and "I Drink Tahoe Tap! " ® In First executed in 2015, and renewed in 2021. This trademark was executed in a license agreement for the recent Raley's collaboration. Tahoe Tap is well recognized regionally and supported by both locals and tourists alike. In 2020, an official brand and bottle were developed. More than 100,000 "Drink Tahoe Tap ®" stickers have been distributed since the campaign launched in 2008.



"Drink Tahoe Tap ®" Taste Test

TWSA staff provides a 'blind taste test' at our outreach booth at local events. Staff provides the waters in 3 unmarked, dispensers using a 2 oz. compostable plastic cup. Each participant votes and the votes are recorded. The taste tests results are consistent; tap water is selected over bottled waters. This program is on hold-due to Covid-19 restrictions on public events.

TWSA Peer Agency Awards
https://www.awwa.org/Membership-Volunteering/Awards/Exemplary-Source-Water-Protection-Award
In 2020, the American Water Works Association (AWWA) recognized the Tahoe Water Suppliers Association (TWSA) with the coveted **2020 Exemplary Source Water Protection Award.** TWSA demonstrated the highest level of protection and preservation of the Lake Tahoe watershed, the region's primary water source for residents.

2020 Tahoe Regional Planning Agency Spirit of TRPA Award
The Tahoe Water Suppliers Association was selected by TRPA staff and board members as one of the **2020 Lake Spirit award recipients** to represent the group of Public Utility Districts and General Improvement Districts who work so hard to protect our lake and provide services to our communities. All recipients were acknowledged at the virtual TRPA Governing Board meeting on November 18, part of TRPA's 50-year celebration. www.trpa.org



Best Tasting Water Awards
In 2017, Cave Rock/Skyland won "Best Tasting Water in Nevada" at the Nevada Rural Water Conference. In January 2016, Kingsbury GID took home the "Gold Medal for Best Tasting Water" at the national Rural Water Rally, in Washington D.C., after receiving "Best Tasting Water in Nevada" in at the 2015 annual Nevada Rural Water Association Conference. IVGID received the "Best Tasting Water in Nevada" at the Water Association Conference; also in 2012 and 2011.



Distribution of Refillable Water Bottles
Prior to having retail bottle sales with Raley's, between 3,000 to 6,000 customized, refillable containers were distributed annually at various events. Since 2010, approximately 50,000 (glass or metal) bottles and pouches have been distributed. Folding, BPA free plastic 'water pouches' were offered for several years, but distribution of plastic water containers was a concern, and has ended. Our largest single distribution event is the annual Tahoe Summit where we provided up to 3,000

drinking water containers and supply water filling stations for the attendees. See microplastics grant information above, on development of a line of custom bottles.

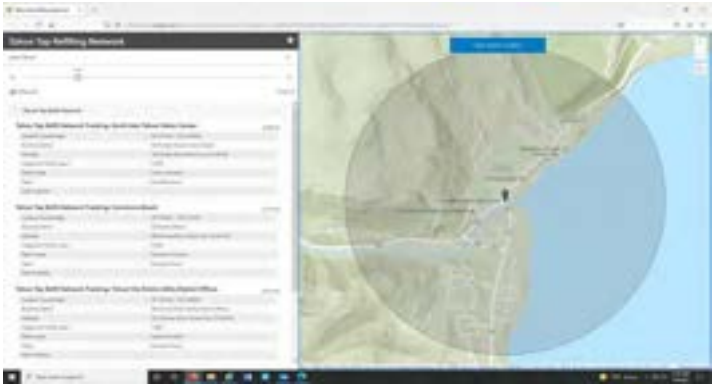
Promoting Greater Access to Tahoe Tap Water for Visitors and Residents

Drink Tahoe Tap® Water Bottle Refill Station Grant Program



In August 2019, TWSA and the Tahoe Fund initiated the Tahoe Tap Water Bottle Refill Station Grant Program. As of October 1, 2021, 16 stations have been installed, both indoor and outdoor, in the region. $500/$1000 rebates are available to Tahoe Basin businesses and non-profits who install a bottle filler/upgraded water fountain. $20,000 in total funding is available through a generous Tahoe Fund match grant. Information posted at www.DrinkTahoeTap.org.

FIND A REFILL: The "Drink Tahoe Tap Refill Network" now has 50 Tahoe locations registered. (www.findtap.com) **via the "TAP APP".**
Local businesses who offer free water refills can register to place their location on a digital mapping source. This regional refill network initially utilized the TAP APP. Getting a simple map or app for location posting water bottle refill stations has proven to be a technical challenge**.** Work continues on resolution of the TAP APP and location map resources. The original water fill station map/app (called the TAP APP) has been altered by the host site and is no longer supported or functioning. So staff has developed some alternatives, but are still seeking the 'final answer' short of developing our own app. As of November, 2021 - 48 fill station locations are presently logged on the 'apps'.



Solutions currently include:

Tahoe Tap fill station information is included in the 2022 Citizen Science App. We will try to see if that will provide a good platform for highlighting available water stations. https://citizensciencetahoe.org/home

South Tahoe Community College students created a dedicated **TAHOE TAP MAP.**
https://www.arcgis.com/apps/instant/nearby/index.html?appid=1c2d3b94a6d6446fa394b8aa5ef987a1

Setting up a dedicated website (Where2fill / Where2fillTahoe) for hosting the map, and Citizen Science App portal is under development for 2022.

If these fail to get us there, we can transfer to the global platform https://closca.com/pages/closca-water-app. Test data has been entered.

Free Tap Water Distribution at Public Events



Covid-19 response included cancellation of most public events, so the water stations were not deployed in summer 2020. They received limited use in summer 2021 with enhanced sanitation best practices. 8 stations are available for regional use at various events. The water fill station construction designs are available online as free resource information at www.TahoeH2O.org. These stations connect up to standard outdoor faucets served by approved water sources, have tap dispenser heads and a carbon filter system. They have proven to be extremely popular and have provided water at multiple large-scale community events. TWSA provides these stations or 5 gallon water dispensers to local events for smaller needs. Since 2014, this program has been instrumental in reducing the use of bottled water at area events; serving fresh water to crowds up to 5000 people.

Outreach / Watershed Education Events

Pre-Covid-19; staff conducted outreach with the TWSA "Drink Tahoe Tap ®" education booth at more than 25 community events annually. The booth features an interactive water taste test along with water conservation, watershed protection and tap water awareness information. Some of the annual events include the North and South Lake Tahoe Earth Day Festivals, Snapshot Day, Rock Tahoe half-marathon, Harbor Shakespeare Festival, SnowFest Science Expo, 4th of July events, Children's Environmental Science Day, the Tahoe Summit, regional music festivals, chamber mixers, ski area special events, education events and other events upon invitation or request.

Community Neighborhood and Beach Cleanups



2020-21 included a push to increase volunteer participation and develop Tahoe's community stewardship culture. TWSA staff serves annually as the Tahoe East Shore/Nevada Coordinators for International Coastal Cleanup Day. We collaborate extensively on North Shore cleanup efforts coordinated by the League to Save Lake Tahoe and Keep Tahoe Clean for South Lake Tahoe. Annually, hundreds of volunteers collect more than a ton of trash from Tahoe's beaches, streams and lakeside trails. IVGID Waste Not / TWSA in coordination with the League to Save Lake Tahoe, support Tahoe Blue Crews with the loan of collection equipment, waste disposal, donation of water bottles.

Sponsorships

2020 saw TWSA supporting a variety of conferences, online events and educational programs in the form of fiscal donations or water bottle donations. In the past year, the Association has supported the production of the State of the Lake Report, Tahoe In Depth publications, Music on the Beach, Concerts at Commons Beach, Nevada Rural Water events, Eyes on the Lake trainings, the Tahoe Summit, North and South Lake Tahoe Earth Day events, Tahoe Film Festival, various conferences and additional events.

TWSA Scholarship Fund

From 2012-2019, TWSA provided a scholarship fund for Tahoe high school students entering college with a

focus on science, math, engineering or environmental studies. Four $500 scholarships were offered annually; one for each Tahoe high school. Low participation resulted in the program closure.

School Programs

In addition to the micro-plastics project, TWSA staff normally provides school and civic group presentations on Tahoe Tap and source water protection, including water quality sampling lessons and streamside ecology activities in area schools. This was Covid-19 impacted, with a shift to virtual platforms for 2020. Since 2011, TWSA and TWSA members (TCPUD, NTPUD, IVGID) have partnered with the Sierra Watershed Education Partnership (SWEP) to offer water quality assemblies annually, to almost 2,000 North Tahoe elementary, middle and high school students. These assemblies feature a presentation by the Truckee High School Envirolution Club's Trashion Show, themed on appreciation of tap water, water conservation and watershed protection. At these shows, students receive custom refillable steel water bottles, shower timers and other water conservation education collateral.

Snapshot Day

http://tahoetruckeesnapshotday.org

In 2021, a reduced scale, 21th Anniversary Snapshot Day event was held. Due to Covid-19 restrictions, it was not open to the general public. Each year, TWSA staff leads Snapshot Day, a large-scale volunteer water quality monitoring event for the Tahoe region from Lake Tahoe to Pyramid Lake. At "Snapshot Day" (annually in May) 300+ volunteers spend the morning at 50+ locations within the watershed - collecting samples of turbidity, nutrients, dissolved oxygen and photographic documentation. Many sites have been repeated now for 15+ years, providing long-term watershed condition data. This event is a collaboration between multiple water quality focused agencies. This is one of the longest running watershed citizen monitoring events on the U.S. west coast.



Beach Water Quality Sampling

TWSA staff collects and analyzes raw water samples on a regular schedule from 6 Incline Village beach and stream zone locations. AIS inspections of shoreline conditions were added in 2015. Data from this sampling activity has been maintained in a centralized database since 2004.

Watershed Protection Outreach Campaigns

TWSA water conservation and water quality protection print publications are updated annually. Outreach materials include a leak detection information card with dye tabs, AWWA 'value of water' and water conservation brochures, TWSA source water protection information, a custom dog waste bag holder and bag refills, 'Drink Tahoe Tap ®' stickers and information on the issues of bottled water versus tap water. The regional Take Care Tahoe messaging was upgraded in 2020.

TWSA General Advertising Program & Social Media
TWSA is found on social media (Facebook/Instagram) as Drink Tahoe Tap (#where2fill and #drinktahoetap). TWSA partnered with the regional Take Care Tahoe campaign, to develop Drink Tahoe Tap ® messaging to encourage the use of refillable water containers. Informational articles and advertisements on source water protection, water quality and water conservation are published regularly in visitor magazines such as Tahoe In Depth, Tahoe Visitor Guide and Tahoe.com Summer/Winter supplements. Each publication reaches an estimated audience of 60,000+ persons each summer and winter season. Issues are provided in the rooms of area hotels and are also distributed at shopping centers, visitor centers and local businesses. Water bottles and "Drink Tahoe Tap" ® stickers also serve as a major portion of the advertising campaign. TWSA staff regularly tapes radio and television public service announcements. Tahoe Tap is featured on Lake Tahoe Television on multiple segments and TWSA runs "Drink Tahoe Tap"® ads.
To view the ad see: https://m.youtube.com/watch?v=633vLUjWM8A&feature=youtu.be

Tahoe Cigarette Disposal Bin Program
https://www.keeptahoeblue.org/our-work/combating-pollution/cigdisposal .



The aim of the Tahoe Cigarette Disposal Program is to reduce toxic chemicals from littered cigarette butts from leaching into the environment, to protect wildlife, and to reduce litter on Lake Tahoe's shoreline and vicinity, while also providing educational information. The bins were obtained through a Keep America Beautiful grant program (value, $20,000). As of October 1, 2020, the League to Save Lake Tahoe and TWSA have installed 100+ canisters throughout the Lake Tahoe Basin, for free. The Tahoe Cigarette Disposal program is branded to fit in with the Take Care Tahoe campaign, and each canister is designed to be highly visible and include education on how cigarette butts have harmful impacts to the environment and wildlife.

Dog Waste Awareness Campaign:
"Be #1 at Picking Up# 2" / "They Drop It, You Drink It"



Dog Waste Pickup Station Sponsorship
Dog waste collection is an ongoing campaign. Bag dispensing stations, custom signage and collection receptacles are placed in high impact areas and monitored by volunteer or partner agency staff. Approximately 50,000 dog bags are provided by TWSA with an estimated 100,000 more bags being provided by our partners, annually.

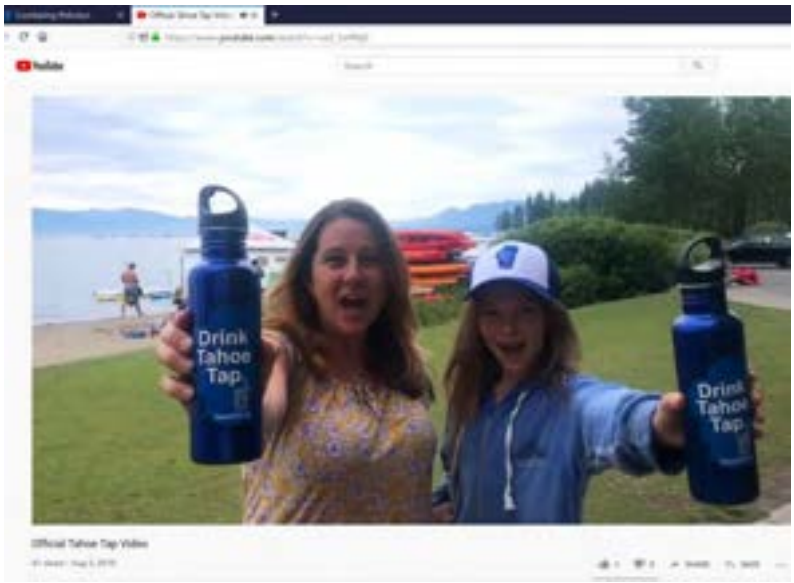
The graphics style Take Care Tahoe messaging on dog waste collection was incorporated into TWSA outreach materials in 2015. 100 stations are in use around Lake Tahoe, including the new Sand Harbor-Incline bike path, the Johnson Meadows property, Van Sickle State Park, Bijou Park, Burke Creek/Kahle Drive, Lake Tahoe Nevada State Park, Brockway Lookout, Tahoe City and Tahoe Vista Dog Parks, Incline Village

community lands, and various Tahoe neighborhoods. Individual leash bag dispensers are also handed out at events.

Love Your Water - Tahoe Tap's Music Video - The "Drink Tahoe Tap Song"
https://www.youtube.com/watch?v=uaZ_tn4fRj0.

Local musician, Joaquin Fioresi, wrote and produced this original song and music video, featuring regional music talent.

In 2020-21, it was featured on regional broadcasts of the on-line summer music series "Virtual Music on the Beach" and "Best of Commons Beach".



Participate in source water protection efforts

Aquatic Invasive Species (AIS) Public Outreach and Engagement; Control Method Workgroups
2020-21 was a milestone year in aquatic invasive species projects at Lake Tahoe.
TWSA staff was heavily engaged in environmental review documentation and research, and our involvement is anticipated over through the next decade, as this is one of Tahoe's top environmental concerns from its potential, eco-system-wide impacts.

TWSA continues to support AIS prevention efforts by other regional agencies including Tahoe Regional Planning Agency (TRPA) and Tahoe Resource Conservation District (TRCD) as a member of the Lake Tahoe Aquatic Invasive Species Working Group (LTAISWG). TWSA staff and utility members are active participants in the LTAISWG, regularly attending meetings and participating in work plan development. TWSA's increased participation has helped resolve past problems related to a lack of communication during the clam removal pilot program with the applicable water agencies.

Staff prepared comments on the following two projects under consideration:

Tahoe Resource Conservation District Lake-Wide Control of Aquatic Invasive Plants Project – Lake Tahoe, California and Nevada
https://tahoercd.org/tahoe-aquatic-invasive-species-resources/
Tahoe RCD, on behalf of the Tahoe Aquatic Invasive Species Coordination Committee (AISCC), and in coordination with the TRPA, is proposing to conduct (non-chemical) aquatic plant control and management throughout suitable habitat areas within the Lake Tahoe Region including the Lake itself, tributaries, and adjacent marshes of Lake Tahoe and the Upper Truckee River and Truckee River as they flow into and out of Lake Tahoe. The Project intends to continue aquatic invasive plant control efforts in locations where previous efforts have been successful, expand control efforts to include known infestation areas, expand available methods/techniques, and to allow for rapid response to detections of new aquatic invasive plant (AIP) infestations. No use of herbicides proposed. Staff submitted comment with no major issues reported.

Tahoe Keys Lagoons Aquatic Weed Control Methods Test Application / CEQA Process

https://tahoekeysweeds.org



The Tahoe Keys Property Owners Association (TKPOA) submitted the Tahoe Keys Lagoons Aquatic Weed Control Methods Test Application. Because the applicant's preferred project includes limited use of selected herbicides (with mitigation) this triggered the need for an Environmental Impact Report (EIR) required by the California Environmental Quality Act (CEQA) and Lahontan Regional Water Quality Control Board (Lahontan Water Board), and an Environmental Impact Statement (EIS) required by the Tahoe Regional Planning Agency (TRPA).

The Control Methods Test application proposes the use of targeted herbicides as one weed control method to test (alongside and in combination with) other methods to reduce and control the abundant growth of invasive and nuisance aquatic weeds that are compromising water quality and degrading beneficial uses of the Tahoe Keys lagoons. The environmental analysis will determine if the use of U.S. Environmental Protection Agency (EPA) and the Department of Pesticide Regulation (DPR) approved herbicides can meet the strict environmental standards of Lake Tahoe's classification as a Tier Three, Outstanding National Resource Water. TWSA staff, and our consultant Water Quality Treatment and Solutions, each prepared comments.

TWSA is highly involved in providing public comment AIS Management Plans. This issue has become a major component of our work. **TWSA support the implementation of non-chemical, water quality enhancing, control methods.** The emerging technologies of Ultraviolet Light (UVC) and Laminar Flow aeration, are showing promising results. Diver assisted removal is slow, but effective.

TRPA, one of the lead agencies on this project, convened a core committee of stakeholders to select neutral facilitation services and an independent environmental consulting firm for the environmental analysis process. The selection team is composed of representatives from Lahontan Water Board, TKPOA, TRPA, Tahoe Water Suppliers Association, and The League to Save Lake Tahoe. The core team unanimously selected Zephyr Collaboration to provide facilitation services for the project, and TRC Solutions, Inc. to provide environmental consulting services.

Since its inception, TWSA staff has participated in regional government, regulatory and scientific research working groups, to keep the dialog about source water protection inclusive of drinking water services. We regularly partner with local non-profits and environmental group on programs, trainings and educational activities. TWSA staff and the water purveyor managers have been active partners in the Asian Clam removal projects and ongoing AIS removal/monitoring projects by the Tahoe RCD, TRPA and UC Davis. TWSA staff provided on–site water quality monitoring support on the Asian Clam Removal Projects occurring summer 2011 in the Marla Bay, Lakeside and Emerald Bay areas.



Final project and environmental document review links:
https://www.waterboards.ca.gov/lahontan/water_issues/programs/tahoe_keys_weed_control
https://tahoekeysweeds.org
https://www.keysweedsmanagement.org

TWSA Comment Letter: https://www.yourtahoeplace.com/uploads/pdf-public-works/TWSA_FINAL_comments__on_Lahontan_Permit_(submitted_10_28_2021).pdf

TWSA Project Staff summary: https://www.yourtahoeplace.com/uploads/pdf-public-works/TKPOA_CMT_TWSA_Staff_Summary_Antideg_10152021.pdf

Tahoe Water Suppliers Association Staff Summary
Tahoe Keys Lagoons Aquatic Weed Control Methods Test (CMT), Environmental Certification Process
Scheduled for Lahontan RWQCB Board Meeting January 2022
Certify-Final EIR/EIR Grant-Basin Plan Prohibition Exemption / Adopt-NPDES Permit
Full Documents: https://tahoekeysweeds.org/environmental_analysis/

Executive Summary

The Tahoe Keys Property Owners Association (TKPOA) is seeking approval for their exemption to the Basin Plan Amendment on the prohibition of herbicide use in Lake Tahoe, as represented in the 2021 Aquatic Pesticide Application Plan (APAP). The project's goal is to reduce aquatic weed biomass by 75% to improve water quality and recreation for beneficial use. The Lead Agency (Lahontan) is requiring full environmental review of the proposed project due to the proposed discharge of aquatic herbicides into receiving waters of the Tahoe Keys Lagoons, a Tier III Outstanding National Resource Water (ONRW Tier III) for ecological and recreational value. After the designation of the Tahoe Keys Lagoons as the greatest threat to the environmental health of Lake Tahoe, the TRPA has secured federal funding through the Lake Tahoe Restoration Act ($3M) to facilitate a solution to the aquatic weed problem at the Tahoe Keys Lagoons. As part of the California Environmental Quality Act (CEQA) process, the TKPOA has worked with regulators and stakeholders to produce a proposed project for herbicide use, and after an initial public scoping process, three additional project alternatives. The proposed project and three alternatives underwent review by an independent third-party consultant chosen by the lead agencies and produced the DEIR/EIS. As required by the (CEQA) Process, the DEIR/EIS is not recommending a project action to the lead agencies; it provides the necessary information for informed decision making, with the required designation of an Environmentally Superior Alternative. The DEIR/EIS has chosen a project alternative as the **Environmentally Superior Alternative, Action Alternative 1 (Testing of Non-Herbicide Methods Only)**. The Proposed Project, Action Alternative 2 (Tahoe Keys Dredge and Replace Substrate), and the No-

Action Alternative would have unavoidable impacts on recreational boating that would not occur under Action Alternative 1 (Testing of Non-Herbicide Methods Only).

The DEIR/EIS has found that the proposed project and the alternative actions will have **no significant impact** on Environmental Health, Aquatic Biology, Utilities, and all reviewed objectives that cannot be avoided with mitigation measures, including early treatment, real-time treatment monitoring, pretreatment surveys, and containment. The non-action alternative has been found to have potentially significant unavoidable impact due to the increase infestation of aquatic weeds from the Tahoe Keys Lagoons throughout greater Lake Tahoe.

The draft EIR/EIS section UT-1: Effects on Water Supply, states that the filtration exemption and other effects on municipal water will have no significantly unavoidable impacts from the proposed project. The proposed CMT has no potential to influence microbial contamination, and mitigation measures will be in place for turbidity.

Lahontan has released environmental documentation for the CMT, including the Tentative Lahontan Board Resolution, Tentative Waste Discharge Requirements (WDR) and National Pollutant Discharge Elimination System (NPDES) permit, and Basin Plan Exemption Criteria in a Staff Report. The antidegradation analysis, provided with the WDR and NPDES permit, complies with the standards of California and Federal antidegradation requirements and explains the Basin Plan Exemption Criteria that will allow for the introduction of two aquatic herbicides into a Tier III ONRW waterbody. The documentation provided by the regulatory agency provides findings that the water quality of the ONRW is maintained and protected through the proposed herbicide control methods test. This finding is based on the analysis that Lake Tahoe and the associated Tahoe Keys Lagoons are outstanding for their exceptional recreational value that depends on the enjoyment of the scenic beauty imparted by its clear, blue waters. The short-term degradation in water quality will only be within the treatment areas. The receiving waters of the Tahoe Keys Lagoons will provide a 4:1 dilution ratio (140 AF of treated waters to 600 AF of untreated waters within the lagoons). Additionally, the regulatory documentation provides the concentration of active ingredient that could be released from the west channel, in a failure of required mitigations, as the current minimum laboratory detection rate for endothall and triclopyr of <0.9 µg/L at Lakeside Park, and a private water company to the west.

Brief History:
The Lahontan Regional Water Quality Control Board's (LRWQCB) Basin Plan Amendment, was adopted by the Regional Water Board on December 7, 2011 and the CA State Water Board on May 15, 2012. It became effective with US EPA approval granted September 10, 2015. The new regulations allow for LRWQCB review of proposed herbicide/pesticide application projects in Lake Tahoe for aquatic invasive species management. Prior regulations upheld a prohibition on chemical use. TWSA involvement did yield enhanced public notification language in the Basin Plan (any proposed chemical use project now requires notification and solicitation of comments from potentially affected water providers, regardless of the distance of the provider's service area from the proposed projects.). LRWQCB staff continues to work with TWSA, NDEP and CDPH on the regulatory language and review process.

Project Details (Proposed Project)

The proposed project is a 2 phase, 3 year Control Methods Test (CMT) with a goal of 75% plant biomass reduction. Year 1 includes the testing of Group A Methods: two herbicides, in standalone test sites plus combination UV-C & Herbicide test sites. Additionally, the proposed project will include testing of UV-C Light, LFA, and no action. Years 2/3 will include testing of mechanical methods (Group B) with no herbicide use.

Year One – 2021

Group A West Lagoon- 21 Test Sites total. Triplicate use of methods (selection condition dependent).

- 6 herbicide-only (3 sites for 2 herbicides)
- 3 UV-C Light only
- 6 combination Herbicide and UV-C Light
- 3 LFA-only
- 3 Control
- 3 (herbicides only) Lake Tallac

Proposed Group A Treatment Site Details.

Table 2-3 Proposed Test Herbicide Application Treatment Site Details. Site Number/Treatments	Application Rate (ppm)	Plot Size (acres)	Actual Herbicide/ Zone Size (acres)
1 Herbicide (Endothall)	5	1.5	1.5
2 Herbicide (ProcellaCOR*)	0.003	1.5	1.5
3 Herbicide (ProcellaCOR*)	0.003	2.1	2.1
5 Herbicide (Endothall)	5	2.2	2.2
8 Herbicide (Endothall)	5	1.6	1.6
9 Herbicide (ProcellaCOR*)	0.003	1.5	1.5
10 Combo Herb/Ultraviolet (Endothall)	5	2.0	0.7
11 Combo Herb/ Ultraviolet (ProcellaCOR*)	0.003	1.6	0.5
12 Combo Herb/ Ultraviolet (ProcellaCOR*)	0.003	1.9	0.7
13 Combo Herb/ Ultraviolet (Endothall)	5	1.7	0.6
14 Combo Herb/ Ultraviolet (Endothall)	5	2.0	0.7
15 Combo Herb/ Ultraviolet (ProcellaCOR*)	0.003	1.2	0.4
16 Control	N/A	1.8	0.0
17 Control	N/A	2.2	0.0
18 Control	N/A	1.5	0.0
19 Herbicide (Endothall)	2 to 5	1.0	1.0
20 Herbicide (Endothall)	2 to 5	1.0	1.0
21 Herbicide (Endothall)	2 to 5	0.9	0.9
Notes: *Triclopyr at an application rate of 2.5 ppm would be substituted for ProcellaCOR if ProcellaCOR is not approved for use in California.			



SOURCE: DigitalGlobe, 2016

Tahoe Keys Lagoons Restoration Program EIR/EIS D180960

TWSA/Tahoe Fund AIS Bottom Barrier Challenge
In 2014, TWSA committed funding to Tahoe RCD, for the replacement of 20 rubber mats ($5000) used by the AIS management team (bottom barrier, non-chemical treatment program) to smother weeds and asian clams. In 2018, The TWSA partnered with the Tahoe Fund to purchase additional bottom barriers with a 1:1 grant match project. http://www.tahoefund. org/our-projects/active-projects/aquatic-invasive-bottom- barrier-challenge/

Aquatic invasive plants affect water quality around the shoreline of Lake Tahoe. Through a well-coordinated program, the Tahoe Resource Conservation District has been able to remove aquatic invasive weeds with the use of bottom barriers and diver-assisted hand pulling. The inventory of bottom barriers was 1.6 acres short of the maximum 5 acres of coverage permitted for Tahoe.

In 2018, the TWSA issued a successful matching challenge to raise a total of $52,000 to purchase the remaining 175 barriers that would bring the inventory to the full 5 acres. With the full inventory of mats, more aquatic invasive weeds are removed from the lake and water quality is improved. Media coverage of the successful funding challenge is posted at:

http://www.kolotv.com/content/news/Keeping-Lake-Tahoe-clean-with-bottom-barriers-490967561.html
http://www.ktvn.com/clip/14565568/tahoe-barriers-invasive-species
http://www.ktvn.com/story/38894280/crews-tackle-invasive-aquatic-plant-issue-at-lake-tahoe

Several TWSA members have been working with Tahoe RCD on AIS controls using non-chemical methods on their properties. Lakeside Park Association has hosted both UV light and bottom barrier installation sites. North Tahoe PUD used bottom barriers at one site, to evaluate different non-herbicide controls. Crystal Shores HOA in Incline Village NV used bottom barriers to treat a milfoil growth site in their marina.

Aquatic Invasive Species (AIS) Education
TWSA outreach efforts include educating the public about Aquatic Invasive Species, covering the transportation risks, ecological implications and preventive measures. AIS information has been incorporated into the TWSA outreach program since the issue emerged at the lake in 2007. Concerns about the introduction of Quaqqa and Zebra mussels, and their potential effect on drinking water infrastructure and water quality are presented through customer signs installed at area boat ramps, and via website and brochures.

TWSA staff members maintain training as Tahoe Keepers, Eyes on the Lake volunteers and AWWA Water Efficiency Practitioners (Level 1).

Track customer responses / summarize activities
Through direct outreach and media contacts, staff estimates 150-200,000 people receive TWSA/IVGID Waste Not information annually. TWSA maintains the websites: www.TahoeH2O.org (and) www.DrinkTahoeTap.org. Source water protection, water conservation, TWSA annual reports and sanitary surveys are available for public review on this website.

Define the elements of a Surface Water Risk Assessment (SWRA)
Provide information to local planning agencies.
In June 2012, the TWSA/USACE Lake Tahoe Source Water Risk Assessment (LTSWRA) was used to evaluate potential impacts to drinking water quality from proposed new beach access areas associated with the Edgewood Lodge Project. The project engineer (RO Anderson) provided extensive case study comparisons and conducted multiple runs of the risk model to assuage concerns voiced by NDEP and TWSA water providers to the Tahoe Regional Planning Agency during the project public comment period.

2014 Lake Tahoe Flow Modeling, Potential Pathogen Transport and Risk Modeling Report
S. Geoffrey Schladow, Andrea Hoyer, Francisco Rueda and Michael Anderson / June 2014

In spring 2013, NDEP initiated discussion with TWSA to fund Phase 2 of the Lake Tahoe Risk Assessment Model developed in 2008 (Black & Veatch, B&V Project No. 41717). Phase 2 was funded by NDEP and TWSA for $95,000 in 2013-14.

There had been significant improvement in the data available on lake currents since 2008, so the upgrades provided better modeling with more refined area grids based on this new data. This project re-analyzed lake water current patterns in the southeastern corner of Lake Tahoe, in the area of the Edgewood and Kingsbury intakes. The analysis is related to public water systems at Lake Tahoe and the impact that local potential contaminating activities have on the source water. In addition to new data, new potential contaminating activities had been proposed near the public water system intakes.

Flow Modeling and Pathogens (PO # S004422)
Executive Summary
Swimming and other body-contact recreational activities have been identified by the USEPA, the Nevada Division of Environmental Protection, the California Department of Health Services and other public health professionals as a potential source of microbiological contamination of recreational waters.

This study was undertaken to quantify the impacts of body contact recreation on microbial water quality at the Kingsbury General Improvement District (KGID) and Edgewood Water Company intakes on Lake Tahoe. This study builds upon the risk assessment conducted previously (Black and Veatch, 2008), and specifically incorporates 5 new features:

(i) Findings of new 3-D hydrodynamic simulations for the nearshore southeastern portion of Lake Tahoe; (ii) Development of a finer-scale 50 m x 50 m finite-segment pathogen fate-consumer risk model; (iii) Additional recreational use associated with the proposed Beach Club and Edgewood Lodge/Resort developments; (iv) Risk assessment for the Edgewood Water Company intake; and (v) Treatment plant upgrades at KGID and Edgewood that included UV disinfection meeting the requirements of the Long Term 2 Enhanced Surface Water Treatment rule (LT2). As in the prior study, this risk assessment focused on Cryptosporidium because of its low infectious dose, environmental persistence and resistance to conventional disinfection.

Mean annual Cryptosporidium concentrations were predicted using a Monte Carlo-based pathogen fate-consumer risk model. Dose-response calculations applied to predicted concentrations following treatment provided estimates of health risks resulting from consumption of recreationally-impacted treated drinking water.Model simulations demonstrate that the additional recreational use at Beach Club and Edgewood Resort beaches, in conjunction with improved understanding of transport, results in increased potential for Cryptosporidium to reach the KGID and Edgewood intakes.

The modeling results that underpinned these conclusions provide a number of additional insights to minimizing pathogen entrainment into drinking water intakes. Primarily, by using a technique developed under this project, it is now possible to determine the source area of pathogens (or any other contaminant) that arrives at a water intake. The results also provide insight into the complex interplay between the windfield, the strength of the lake's thermal stratification and the transport patterns of pathogens. Most notably, having an intake located below the maximum depth of the thermocline greatly reduces the frequency of pathogen arrival at the intake. This has other implications with respect to lake level and drought conditions.

With prolonged drought episodes (predicted to be more frequent under future climatic conditions), lake level will be lower and thereby reduce the depth of the water intakes. Under those conditions the period of time favorable for pathogen transport to the intakes is likely to increase significantly. Similarly, the time of water withdrawal can be used to minimize risk. Night time and early morning withdrawals seem to pose the greatest risk, as pathogens released the previous day have had little opportunity to be de-activated by solar radiation. This highlights the linkage between drinking water quality and maintenance of high water clarity, particularly in the nearshore region. Maximizing the penetration of UV radiation from solar radiation into the water column provides "free" water treatment.

The release of a surrogate for herbicide transport from the vicinity of Tahoe Keys was simulated, and showed that herbicide could be transported to the vicinity of the nearshore regions of south-east Lake Tahoe within a 24 hour period. Within that period, material did not actually arrive at any of the water intakes, but based on other results in this report, that would occur within less than 48 hours. It must be borne in mind that these results are a first estimate of the fate of herbicides. No account has been taken of the dilution that a real plume of herbicide would be subject to, and the possible breakdown into other chemicals. Likewise, the toxicity (if any) of the herbicide for the case of consumption or body contact recreation has not been considered as it was beyond the scope of the study. However, should the use of herbicides be permitted at Lake Tahoe, there is a strong case that a more complete study of the fate of these products on public health should be undertaken."

A TWSA sponsored workshop on this report and the current data was offered on Nov. 5 and 6, 2014, by Dr. Schladow at both north and south Tahoe locations. Media coverage of the presentations is at: http://www.laketahoenews.net/2014/11/scientists-studying-life-below-tahoes-surface/

Gather, track, and report regularly on TWSA partners' operations, management, project, planning or other changes that may affect water quality:
TWSA members and staff continue to annually report on planning or other changes that may affect drinking water quality. Raw water data (Turbidity, Fecal Coliform and Cryptosoridium levels) is collected and tracked from each of the water purveyors' intakes on a monthly basis. Long term data sets are maintained. This data, along with operational upgrades, capital improvement projects and Tahoe area environmental improvement projects are recorded in the TWSA Watershed Control Annual Report. The USEPA Long Term 2 Enhanced Surface Water Treatment rule (LT2) required redundancy on treatment for filtration avoidance permit facilities. All TWSA members have met this requirement. Detailed water quality data for members is included later in the report.

Participate in regional planning efforts, including general/technical committees, TRPA working group and Board activities, agency regulatory language and amendment/ordinance process. Promote TWSA objectives/goals by attending stakeholder meetings and offering presentations /testimony.

Public Drinking Water Protection Advocacy
TWSA drinking water quality advocacy is our core mission. Much of our work has focused on research on source water protection and aquatic weeds management practices. The TWSA has been actively involved in dialog and discussion regarding the proposed aquatic weeds controls in the Tahoe Keys. The TWSA supports the use of non-chemical methods, citing herbicide use's applicability in a Tier 3 water is only as a last resort in aquatic weeds management; after all other methods are exhausted.

Tahoe Keys Integrated Weeds Management Stakeholder Circle (SC) Work Group; one of only 2 non-regulatory members. Over the past 2 years, the mediated workgroup was organized by the TRPA to bring together regulatory partners and stakeholders.

Current information is posted at: https://tahoekeysweeds.org/ . The goal of the collaborative, multi-stakeholder process is to ensure stakeholder concerns and perspectives are addressed during the environmental analysis, resulting in a plan for testing weed control methods that is science-based, broadly supported, and effective at controlling aquatic weeds in the Tahoe Keys lagoons

TWSA maintains staff presence on the TRPA Interagency Shorezone Coordination Group. This group meets monthly to review Shorezone project applications each month.

TWSA maintains staff presence on Nearshore Aquatic Invasive Weeds Working Group (NAIWWG), facilitated by the Tahoe Resource Conservation District (TRCD). This group meets quarterly to review and discuss lakewide AIS projects, action plans, treatment technologies, and emerging issues.

TWSA staff has been receiving notification on buoy and dock permit applications being re-issued by Nevada State Lands. TWSA staff review these notifications and then forward any applications of concern to the appropriate water agency for further review.

TWSA staff maintains ongoing participation with the TRPA, NDEP, Lahontan Water Board, The Tahoe Fund, City of Reno Sustainability Workgroup, Tahoe Environmental Research Center, Sustainable Tahoe and other working groups to maintain dialogue on source water protection.

Micro-Plastics – Pilot Project to Reduce Microplastic Pollution at Lake Tahoe

Micro-plastics have emerged as a potential contaminate of concern in freshwater surface waters, including Tahoe. Despite Tahoe's unique situation of a self-contained basin, with no major upstream influences such as industrial discharges or sewage, recent research has shown micro-plastics to be present in both shoreline sediment samples. Probable vectors of distribution include atmospheric deposition and trash/ urban runoff. Two area research agencies, Desert Research Institute (DRI) and Tahoe Center for Environmental Sciences (TCES-UC Davis) are conducting sampling efforts in both freshwater and storm-drains. Details presented earlier in this section.

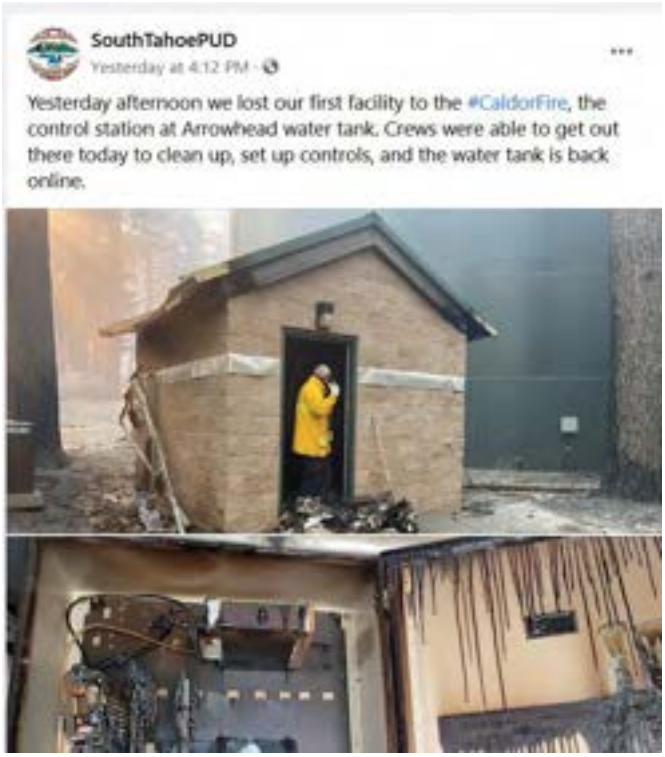
Emergency Preparedness

TWSA members are participants in the NvWARN and CalWARN emergency inter-local agreements. The WARN groups of water and wastewater utilities offer a web-driven, statewide mutual assistance program. Managed through the websites (http://www.calwarn.org) (http://www.nvwarn.org), CalWARN and NvWARN agreements provide a system for immediate assistance for member utilities during an emergency. Water and wastewater utilities can request equipment and personnel to assist during natural or man-made events that impact water and wastewater systems.

Mutual Aid

In 2014, a TWSA subcommittee began the revision of a Tahoe specific mutual aid agreement, this update was completed in 2017 and is being revised for 2022.

The Caldor Fire created major public safety and emergency response needs as it tore through the edges of the City of South Lake Tahoe (August/Sept. 2021). Emergency response protocols included assisting TWSA members with connecting with their emergency managers, to address issues such as infrastructure mapping needs, assuring generator fuel supplies and staffing.



August, 2021 - The Caldor Fire erupts. The Caldor Fire becomes the 15th-largest and 16th-most destructive wildfire in California's recorded history, according to Cal Fire. Its cause remains under investigation.

October 2021 - Caldor Fire 100% contained, nearly two months after South Lake Tahoe evacuations

https://www.sacbee.com/news/california/fires/article255173052.html

Fire crews work to repair containment lines of California's Caldor Fire in ElDorado County, California. The fire, that was first reported on August 14, had burned 221,775 acres and was 98 percent contained by October 16.

The Caldor Fire, which destroyed hundreds of homes in rural El Dorado County and displaced tens of thousands of residents in and near South Lake Tahoe in early September, is now 100% contained. The blaze grew to 221,835 acres (347 square miles) before the U.S. Forest Service announced full containment Thursday. Containment does not mean the fire is extinguished, only that crews have constructed a full perimeter of containment lines around the fire. More than 500 firefighters remain assigned to the Caldor Fire, continuing mop-up and repair efforts to ensure those containment lines hold. "For example, although the fire is contained, large diameter trees and stump holes will continue to smolder well into the winter months," Forest Service officials wrote in a Thursday morning incident update. Containment took more than two months. The Caldor Fire started Aug. 14 near the town of Grizzly Flats, which was largely destroyed as the blaze ripped to the north toward the Pollock Pines area in its fierce initial sprint, before winds started blowing it to the northeast. Through the latter half of August, the fire continued to creep east along Highway 50 and eventually made its way to the western edge of the Lake Tahoe Basin. The city of South Lake Tahoe, home to about 22,000 residents, was put under a mandatory evacuation order Aug. 30, lifted Sept. 5 as weather and fire behavior began to improve. A roughly 50-mile stretch of Highway 50 was also closed to the public for about a month. The Caldor Fire destroyed just over 1,000 structures, most of them in Grizzly Flats but some along the Highway 50 corridor near the summit, near Phillips and Twin Bridges, according to a damage map from Cal Fire. Two civilians were transported from Grizzly Flats with burn injuries. No fatalities were reported.

Read more at: https://www.sacbee.com/news/california/fires/article255173052.html#storylink=cpy

Tahoe In Depth Special Caldor Fire Issue:
https://www.trpa.gov/wp-content/uploads/CaldorFire_12pgs_No20_FINAL_web.pdf

An **ArkStorm @ Tahoe Preparedness Workshop** WSA members and other agency representatives a spent ½ day discussing the operations of water and sewer supply systems during a potential long-term storm event. The exercise was designed to address potential social and ecological impacts of extreme winter storm events in the Lake Tahoe region.

Fire Flow Water Supply Enhancements
TWSA members and South Tahoe Public Utility District have been working collaboratively on federal funding requests for infrastructure upgrades and inter-tie projects in order to address the need for adequate fire flows in the event of urban wildfire. The Lake Tahoe Community Fire Protection Partnership has worked to secure federal funding which, when matched dollar-for-dollar with local agency funding, allows construction of critical water infrastructure projects with a nexus to fire protection within the Lake Tahoe Basin. More than $32,000,000 in federal funds have been 50% matched by Partnership members. (Source: USFS Funding/Lake Tahoe Fire Prevention Partnership).The Fire Flow Partnership is formalized, with both TWSA and non-TWSA members. More information can be obtained by contacting Lynn Nolan, at South Tahoe PUD.

Intensive efforts are being focused on Tahoe "Wildfire Adapted Communities" – a multi-agency, multi-state, multi-decade effort of education and forest fuels reduction projects designed to reduce and mitigate risk of catastrophic wildfire in the Tahoe Basin.

Wildfire in the Urban-Wildlands Interface of the Tahoe Basin is universally identified as a high-level risk to source water protection, holding potential catastrophic damage to water quality, water infrastructure, water treatment and distribution. Wastewater infrastructure is also highly vulnerable and is a critical service to maintain and protect.

Nineteen agencies currently form the Tahoe Basin Fuels Partnership* working group. The membership includes a mix of community owned and private water suppliers, and the regional wastewater agencies. Eleven of the TWSA members are active in this Partnership. Each of the Partnership members operates and maintains infrastructure for water/wastewater services, serving local and visitor populations. Serving a year round population under 100,000 – infrastructure investments to protect our source water have been a major commitment of our communities. Tahoe's unique draw as an international tourist destination is currently estimated at 24 million annual visitations. This is 3x the visitation to the top 3 US National Parks, combined.

Fuels Reduction Planning and Implementation funding currently secured:
The Partnership recently secured funding for a 2 phase project (executing 2020-2023):

$250,000 from the California Tahoe Conservancy (CTC) to conduct a bi-state (CA and NV) risk analysis/treatment prioritization for fuels reduction near vulnerable Tahoe Basin water and wastewater infrastructure. This is unique with California funding being available for planning/treatment to Nevada Tahoe Basin water/wastewater agencies. (Year 1). It is anticipated that approximately 400 acres will be identified for treatment.

$500,000 in Lake Tahoe Restoration Act (LTRA) has been secured by the US Forest Service for implementation to treat 200 acres, one-half of the anticipated high risk treatment areas from the assessment (years 2-3). This funding is restricted to requiring direct water quality influence (nexus) on an adjacent federal lands property. It is likely that this restriction makes one-half (200 acres) of the high-risk acreage ineligible for funding from this source.

Set trigger for water supplier notification during a plan review that includes activities that may affect drinking water quality

Regulatory language in the LRWQCB Basin Plan Amendment requires water provider notification and solicitation of comments of potential chemical use projects.

TWSA has supported drinking water source protection through discussion of the zone of protection around drinking water intakes and wells. Current TRPA language includes a 600 ft. buffer zone to trigger project review near lake source intakes. TWSA formally requested the TRPA standard change to a 1,320 ft. (1/4 mile) buffer zone of protection around drinking water intakes. The TRPA Shoreline Plan review process initiates a water provider notification triggers for any new proposed piers or permanent structures within 1,320 ft. of an intake. For buoy fields, the notification process is also triggered in the Project Review process. The planning review process now includes a check mechanism for notification to a purveyor of any project within 600 ft. of groundwater or 1320 ft. for lake intakes. TRPA maps are flagged for drinking water sources. However, intake locations are not published for security reasons.

TWSA staff receives notification and hard copies of applications of a variety of use permits (piers, buoys) and potential projects as submitted by applicants to Nevada State Lands. These are forwarded to the applicable water providers so they can include comment and mitigation requirements such as turbidity and bacterial sampling for potential impact projects.

Develop a plan to incorporate new members into TWSA

TWSA has a defined cost sharing plan and formal membership agreement. STPUD became a full member in 2017. Also in 2017, the TWSA Board completed a bylaws review process with updates. Several local purveyors have expressed interest in joining, so membership is anticipated to increase in 2022.

Annual Reporting

The TWSA Watershed Control Program Annual Report is submitted to the Nevada Division of Environmental Protection Bureau of Safe Drinking Water and the California Division of Drinking Water Programs (Northern California Field Operations Branch) annually, each December. Reports are posted online at www.TahoeH2O.org. Hard copies of the report are distributed to personnel of area agencies upon request. TWSA Watershed Control Program Annual Reports have been published annually since 2003.

<u>TWSA Organizational Goals</u>

The TWSA Board conducts annual goal setting (reviewed 6/2021). The TWSA Board Goals are:

1. **"Continue and increase emphasis on extensive education and outreach on focus topics of: source water protection, Aquatic Invasive Species (AIS) threats, treatment methods used for AIS and the value of municipal tap water."**

   As detailed in Action Plan Highlights 1.0 through 1.9 – a variety of actions happen towards this goal.

2. **"Continue outreach and advocacy efforts for federal infrastructure funding, especially for fire flow capacity."**

   STPUD and IVGID conduct federal lobbying efforts on behalf of drinking water concerns for the Association. STPUD has conducted collective grant funding management for the TWSA group on fire flow enhancement infrastructure such as additional tanks, hydrants, pipe replacement and upgrades.

3. **"Continue a strong communication relationship with Tahoe Regional Planning Agency (TRPA), Nevada Department of Environmental Protection (NDEP), Lahontan Regional Water Quality Control Board (LRWQCB) and other regulatory agencies on source water protection."**

   The most significant recent development includes participation on the Stakeholder Committee of the Tahoe Keys Control Methods Test working group. This is a mediated team coordinated by TRPA for the

Tahoe Keys Property Owners Association "Application for Exemption" resubmitted to the Lahontan Regional Water Quality Control Board in July 2018. Past participation has ongoing project review and mitigation suggestions provided regarding pesticide and herbicide use (land and water use) to Lahontan Regional Water Quality Control Board (LRWQCB). Agency involvement by Nevada Dept. of Environmental Protection and California Dept. of Public Health was prompted by water provider concerns. Initial public comment prompted the LRWQCB Board to direct staff to form a working group to address the water provider concerns and produce appropriate intake protection/mitigation language. This language was incorporated into the existing regulations. TWSA staff has been heavily involved in the Nearshore Aquatic Invasive Weeds Working Group (NAIWWG) in the past 5 years. Public comment is offered. Research is conducted and shared with the group.

TWSA's Executive Director and Chairman are in regular contact with agency staff regarding drinking water provider concerns. Staff has maintained presence on TRPA led planning and workgroup committees for shore zone projects and AIS projects.

TWSA is a sponsor for, and TWSA staff submits articles to TRPA's Tahoe in Depth publication. This magazine is Tahoe's environmental news print (also online) platform. Print copies are distributed quarterly via US Mail to all property owners in the Basin, and are offered at visitor locations.

4. **"Maintain and improve project review / involvement process with TRPA, NV State Lands, Lahontan Water Board and other planning/regulatory agencies.**

Current active projects include:

- Aquatic Invasive Species (AIS): threats/prevention programs, treatment methods, Control Methods Test
- Groundwater Contamination at the 'Y" / PCE Plume Project
- Tahoe Regional Planning Agency Shoreline Plan and Project Reviews
- Nevada State Lands notifications on occupancy of lake bottom
- Truckee River Operating Agreement (TROA) Ongoing regulatory updates
- Federal and state regulatory updates
- Emerging contaminamts (microplastics)

TWSA members worked with TRPA on establishing a standardized Memorandum of Understanding (MOU) for routine water utility work, reducing the need to obtain individual permits for standard small scale construction and infrastructure upgrades. As outlined above in Action Plan highlights; TWSA staff and member agencies are actively involved in the planning and review of projects, activities and regulations related to source water protection at Lake Tahoe.

5. **"Utilize regional studies/projects to determine how they protect source water quality. Continue to work with LTWIP as appropriate."**

Review of published reports and studies is conducted on an ongoing basis by TWSA staff and member agencies. Intensive staff resources have been directed to research and develop TWSA public comment on the potential use of aquatic herbicides for aquatic weeds control, driven by planning efforts in the Tahoe Keys area. Many of the reports and studies released in the past year are referenced in this annual report.

Water Use Efficiency (Conservation) in California

California water conservation policy mandates extensive education, outreach and enforcement measures. Common conservation measures implemented include: tiered rates, irrigation restrictions, probation on water use on hardscaping, requirements for water efficient indoor fixtures, online water waste reporting forms and more. TWSA California members meet the 20% by 2020 state goal.

Summer 2021 Drought Proclamation for the Sacramento-San Joaquin Delta Watershed, including Placer and El Dorado Counties.
https://www.waterboards.ca.gov/board_decisions/adopted_orders/resolutions/2021/rs2021_0028_regs.pdf

Water Efficiency (Conservation) in Nevada
The State of Nevada did not declare a drought emergency; however, water providers enacted conservation education and voluntary water reductions.

Review Tahoe annual diversions reports
TWSA members did not exceed allocated water rights in the past year. Lake Tahoe to Pyramid Lake is a complex and highly managed, bi-state, watershed. The Truckee River Operating Agreement (TROA) http://www.troa.net/ was signed on Sept. 6, 2008. This agreement among 16 parties (including Federal, California, Nevada, Pyramid Lake Paiute Tribe, water agencies/irrigation districts and Truckee Meadows Water Authority) was designed to improve the operational flexibility of Truckee River reservoirs, and had been in negotiation for more than 18 years. It is designed to formalize, regulate and monitor water rights and water use within the Tahoe Basin, the Truckee River Watershed and the final outflow areas of Pyramid Lake and the Carson River. Under TROA, Tahoe Basin water rights for water extractions (surface and groundwater) are capped at 34,000 acre feet total, annually. Allocations are 11,000 acre feet per year (afy) for Nevada use and 23,000 (afy) for California use. Implementation began December 2014.



III. MONITORING AND DATA MANAGEMENT

TWSA OPERATORS UNDER FILTRATION EXEMPTION *

Ozone plus Ultraviolet disinfection; chlorine residual for delivery:

- Incline Village General Improvement District (IVGID)
- Kingsbury General Improvement District (KGID)
- Edgewood Water Company (Edgewood)
- Zephyr Water Utility District (ZWUD)
- Glenbrook Water Cooperative (Glenbrook)

Ultraviolet (UV) disinfection and chlorine residual for delivery:

- North Tahoe Public Utility District (NTPUD)

TWSA OPERATORS USING FILTRATION TREATMENT

Filtration and chlorine residual for delivery:

- Tahoe City Public Utility District (TCPUD), the McKinney Quail System
- Skyland Water Company (Skyland)
- Cave Rock Water System (Cave Rock)
- Round Hill General Improvement District (RHGID)
- Lakeside Park Association (LPA)

*Treatment Requirements for Filtration Avoidance		
Water Quality Parameter	**Surface Water Treatment Rule (SWTR)**	**SWTR + LT2ESWTR**
Giardia	3-log removal/inactivation	3-log removal/inactivation
Virus	4-log removal/inactivation	4-log removal/inactivation
Cryptosporidium		2-log removal/inactivation
Turbidity	<5 Nephelometric Turbidity Unit (NTU)	<5 NTU
Total coliform	<100/100 mL	<100/100 mL
Fecal coliform	<20/100 mL	<20/100 mL

Source: USACE Risk Assessment Report 2008

* Note: All TWSA filtration exempt water purveyors met LT2 upgrade requirements by using a combination of ozone and ultraviolet (UV) treatment or UV alone. All purveyors use chlorine residual for distribution system disinfection. System upgrades are described in Chapter V.

The EPA defines water quality monitoring as a method to identify new, potentially contaminating activities and control existing activities. Water suppliers are required to monitor raw water that may affect human health for constituents. In 2002, the Tahoe Water Suppliers Association (TWSA) established a central drinking water quality database to improve accessibility, evaluate long-term health of their water supply, distinguish water quality trends and identify potential treatment methods. Between 2003 and 2004, TWSA staff combined existing climatic databases in the Basin for future causal studies. TWSA staff continues to monitor weather in relation to turbidity and total coliform monitoring spikes. The TWSA has also worked with the Army Corps of Engineers, the Nevada Department of Environmental Protection, the University of California-Davis, the University of California-Riverside, and Black & Veatch Consulting, to complete and update a risk assessment study of the drinking water

intakes. TWSA also monitors shorezone development and aquatic invasive species issues throughout the watershed. These are initial steps in expanding the source water quality monitoring program.

Raw Water Monitoring

Under the Surface Water Treatment Rule, TWSA filtration exempt water suppliers are required to complete turbidity (NTU) and total coliform or fecal coliform analyses on raw drinking water, 40 CFR §141.71(a). Samples are taken from the first pump station from the drinking water intake pipe prior to treatment. Sample frequency is dependent on the flow of raw water relative to community demand. For example, TCPUD's McKinney Quail System helps serve an increase in the seasonal community and often does not pump or sample raw water daily during the winter months. The non-filtering water suppliers currently test raw water for total coliform and E. coli coliform. State standards are met based on total coliform results. The filtering water suppliers are not required to test for total coliform and E. coli coliform on raw water; turbidity monitoring is required. LPA and TCPUD also monitor for coliform, even though they are filtration systems. All purveyor results are included in the following report section (see Chapter IV).

All water suppliers are required to submit the maximum and mean of the regulated impurities to the Nevada Department of Environmental Protection Bureau of Safe Drinking Water and the California State Water Resources Control Board, Division of Drinking Water Programs, on a monthly basis. Any violations of monitoring or water quality parameter levels must be reported immediately. Depending on the violation type and duration, violations may require additional monitoring, reporting, and customer alerts, including boil orders or ongoing treatment.

To help suppliers identify potential problems and future treatment processes, TWSA developed a combined database which includes:

- maximum turbidity
- mean turbidity
- median turbidity
- maximum total coliform and E. coli coliform
- mean total coliform and E. coli coliform
- median total coliform and E. coli coliform
- total coliform and E. coli coliform colony counts and percentage of positive samples per year
- 90th percentile of constituent readings

The Annual Report summarizes raw water data for each purveyor for July 1, 2020, to June 30, 2021 reporting year, and yearly data ranging between July 1, 2011, and June 30, 2021. TWSA maintains a database with many purveyors' data, archived from 1997. The graphical data analysis includes the following:

- monthly mean and maximum turbidity
- annual mean and maximum turbidity
- monthly mean and maximum total coliform
- annual mean and maximum total coliform

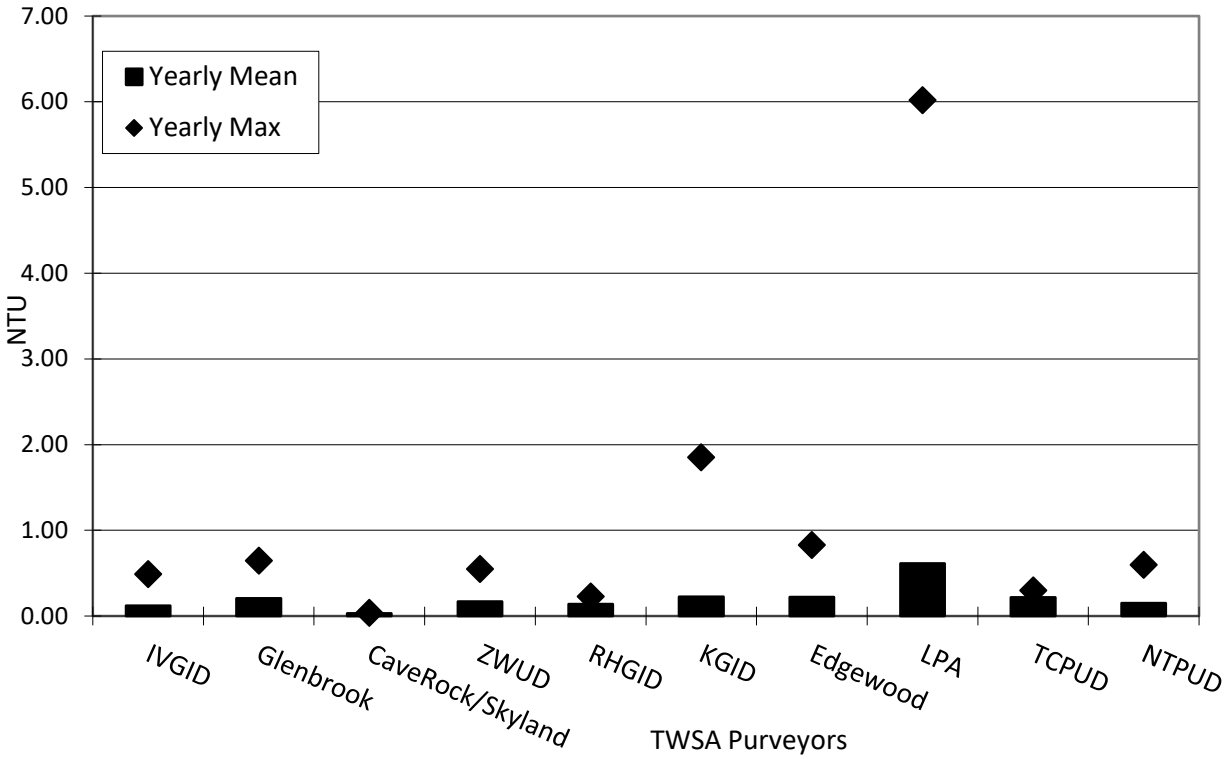
The analysis aims to identify trends and develop methods of maintaining and improving the supply and treatment processes. Following is a brief overview of the purveyors' combined raw water sample results during the 2020-2021 reporting year, listed as 2020 in tables and figures, and between the 2011 and

2021 reporting years. Individual reports are located in the agency sections within Chapter IV of this document.

Turbidity

During the 2020-2021 reporting year, the maximum turbidity readings for the purveyors ranged between 0.040 NTU and 6.02 NTU (Table 5.0 and Figure 1.0). The purveyors' maximum turbidity readings occurred at different times of the year but tended to occur during summer storm events that produced winds from the south (Tables 5.0, 5.1). The maximum turbidity reading, 6.02 NTU, occurred on April 14, 2021, at LPA. A precipitation event producing 0.39 inches of rain paired with winds from the southeast likely influenced the high turbidity reading (Table 5.3). Lakeside Park Association (LPA) is a filtration water purveyor, and the maximum turbidity value of 6.02 NTU is above the requirement for filtration avoidance of 5 NTU. LPA conducted turbidity analysis on 346 raw water samples, and three results were above 5 NTU equaling 0.87% of samples for the reporting year. Of the purveyors with filtration avoidance, KGID had the highest maximum annual turbidity value of 1.85 NTU, taken during a wind event that produced 1.7-17.0 MPH winds with gusts up to 17.0 MPH from the Southwest. All results from KGID were below the 5 NTU requirement for filtration exemption, and seven results were greater than 1.00 NTU.

Figure 1.0: Comparison of Annual Mean and Maximum Turbidity Results for TWSA Purveyors for the 2020-2021 Reporting Year.



Annual maximum turbidity readings were abundant throughout the reporting year. Two purveyors reported multiple maximum readings; TCPUD annual maximum, 0.30 NTU was recorded three times, Cave Rock/Skyland annual maximum of 0.040 NTU occurred 11 times. The reporting year shows a trend

between annual maximums below 0.30 NTU and increased frequency, whereas readings greater than 0.50 NTU are less frequent, as seen in the 2020-2021 data set (Table 5.0).

Following historical trends, maximum turbidity readings have been correlated to wind events producing a wave mixing effect. Of the ten TWSA water purveyors, six had maximum turbidity readings in the summer; IVGID September, Glenbrook August, Cave Rock Skyland July and August, RHGID July, TCPUD July – September, NTPUD September (Table 5.1). The winter season of 2021 had four maximum turbidity readings at; Cave Rock/Skyland December, ZWUD January, KGID March, Edgewood March. Annual spring runoff likely influenced the maximum turbidity reading at Cave Rock/Skyland in May, and LPA in April 2021.

Table 5.0: Summary of TWSA raw water turbidity between July 1, 2020 and June 30, 2021.

2020-2021 (NTU)	IVGID	Glenbrook	Cave Rock/ Skyland	ZWUD	RHGID	KGID	Edgewood	LPA	TCPUD	NTPUD
Mean	0.12	0.21	0.031	0.17	0.14	0.23	0.22	0.61	0.22	0.15
Maximum	0.49	0.65	0.040	0.55	0.23	1.85	0.83	6.02	0.30	0.60
Date Maximum	17-Sep	5-Aug	*Multiple	6-Jun	1-Jul	23-Mar	13-Mar	14-Apr	10-July 22-Aug 23-Sep	17-Aug
Highest Monthly Mean	0.16	0.25	0.036	0.25	0.18	0.29	0.29	1.30	0.23	0.20
Date Mean	Sep-20	Jun-20	July 20 Nov. 20	Jun-21	Sep.	Feb-21	Sep-20 Oct-20	May-21	July	Jul-20 Aug-20

*Dates for Cave Rock/Skyland Maximum Turbidity: 6-July, 29-July, 31- Aug, 12-Dec to 16-Dec, 28-May, 11-Jun, 24-Jun.

Annual mean turbidity results ranged from 0.031 NTU to 0.61 NTU for the 2020-2021 reporting year (Figure 1.0). The highest annual mean turbidity reading for the TWSA purveyors was 0.61 NTU and was from LPA's intake, a system operated with filtration. The highest annual mean turbidity result for the filtration exempt purveyors is 0.23 NTU for KGID (Table 5.1). Annual mean turbidity decreased for eight purveyors and increased for two between this reporting year and the previous (Table 5.3). The highest monthly mean turbidity calculations ranged between 0.20 NTU and 0.57 NTU and occurred primarily during September 2020 with results at IVGID, RHGID, and Edgewood (Table 5.0).

For the 10-year reporting period of July 1, 2011, to June 30, 2021, maximum turbidity for each purveyor has varied. For the 10-year period, the highest maximum turbidity reading was recorded at LPA, 20.20 NTU, during the 2016-2017 reporting year, and the lowest maximum turbidity reading, 0.040 NTU, was recorded in 2020 at Cave Rock/Skyland; both purveyors operate with filtration (Table 5.2 and Figure 1.1). For filtration exempt purveyors, the highest and lowest annual mean for the 10-year reporting period were calculated for Glenbrook, with 7.21 NTU in 2014 and 0.35 NTU in 2011 and 2012. Although no trends visually appear, many of the maximum turbidity values remained below 5 NTU except NTPUD in 2013, Glenbrook 2014, LPA 2016, and LPA 2018 (Figure 1.2). Annual maximum turbidity was the lowest in 2012 for the 10-year reporting period, with values 0.26 NTU-1.00 NTU (Table 5.2). For the 2020-2021 reporting year (noted as 2020 in Tables and Figures), annual maximum turbidity values have been lower across seven of ten purveyors and increased for three compared to the previous reporting year. Linear trendline data for the 10-year period shows that five purveyors have a decreasing annual maximum turbidity trend, and five show an increasing trend in annual maximum turbidity (Figure 1.1).

Historical annual mean turbidity is relatively consistent for each of the purveyors (Table 5.3). The annual range throughout the 10-year reporting years and all purveyors is 0.031 NTU to 0.62 NTU (Table 5.3). For filtration exempt purveyors, the range in annual mean over the 10-year reporting period is 0.10 NTU at Glenbrook in 2011 and 0.43 NTU at NTPUD in 2013 (Table 5.3). The 2020-2021 reporting year annual mean turbidity values range from 0.031 NTU to 0.61 NTU (Figure 1.0). Although no inclusive trends visually appear, over the 10-year reporting period, linear trendline data for annual mean turbidity show three purveyors with decreasing trends, five with increasing trends, and two with stable trends (Figure 1.2).

The turbidity values for Cave Rock/Skyland for the 2020-2021 reporting year are representative of the drought conditions seen throughout the Lake Tahoe watershed. The annual minimum for 2020-2021 is 0.002 NTU, the lowest value in the TWSA Cave Rock/Skyland data set from 2002-2021. Additional analysis shows the annual minimum during the drought year of 2015 as 0.01 NTU, with the second-lowest annual maximum of 0.26 NTU, after this reporting year. The similarities between 2015 and 2020 show a likely correlation between drought conditions and turbidity at the Cave Rock/Skyland intake due to the reduction of seasonal runoff. Additionally, the following purveyors had maximum turbidity values similar to the 2015 reporting year: ZWUD, RHGID, LPA (Table 5.2). The following purveyors had annual mean values similar to 2015: Glenbrook, RHGID, KGID (Table 5.3)

Table 5.1: Summary TWSA raw water turbidity data for the 2020-2021 reporting year in relation to weather.

2020-2021 (NTU)	IVGID	Glenbrook	Cave Rock/ Skyland	ZWUD	RHGID	KGID	Edgewood	LPA	TCPUD	NTPUD
Maximum	0.49	0.65	0.040	0.55	0.23	1.85	0.83	6.02	0.30	0.60
Date Maximum	17-Sep	5-Aug	*Multiple	6-Jun	1-Jul	23-Mar	13-Mar	14-Apr	*Multiple	17-Aug
Sustained Wind Speed Average/ Max	0.5 - 6.0	0.0-4.0	See Table 5.3 (a)	2.7 - 13.0	0.7 - 8.9	1.7 - 17.0	0.5-17.0	0.1- 6.0	See Table 5.3 (b)	3.8 - 11.0
Wind Gust Max Speed	7	7.6		19	12.30	17	17	6.00		0
Wind Direction	ESE	SW		S	SW	SW	SE	SE		ESE
Weather Event/ Precipitation (in)	0.00	0.00		0.00 inches	0.00 inches	0.00 inches	0.07 Rain	0.39 Rain		0.00

Table 5.1 (a): Summary Cave Rock/ Skyland raw water turbidity data for the 2020-2021 reporting year in relation to weather.

2020-2021 (NTU)	Cave Rock / Skyland											TCPUD		
Maximum	0.040											0.30		
Date Maximum	6-Jul	29-Jul	31-Aug	12-Dec	13-Dec	14-Dec	15-Dec	16-Dec	28-May	11-Jun	24-Jun	10-Jul	22-Aug	23-Sep
Sustained Wind Speed Average/Max	1.0/ 11.2	1.9/ 10.5	2.1 / 16.8	6.2 / 28.6	1.2 / 23.0	0.0 / 3.4	0.2 / 10.3	0.3 / 8.9	1.2 / 8.0	3.1 / 6.0	1.0 / 6.8	0.2 - 3.6	0.2 - 4.9	0.1 - 4.0
Wind Gust Max Speed	12.3	15	19.9	32.4	27.5	4.9	12.3	9.8	11	10	8	5.8	9.2	6.9
Wind Direction	NE	N	NNE	NNW	NNE	SE	ESE	ESE	ENE	SW	NE	NW	NW	WNW
Weather Event/ Precipitation (in)	0.00	0.00	0.00	0.00	0.11 Rain/ snow	0.00	0.04 Rain	0.05 Rain	0.00	0.00	0.00	0.00	0.00	0.00

Table 5.2: Comparison of TWSA purveyors' annual maximum turbidity results for the July 1, 2011-June 30, 2021 reporting years.

(units NTU)	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
IVGID	0.41	0.53	0.38	0.78	0.63	0.79	0.76	0.80	0.79	0.49
Glenbrook	0.35	0.35	1.00	7.21	1.37	0.59	0.77	0.81	1.13	0.65
CaveRock/ Skyland	3.55	1.00	0.99	1.00	0.26	0.46	0.39	0.30	0.36	0.040
ZWUD	0.67	0.94	0.81	0.91	0.57	0.48	0.83	0.90	0.84	0.55
RHGID	0.30	0.26	0.23	0.29	0.27	0.35	0.29	0.38	0.33	0.23
KGID	0.95	0.61	0.61	0.66	0.60	4.28	0.81	1.38	0.65	1.85
Edgewood	0.80	0.75	0.45	0.75	0.70	0.70	0.92	0.66	0.44	0.83
LPA	1.40	1.00	1.00	1.00	5.60	20.20	1.67	17.00	4.59	6.02
TCPUD	0.51	0.42	0.42	0.31	0.40	0.50	0.60	0.50	0.50	0.30
NTPUD	1.30	0.85	5.01	0.99	0.92	1.03	0.65	0.50	0.85	0.60

Historic information is available upon request.

Table 5.3: Comparison of TWSA purveyors' annual mean turbidity results for the July 1, 2011-June 30, 2021 reporting years.

(units NTU)	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
IVGID	0.15	0.14	0.12	0.14	0.16	0.18	0.18	0.19	0.18	0.12
Glenbrook	0.10	0.15	0.12	0.23	0.19	0.17	0.22	0.19	0.23	0.21
Cave Rock/ Skyland	0.14	0.39	0.23	0.22	0.12	0.21	0.23	0.16	0.17	0.031
ZWUD	0.18	0.16	0.18	0.17	0.30	0.16	0.24	0.26	0.30	0.17
RHGID	0.13	0.11	0.10	0.11	0.15	0.14	0.13	0.12	0.20	0.14
KGID	0.25	0.19	0.17	0.18	0.23	0.24	0.23	0.19	0.17	0.23
Edgewood	0.18	0.19	0.14	0.18	0.14	0.16	0.21	0.24	0.23	0.22
LPA	0.60	0.33	0.30	0.31	0.26	0.62	0.23	0.26	0.28	0.61
TCPUD	0.31	0.22	0.19	0.22	0.17	0.21	0.60	0.22	0.27	0.22
NTPUD	0.28	0.27	0.43	0.24	0.20	0.23	0.27	0.21	0.22	0.15

Historic information is available upon request.

Figure 1.1: Comparison of TWSA Purveyors' Maximum Turbidity Results from 2011 to 2021.

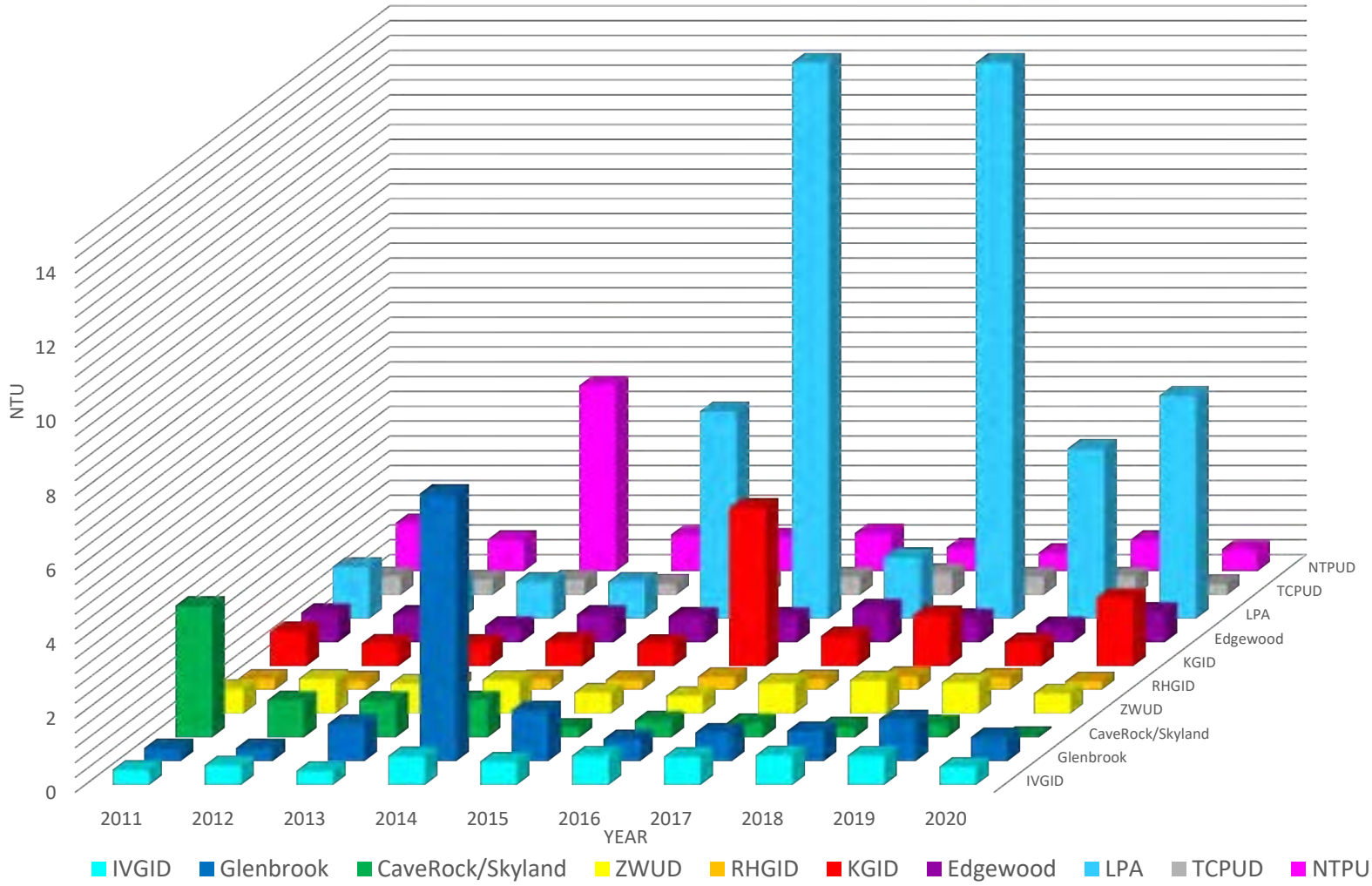
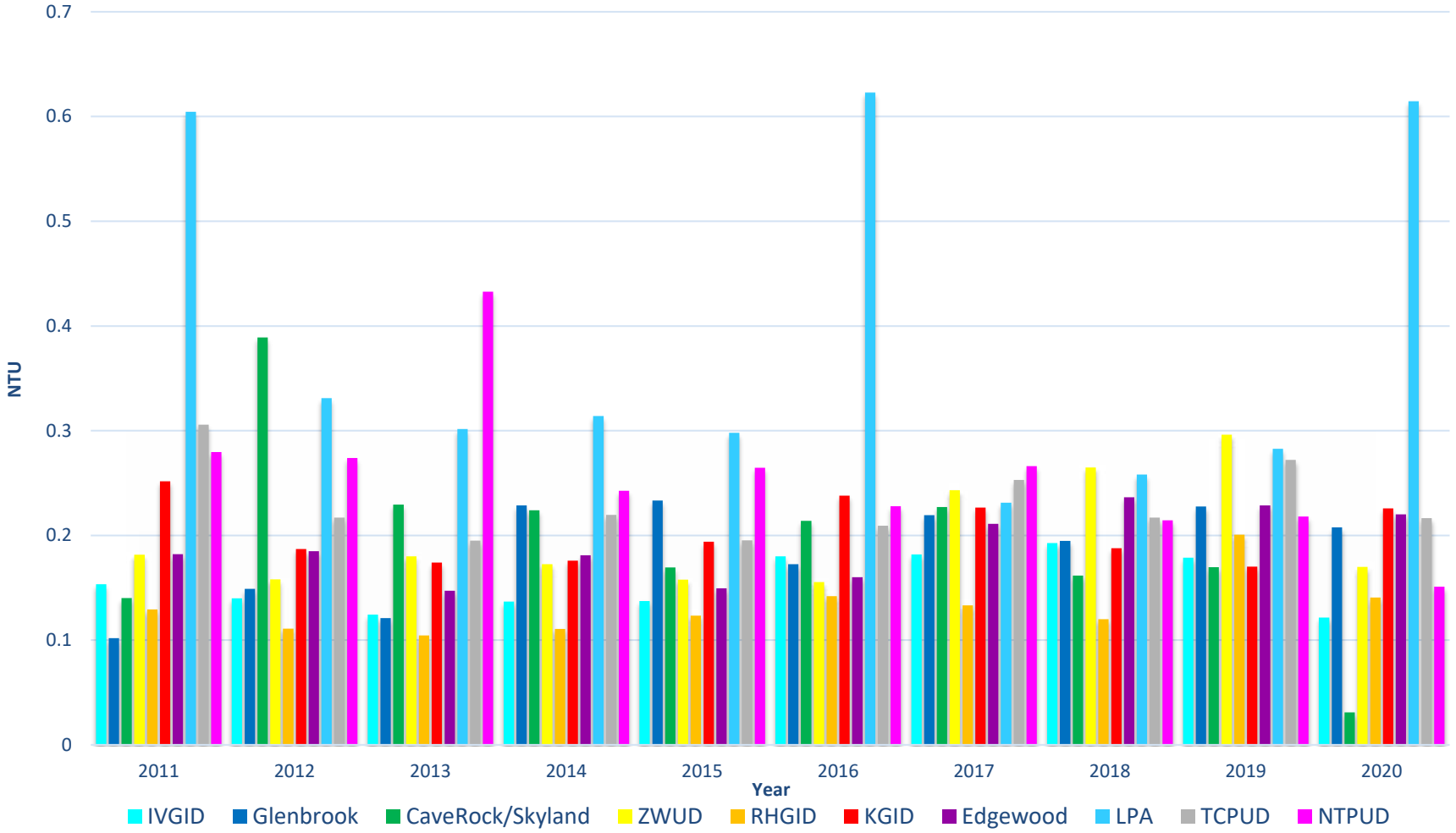


Figure 1.2: Comparison of TWSA Purveyors' Annual Mean Turbidity for the 2011-2021 Reporting Years.

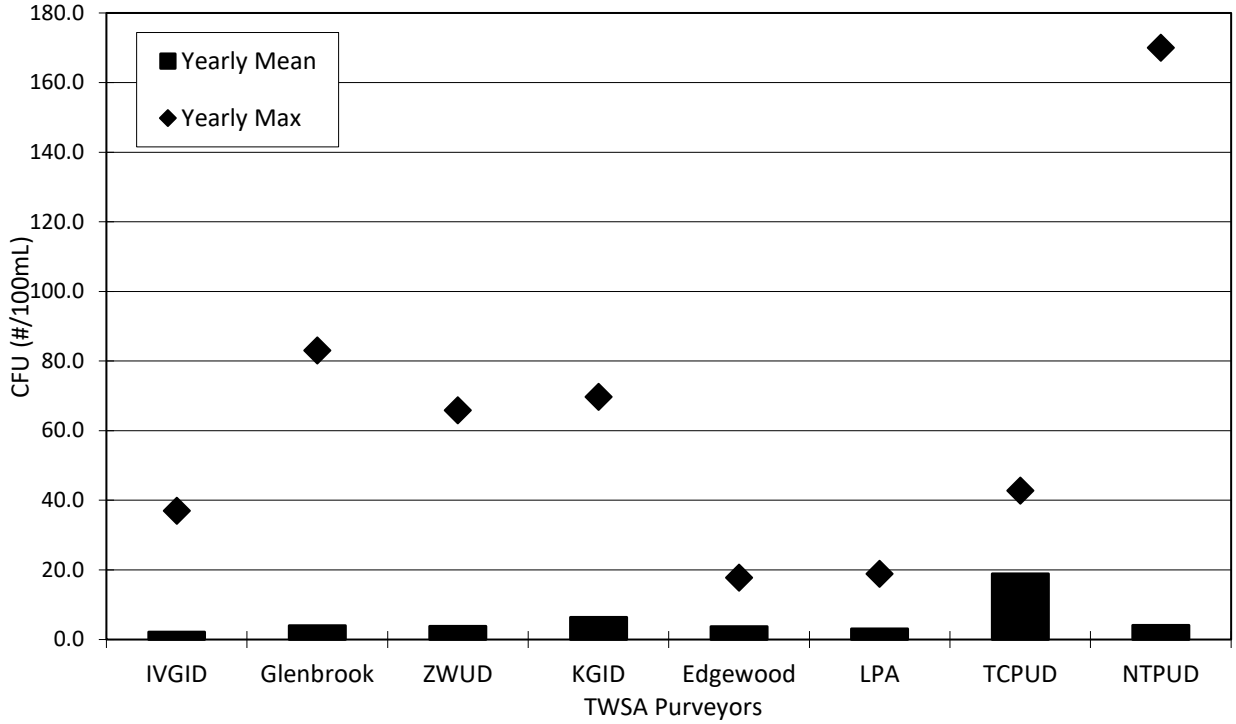


Coliform

Maximum total coliform is the highest number of colony-forming units per 100 mL (CFU) or most probable number of colony-forming units per 100 mL (MPN) counted from a single raw water sample during a reporting month or year. The mean total coliform count is the average number of colonies counted per individual sample during the reporting month or year.

During the 2020-2021 reporting year, the maximum total coliform readings for the purveyors were between 17.8 CFU/100 mL and 170 CFU/100 mL (Table 5.4). The purveyors' annual mean total coliform results were between 2.16 CFU/100 mL and 18.87 CFU/100 mL (Table 5.4). The maximum reading of 170 CFU/100 mL was taken at NTPUD on September 29, 2020, and was likely influenced by the increase in temperature to 70.0^{o}F from a weekly average of 60.0^{o}F paired with mixing caused by sustained winds of 1.5 mph - 8.2 mph (Table 5.4). Filtration exemption criteria require 90% of measurements from the previous six months to be below 100 CFU/100 mL. Before September 29, 2020, NTPUD analyzed 79 raw water samples for total coliform between March 1, 2020, and September 30, 2020. Only one result was greater than 100 CFU/100 mL equaling 1.27% of measurements from the previous six-month period. The annual maximum reading of 170 CFU/100 mL is less than the previous year's max of 200.5 from Glenbrook, similar to results at LPA in 2012 (160.7 CFU/100 mL) and KGID in 2018 (118.4 CFU/100 mL).

Figure 1.3: Comparison of Annual Mean and Maximum Total Coliform for TWSA Purveyors for the 2020-2021 Reporting Year.



For the 2020-2021 reporting year annual mean total coliform values range is 2.16 CFU/100 mL to 18.87 CFU/100 mL. The annual mean was highest at TCPUD with a result of 18.87 CFU/100 mL, the highest result for filtration exempt purveyor was KGID with 6.36 CFU/100 mL. In comparison to the previous reporting year, four purveyors had decreased annual mean results, and four had increased (Figure 1.5).

Table 5.4: For the 2020-2021 reporting year, a comparison of annual maximum total coliform (CFU or MPN/100 mL) and weather data by date for TWSA water suppliers.

Annual Total Coliform CFU (#/100 mL)	IVGID	Glenbrook	ZWUD	KGID		Edgewood	LPA	TCPUD	NTPUD
Mean	2.16	4.03	3.86	6.36		3.69	3.09	18.87	4.10
Maximum	37	83.1	65.9	69.7		17.8	18.9	42.8	170
Date Maximum	8-Sep	1-Sep	5-Aug	14-Sep	14-Oct	24-Aug	4-Aug	10-Sep	29-Sep
Sustained Wind Speed Average/Max	2.0 - 14.1	0.2-5.4	2.6 - 12.0	0.3 - 9.0	0.0 - 3.0	0.3- 6.0	0.1 - 5.0	0.1 - 2.0	1.5 - 8.2
Wind Gust Speed	17.00	7.6	14.0	9.0	3.0	6.0	5.0	2.2	0.0
Daily Max Temp (°F)	66.6	77.0	80.1	79.8	69.8	83.5	83.1	65.5	70.0
1 Week Mean Temperature (°F)	68.7	64.1	67.1	60.2	54.1	69.2	66.7	59.5	60.0

For the 10-year reporting period, July 1, 2011 to June 30, 2021, the maximum total coliform for each purveyor has varied. Although no trends visually appear, maximum total coliform results were below 100 CFU/100 mL for all purveyors during the 2015-2016 reporting year. Additionally, the 10-year reporting period had the highest annual maximum total coliform results in 2017-2018. Results ranged from 28.8 CFU/100 mL - 613 CFU/100 mL, the filtration exempt water purveyor 10-year maximum 500 CFU/100 mL, was recorded at NTPUD. The filtering purveyor 10-year maximum of 613 CFU/100 mL was recorded at LPA (Figure 1.5 and Table 5.5).

For the 2020-2021 reporting year, maximum total coliform values were lower across four of eight purveyors in comparison to the previous reporting year. Linear trendline data for the 10-year period shows that six purveyors have increasing maximum total coliform results, and two have a decreasing trend (Figure 1.5). It should be noted that, during the 2015-2016 reporting year, NTPUD had a statistical anomaly that resulted in the removal of three "Too Numerous to Count" results from the data set. See the 2016 Watershed Control Annual Program Report for full details.

Historical annual mean total coliform results are relatively consistent for each of the purveyors. The annual range throughout the 10 –year reporting period and purveyors is 0.00 CFU/100 mL to 69.36 CFU/100 mL (Table 5.8). Linear trendline data for the 10-year reporting period for annual mean total coliform results show increasing trends for all purveyors, likely influenced by the increase in total coliform seen in the 2017 reporting year (Figure 1.6). See the 2018 TWSA Watershed Control Annual Report for discussion on factors influencing the watershed.

Table 5.5: Comparison of TWSA purveyors' annual maximum Total Coliform results for the July 1, 2011-June 30, 2021 reporting years.

(units CFU/ 100 mL)	2011	2012	2013	2014	2015	2016	*2017*	2018	2019	2020
IVGID	20	20	69	43	37	16	76	1.00	1	37
Glenbrook	28.8	40.6	30.6	40.6	62.4	16.4	28.8	28.80	200.5	83.1
ZWUD	11.1	50.4	30.6	19.2	32.4	38.4	29	22.20	30.6	65.9
KGID	22.2	200.5	200.5	200.5	83.1	200.5	144	118.40	88.5	69.7
Edgewood	20	27.5	26.2	16.1	60.9	20.3	35.5	36.40	45.20	17.8
LPA	32.8	160.7	52	12.1	7.5	10.9	613	29.50	37.3	18.9
TCPUD	16.4	2	3.1	13.7	3.1	5.1	67.7	55.40	32.7	42.8
NTPUD	220	50	50	110	50	70	500	23.00	30	170

Table 5.: Comparison of TWSA purveyors' annual mean Total Coliform results for the July 1, 2011-June 30, 2021 reporting years.

(units CFU/100 mL)	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
IVGID	0.21	0.24	0.56	0.46	0.35	0.24	1.95	0.01	0.01	2.16
Glenbrook	1.34	4.00	1.98	3.14	4.01	2.48	3.45	2.82	9.34	4.03
ZWUD	1.25	3.20	1.79	3.19	2.51	3.54	3.07	3.06	4.30	3.86
KGID	1.66	2.90	3.25	5.82	2.70	9.78	6.30	5.42	5.98	6.36
Edgewood	1.52	2.10	1.64	1.20	1.71	2.95	7.33	8.30	4.23	3.69
LPA	5.51	11.80	6.82	2.32	1.12	1.84	69.36	4.92	4.03	3.09
TCPUD	3.20	0.00	0.00	1.00	1.02	3.73	18.22	15.13	8.86	18.87
NTPUD	4.32	2.25	3.07	4.42	2.97	2.52	11.21	1.85	1.82	4.10

Figure 1.4: Comparison of TWSA Purveyors' Annual Maximum Total Coliform from 2011 to 2021.

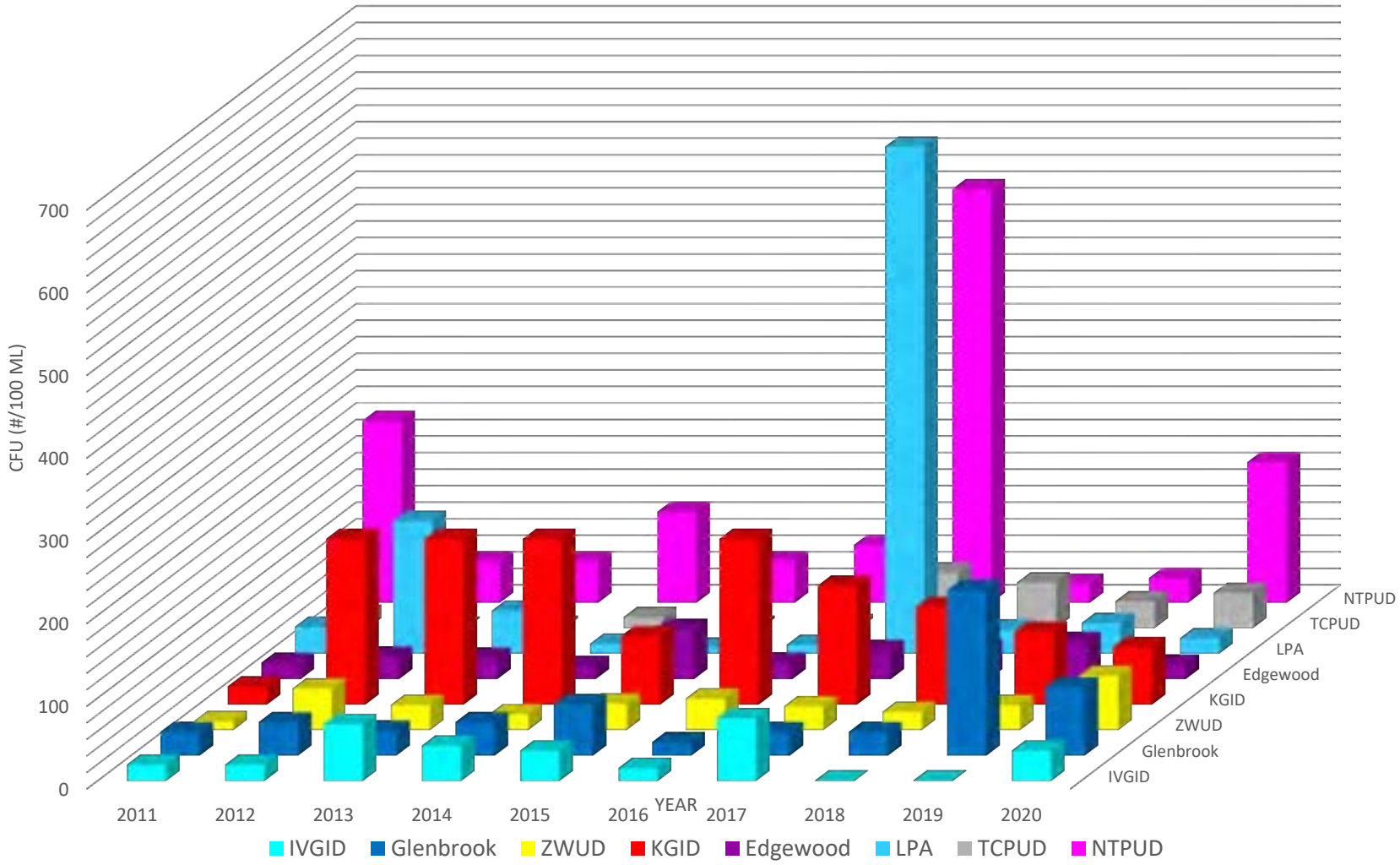
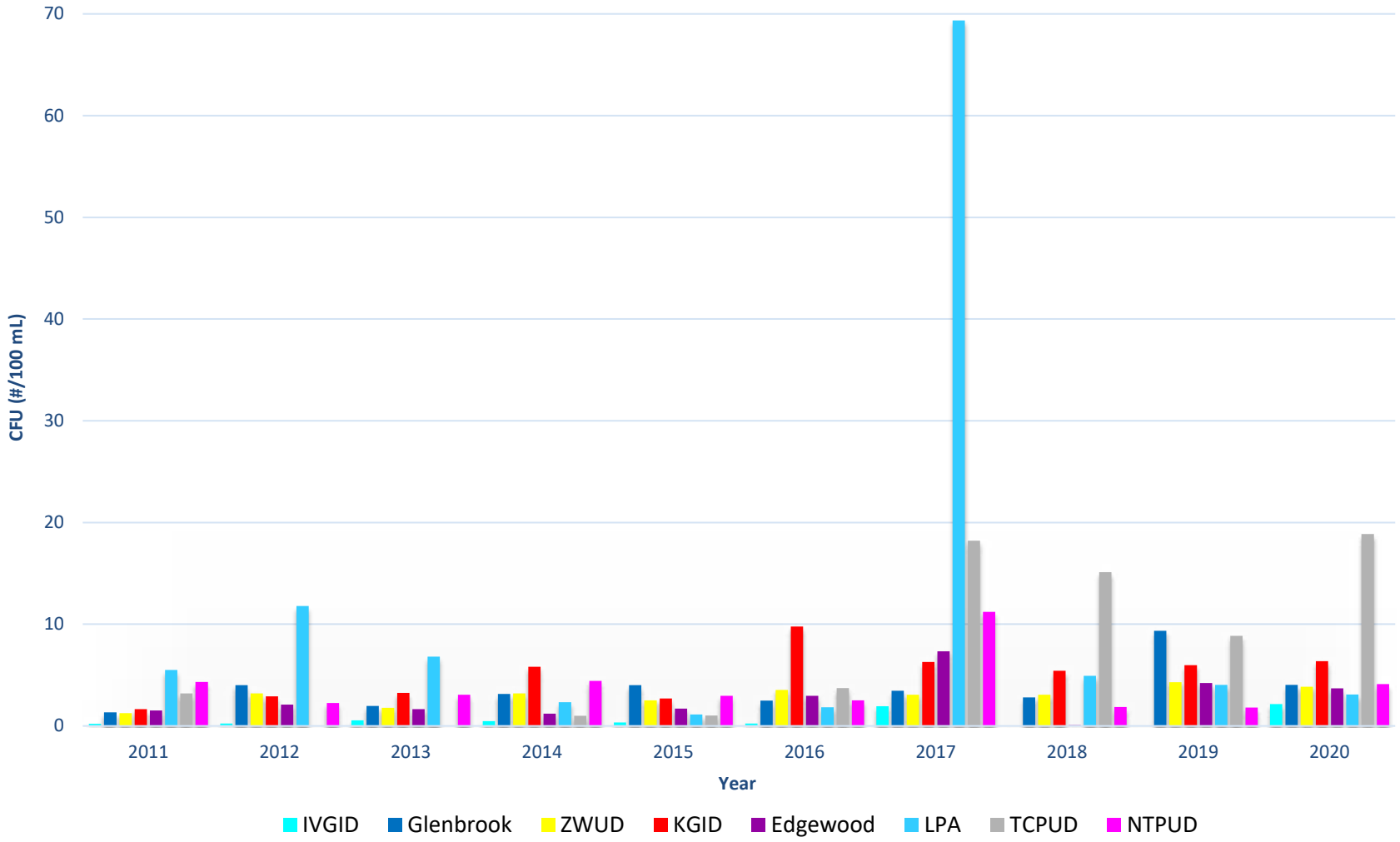


Figure 1.5: Comparison of TWSA Purveyors' Annual Mean Total Coliform Results from 2011 to 2021.



Surface Water Monitoring

In the past (1999 to 2010), IVGID partnered with the NDEP to provide a volunteer surface water monitoring program on the north shore of Lake Tahoe. The Incline Village Clean Water Team was a volunteer water monitoring program in the Incline Village/Crystal Bay area, focused on surface water monitoring at eleven locations on a monthly or bi-monthly basis. At each site, volunteers monitored dissolved oxygen, electrical conductivity, gauge height, pH, and streamflow and collected two grab samples. The grab samples were analyzed in the lab for total coliform, fecal coliform, and turbidity. Results from surface water samples led IVGID staff to broken water pipes and identified social recreation areas (dog walking areas). This information was valuable in providing advice on the future location of a new dog park that would combine areas of high dog use into a managed site. Due to a lack of volunteer support, the Clean Water Team is not currently in operation.

In 2003, IVGID added a beach monitoring program. Once a week throughout the summer season and biweekly in the winter, staff collects samples from four beach sites and the mouths of two streams. The samples are analyzed in the lab for turbidity, total coliform, and E. coli coliform. The results of the tests are used to determine if additional studies are needed to assess the effect of recreational activity on source water quality. Initial results indicate an increasing trend in the total coliform at beach and creek sites during the summer months. The goal is to identify and remove or reduce potential contaminating sources. IVGID staff continues to operate their stream and beach monitoring program.

Climatic Database

In 2004, IVGID staff started analyzing climatic databases to provide accessible weather data for causal correlation analyses. The weather data analyzed includes wind speed (sustained and gusts), wind direction, precipitation, humidity, temperature (maximum, minimum, and weekly average), and snow depth. The web-based weather data provided from Weather Underground, *www.wunderground.com*, is used extensively in analysis.

Safe Drinking Water Information System (SDWIS)

The EPA maintains the Safe Drinking Water Information System to track and inform people if a water purveyor has violated the Safe Drinking Water Act. These violations can relate to health, reporting, or monitoring requirements that were not met. TWSA purveyors had one violation during the reporting year.

Table 5.7: Violations by TWSA purveyors of the Health, Reporting, or Monitoring Requirements of the Environmental Protection Agency's Safe Drinking Water Act (SDWIS 2020-2021).

Incline Village GID

Monitoring and Reporting and other Violations: system failed to complete all samples or sample in a timely manner or had another non-health-based violation. A significant monitoring violation means the system failed to take a large percentage of the required samples. Non-significant monitoring violations indicate that the water system failed to take some of the required samples but did do some of the required sampling.

Type of Violation	**Compliance Period Begin Date**	**Compliance Period End Date**
Monitoring of Treatment (SWTR-Unfilt/GWR), non-health-based, non-significant violation.	March-01-2021	March-31-2021

Drinking Water Rule or Contaminant

Surface Water Treatment Rule

Follow Up Action	**Date of Response**
State Public Notification Requested	May-21

The following section provides detailed water quality reports for each of the TWSA water purveyors.

Incline Village General Improvement District
Water Quality Data Summary 2020-2021

During the 2020-2021 reporting year, the Incline Village General Improvement District (IVGID) remained in compliance with Federal and State water quality requirements. During the same period, the Environmental Protection Agency (EPA) notes IVGID received one violation of the monitoring requirements of the Safe Drinking Water Act. A full description is available in section III of this report (Table 5.7). Additional regulatory information for IVGID is provided in the Consumer Confidence Report found at the end of this section.

Turbidity

Between July 1, 2020, and June 30, 2021, IVGID met Federal and State guidelines for turbidity by remaining within the regulatory limits. The monthly mean and maximum turbidity measurements did not exceed 0.50 NTU (Figure 5.0).

The highest turbidity reading for the 2020-2021 reporting year was 0.49 NTU, coinciding with a wind event on September 17, 2020. Sustained winds from the east/southeast of 0.5-6.0 mph with gusts up to 7 mph likely affected the turbidity results (Table 5.1). The highest monthly mean turbidity, 0.16 NTU, occurred in September 2020 (Table 6.0, Figure 2.1). The annual mean turbidity for IVGID was 0.12 NTU, and 90% of results were below 0.14 NTU.

Table 6.0: IVGID source water turbidity data from July 1, 2020, through June 30, 2021. Turbidity analyses completed on samples collected daily from raw water at the IVGID intake.

Month	Monthly max (NTU)	Date monthly max	Monthly mean (NTU)	Monthly median (NTU)	90th percentile
Jul-20	0.31	29	0.12	0.11	0.14
Aug-20	0.25	7	0.11	0.11	0.14
Sep-20	0.49	26	0.16	0.11	0.42
Oct-20	0.33	2	0.11	0.1	0.11
Nov-20	0.34	23	0.14	0.11	0.24
Dec-20	0.33	11	0.13	0.12	0.18
Jan-21	0.28	16	0.12	0.11	0.14
Feb-21	0.21	3, 27	0.11	0.1	0.13
Mar-21	0.10	27	0.10	0.1	0.10
Apr-21	0.36	3	0.11	0.09	0.11
May-21	0.14	30	0.13	0.13	0.14
Jun-21	0.14	8	0.11	0.11	0.13

IVGID's turbidity readings have not reached or exceeded 1.0 NTU since 2002. From 1997-2002, maximum IVGID turbidity readings ranged from 1.0 to 1.9 NTU. The annual maximum, mean, and median turbidity results for the 2020-2021 reporting year were lower than the previous reporting year (Figure 2.1). Linear trendline data shows an increase in annual maximum and mean turbidity for the IVGID drinking water intake from July 1, 2011, – June 30, 2021, with all results less than 1.0 NTU (Figure 2.1).

Coliform

IVGID met Federal and State guidelines for total coliform and E. coli coliform. The maximum total coliform count was 37 CFU/100 mL, greater than the previous years' maximum of 1 CFU/100 mL and less than the 2017 reporting 10-year maximum of 76 CFU/100 mL (Table 6.1). The 2020-2021 maximum total coliform result of 37 CFU/100 mL occurred on September 8, 2020. The result was likely caused by wind-wave action produced by a southeast wind event that produced sustained winds of 2.0-14.1 mph with gusts up to 17 mph. Temperature was unlikely influential, as the daily maximum temperature was below the weekly average. A full description of weather paired with maximum total coliform readings is available (Table 5.5).

Total coliform was detected in 25% of the 158 samples analyzed, greater than the previous reporting year detection rate of 1% and the highest in the 10-year reporting period (Table 6.1, Figure 2.3). Annual total coliform maximums show a decreasing trend over the 10-year reporting period from July 1, 2011, to June 30, 2021 (Figure 5.3). Of the 158 results, 90% of samples were below 6.3 CFU/100 mL (Table 5.8, Table 6.1, and Figure 2.3). The annual mean total coliform count was 2.16 CFU/100 mL for the 2020-2021 reporting year. Annual mean total coliform results show a slightly increasing linear trend from 2011-2021 (Figure 5.3).

IVGID also completed tests for E. coli coliform on the 158 source water samples. E. coli coliform was detected in two samples during the 2020-2021 reporting year, and both results were 1 CFU/100 mL. E. coli coliform was detected in 1.3% of samples taken by IVGID, and the annual mean E. coli coliform result was 1.00 CFU/100 mL (Table 6.1 and 9.2).

Table 6.1: IVGID annual source water total and E. coli coliform data results from July 1, 2020, through June 30, 2021. Coliform analyses completed on samples collected daily from raw water at the IVGID intake.

	Total coliform (# colonies/100 mL)	E. coli coliform (# colonies/100 mL)
Mean	2.16	0.01
Median	0.00	0.00
Max	37.00	1.00
90th Percentile	6.30	0.00
Colony-Forming Samples	40.00	2.00
Total Number of Samples	158.00	158.00

Table 6.2: IVGID monthly source water total and E. coli coliform data result from July 1, 2020, through June 30, 2021. Coliform analyses completed on samples collected daily from raw water at the IVGID intake.

	Monthly maximum total coliform (# colonies/100 mL)	Monthly mean total coliform (# colonies/100 mL)	Monthly maximum E.coli coliform (# colonies/100 mL)	Monthly mean E.coli coliform (# colonies/100 mL)
Jul-20	23.00	1.92	1.00	0.07
Aug-20	31.00	7.15	1.00	0.08
Sep-20	37.00	8.92	0.00	0.00
Oct-20	9.00	2.85	0.00	0.00
Nov-20	22.00	3.08	0.00	0.00
Dec-20	0.00	0.00	0.00	0.00
Jan-21	23.00	1.92	0.00	0.00
Feb-21	0.00	0.00	0.00	0.00
Mar-21	0.00	0.00	0.00	0.00
Apr-21	0.00	0.00	0.00	0.00
May-21	1.00	0.08	0.00	0.00
Jun-21	5.00	0.87	0.00	0.00

Figure 2.0: Monthly Mean and Max Turbidity Results for Incline Village General Improvement District between July 1, 2020 and June 30, 2021.

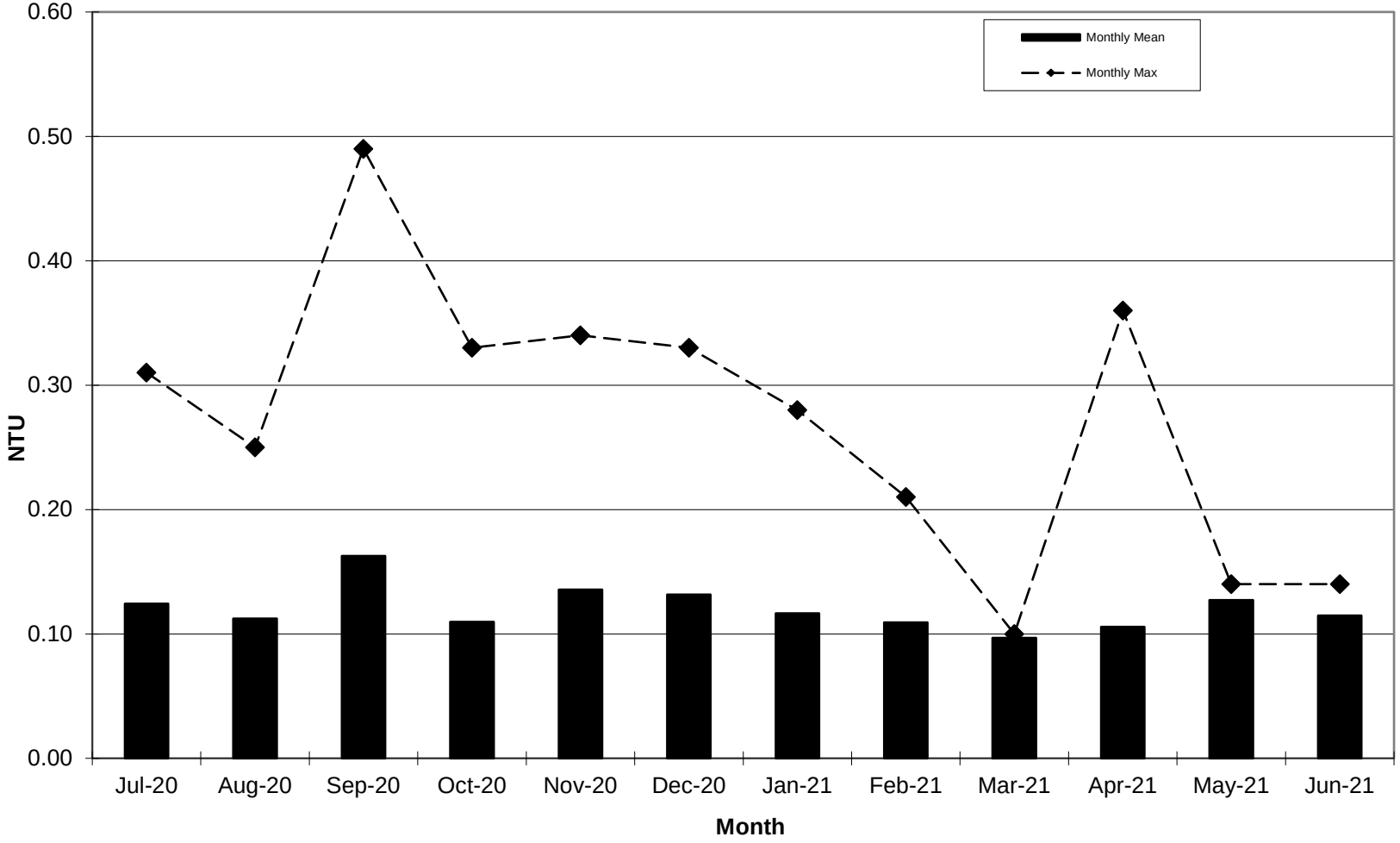


Figure 2.1: Yearly Mean and Max Turbidity Results for Incline Village General Improvement District between July 1, 2011 and June 30, 2021.

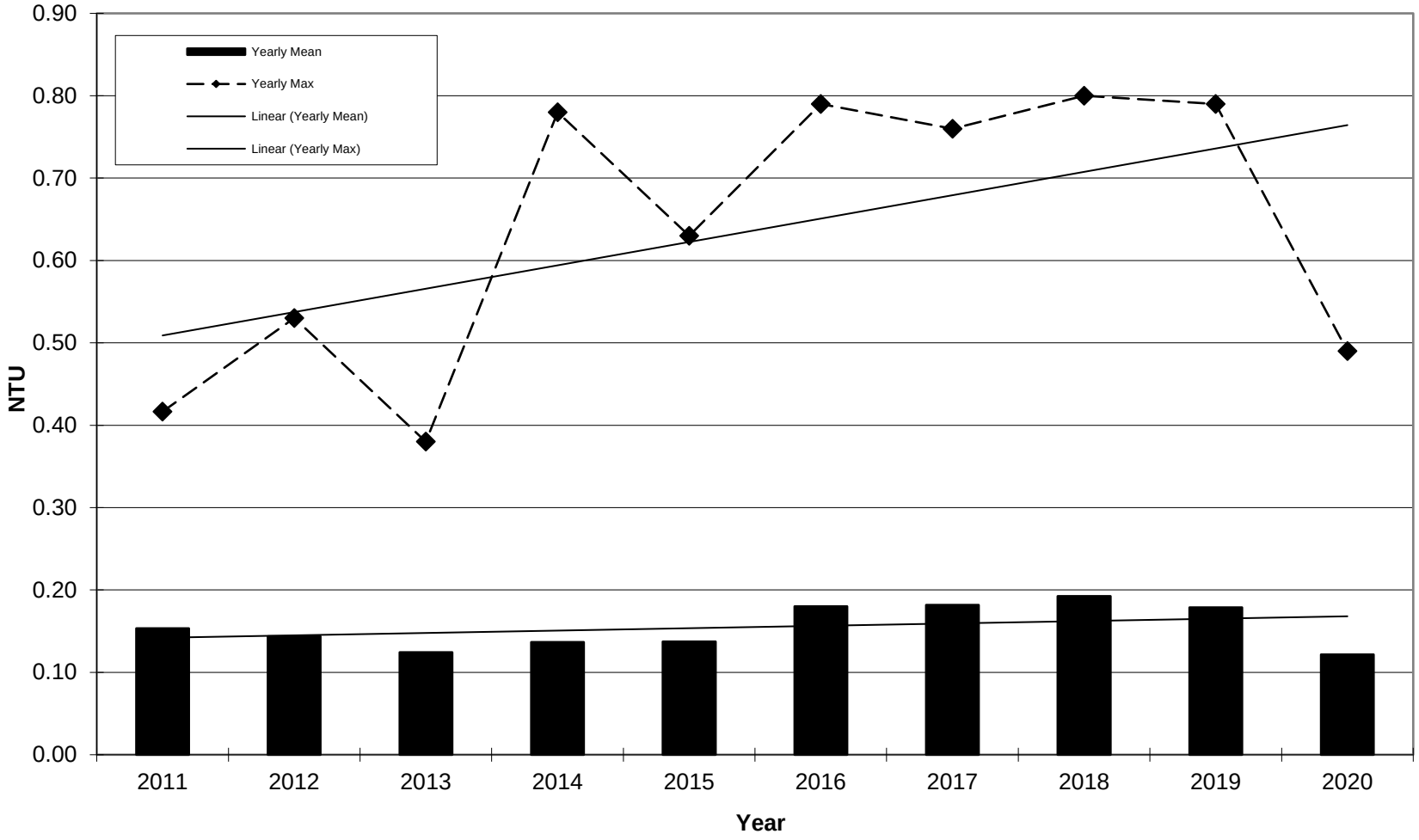


Figure 2.2: Monthly Mean and Max Total Coliform Results for Incline Village General Improvement District between July 1, 2020 and June 30, 2021.

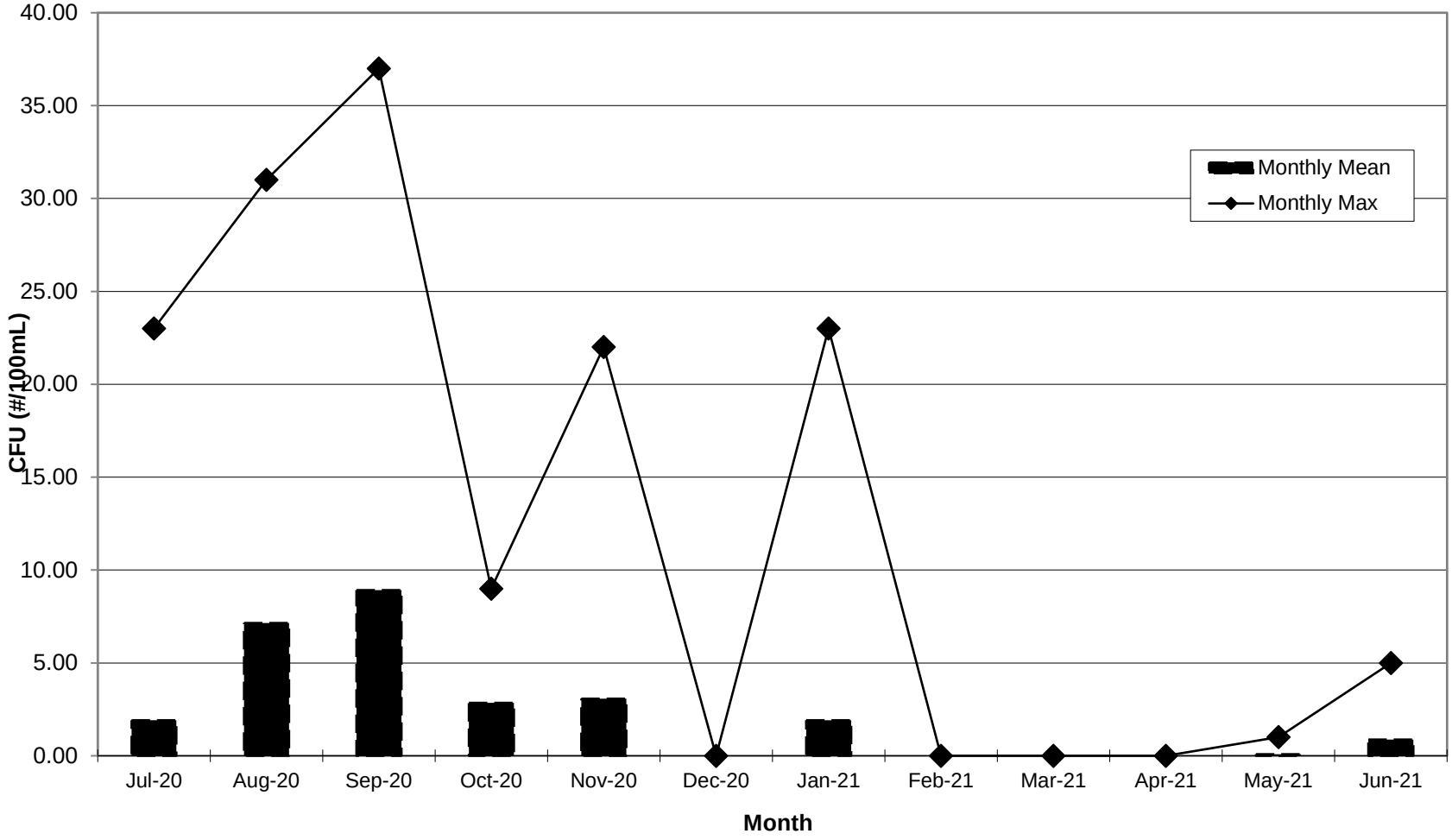
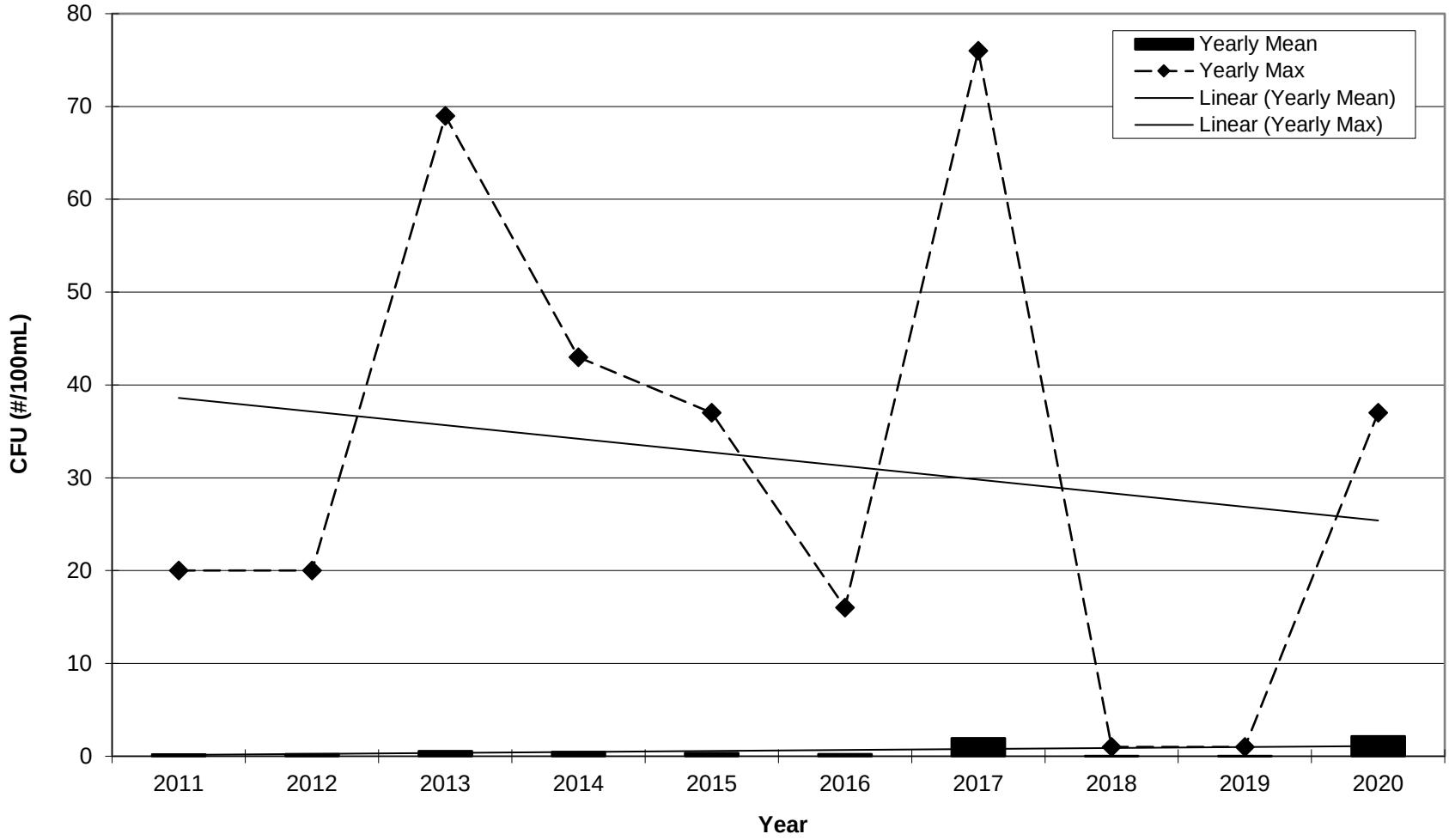


Figure 2.3: Yearly Mean and Max Coliform Results for Incline Village General Improvement District between July 1, 2011 and June 30, 2021.



WATER QUALITY CONSUMER CONFIDENCE REPORT 2021

FOR CALENDAR YEAR 2020

INCLINE VILLAGE PUBLIC WORKS
1220 SWEETWATER ROAD, INCLINE VILLAGE NV 89451 . OFFICE HOURS M-F 8AM TO 4:30PM
P: (775)832-1203 . F: (775)832-1260 . PW@IVGID.ORG . WWW.IVGIDPUBLICWORKS.ORG

This brochure is a snapshot of the quality of the water that we provided last year. Included are the details about where your water comes from, what it contains, and how it compares to Environmental Protection Agency (EPA) and Nevada state standards. We are committed to providing you with information because informed customers are our best allies. It is important that customers be aware of the efforts that are continually being made to improve their water systems.

For more information please contact:
Keith Rudd at (775) 832-1290.

SOURCE NAME	SOURCE WATER TYPE
Lake Tahoe Intake at Burnt Cedar Water Disinfection Plant	Surface Water

We add disinfectant to protect you against microbial contaminants. The Safe Drinking Water Act (SDWA) requires states to develop a Source Water Assessment (SWA) for each public water supply that treats and distributes raw source water in order to identify potential contamination sources. The state has completed an assessment of our source water. For the source water assessment results, please contact us.

MESSAGE FROM THE EPA

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons, such as those with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/CDC guidelines on the appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the Safe Drinking Water Hotline (800-426-4791) or visit www.epa.gov/safewater.

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that the water poses a health risk.

More information about contaminants and potential health effects can be obtained by calling the EPA's Safe Drinking Water Hotline (800-426-4791) or visiting the EPA website at www.epa.gov/safewater.

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

CONTAMINANTS THAT MAY BE PRESENT IN SOURCE WATER BEFORE TREATMENT INCLUDE:

Microbial contaminants, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations and wildlife.
Inorganic contaminants, such as salts and metals, which can be naturally-occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming.
Pesticides and herbicides, may come from a variety of sources such as stormwater run-off, agriculture, landscaping and residential users.
Radioactive contaminants, which can be naturally occurring or the result of mining activity.
Organic contaminants, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, may also come from gas stations, urban stormwater run-off, and septic systems.

In order to ensure that tap water is safe to drink, the EPA prescribes regulations which limit the amount of certain contaminants in water provided by public water systems. We treat our water according to the EPA's regulations. Food and Drug Administration (FDA) regulations establish limits for contaminants in bottled water, which must provide protection for public health. Our water system tested a minimum of 15 samples per month in accordance with the Total Coliform Rule for microbiological contaminants. Coliform bacteria are usually harmless, but their presence in water can be an indication of disease-causing bacteria. When coliform bacteria are found, special follow-up tests are done to determine if harmful bacteria are present in the water supply. If this limit is exceeded, the water supplier must notify the public by newspaper, television or radio.

WATER QUALITY DATA - INCLINE VILLAGE GID

Public Water System (PWS) #NV0000158

The water provided to you is safe and high quality. Our tap water exceeds all national standards.

The following tables list all of the drinking water contaminants which were detected during the 2020 calendar year. The presence of these contaminants does not necessarily indicate the water poses a health risk. Unless noted, the data presented in this table is from the testing done January 1 - December 31, 2020. The state requires us to monitor for certain contaminants less than once per year because the concentrations of these contaminants are not expected to vary significantly from year to year. Some of the data, though representative of the water quality, is more than one year old.

Violations: IVGID is required to include an explanation of any violations. We are pleased to report there were no violations in 2020. We are required to monitor your drinking water for specific contaminants on a regular basis. Results of regular monitoring are an indicator of whether or not our drinking water meets health standards. There are no additional required health effects violation notices.

Type	Category	Analyte	Compliance Period
No violations occurred calendar year 2020			



OZONE GENERATOR AT BURNT CEDAR WDP

TERMS & ABBREVIATIONS

Maximum Contaminant Level Goal (MCLG): the "Goal" is the level of a contaminant in drinking water below which there is no known or expected risk to human health. MCLG's allow for a margin of safety.

Maximum Contaminant Level (MCL): the "Maximum Allowed" MCL is the highest level of a contaminant that is allowed in drinking water. MCL's are set as close to the MCLG's as feasible using the best available treatment technology.

Action Level (AL): the concentration of a contaminant that, if exceeded, triggers treatment or other requirements that a water system must follow.

Treatment Technique (TT): a treatment technique is a required process intended to reduce the level of a contaminant in drinking water.

Maximum Residual Disinfectant Level (MRDL): the highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

Maximum Residual Disinfectant Level Goal (MRDLG): the level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLG's do not reflect the benefits of the use of disinfectants to control microbial contaminants.

mg/l: milligrams per liter

No Detected Results (ND): laboratory analysis indicates that the constituent is not present.

Parts per Million (ppm) or milligrams per liter (mg/l)

Parts per Billion (ppb) or micrograms per liter (µg/l)

Picocuries per Liter (pCi/L): picocuries per liter is a measure of the radioactivity in water.

Millirems per Year (mrem/yr): measure of radiation absorbed by the body.

Million Fibers per Liter (MFL): million fibers per liter is a measure of the presence of asbestos fibers that are longer than 10 micrometers.

Nephelometric Turbidity Unit (NTU): nephelometric turbidity unit is a measure of the clarity of water. Turbidity in excess of 5 NTU is just noticeable to the average person.

pH: pH is a measure of the acidity or basicity of an aqueous solution. Pure water is said to be neutral, with a pH close to 7.0 at 25 °C (77 °F). Solutions with a pH less than 7 are said to be acidic and solutions with a pH greater than 7 are basic or alkaline.

TDS: Total Dissolved Solids is a measure of the combined content of all inorganic and organic substances contained in a liquid.

TTHM: Total Trihalomethanes (bromoform, chloroform, bromodichloromethane, chlorodibromomethane)

RAA: running annual average.

Soft/Hard Water: Because it is the precise mixture of minerals dissolved in the water, together with the water's pH and temperature, that determines the behavior of the hardness, a single-number scale does not adequately describe hardness. However, the United States Geological Survey uses the following classification into hard and soft water: Classification by hardness in mg/L: Soft = 0 to 60; moderately hard = 61-120; hard = 121-180; very hard >180.

TEST RESULTS: 2020 WATER QUALITY DATA

Microbiological	Result	MCL	MCLG	Typical Source
COLIFORM (TCR)	0 = No Detected results in Calendar Year 2020	0	0	Naturally present in environment

Regulated Contaminants	Unit	Sample Date	Highest Level Detected	Range	MCL	MCLG	Typical Source
2,3,7,8-TCDD	ppb	07/05/2018	0.00001	0-0.00001	0.00003	0	Emissions from waste incineration, and other combustion, discharge from chemical factories
TETRACHLOROETHYLENE	ppb	09/11/2019	0.56	0-0.56	5	0	Discharge from factories and dry cleaners
BROMATE	ppb	04/08/2020	4.2	0-4.2	10	1	By-product of drinking water ozonation and chlorination
FLUORIDE Naturally occurring; Fluoride is NOT ADDED to IVGID tap water	ppm	04/05/2017	ND = No detected results	ND	2	4	Erosion of natural deposits; Water additive which promotes strong teeth; Discharge from fertilizer and aluminum factory
RADIONUCLIDES Gross Alpha, including Radon & U	pCi/L	08/03/2016	0.8	0.8	15	0	Erosion of natural deposits

Disinfection By-Products	Unit	Sample Year	Running Annual Average	Range	MCL	MCLG	Typical Source
TOTAL HALOACETIC ACIDS (HAA5)	ppb	2020	6	0-8.2	60	0	By-product of drinking water disinfection
TTHM	ppb	2020	19	15.2-24	80	0	By-product of drinking water chlorination

LEAD and COPPER	Unit	Sample Year	90th Percentile		AL	Sites Over AL	Typical Source
			Level Detected	Range			
COPPER, FREE	ppm	2017-19	0.009	0-0.014	1.3	0	Corrosion of household plumbing systems; Erosion of natural deposits; Leaching from wood preservatives.
LEAD	ppb	2017-19	2.6	0-2.7	15	0	Corrosion of household plumbing systems; Erosion of natural deposits

Secondary Contaminants	Unit	Sample Date	Highest Level Detected	Range	SMCL	MCLG	Noticeable Effects
CALCIUM	mg/L	10/05/2015	9.2	9.2			
CHLORIDE	mg/L	02/10/2020	3.3	3.3	400		Salty taste at higher levels
COLOR	CU	02/07/2019	5	5	15		Visible tint
HARDNESS, Total (as CACO3)	mg/L	10/05/2015	34	34			34 = soft water
IRON	mg/L	04/05/2017	0.068	0.068	0.6		Rusty color; sediment
MAGNESIUM	mg/L	02/10/2020	2.4	2.4	150		
PH	pH	02/10/2020	8.33	8.33	8.5		8.17 = slightly alkaline water
SODIUM	mg/L	02/10/2020	10	10	200	20	
SULFATE	mg/L	02/10/2020	3.2	3.2	500		Salty taste at higher levels
TOTAL DISSOLVED SOLIDS	mg/L	02/10/2020	79	79	1000		Hardness; deposits; cloudy water
TEMPERATURE	°C	04/05/2017	22.3	22.3			

The EPA website has a helpful guide on drinking water regulations. It is available on their website: www.epa.gov/ground-water-and-drinking-water/national-primary-drinking-water-regulation-table

COMMONLY ASKED QUESTIONS

Where does my drinking water come from?

The source of your drinking water is Lake Tahoe. Pumped directly out of the lake, your drinking water is first disinfected, then distributed through 90 miles of pipelines, stored in one of 13 water storage tanks and finally delivered to your property. Due to the high quality of our drinking water source, IVGID is not required to perform filtration. Our treatment system meets stringent national water quality standards through rigorous watershed management practices, extensive water quality monitoring and state-of-the-art ozone and ultraviolet disinfection with a chlorine residual.

How healthy is our drinking water?

Our drinking water is healthy and pleasant to drink. The water tests well below the maximum contaminant level for both health and aesthetic contaminants. In 2012, 2013 and 2016, IVGID won the "Best Tasting Water in Nevada Award" from the Nevada Rural Water Association. IVGID is a member of the Tahoe Water Suppliers Association (TWSA). This group provides a unified voice for source water protection in the Tahoe Basin.

In 2020, the local water providers were awarded the American Water Works Association "Exemplary Source Water Protection Program Award." As purveyors of some of the finest drinking water in the United States, we encourage you to fill up a glass and DRINK TAHOE TAP®.

To learn more about how you can protect the source of your drinking water, visit the TWSA website: www.TahoeH2O.org, the IVGID Public Works website: www.ivgidpublicworks.org, or call (775) 832-1284.

Does IVGID add fluoride to the drinking water?

No, fluoride is not added to IVGID's drinking water.



Should I be concerned about lead?

Your water meets State and federal requirements for lead. If present at elevated levels, this contaminant can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. IVGID'S water system is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your drinking water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline at 800-424-5323 or http://www.epa.gov/safewater/lead.

Should I filter the water?

IVGID tap water is safe and pleasant to drink from the tap. If you have concerns about the tap water, a simple carbon block filter (pitcher or tap mount) will remove final traces of metals (from your plumbing), chlorine (a disinfectant required in municipal water distribution) and resolve any taste or odor issues.

What agencies set testing standards for drinking water?

In order to ensure that tap water is safe to drink, the EPA prescribes many regulations and testing requirements that limit the amount of certain contaminants in water provided by public water systems. The Food and Drug Administration (FDA) regulations establish limits for contaminants in bottled water. In general, the EPA standards for tap water are much more stringent than the FDA standards for bottled water.

How can I get involved?

The IVGID Board of Trustees meeting dates and times are posted on the Meeting & Agendas page of our website: www.yourtahoeplace.com/ivgid/board-of-trustees/meetings-and-agendas. To be emailed agendas for meetings send and email to: info@ivgid.org with the subject "Agenda."

ABOUT IVGID

The Incline Village General Improvement District, commonly referred to as IVGID, is a quasi-public agency established under Nevada Revised Statute, Chapter 318 and chartered to provide water, sewer, trash and recreation services for the unincorporated communities of Incline Village and Crystal Bay, Nevada. It is governed by an elected Board of Trustees which, acting on behalf of the electorate, sets policy and determines strategies to accomplish its charter. Both Incline Village and Crystal Bay, Nevada are located within Washoe County, the entity that had the authority to create IVGID.

¡ATENCIÓN! Este folleto contiene información sobre la calidad de su agua potable y está disponible en español. Por favor llame a (775)832-1203 para obtener una versión traducida.

Glenbrook Water Cooperative
Water Quality Data Summary 2020-2021

During the 2020-2021 reporting year, Glenbrook Water Cooperative (Glenbrook) remained in compliance with Federal and State water quality requirements. During the same period, the Environmental Protection Agency (EPA) notes no violation of the health, reporting, or monitoring requirements of the Safe Drinking Water Act (Table 5.9). Additional regulatory information for Glenbrook is provided in the Consumer Confidence Report found at the end of this section.

Turbidity

Between July 1, 2020, and June 30, 2021, Glenbrook met Federal and State guidelines for turbidity by remaining within regulatory limits. The monthly mean and maximum turbidity measurements did not exceed 5.0 NTU (Figure 3.0). The highest turbidity reading for the 2020-2021 reporting year was 0.65 NTU, lower than the previous reporting year's maximum of 1.13 NTU. The maximum turbidity reading was taken on August 5, 2021. A mixing effect was likely produced by wind from the southwest of 0.0-4.0 MPH paired with gusts up to 7.6 mph (Table 5.1). Glenbrook had an annual mean turbidity value of 0.21 NTU for the 2020-2021 reporting year. The largest monthly mean turbidity, 0.25 NTU, occurred in July 2020 (Table 7.0).

Table 7.0: Glenbrook Water Cooperative source water turbidity data summary July 1, 2020, through June 30, 2021. Turbidity analyses completed on samples collected daily from raw water at the Glenbrook intake.

	Monthly Max (NTU)	Date Monthly Max	Monthly Mean (NTU)	Monthly Median (NTU)	Monthly 90% (NTU)
Jul-20	0.39	12	0.25	0.23	0.30
Aug-20	0.65	5	0.20	0.19	0.24
Sep-20	0.23	1,3	0.18	0.18	0.20
Oct-20	0.22	3	0.19	0.19	0.20
Nov-20	0.21	1	0.17	0.18	0.19
Dec-20	0.33	1	0.20	0.19	0.24
Jan-21	0.24	2,25	0.20	0.20	0.22
Feb-21	0.23	8,10,12,14,16,18	0.14	0.19	0.23
Mar-21	0.35	30	0.24	0.24	0.27
Apr-21	0.35	30	0.24	0.24	0.27
May-21	0.35	2	0.22	0.19	0.31
Jun-21	0.22	5,6	0.19	0.19	0.22

Historically, Glenbrook has maintained low turbidity measurements. The highest readings in the 10-year reporting period of July 1, 2011-June 30, 2021, include 7.1 NTU in 2014, 1.37 NTU in 2015, and 1.13 NTU in 2019. Within the same 10-year period, turbidity values also include the lowest, 0.35 NTU in 2011 and 2012. The maximum turbidity for the 2020-2021 reporting year of 0.65 NTU is similar to the annual maximum in 2016 (0.59 NTU) and 2017 (0.77 NTU). Annual maximum turbidity shows a decreasing linear trend over the 10-year reporting period (Figure 3.1).

Glenbrook has historically maintained annual mean turbidity values below 0.21 NTU, including 0.21 NTU for 2020-2021. Annual mean turbidity shows an increasing linear trend over the 10-year reporting period (Figure 7.1).

Coliform

Glenbrook met Federal and State guidelines for total coliform during the 2020-2021 reporting year. The 2020-2021 maximum total coliform count was 83.1 CFU/100 mL, a decrease from 200.50 CFU/100 mL in 2019-2020 (Figure 3.3). The maximum total coliform result occurred on September 1, 2020. The weather included sustained winds of 0.2-5.4 mph with gusts up to 7.6 mph paired with a maximum temperature of 77.0^{o} F, during a weekly mean temperature of 64.1^{o} F (Table 5.4). The increase in temperature, paired with mixing caused by wind, may have contributed to the high total coliform results.

The 2020-2021 annual mean total coliform count is 4.03 CFU/100 mL, lower than the previous reporting years' mean of 9.34 CFU/100 mL (Tables 7.1, 7.2, Figure 3.3). The highest monthly mean total coliform result was 22.43 CFU/100 mL, recorded in September 2020. Total coliform was detected in 36% of the 81 samples analyzed, an increase from 39% the previous year. In the 2020-2021 reporting year, the total coliform results decreased throughout the cooler months and increased during the warm summer months (Figure 3.2). The yearly maximum and mean total coliform results show an increasing linear trend over the 10-year reporting period of July 1, 2011-June 30, 2021 (Figure 3.3).

Glenbrook also performed tests for E. coli coliform during the 2020-2021 reporting year. E. coli coliform was detected in two samples representing 2.47% of the samples analyzed, increasing from 2.63% in the previous reporting year. For the 2020-2021 reporting year, the maximum E. coli coliform value was 1.0 CFU/100 mL, with an annual mean of 0.02 CFU/100 mL (Table 7.1).

Table 7.1: Glenbrook Water Cooperative annual source water total coliform data results from July 1, 2020, through June 30, 2021. Coliform analyses completed on samples collected from raw water at the Glenbrook intake.

	Total coliform (# colonies/100 mL)	E. coli coliform (# colonies/100 mL)
Mean	4.03	0.02
Median	0.00	0.00
Max	83.10	1.00
90th Percentile	11.10	0.00
Colony- Forming Samples	29.00	2.00
Total Number of Samples	81.00	81.00

Table 7.2: Glenbrook Water Cooperative monthly source water Total Coliform data results from July 1, 2019, through June 30, 2020. Analyses completed on samples collected from raw water at the Glenbrook Water Company intake.

	Monthly Maximum Total Coliform (# colonies/100 mL)	Monthly Mean Total Coliform (# colonies/100 mL)	Monthly Maximum E.coli (# colonies/100 mL)	Monthly Mean E.coli (# colonies/100 mL)
Jul-19	4.20	1.26	0.00	0.00
Aug-19	30.60	11.82	0.00	0.00
Sep-19	83.10	22.43	1.00	0.11
Oct-19	11.10	5.50	0.00	0.00
Nov-19	4.20	1.05	0.00	0.00
Dec-19	0.00	0.00	0.00	0.00
Jan-20	0.00	0.00	0.00	0.00
Feb-20	0.00	0.00	0.00	0.00
Mar-20	0.00	0.00	0.00	0.00
Apr-20	1.00	0.13	1.00	0.13
May-20	3.10	0.64	0.00	0.00
Jun-20	7.50	1.98	0.00	0.00

Figure 7.0: Monthly Mean and Max Turbidity Results for Glenbrook Water Cooperative between July 1, 2020 and June 30, 2021.

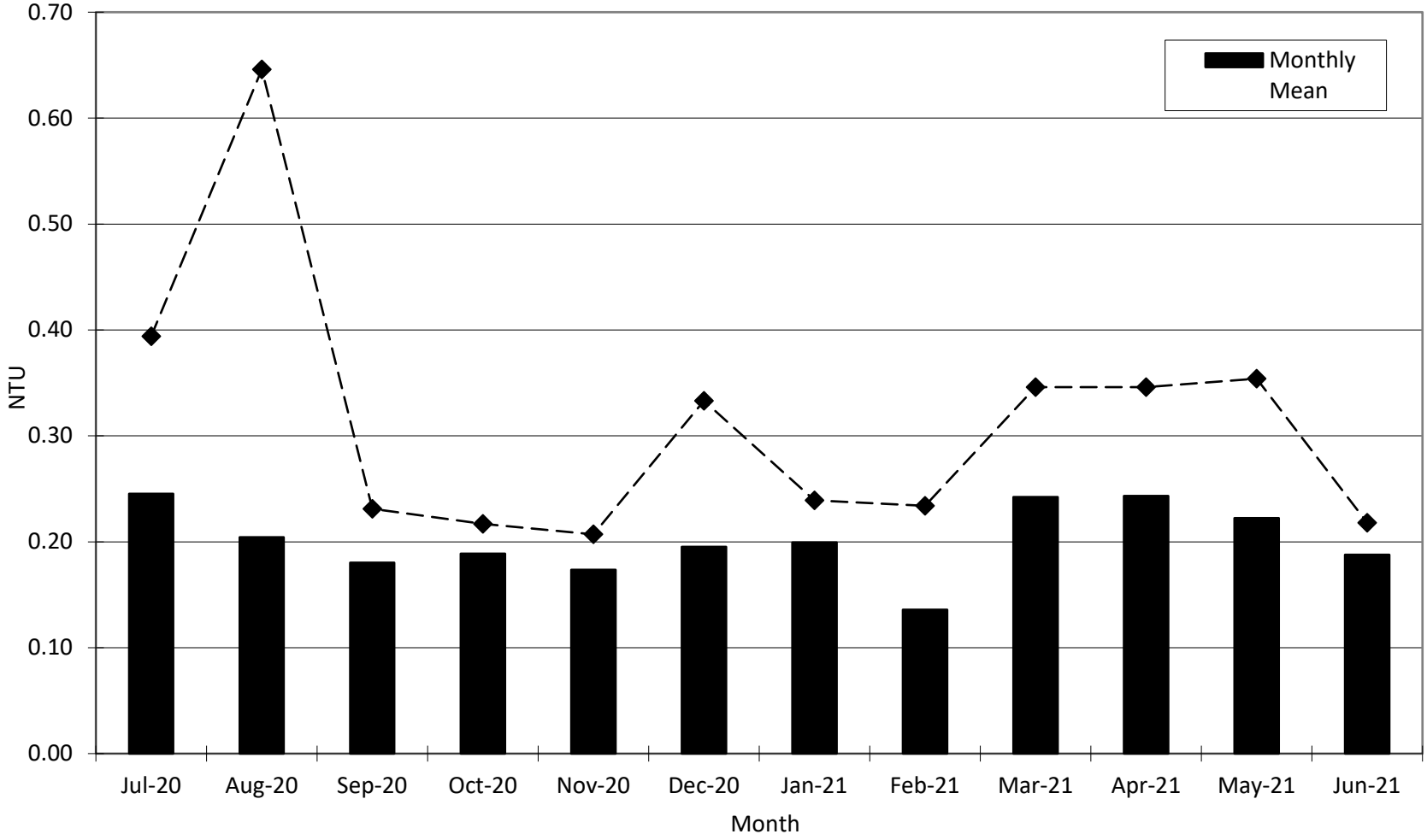


Figure 7.1: Yearly Mean and Max Turbidity Results for Glenbrook Water Cooperative between July 1, 2011 and June 30, 2021.

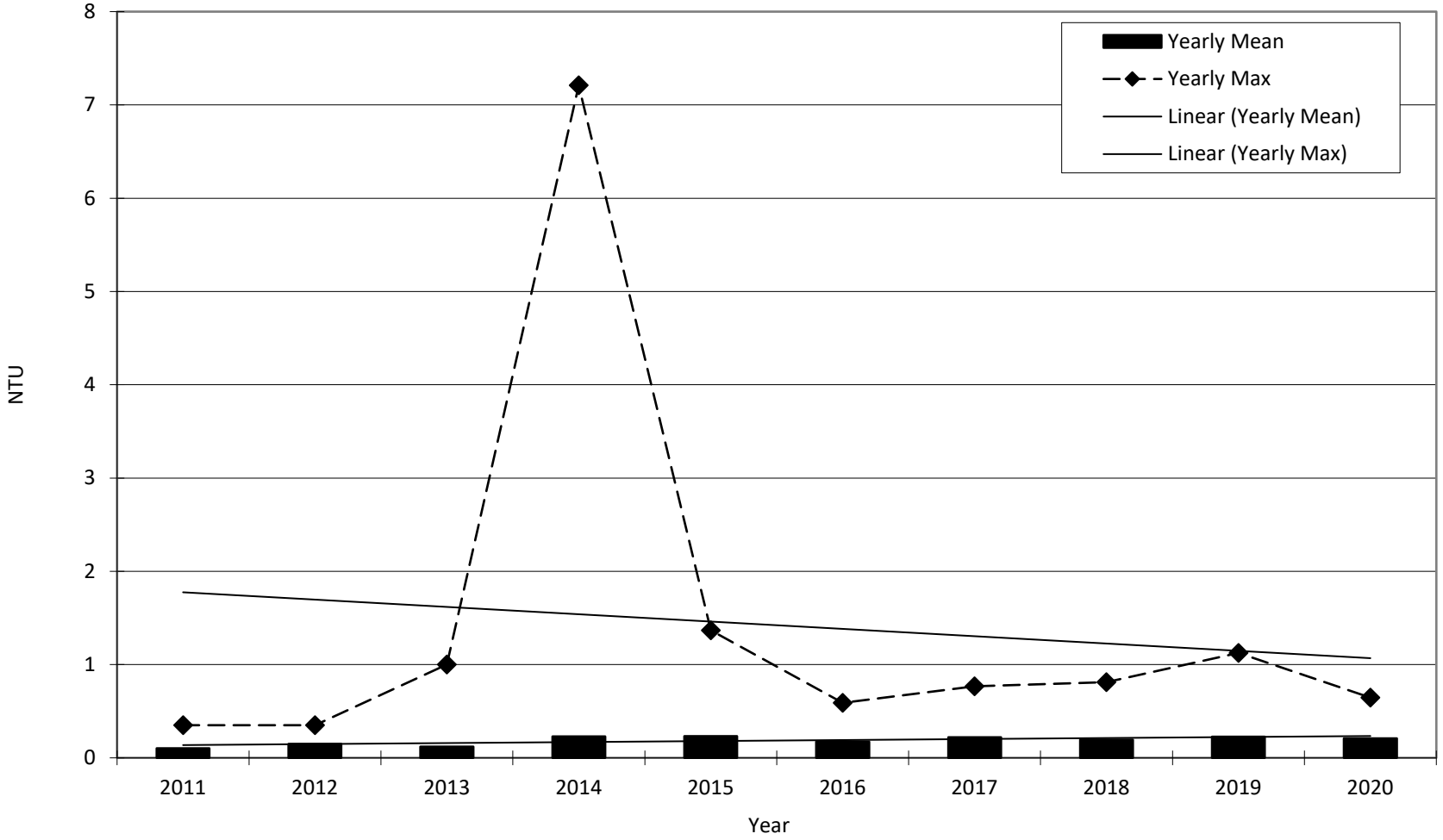


Figure 7.2: Monthly Mean and Max Total Coliform Results for Glenbrook Water Cooperative between July 1, 2020 and June 30, 2021.

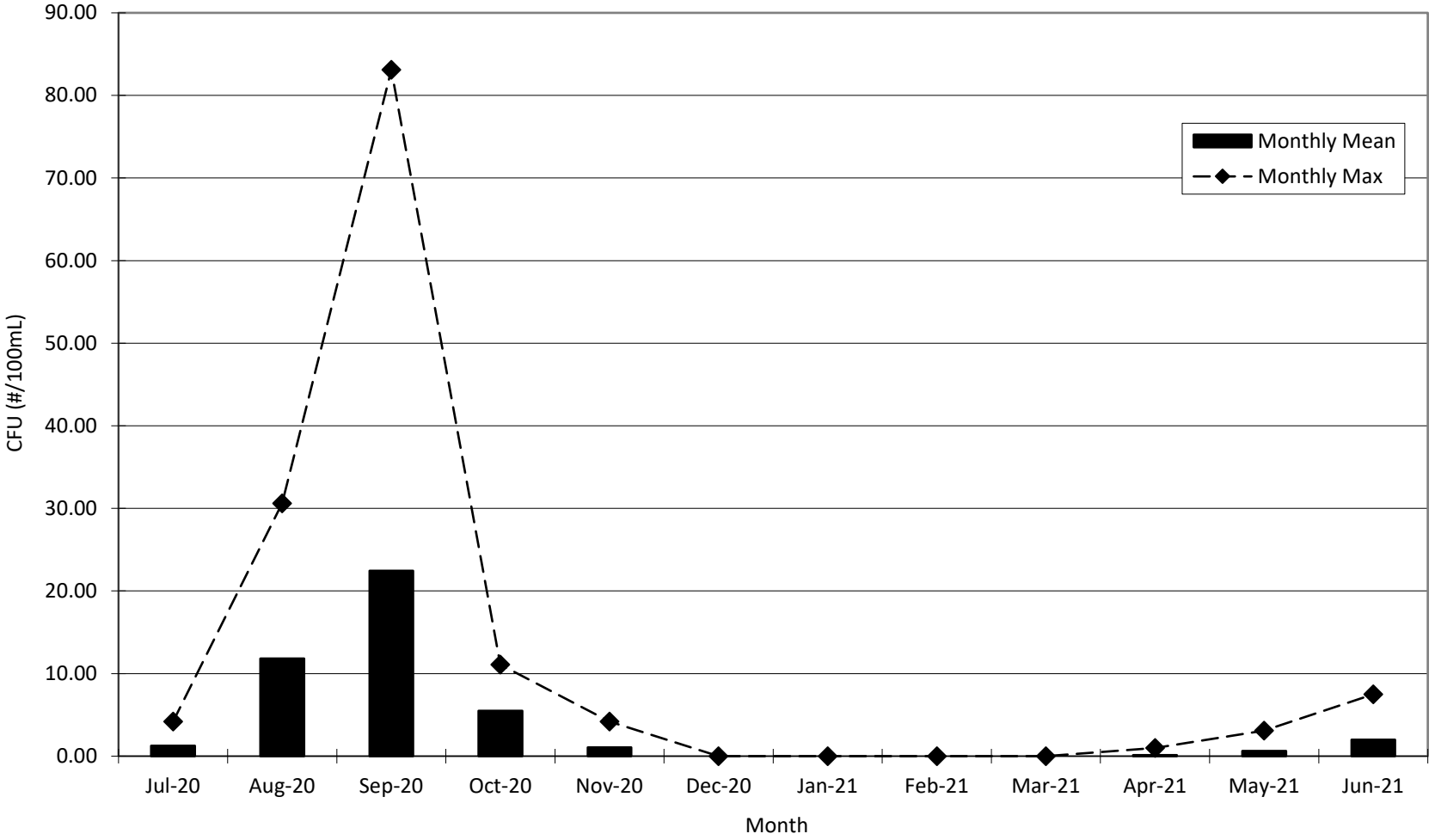
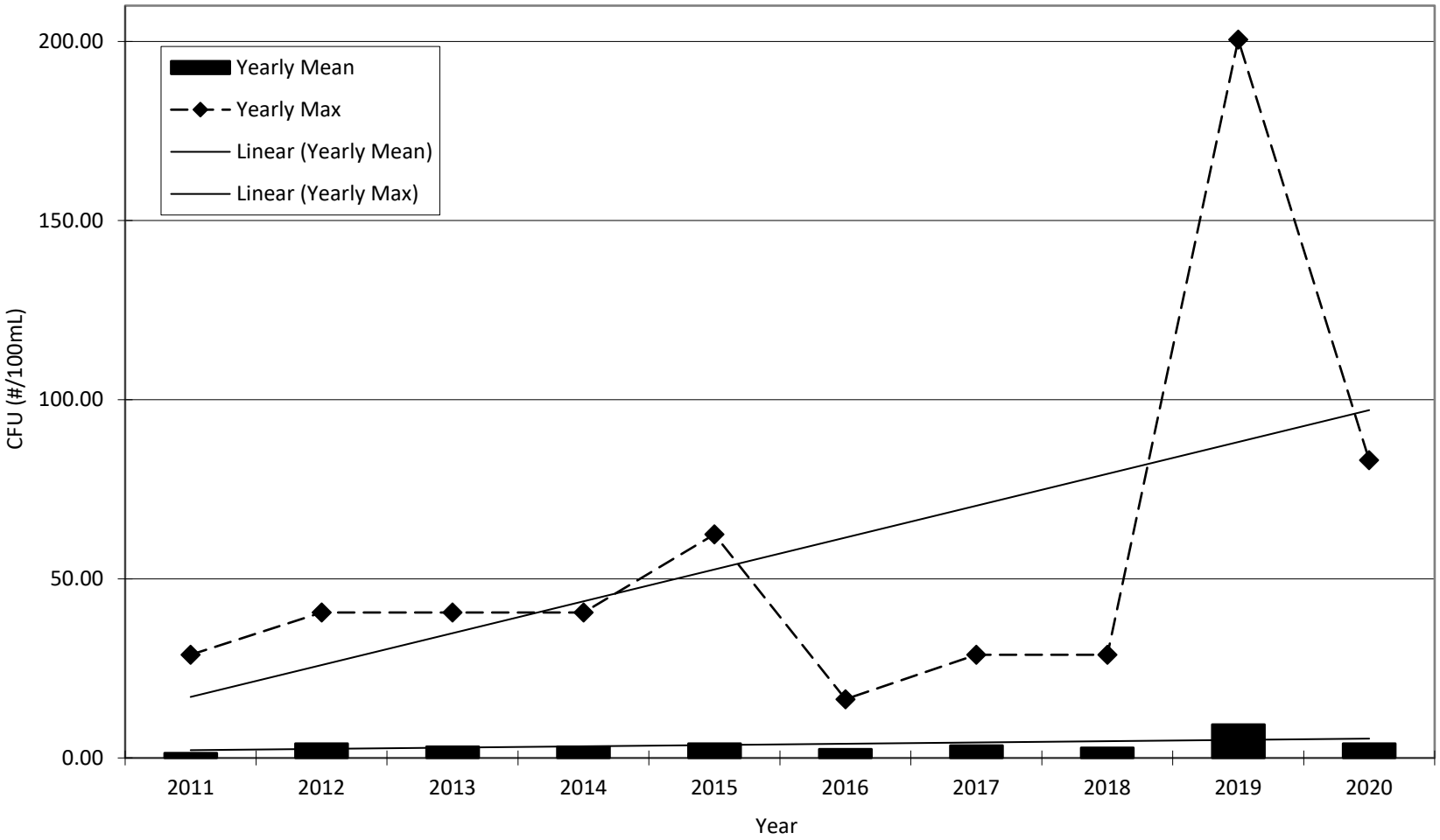


Figure 7.3: Yearly Mean and Max Total Coliform Results for Glenbrook Water Cooperative between July 1, 2011 and June 30, 2021.



2020 Consumer Confidence Report

Is my water safe?

We are pleased to present this year's Annual Water Quality Report (Consumer Confidence Report) as required by the Safe Drinking Water Act (SDWA). This report is designed to provide details about where your water comes from, what it contains, and how it compares to standards set by regulatory agencies. This report is a snapshot of last year's water quality. We are committed to providing you with information because informed customers are our best allies.

Do I need to take special precautions?

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/Centers for Disease Control (CDC) guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the Safe Water Drinking Hotline (800-426-4791).

Where does my water come from?

The Glenbrook water comes from Lake Tahoe.

Source water assessment and its availability

A source water assessment is available upon request.

Why are there contaminants in my drinking water?

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency's (EPA) Safe Drinking Water Hotline (800-426-4791). The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or

from human activity: microbial contaminants, such as viruses and bacteria, that may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife; inorganic contaminants, such as salts and metals, which can be naturally occurring or result from urban stormwater runoff, industrial, or domestic wastewater discharges, oil and gas production, mining, or farming; pesticides and herbicides, which may come from a variety of sources such as agriculture, urban stormwater runoff, and residential uses; organic Chemical Contaminants, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and can also come from gas stations, urban stormwater runoff, and septic systems; and radioactive contaminants, which can be naturally occurring or be the result of oil and gas production and mining activities. In order to ensure that tap water is safe to drink, EPA prescribes regulations that limit the amount of certain contaminants in water provided by public water systems. Food and Drug Administration (FDA) regulations establish limits for contaminants in bottled water which must provide the same protection for public health.

How can I get involved?

Preventing contaminants from running into the Lake benefits all.

Water Conservation Tips

Did you know that the average U.S. household uses approximately 400 gallons of water per day or 100 gallons per person per day? Luckily, there are many low-cost and no-cost ways to conserve water. Small changes can make a big difference - try one today and soon it will become second nature.

- Take short showers - a 5 minute shower uses 4 to 5 gallons of water compared to up to 50 gallons for a bath.
- Shut off water while brushing your teeth, washing your hair and shaving and save up to 500 gallons a month.
- Use a water-efficient showerhead. They're inexpensive, easy to install, and can save you up to 750 gallons a month.
- Run your clothes washer and dishwasher only when they are full. You can save up to 1,000 gallons a month.
- Water plants only when necessary.
- Fix leaky toilets and faucets. Faucet washers are inexpensive and take only a few minutes to replace. To check your toilet for a leak, place a few drops of food coloring in the tank and wait. If it seeps into the toilet bowl without flushing, you have a leak. Fixing it or replacing it with a new, more efficient model can save up to 1,000 gallons a month.
- Adjust sprinklers so only your lawn is watered. Apply water only as fast as the soil can absorb it and during the cooler parts of the day to reduce evaporation.

- Teach your kids about water conservation to ensure a future generation that uses water wisely. Make it a family effort to reduce next month's water bill!
- Visit www.epa.gov/watersense for more information.

Cross Connection Control Survey

The purpose of this survey is to determine whether a cross-connection may exist at your home or business. A cross connection is an unprotected or improper connection to a public water distribution system that may cause contamination or pollution to enter the system. We are responsible for enforcing cross-connection control regulations and insuring that no contaminants can, under any flow conditions, enter the distribution system. If you have any of the devices listed below please contact us so that we can discuss the issue, and if needed, survey your connection and assist you in isolating it if that is necessary.

- Boiler/ Radiant heater (water heaters not included)
- Underground lawn sprinkler system
- Pool or hot tub (whirlpool tubs not included)
- Additional source(s) of water on the property
- Decorative pond
- Watering trough

Source Water Protection Tips

Protection of drinking water is everyone's responsibility. You can help protect your community's drinking water source in several ways:

- Eliminate excess use of lawn and garden fertilizers and pesticides - they contain hazardous chemicals that can reach your drinking water source.
- Pick up after your pets.
- If you have your own septic system, properly maintain your system to reduce leaching to water sources or consider connecting to a public water system.
- Dispose of chemicals properly; take used motor oil to a recycling center.
- Volunteer in your community. Find a watershed or wellhead protection organization in your community and volunteer to help. If there are no active groups, consider starting one. Use EPA's Adopt Your Watershed to locate groups in your community, or visit the Watershed Information Network's How to Start a Watershed Team.
- Organize a storm drain stenciling project with your local government or water supplier. Stencil a message next to the street drain reminding people "Dump No Waste - Drains to River" or "Protect Your Water." Produce and distribute a flyer for households to remind residents that storm drains dump directly into your local water body.

Additional Information for Lead

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. Glenbrook Water Coop is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at http://www.epa.gov/safewater/lead.

Additional Information for Arsenic

While your drinking water meets EPA's standard for arsenic, it does contain low levels of arsenic. EPA's standard balances the current understanding of arsenic's possible health effects against the costs of removing arsenic from drinking water. EPA continues to research the health effects of low levels of arsenic which is a mineral known to cause cancer in humans at high concentrations and is linked to other health effects such as skin damage and circulatory problems.

Water Quality Data Table

In order to ensure that tap water is safe to drink, EPA prescribes regulations which limit the amount of contaminants in water provided by public water systems. The table below lists all of the drinking water contaminants that we detected during the calendar year of this report. Although many more contaminants were tested, only those substances listed below were found in your water. All sources of drinking water contain some naturally occurring contaminants. At low levels, these substances are generally not harmful in our drinking water. Removing all contaminants would be extremely expensive, and in most cases, would not provide increased protection of public health. A few naturally occurring minerals may actually improve the taste of drinking water and have nutritional value at low levels. Unless otherwise noted, the data presented in this table is from testing done in the calendar year of the report. The EPA or the State requires us to monitor for certain contaminants less than once per year because the concentrations of these contaminants do not vary significantly from year to year, or the system is not considered vulnerable to this type of contamination. As such, some of our data, though representative, may be more than one year old. In this table you will find terms and abbreviations

that might not be familiar to you. To help you better understand these terms, we have provided the definitions below the table.

Contaminants	MCLG or MRDLG	MCL, TT, or MRDL	Detect In Your Water	Range		Sample Date	Violation	Typical Source
				Low	High			
Disinfectants & Disinfection By-Products								
(There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants)								
Bromate (ppb)	0	10	2	1	2	2020	No	By-product of drinking water disinfection
Haloacetic Acids (HAA5) (ppb)	NA	60	2.08	.50	2.08	2020	No	By-product of drinking water chlorination
TTHMs [Total Trihalomethanes] (ppb)	NA	80	5	2	5	2020	No	By-product of drinking water disinfection
Inorganic Contaminants								
Arsenic (ppb)	0	10	0	NA	NA	2020	No	Erosion of natural deposits; Runoff from orchards; Runoff from glass and electronics production wastes
Barium (ppm)	2	2	.1	NA	NA	2020	No	Discharge of drilling wastes; Discharge from metal refineries; Erosion of natural deposits
Copper - source water (ppm)	NA		.012	NA	NA	2020	No	Corrosion of household plumbing systems; Erosion of natural deposits
Radioactive Contaminants								
Alpha emitters (pCi/L)	0	15	.922	NA	NA	2019	No	Erosion of natural deposits
Beta/photon emitters (mrem/yr)	0	4	1.89	NA	NA	2019	No	Decay of natural and man-made deposits.
Radium (combined 226/228) (pCi/L)	0	5	1.66	NA	NA	2019	No	Erosion of natural deposits

Contaminants	MCLG	AL	Your Water	Sample Date	# Samples Exceeding AL	Exceeds AL	Typical Source
Inorganic Contaminants							

Contaminants	MCLG	AL	Your Water	Sample Date	# Samples Exceeding AL	Exceeds AL	Typical Source
Copper - action level at consumer taps (ppm)	1.3	1.3	.19	2019	0	No	Corrosion of household plumbing systems; Erosion of natural deposits
Lead - action level at consumer taps (ppb)	0	15	.008	2019	0	No	Corrosion of household plumbing systems; Erosion of natural deposits

Additional Contaminants

In an effort to insure the safest water possible the State has required us to monitor some contaminants not required by Federal regulations. Of those contaminants only the ones listed below were found in your water.

Contaminants	State MCL	Your Water	Violation	Explanation and Comment
Chloride	400 mg/l	2.5 mg/l	No	

Additional Monitoring

As part of an on-going evaluation program the EPA has required us to monitor some additional contaminants/chemicals in 2019. Information collected through the monitoring of these contaminants/chemicals will help to ensure that future decisions on drinking water standards are based on sound science.

Name	Reported Level	Range	
		Low	High
HAA6Br (ug/L)	.4075		.64
HAA9 (ug/L)	1.525	.42	2.68
manganese (ug/L)	2.1		2.1

Unit Descriptions	
Term	**Definition**
ug/L	ug/L : Number of micrograms of substance in one liter of water
ppm	ppm: parts per million, or milligrams per liter (mg/L)
ppb	ppb: parts per billion, or micrograms per liter (µg/L)
pCi/L	pCi/L: picocuries per liter (a measure of radioactivity)
mrem/yr	mrem/yr: millirems per year (a measure of radiation absorbed by the body)
NA	NA: not applicable
ND	ND: Not detected
NR	NR: Monitoring not required, but recommended.

Important Drinking Water Definitions	
Term	**Definition**
MCLG	MCLG: Maximum Contaminant Level Goal: The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.
MCL	MCL: Maximum Contaminant Level: The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.
TT	TT: Treatment Technique: A required process intended to reduce the level of a contaminant in drinking water.
AL	AL: Action Level: The concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow.
Variances and Exemptions	Variances and Exemptions: State or EPA permission not to meet an MCL or a treatment technique under certain conditions.
MRDLG	MRDLG: Maximum residual disinfection level goal. The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.
MRDL	MRDL: Maximum residual disinfectant level. The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.
MNR	MNR: Monitored Not Regulated
MPL	MPL: State Assigned Maximum Permissible Level

For more information please contact:

Contact Name: Cameron McKay
Address:
Phone: 775-790-0711

Cave Rock/Skyland Water Utility District
Water Quality Data Summary 2020-2021

Cave Rock/Skyland Water Utility District (Cave Rock/Skyland) is a filtration supplier and is only required to report source water turbidity. During the reporting year, Cave Rock/Skyland remained in compliance with Federal and State water quality requirements for a filtering water supplier. During the same period, the Environmental Protection Agency (EPA) notes no violation of the health, reporting, or monitoring requirements of the Safe Drinking Water Act (Table 5.9). Additional regulatory information for Cave Rock/Skyland is provided in the Consumer Confidence Report found at the end of this section.

Turbidity

Between July 1, 2020, and June 30, 2021, Cave Rock/Skyland met Federal and State guidelines for turbidity by remaining within regulatory limits. The monthly maximum turbidity measurements did not exceed 1.0 NTU. The maximum turbidity reading for the 2020-2021 reporting year, 0.040 NTU, was recorded 11 times throughout the reporting year (Table 5.1 (a)). Five of these events included wind events from the north and four with wind from the east. The wind events likely created a mixing effect due to wind-wave action from gusts ranging from 5-32 MPH. The annual mean turbidity for Cave Rock/Skyland was 0.031 NTU, less than the previous reporting year's annual mean of 0.17 NTU (Figure 4.1). The highest monthly mean turbidity was 0.036 NTU in July and November 2020 (Figure 4.0).

Table 8.0: Cave Rock/Skyland source water turbidity data results from July 1, 2020, through June 30, 2021. Turbidity analyses completed on samples collected daily from raw water at the Cave Rock/Skyland intake.

	Monthly max (NTU)	Date monthly max	Monthly mean (NTU)	Monthly median (NTU)	90th Percentile
Jul-20	0.040	6, 29	0.036	0.037	0.039
Aug-20	0.040	31	0.027	0.030	0.037
Sep-20	0.030	All	0.030	0.030	0.030
Oct-20	0.034	27-31	0.032	0.032	0.034
Nov-20	0.038	27-30	0.036	0.036	0.038
Dec-20	0.040	12-16	0.035	0.038	0.040
Jan-21	0.039	28	0.030	0.030	0.030
Feb-21	0.030	All	0.030	0.030	0.030
Mar-21	0.030	1–27	0.030	0.030	0.030
Apr-21	0.030	26-30	0.019	0.019	0.030
May-21	0.040	28	0.031	0.030	0.035
Jun-21	0.040	11, 24	0.035	0.034	0.039

Historically, Cave Rock/Skyland has maintained turbidity measurements below the 5.0 NTU regulatory requirement for filtration exemption (Figure 6.1). The record maximum turbidity reading of 3.55 NTU occurred during the 2011-2012 reporting year. The annual maximum turbidity reading of 0.040 NTU for the 2020-2021 reporting year is the lowest in the 10-year reporting period of July 1, 2011 – June 30, 2021, and similar to the annual minimum of 2009 (0.04 NTU), 2011(0.047 NTU), and 2012 (0.050 NTU). The annual minimum for 2020-2021 is 0.002 NTU, the lowest value in the TWSA Cave Rock/Skyland data set from 2002-2021. Additional analysis shows the annual minimum during the drought year of 2015 as

0.01 NTU, with the second-lowest annual maximum of 0.26 NTU, after this reporting year. The similarities between 2015-2016 and 2020-2021 show a likely correlation between drought conditions and turbidity at the Cave Rock Skyland intake due to the reduction of seasonal runoff. Linear trendline statistics show a decrease in annual maximum and mean turbidity from July 1, 2011-June 30, 2021 (Figure 4.1).

Figure 4.0: Monthly Max Turbidity Results for Cave Rock and Skyland Water Districts between July 1, 2020 and June 30, 2021.

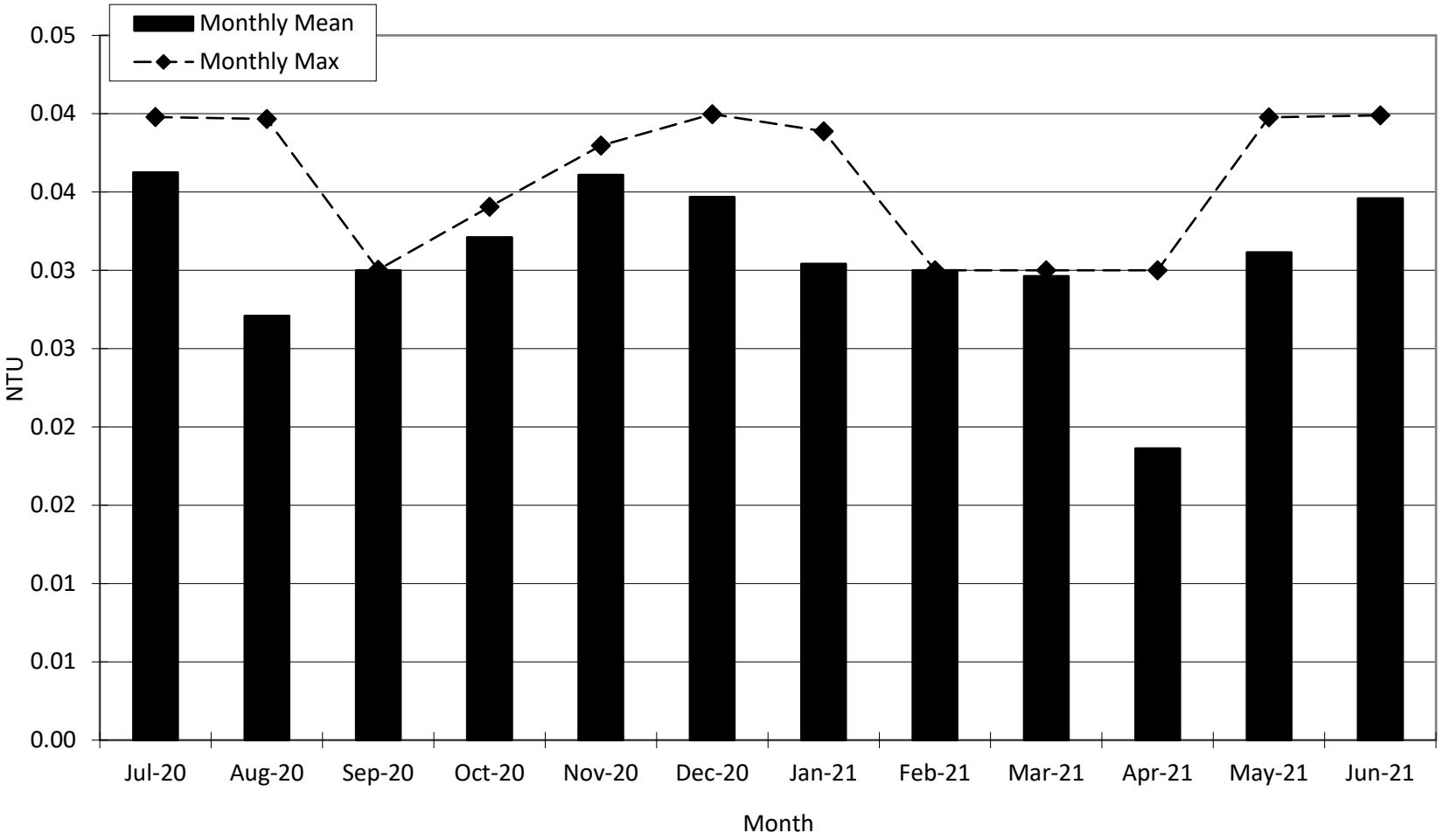
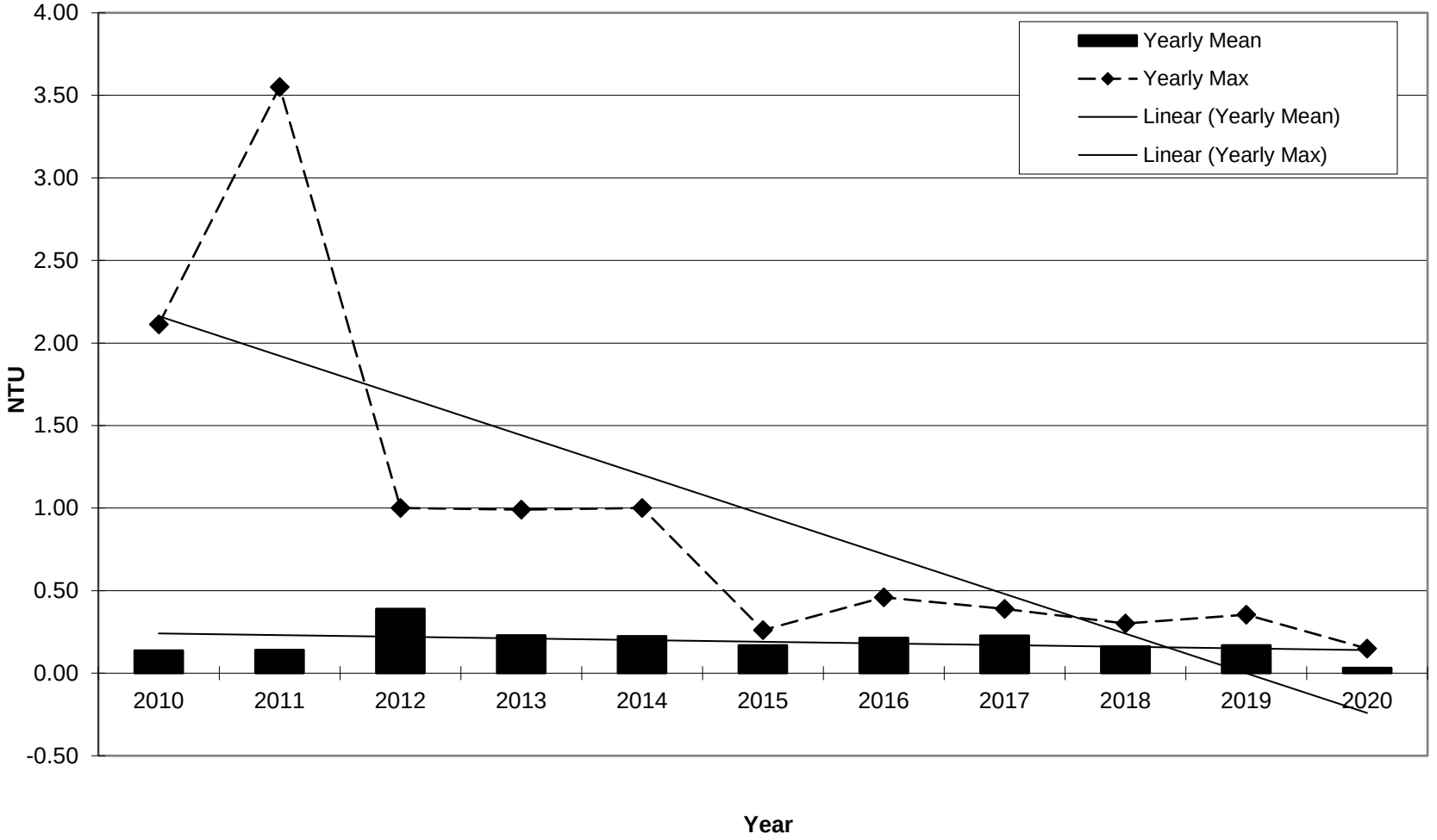


Figure 4.1: Yearly Mean and Max Turbidity Results for Cave Rock and Skyland Water Districts between July 1, 2010 and June 30, 2021.



CAVE ROCK SKYLAND
Consumer Confidence Report – 2021
Covering Calendar Year – 2020

Your water comes from:

Source Name	Source Water Type
LAKE TAHOE INTAKE	Surface Water

We treat your water to remove several contaminants and we add disinfectant to protect you against microbial contaminants. The Safe Drinking Water Act (SDWA) requires states to develop a Source Water Assessment (SWA) for each public water supply that treats and distributes raw source water in order to identify potential contamination sources. The state has completed an assessment of our source water. For results of the source water assessment, please contact us.

Message from EPA

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons, such as those with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the Safe Drinking Water Hotline (800-426-4791).

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the EPA's Safe Drinking Water Hotline (800-426-4791).

The sources of drinking water (both tap water and bottled water) included rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Contaminants that may be present in source water before we treat it include:

Microbial contaminants, such as viruses and bacteria, may come from sewage treatment plants, septic systems, agricultural livestock operations and wildlife.

Inorganic contaminants, such as salts and metals, can be naturally-occurring or result from urban storm water runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming.

Pesticides and herbicides may come from a variety of sources such as storm water run-off, agriculture, and residential users.

Radioactive contaminants, can be naturally occurring or the result of mining activity

Organic contaminants, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, may also come from gas stations, urban storm water run-off, and septic systems.

In order to ensure that tap water is safe to drink, EPA prescribes regulation which limits the amount of certain contaminants in water provided by public water systems. We treat our water according to EPA's regulations. Food and Drug Administration regulations establish limits for contaminants in bottled water, which must provide the same protection for public health.

Our water system tested a minimum of 2 samples per month in accordance with the Total Coliform Rule for microbiological contaminants. Coliform bacteria are usually harmless, but their presences in water can be an indication of disease-causing bacteria. When coliform bacteria are found, special follow-up tests are done to determine if harmful bacteria are present in the water supply. If this limit is exceeded, the water supplier must notify the public by newspaper, television or radio.

Terms & Abbreviations

Maximum Contaminant Level Goal (MCLG): the "Goal" is the level of a contaminant in drinking water below which there is no known or expected risk to human health. MCLG's allow for a margin of safety.

Maximum Contaminant Level (MCL): the "Maximum Allowed" MCL is the highest level of a contaminant that is allowed in drinking water. MCL's are set as close to the MCLG's as feasible using the best available treatment technology.

Action Level (AL): the concentration of a contaminant that, if exceeded, triggers treatment or other requirements that a water system must follow.

Treatment Technique (TT): a treatment technique is a required process intended to reduce the level of a contaminant in drinking water.

Maximum Residual Disinfectant Level (MRDL): the highest level of a disinfectant allowed in

drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of

microbial contaminants.

Maximum Residual Disinfectant Level Goal (MRDLG): the level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLG's do not reflect the benefits of the use of disinfectants to control microbial contaminants.

Non-Detects (ND): laboratory analysis indicates that the constituent is not present.

Parts per Million (ppm) or milligrams per liter (mg/l)

Parts per Billion (ppb) or micrograms per liter (µg/l)

Picocuries per Liter (pCi/L): picocuries per liter is a measure of the radioactivity in water.

Millirems per Year (mrem/yr): measure of radiation absorbed by the body.

Million Fibers per Liter (MFL): million fibers per liter is a measure of the presence of asbestos fibers that are longer than 10 micrometers.

Nephelometric Turbidity Unit (NTU): nephelometric turbidity unit is a measure of the clarity of water. Turbidity in excess of 5 NTU is just noticeable to the average person.

Water Quality Data

The tables following below list all of the drinking water contaminants, which were detected during the 2020 calendar year. The presence of these contaminants does not necessarily indicate the water poses a health risk. Unless noted, the data presented in this table is from the testing done January 1 - December 31, 2020. The state requires us to monitor for certain contaminants less than once per year because the concentrations of these contaminants are not expected to vary significantly from year to year. Some of the data, though representative of the water quality, is more than one year old. **The bottom line is that the water that is provided to you is safe.**

Testing Results for CAVE ROCK SKYLAND

Microbiological	Result	MCL	MCLG	Typical Source
No Detected Results were Found in the Calendar Year of 2020				

Disinfection By-Products	Monitoring Period	RAA	Range	Unit	MCL	MCLG	Typical Source
TOTAL HALOACETIC ACIDS (HAA5)	2020	11	0 - 34	ppb	60	0	By-product of drinking water disinfection
TTHM	2020	7	2 - 7	ppb	80	0	By-product of drinking water chlorination

Lead and Copper	Date	90TH Percentile		Unit	AL	Sites Over AL	Typical Source
COPPER, FREE	2017 - 2019	0.084	0.022 - 0.066	ppm	1.3	0	Corrosion of household plumbing systems; Erosion of natural deposits; Leaching from wood preservatives.
LEAD	2017 - 2019	2		ppb	15	0	Corrosion of household plumbing systems; Erosion of natural deposits.

Regulated Contaminants	Collection Date	Highest Value	Range	Unit	MCL	MCLG	Typical Source
ARSENIC	6/10/2020	3	3	ppb	10	0	Erosion of natural deposits; Runoff from orchards; Runoff from glass and electronics production wastes.
BARIUM	6/10/2020	0.01	0.01	ppm	2	2	Discharge of drilling wastes; Discharge from metal refineries; Erosion of natural deposits.

Regulated Contaminants	Collection Date	Highest Value	Range	Unit	MCL	MCLG	Typical Source
MERCURY	6/10/2020	0.2	0.2	ppb	2	2	Erosion of natural deposits; Discharge from refineries and factories; Runoff from landfills; Runoff from cropland.

Radionuclides	Collection Date	Highest Value	Range	Unit	MCL	MCLG	Typical Source
COMBINED RADIUM (-226 & -228)	10/19/2016	0.595	0.595	pCi/L	5	0	Erosion of natural deposits
GROSS ALPHA, INCL. RADON & U	10/19/2016	0.166	0.166	pCi/L	15	0	Decay of natural and man-made deposits
GROSS BETA PARTICLE ACTIVITY	10/19/2016	1.24	1.24	pCi/L	50	0	Decay of natural and man-made deposits
RADIUM-226	10/19/2016	0.212	0.212	pCi/L	5	0	
RADIUM-228	10/19/2016	0.383	0.383	pCi/L	5	0	

Secondary Contaminants	Collection Date	Highest Value	Range	Unit	SMCL	MCLG
ALKALINITY, BICARBONATE	10/19/2016	42	42	mg/L		
ALKALINITY, TOTAL	10/19/2016	42	42	mg/L		
CALCIUM	10/19/2016	8.5	8.5	mg/L		
CHLORIDE	6/10/2020	2.4	2.4	mg/L	400	
HARDNESS, TOTAL (AS CACO3)	10/19/2016	31	31	mg/L		
MAGNESIUM	6/10/2020	2.4	2.4	mg/L	150	
PH	6/10/2020	7.82	7.82	PH	8.5	
SODIUM	6/10/2020	6.7	6.7	mg/L	200	20
SULFATE	6/10/2020	1.6	1.6	mg/L	500	
TDS	6/10/2020	61	61	mg/L	1000	

Health Information About Water Quality

While your water meets the EPA's standard for Lead, *if present at elevated levels* this contaminant can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. Your Water System is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your drinking water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at http://www.epa.gov/safewater/lead.

Violations

During the 2020 calendar year, CAVE ROCK SKYLAND is required to include an explanation of the violation(s) in the table below and the steps taken to resolve the violation(s) with this report.

Type	Category	Analyte	Compliance Period
No Violations Occurred in the Calendar Year of 2020			

Zephyr Water Utility District
Water Quality Data Summary 2020-2021

During the 2020-2021 reporting year, Zephyr Water Utility District (ZWUD) remained compliant with Federal and State water quality requirements. During the same period, the Environmental Protection Agency (EPA) notes no violation to the health, reporting, or monitoring requirements of the Safe Drinking Water Act (Table 5.9). Additional regulatory information for ZWUD is provided in the Consumer Confidence Report found at the end of this section.

Turbidity

Between July 1, 2020, and June 30, 2021, ZWUD met Federal and State guidelines for turbidity by remaining within regulatory limits. The monthly maximum turbidity measurements did not exceed 1.0 NTU (Figure 5.0). The highest turbidity reading for the 2020-2021 reporting year was 0.55 NTU and occurred on June 6, 2020 (Table 9.0). Winds from the south of 2.7-13.0 mph with gusts up to 19 mph likely created a mixing effect (Table 5.1). The annual mean for 2020-2021 is 0.17 NTU lower than the previous reporting year's annual mean of 0.30, equal to 2014 (Figure 5.1).

Table 9.0: Zephyr Water Utility District source water turbidity data results from July 1, 2020, through June 30, 2021. Turbidity analyses completed on samples collected daily from raw water at the Zephyr Water Utility District water supply intake.

Month	Monthly max (NTU)	Date monthly max	Monthly Mean (NTU)	Monthly median (NTU)	Monthly 90%
Jul-20	0.22	1	0.18	0.17	0.21
Aug-20	0.20	7	0.18	0.17	0.19
Sep-20	0.19	7	0.16	0.16	0.17
Oct-20	0.19	23	0.14	0.14	0.16
Nov-20	0.20	27	0.16	0.16	0.17
Dec-20	0.20	23	0.16	0.16	0.17
Jan-21	0.19	2	0.16	0.16	0.17
Feb-21	0.19	19	0.16	0.17	0.18
Mar-21	0.22	28	0.14	0.13	0.16
Apr-21	0.22	9	0.17	0.17	0.19
May-21	0.22	31	0.18	0.18	0.20
Jun-21	0.55	6	0.25	0.18	0.49

Historically, ZWUD has maintained low turbidity measurements. The highest reading reported since 1997, 1.35 NTU, occurred in 1998. Annual maximum turbidity for the 10-year reporting period includes the lowest result of 0.48 NTU in 2016 and the highest reading of 0.94 NTU in 2012. Annual mean turbidity remained below 0.20 NTU from 2011-2015 and increased steadily from 2017-2019, with this year's result dropping below 0.30 NTU to 0.17 NTU. Linear trend line analysis of the 10-year reporting period from July 1, 2011, to June 30, 2021, shows decreasing linear trend in annual maximum turbidity and increasing annual mean turbidity (Figure 5.1).

Coliform

ZWUD met Federal and State guidelines for total coliform and E. coli coliform bacteria. The maximum total coliform count was 65.9 coliform-forming units per 100 mL (CFU/100 mL), an increase from the previous year's max of 30.6 CFU/100 mL (Table 9.1, Figure 5.3). The maximum total coliform reading of 65.9 CFU/100 mL occurred on August 5, 2020. The maximum temperature reached 80.1 F, while the weekly mean temperature was 67.1^0 F. The increase in temperature paired with the strong sustained wind of 2.6-12.0 mph with 14 mph gusts reported likely influenced total coliform growth (Table 5.4). Total coliform values were the highest during summer 2020, with winter values showing the influence of snowmelt in February 2021 due to daily maximum temperatures rising above 50^0 F from February 11 through February 16, 2020 (Figure 5.2).

Total coliform was detected in 63 of the 105 samples analyzed, equaling 60%. The annual mean total coliform count was 3.86 CFU/100 mL, a higher value from the 2019-2020 mean of 4.30 CFU/100 mL (Table 9.1, Figure 5.3).

Historically the annual mean total coliform results have remained consistent and well below 5 CFU/100 mL. While the maximum total coliform results show greater variability than annual mean, all results reported are well below regulatory limits for total coliform. The linear trend line over the 10-year reporting period of July 1, 2011- June 30, 2021, shows an increasing trend for both annual mean and maximum results (Figure 5.3).

ZWUD also completed tests for E. coli coliform on all samples tested for total coliform; one detect was reported for the 2020-2021 reporting year. The maximum E. coli coliform reading was 1 CFU/20 mL; this result was taken on July 28, 2020. The annual mean E. coli coliform result was 0.01 CFU/20 mL, and $90^{\%}$ of the samples for 2020-2021 were below zero (Table 9.1).

Table 9.1: Zephyr Water Utility District annual source water total and E. coli coliform data results from July 1, 2020, through June 30, 2021. Coliform analyses completed on samples collected daily from raw water at the ZWUD intake.

	Total coliform (# colonies/100 mL)	E. coli coliform (# colonies/20 mL)
Mean	3.86	0.01
Median	1.00	0.00
Max	65.90	1.00
90th Percentile	11.10	0.00
Colony-Forming Samples	63	1
Total Number of Samples	105	105

Table 9.2: Zephyr Water Utility District monthly source water total and E. coli coliform data results from July 1, 2020, through June 30, 2021. Coliform analyses completed on samples collected daily from raw water at the ZWUD intake.

	Monthly maximum total coliform (# colonies/100 mL)	Monthly mean total coliform (# colonies/100 mL)	Monthly maximum E. coli coliform (# colonies/100 mL)	Monthly mean E. coli coliform (# colonies/20 mL)
Jul-20	20.70	2.51	1.00	0.11
Aug-20	65.90	14.99	0.00	0.00
Sep-20	20.70	7.58	0.00	0.00
Oct-20	19.20	9.25	0.00	0.00
Nov-20	12.40	6.03	0.00	0.00
Dec-20	1.00	0.40	0.00	0.00
Jan-21	1.00	0.25	0.00	0.00
Feb-21	4.20	1.16	0.00	0.00
Mar-21	0.00	0.00	0.00	0.00
Apr-21	3.10	1.14	0.00	0.00
May-21	4.20	1.15	0.00	0.00
Jun-21	20.70	3.09	0.00	0.00

Figure 9.0: Monthly Mean and Max Turbidity Results for Zephyr Water Utility District between July 1, 2020 and June 30, 2021.

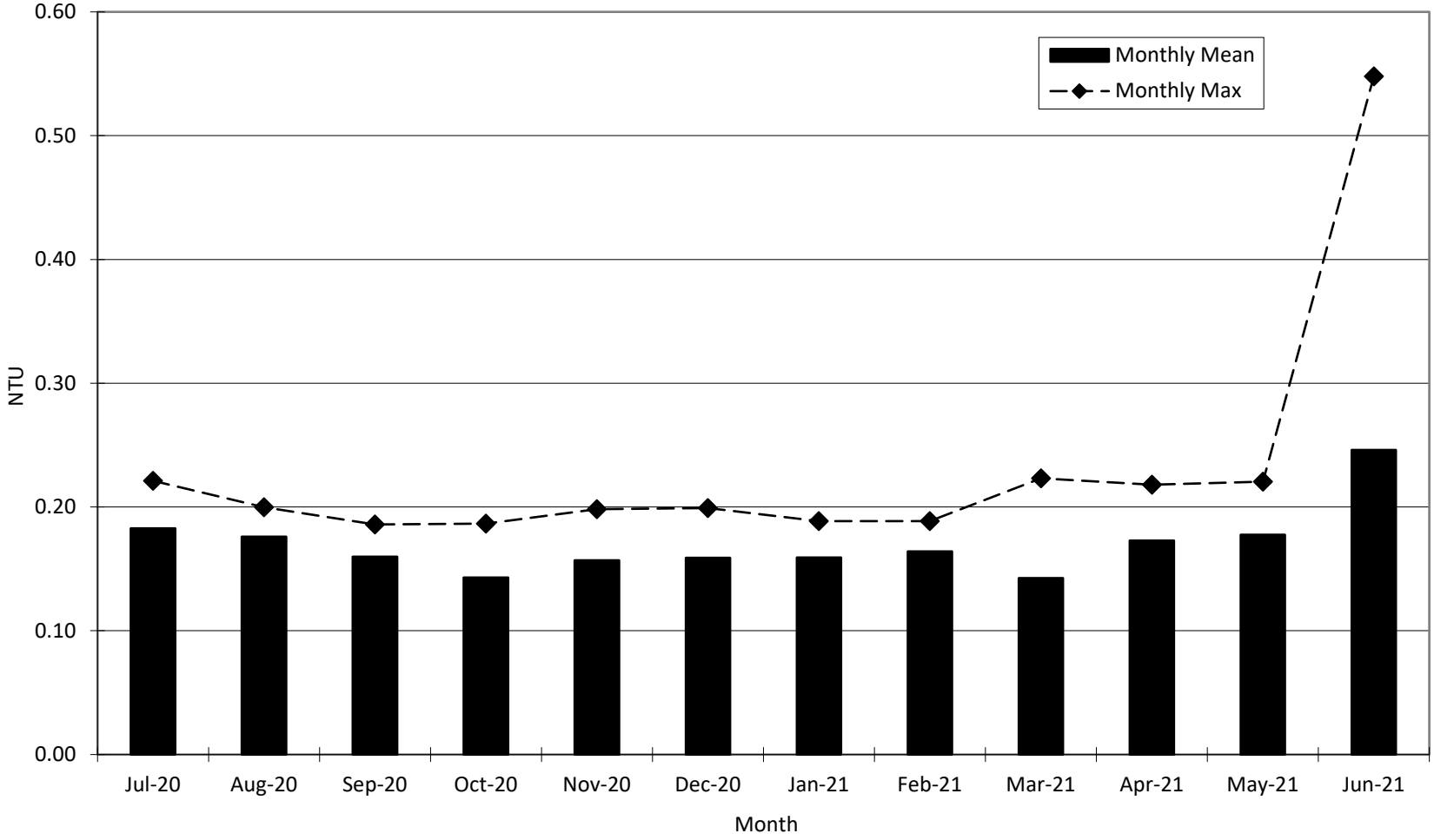


Figure 9.1: Yearly Mean and Max Turbidity Results for Zephyr Water Utility Dristrict between July 1, 2011 and June 30, 2021.

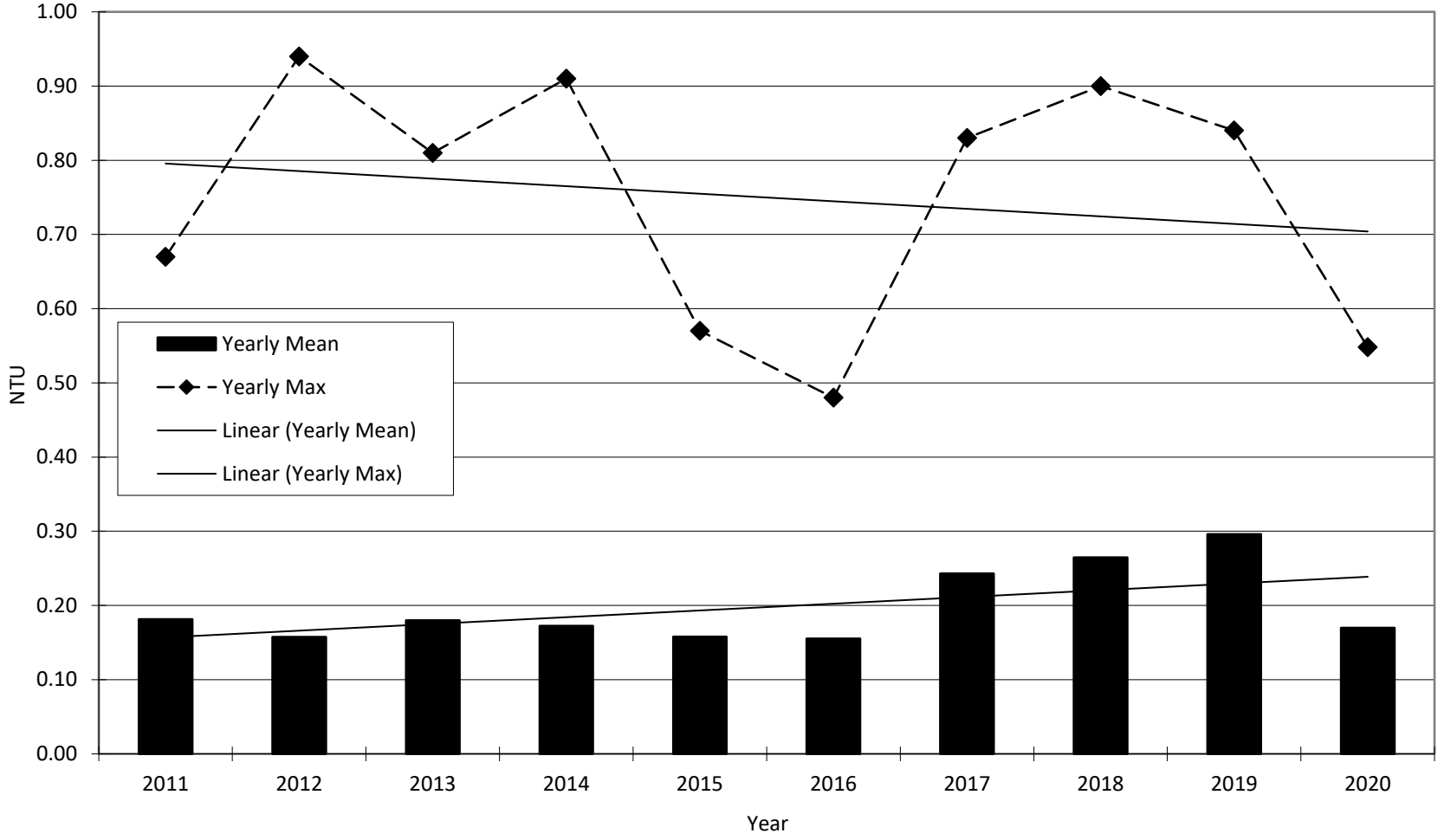


Figure 9.2: Monthly Mean and Max Coliform Results for Zephyr Water Utility District between July 1, 2020 and June 30, 2021.

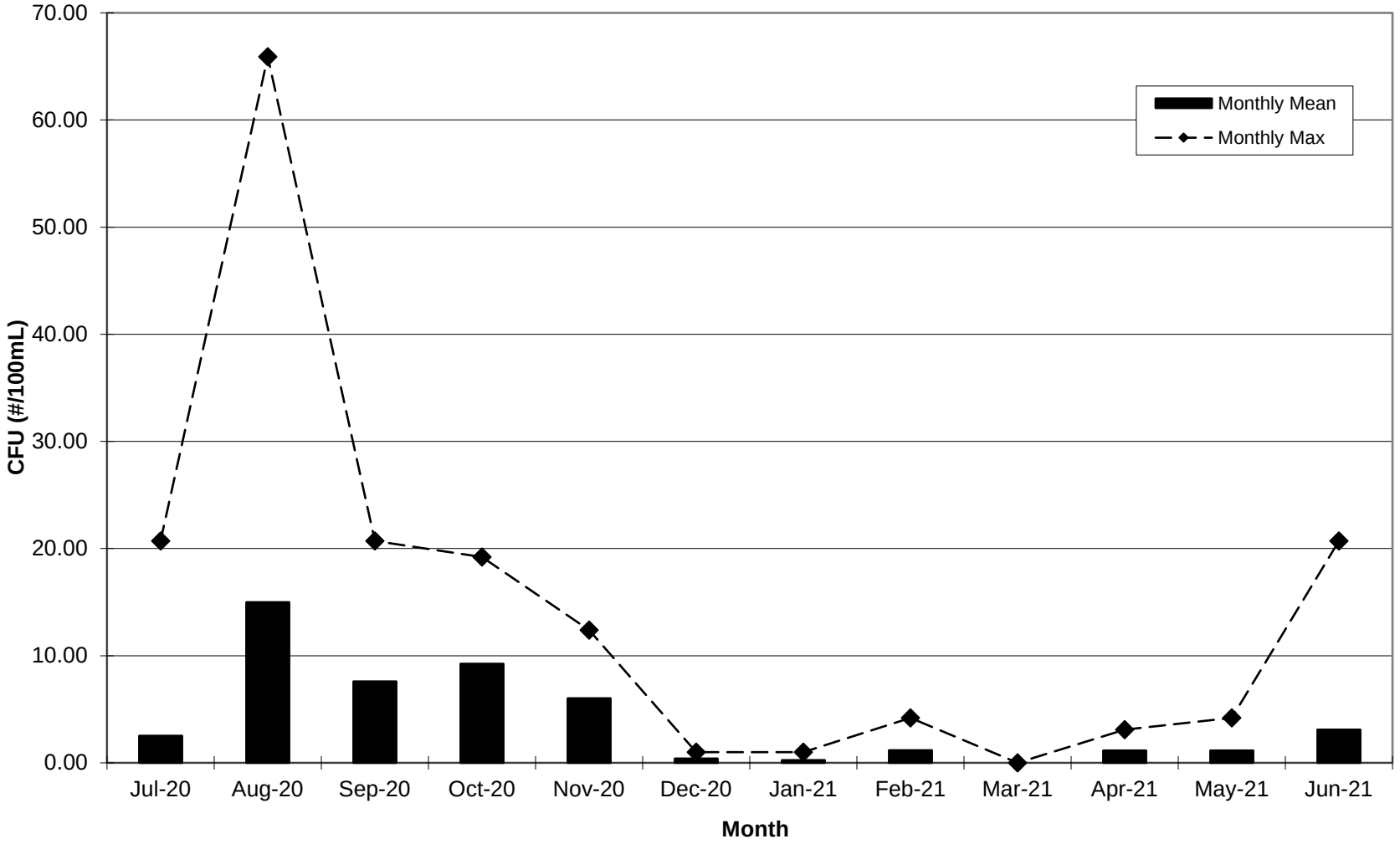
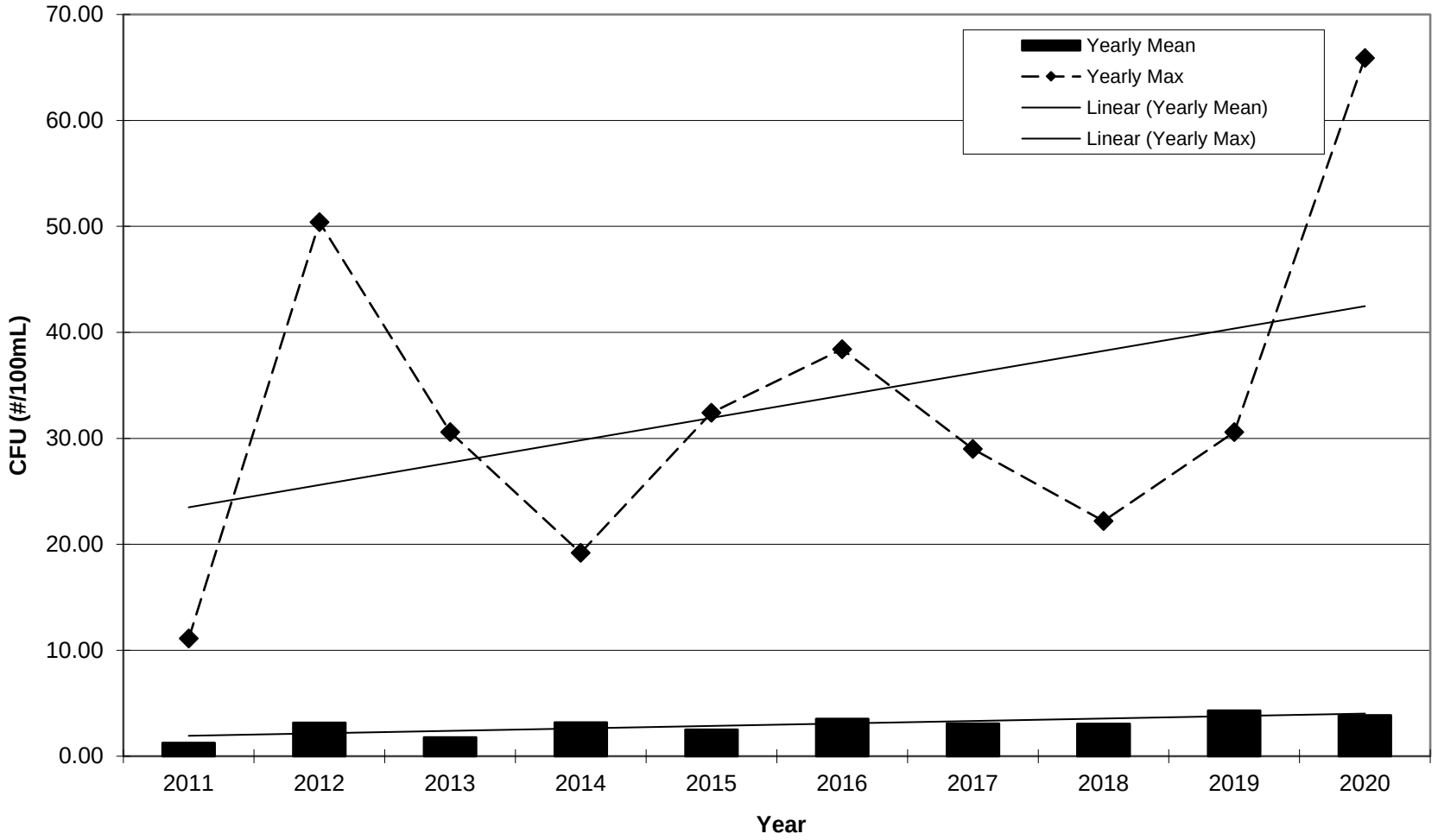


Figure 9.3: Yearly Mean and Max Coliform Results for Zephyr Water Utility District between July 1, 2011 and June 30, 2021.



ZEPHYR COVE WATER UTILITY DISTR
Consumer Confidence Report – 2021
Covering Calendar Year – 2020

This brochure is a snapshot of the quality of the water that we provided last year. Included are the details about where your water comes from, what it contains, and how it compares to Environmental Protection Agency (EPA) and state standards. We are committed to providing you with information because informed customers are our best allies. It is important that customers be aware of the efforts that are continually being made to improve their water systems. To learn more, please attend any of the regularly scheduled meetings.

For more information please contact GREG MELANDOW at 775-782-9989.

Your water comes from:

Source Name	Source Water Type
LAKE TAHOE INTAKE	Surface Water

We treat your water to remove several contaminants and we add disinfectant to protect you against microbial contaminants. The Safe Drinking Water Act (SDWA) requires states to develop a Source Water Assessment (SWA) for each public water supply that treats and distributes raw source water in order to identify potential contamination sources. The state has completed an assessment of our source water. For results of the source water assessment, please contact us.

Message from EPA

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons, such as those with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the Safe Drinking Water Hotline (800-426-4791).

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The sources of drinking water (both tap water and bottled water) included rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Contaminants that may be present in source water before we treat it include:

Microbial contaminants, such as viruses and bacteria, may come from sewage treatment plants, septic systems, agricultural livestock operations and wildlife.

Inorganic contaminants, such as salts and metals, can be naturally-occurring or result from urban storm water runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming.

Pesticides and herbicides may come from a variety of sources such as storm water run-off, agriculture, and residential users.

Radioactive contaminants, can be naturally occurring or the result of mining activity

Organic contaminants, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, may also come from gas stations, urban storm water run-off, and septic systems.

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Water Quality Data

The tables following below list all of the drinking water contaminants that were detected during the 2020 calendar year. The presence of these contaminants does not necessarily indicate that the water poses a health risk. Unless noted, the data presented in this table is from testing done January 1- December 31, 2020. The state requires us to monitor for certain contaminants less than once per year because the concentrations of these contaminants are not expected to vary significantly from year to year. Some of the data, though representative of the water quality, is more than one year old. **The bottom line is that the water that is provided to you is safe.**

Terms & Abbreviations

Maximum Contaminant Level Goal (MCLG): the "Goal" is the level of a contaminant in drinking water below which there is no known or expected risk to human health. MCLG's allow for a margin of safety.
Maximum Contaminant Level (MCL): the "Maximum Allowed" MCL is the highest level of a contaminant that is allowed in drinking water. MCL's are set as close to the MCLG's as feasible using the best available treatment technology.
Action Level (AL): the concentration of a contaminant that, if exceeded, triggers treatment or other requirements that a water system must follow.
Treatment Technique (TT): a treatment technique is a required process intended to reduce the level of a contaminant in drinking water.
Maximum Residual Disinfectant Level (MRDL): the highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.
Maximum Residual Disinfectant Level Goal (MRDLG): the level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLG's do not reflect the benefits of the use of disinfectants to control microbial contaminants.
Non-Detects (ND): laboratory analysis indicates that the constituent is not present.
Parts per Million (ppm) or milligrams per liter (mg/l)
Parts per Billion (ppb) or micrograms per liter (µg/l)
Picocuries per Liter (pCi/L): picocuries per liter is a measure of the radioactivity in water.
Millirems per Year (mrem/yr): measure of radiation absorbed by the body.
Million Fibers per Liter (MFL): million fibers per liter is a measure of the presence of asbestos fibers that are longer than 10 micrometers.
Nephelometric Turbidity Unit (NTU): nephelometric turbidity unit is a measure of the clarity of water. Turbidity in excess of 5 NTU is just noticeable to the average person.

Water Quality Data

The tables following below list all of the drinking water contaminants, which were detected during the 2020 calendar year. The presence of these contaminants does not necessarily indicate the water poses a health risk. Unless noted, the data presented in this table is from the testing done January 1 - December 31, 2020. The state requires us to monitor for certain contaminants less than once per year because the concentrations of these contaminants are not expected to vary significantly from year to year. Some of the data, though representative of the water quality, is more than one year old. **The bottom line is that the water that is provided to you is safe.**

Testing Results for ZEPHYR COVE WATER UTILITY DISTR

Microbiological	Result	MCL	MCLG	Typical Source
No Detected Results were Found in the Calendar Year of 2020				

Disinfection By-Products	Monitoring Period	RAA	Range	Unit	MCL	MCLG	Typical Source
TOTAL HALOACETIC ACIDS (HAA5)	2020	2	0 - 4.8	ppb	60	0	By-product of drinking water disinfection
TTHM	2020	7	0 - 7.6	ppb	80	0	By-product of drinking water chlorination

Lead and Copper	Date	90TH Percentile		Unit	AL	Sites Over AL	Typical Source
COPPER, FREE	2020	0.16	0.002 - 0.18	ppm	1.3	0	Corrosion of household plumbing systems; Erosion of natural deposits; Leaching from wood preservatives.

Regulated Contaminants	Collection Date	Highest Value	Range	Unit	MCL	MCLG	Typical Source
BARIUM	10/20/2020	0.01	0.01	ppm	2	2	Discharge of drilling wastes; Discharge from metal refineries; Erosion of natural deposits.
MERCURY	10/20/2020	1	1	ppb	2	2	Erosion of natural deposits; Discharge from refineries and factories; Runoff from landfills; Runoff from cropland.

Radionuclides	Collection Date	Highest Value	Range	Unit	MCL	MCLG	Typical Source
COMBINED RADIUM (-226 & -228)	6/8/2016	0.635	0.635	pCi/L	5	0	Erosion of natural deposits
GROSS ALPHA, INCL. RADON & U	6/8/2016	0.768	0.768	pCi/L	15	0	Decay of natural and man-made deposits
GROSS BETA PARTICLE ACTIVITY	6/8/2016	2.61	2.61	pCi/L	50	0	Decay of natural and man-made deposits
RADIUM-228	6/8/2016	0.635	0.635	pCi/L	5	0	

Secondary Contaminants	Collection Date	Highest Value	Range	Unit	SMCL	MCLG	Typical Source
ALKALINITY, BICARBONATE	6/8/2016	35	35	MG/L			0
ALKALINITY, TOTAL	6/8/2016	35	35	MG/L			0
CALCIUM	6/8/2016	8	8	MG/L			0
CHLORIDE	10/20/2020	2.6	2.6	MG/L	400		0
HARDNESS, TOTAL (AS CACO3)	6/8/2016	28	28	MG/L			0
MAGNESIUM	10/20/2020	1.5	1.5	MG/L	150		0
PH	10/20/2020	7.98	7.98	PH	8.5		0
SODIUM	10/20/2020	6.9	6.9	MG/L	200	20	0
SULFATE	10/20/2020	1.9	1.9	MG/L	500		0
TDS	10/20/2020	60	60	MG/L	1000		0
TEMPERATURE (CENTIGRADE)	10/20/2020	21.3	21.3	C			0

Health Information About Water Quality

Your water meets the EPA's standard for Lead. If present at elevated levels, this contaminant can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. Your Water System is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your drinking water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at http://www.epa.gov/safewater/lead.

Violations

During the 2020 calendar year, ZEPHYR COVE WATER UTILITY DISTR is required to include an explanation of the violation(s) in the table below and the steps taken to resolve the violation(s) with this report.

Type	Category	Analyte	Compliance Period
No Violations Occurred in the Calendar Year of 2020			

Health Information About the Above Violation(s)

There are no additional required health effects violation notices.

Round Hill General Improvement District
Water Quality Data Summary 2020-2021

Round Hill General Improvement District (RHGID) is a filtering water supplier that is only required to report source water turbidity. During the 2020-2021 reporting year, RHGID remained under a filtering water supplier's Federal and State water quality requirements. During the same period, the Environmental Protection Agency (EPA) noted no violation to the health, reporting, or monitoring requirements of the Safe Drinking Water Act (Table 5.9). Additional regulatory information for RHGID is provided in the Consumer Confidence Report found at the end of this section.

Turbidity

Between July 1, 2020, and June 30, 2021, RHGID met Federal and State guidelines for turbidity by remaining below regulatory limits. The monthly mean and maximum turbidity measurements for the 2020-2021 reporting year did not exceed 0.25 NTU (Figure 6.0). The maximum turbidity reading for the reporting year was 0.23 NTU, lower than the previous reporting years' maximum of 0.33 NTU (Figure 6.1). The annual maximum was recorded on July 1, 2020, wave action associated with southwest winds of 0.7-8.9 MPH with gusts up to 12.3 MPH likely influenced the turbidity reading (Table 5.1). The annual mean turbidity for 2020-2021 was 0.14 NTU, higher than the previous reporting year's result of 0.20 NTU (Figure 6.1). The largest monthly mean turbidity result was 0.18 NTU in September 2020 (Table 10.0).

Table 10.0: RHGID source water turbidity data results from July 1, 2020, through June 30, 2021. Turbidity analyses completed on samples collected daily from raw water at the RHGID intake.

Month	Monthly max (NTU)	Date monthly max	Monthly mean (NTU)	Monthly median (NTU)	90th percentile
Jul-20	0.23	1	0.17	0.17	0.21
Aug-20	0.21	24	0.17	0.17	0.18
Sep-20	0.21	2, 18	0.18	0.18	0.20
Oct-20	0.20	2	0.16	0.16	0.19
Nov-20	0.20	2	0.16	0.16	0.18
Dec-20	0.13	9, 11, 26, 31	0.11	0.11	0.13
Jan-21	0.15	18	0.10	0.10	0.13
Feb-21	0.13	3, 6	0.09	0.13	0.11
Mar-21	0.12	15, 28	0.09	0.10	0.11
Apr-21	0.16	19	0.12	0.12	0.14
May-21	0.21	19	0.16	0.16	0.20
Jun-21	0.19	7	0.16	0.16	0.17

Historically, RHGID has maintained low turbidity measurements. In 2006, turbidity reading reached 4.89 NTU during a rain and snow event. Due to this high reading, the intake was relocated and extended an additional 1,500 feet into deeper water at a total distance of 2,500 feet from shore. The next highest reading was reported in January 1997, 2.19 NTU, and occurred during a 100-year storm event. The highest maximum turbidity reading in the 10-year reporting period of July 1, 2011-June 30, 2021 is 0.0.38 NTU, recorded in 2018. Annual maximum results

are all below 0.40 NTU for the 10-year reporting period (Figure 6.1). Annual mean turbidity has remained below 0.20 NTU for the 10–year reporting period, with nine of ten years below 0.15 NTU. Linear trend line analysis shows an increasing trend in both annual maximum and annual mean from July 1, 2011-June 20, 2021 (Figure 6.1).

Figure 6.0: Monthly Mean and Max Turbidity Results for Round Hill General Improvement District between July 1, 2020 and June 30, 2021.

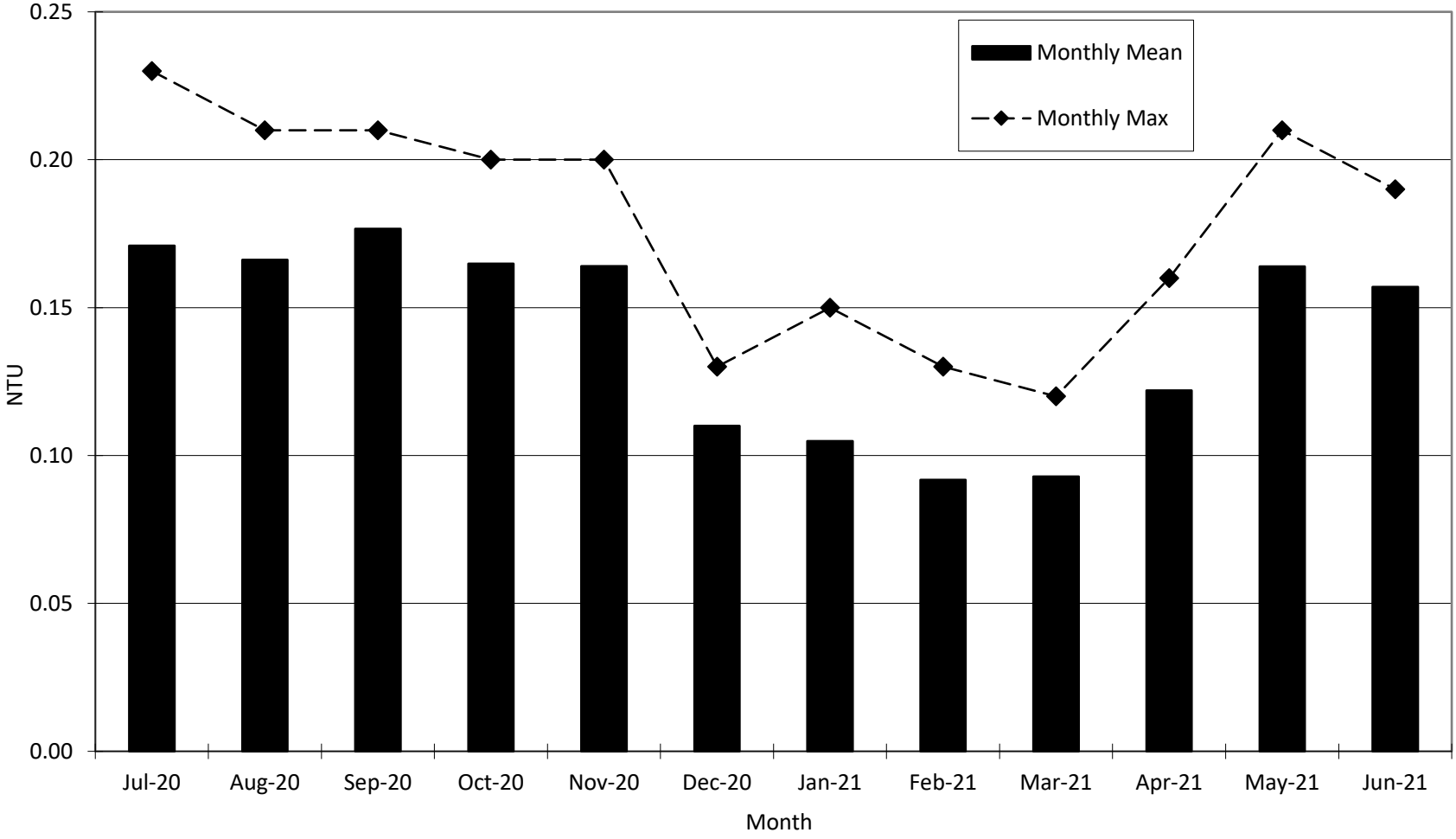
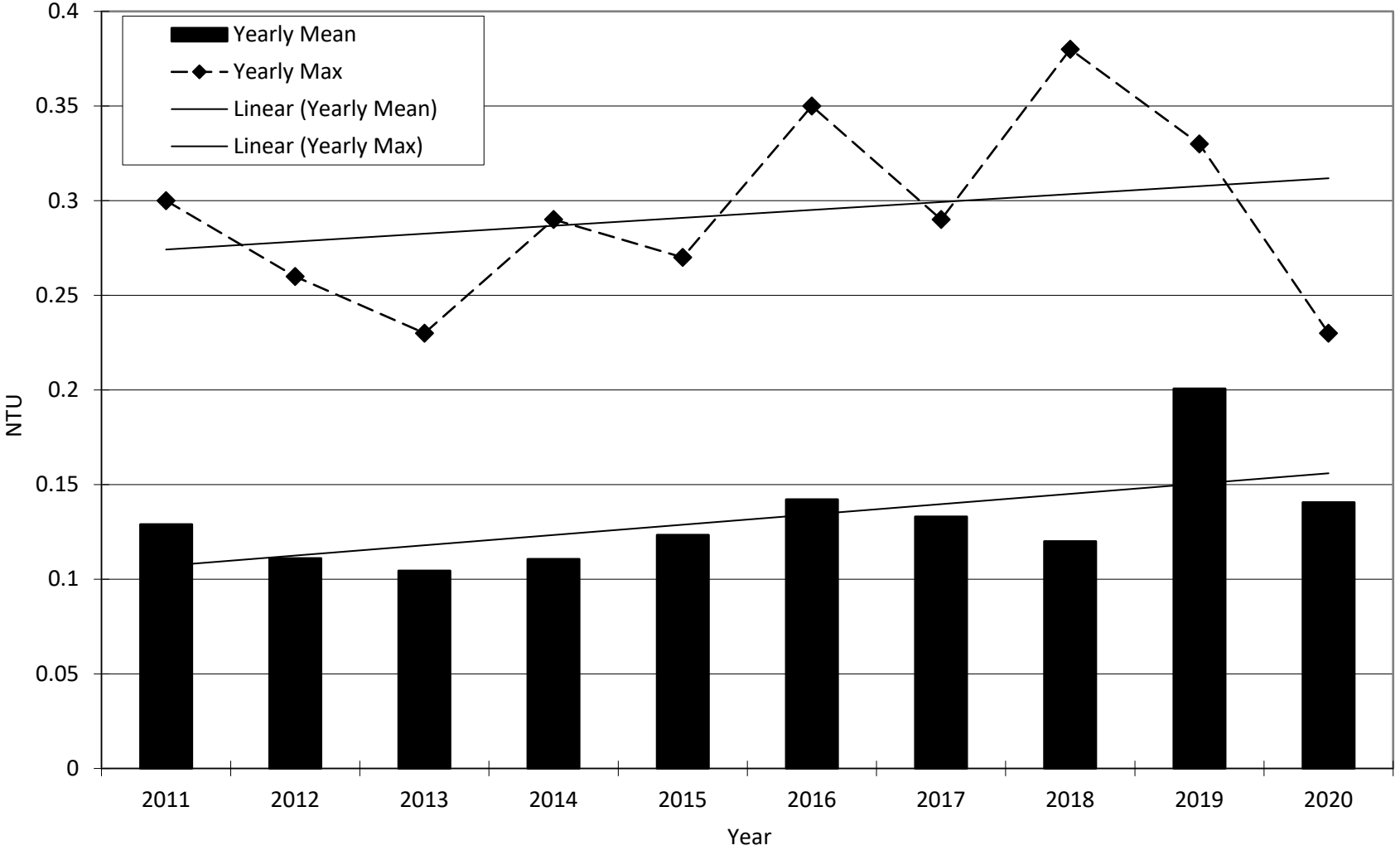


Figure 6.1: Yearly Mean and Max Turbidity Results for Round Hill General Improvement District between July 1, 2011 and June 30, 2021.





ROUND HILL GID
Consumer Confidence Report – 2021
Covering Calendar Year 2020

Your Water Meets All Drinking Water Standards.

Absolutely. Last year, as in years past, your tap water met all U.S. Environmental Protection Agency (EPA) and state drinking water health standards. Round Hill GID vigilantly safeguards its water supply and once again we are proud to report that our system has not violated a maximum contaminant or other water quality standard.

The water that you use in Round Hill comes from Lake Tahoe. Your water is treated with filtration, then it is chlorinated and delivered through a seven mile distribution system to your home. **The water from your tap meets all requirements set forth by the U.S. Environmental Protection Agency and the Nevada Division of Environmental Protection.**

This brochure is a snapshot of the quality of the water that we provided last year. Included are the details about where your water comes from, what it contains, and how it compares to Environmental Protection Agency (EPA) and state standards. We are committed to providing you with information because informed customers are our best allies. It is important that customers be aware of the efforts that are continually being made to improve their water systems. To learn more, please attend any of the regularly scheduled meetings. For more information please contact Andrew Hickman at 775-588-2571.

We treat your water to remove several contaminants and we add disinfectant to protect you against microbial contaminants. The Safe Drinking Water Act (SDWA) requires states to develop a Source Water Assessment (SWA) for each public water supply that treats and distributes raw source water in order to identify potential contamination sources. The state has completed an assessment of our source water. For results of the source water assessment, please contact us.

Message from EPA

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons, such as those with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the Safe Drinking Water Hotline (800-426-4791).

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the EPA's Safe Drinking Water Hotline (800-426-4791).

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Contaminants that may be present in source water before we treat it include:

Microbial contaminants, such as viruses and bacteria, may come from sewage treatment plants, septic systems, agricultural livestock operations and wildlife.

Inorganic contaminants, such as salts and metals, can be naturally-occurring or result from urban storm water runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming.

Pesticides and herbicides may come from a variety of sources such as storm water run-off, agriculture, and residential users.
Radioactive contaminants, can be naturally occurring or the result of mining activity.
Organic contaminants, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, may also come from gas stations, urban storm water run-off, and septic systems.

In order to ensure that tap water is safe to drink, EPA prescribes regulation which limits the amount of certain contaminants in water provided by public water systems. We treat our water according to EPA's regulations. Food and Drug Administration regulations establish limits for contaminants in bottled water, which must provide the same protection for public health.

Our water system tested a minimum of 2 samples per month in accordance with the Total Coliform Rule for microbiological contaminants. Coliform bacteria are usually harmless, but their presences in water can be an indication of disease-causing bacteria. When coliform bacteria are found, special follow-up tests are done to determine if harmful bacteria are present in the water supply. If this limit is exceeded, the water supplier must notify the public by newspaper, television or radio.

Water Quality Data

The following tables list all of the drinking water contaminants that were detected during the 2020 calendar year. The presence of these contaminants does not necessarily indicate that the water poses a health risk. Unless noted, the data presented in this table is from testing done January 1- December 31, 2020. The state requires us to monitor for certain contaminants less than once per year because the concentrations of these contaminants are not expected to vary significantly from year to year. Some of the data, though representative of the water quality, is more than one year old. **The bottom line is that the water that is provided to you is safe.**



WATER QUALITY TERMS & DEFINITIONS

Maximum Contaminant Level Goal (MCLG): the "Goal" is the level of a contaminant in drinking water below which there is no known or expected risk to human health. MCLG's allow for a margin of safety.

Maximum Contaminant Level (MCL): the "Maximum Allowed" MCL is the highest level of a contaminant that is allowed in drinking water.

MCL's are set as close to the MCLG's as feasible using the best available treatment technology.

Secondary Maximum Contaminant Level (SMCL): the secondary standards of "Maximum Allowed" MCL allowed in drinking water.

Action Level (AL): the concentration of a contaminant that, if exceeded, triggers treatment or other requirements that a water system must follow.

Treatment Technique (TT): a treatment technique is a required process intended to reduce the level of a contaminant in drinking water.

Maximum Residual Disinfectant Level (MRDL): the highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

Maximum Residual Disinfectant Level Goal (MRDLG): the level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLG's do not reflect the benefits of the use of disinfectants to control microbial contaminants.

Non-Detects (ND): laboratory analysis indicates that the constituent is not present.

Parts per Million (ppm): or milligrams per liter (mg/l)

Parts per Billion (ppb): or micrograms per liter (µg/l)

Picocuries per Liter (pCi/L): picocuries per liter is a measure of the radioactivity in water.

Millirems per Year (mrem/yr): measure of radiation absorbed by the body.

Million Fibers per Liter (MFL): million fibers per liter is a measure of the presence of asbestos fibers that are longer than 10 micrometers.

Nephelometric Turbidity Unit (NTU): nephelometric turbidity unit is a measure of the clarity of water. Turbidity in excess of 5 NTU is just noticeable to the average person.

WATER QUALITY TABLE

Testing Results for Round Hill GID

Disinfection By-Products	Monitoring Period	RAA	Range	Unit	MCL	MCLG	Typical Source
TOTAL HALOACETIC ACIDS (HAA5)	2020	ND	ND	ppb	60	0	By-product of drinking water disinfection
TTHM	2020	3	2.92	ppb	80	0	By-product of drinking water chlorination

Lead and Copper	Date	90th Percentile		Unit	AL	Sites Over AL	Typical Source
COPPER, FREE	2017-2019	0.059	ND - 0.068 0.042	ppm	1.3	0	Corrosion of household plumbing systems; Erosion of natural deposits; Leaching from wood preservatives.
LEAD	2017-2019	2	ND - 3.7	ppb	15	0	Corrosion of household plumbing systems; Erosion of natural deposits.

Radionuclides	Collection Date	Highest Value	Range	Unit	MCL	MCLG	Typical Source
Combined RADIUM (-226 & -228)	9/19/2019	0.2	0.2	pCi/L	5	0	Erosion of natural deposits

Secondary Contaminants	Collection Date	Highest Value	Range	Unit	SMCL	MCLG	
CARBON, TOTAL	2020 Quarterly	ND	ND	ppm	4		
CHLORIDE	9/10/2020	2.92	2.92	mg/L	400		
MAGNESIUM	9/10/2020	2.5	2.5	mg/L	150		
SODIUM	9/10/2020	7.0	4.36-7.0	mg/L	200	20	
SULFATE	9/10/2020	1.6	1.6	mg/L	500		
TDS	9/10/2020	72	72	mg/L	1000		

Health Information About Water Quality

While your water meets the EPA's standard for Lead, if present at elevated levels this contaminant can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. We are responsible for providing high quality drinking water, but we cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your drinking water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline at 800-426-4791 or at www.epa.gov/safewater/lead.

Violations

Type	Category	Analyte	Compliance Period
The ROUND HILL GID public water system did not receive any violations in 2020.			



Protection of drinking water is everyone's responsibility. You can help protect your community's drinking water source in several ways:

- Eliminate excess use of lawn and garden fertilizers and pesticides — they contain hazardous chemicals that can reach your drinking water source.
- Pick up after your pets.
- Dispose of chemicals properly; take used motor oil to a recycling center.
- Volunteer in your community. Find a watershed or wellhead protection organization in your community and volunteer to help. If there are no active groups, consider starting one. Use EPA's Adopt Your Watershed to locate groups in your community, or visit the Watershed Information Network's How to Start a Watershed Team.
- Organize a storm drain stenciling project with your local government or water supplier. Stencil a message next to the street drain reminding people "Dump No Waste - Drains to Lake" or "Protect Your Water." Produce and distribute a flyer for households to remind residents that storm drains dump directly into your local water body.

Green waste drop-off is FREE for residential customers of South Tahoe Refuse!

Monday - Saturday 8am to 5pm
Resource Recovery Facility
2121 Eloise Ave.

Vouchers are no longer required,
but customers must provide their resident service address at time of drop-off. Please bring in CLEAN GREEN WASTE ONLY: pine needles, pinecones, weeds, leaves, branches, etc. -- Vegetation ONLY. Residential drop-off by trucks, trucks with trailers, small tip-trucks and small box vans. No rocks or construction material of any type. No dirt, stumps, trash, milled wood, metal, or plastic of any kind. Regular charges will apply for contaminated loads.

Keep it Clean - Keep it Green!
If your load is boxed, bagged, or canned, you will need to dump them out.

Commercial Green Waste Dates/Times

Same rules apply as above.
CLEAN GREEN WASTE ONLY!
Resource Recovery Facility, 2121 Eloise Ave.

May 29	8am-4pm	**September 4**	8am-4pm
June 26	8am-4pm	**October 16**	8am-4pm

Water Conservation Tips

Did you know that the average U.S. household uses approximately 400 gallons of water per day or 100 gallons per person per day? Luckily, there are many low-cost and no-cost ways to conserve water. Small changes can make a big difference – try one today and soon it will become second nature.

- Take short showers - a 5 minute shower uses 4 to 5 gallons of water compared to up to 50 gallons for a bath.
- Shut off water while brushing your teeth, washing your hair and shaving and save up to 500 gallons a month.
- Use a water-efficient showerhead. They're inexpensive, easy to install, and can save you up to 750 gallons a month.
- Run your clothes washer and dishwasher only when they are full. You can save up to 1,000 gallons a month.
- Water plants only when necessary.
- Fix leaky toilets and faucets. Faucet washers are inexpensive and take only a few minutes to replace. To check your toilet for a leak, place a few drops of food coloring in the tank and wait. If it seeps into the toilet bowl without flushing, you have a leak. Fixing it or replacing it with a new, more efficient model can save up to 1,000 gallons a month.
- Adjust sprinklers so only your lawn is watered. Apply water only as fast as the soil can absorb it and during the cooler parts of the day to reduce evaporation.
- Teach your kids about water conservation to ensure a future generation that uses water wisely. Make it a family effort to reduce next month's water bill!
- Visit www.epa.gov/watersense for more information.

Kingsbury General Improvement District
Water Quality Data Summary 2020-2021

During the 2020-2021 reporting year, Kingsbury General Improvement District (KGID) remained within Federal and State water quality requirements. During the same period, the Environmental Protection Agency (EPA) notes no violation of the health, reporting, or monitoring requirements of the Safe Drinking Water Act (Table 5.9). Additional regulatory information for KGID is provided in the Consumer Confidence Report found at the end of this section.

Turbidity

Between July 1, 2020, and June 30, 2021, KGID met Federal and State guidelines for turbidity by remaining within regulatory limits. The yearly maximum was 1.85 NTU, taken during a wind event on March 23, 2021. Winds were from the southwest 1.7-17.0 mph (Tables 5.1, 11.0). The annual mean turbidity result was 0.23 NTU, and 90% of the samples were below 0.25 NTU (Table 11.0). The largest monthly mean turbidity, 0.29 NTU, occurred in February 2021 (Table 11.0, Figure 7.0).

Table 11.0: KGID source water turbidity data results from July 1, 2020, through June 30, 2021. Turbidity analyses completed on samples collected daily from raw water at the KGID intake.

	Monthly max (NTU)	Date monthly max	Monthly mean (NTU)	Monthly median (NTU)	90th percentile
Jul-20	0.26	2	0.21	0.21	0.23
Aug-20	0.25	10	0.19	0.19	0.21
Sep-20	0.28	26	0.20	0.20	0.24
Oct-20	0.42	13	0.18	0.17	0.20
Nov-20	0.32	15	0.17	0.16	0.19
Dec-20	0.23	13	0.16	0.16	0.18
Jan-21	0.99	5	0.25	0.17	0.45
Feb-21	1.22	23	0.29	0.16	0.78
Mar-21	1.85	23	0.27	0.17	0.32
Apr-21	1.49	20	0.26	0.19	0.22
May-21	1.33	18	0.27	0.22	0.27
Jun-21	0.62	22	0.26	0.21	0.39

Historically (1997-2003), KGID maintained annual mean source water turbidities less than 1.0 NTU. Maximum annual turbidity ranged from 2.59 NTU to 3.0 NTU between 2004 and 2006, returned to below 1.0 NTU in 2007, increased above 1.0 NTU again in 2008-2010, and dropped below 1.0 NTU in 2011 through 2016. Annual maximum turbidity reached 4 NTU during the 2016-2017 reporting year, during the large runoff season of spring 2017. From 2017- 2020 annual maximum turbidity ranged from 0.65 NTU to 1.85 NTU. Linear trendline data for the 10 – year reporting period of July 1, 2011 – June 30, 2021, shows an increasing linear trend in annual maximum (Figure 7.1). The annual mean turbidity, 0.23 NTU, for the 2020-2021 reporting year is greater than 0.17 NTU the previous year. Annual mean turbidity values remain below 0.25 NTU for the 10-year reporting period, and linear trendline analysis shows a stable trend (figure 7.1).

Coliform

KGID met Federal and State guidelines for total coliform during the 2020-2021 reporting year, with zero Total Coliform results above 100 coliform-forming units per 100 mL (CFU/100 mL). The maximum total coliform count was 69.70 CFU/100 mL, below the 2019-2020 reporting year's annual maximum of 88.5 CFU/100 mL. The maximum total coliform reading occurred twice during the reporting year, September 14, 2020, and October 14, 2020. The daily maximum temperature was 15°F greater than the weekly average on both occasions. Increased temperatures paired with winds from the east causing mixing action likely contributed to the maximum total coliform results (Table 5.4). Total coliform was detected in 66% of the 157 samples analyzed, an increase from 64% in the previous reporting year. The annual mean total coliform count was 6.36 CFU/100 mL, the median number was 2 CFU/100 mL, and 90% of the samples were below 16.96 CFU/100 mL (Table 11.1). The monthly mean total coliform results ranged between 0.25 CFU/100 mL and 24.71 CFU/100 mL (Table 11.2). The highest monthly mean total coliform results occurred in September 2020. Linear trend line data shows a decreasing trend in annual maximum and an increasing trend in annual mean over the 10- year reporting period of July 1, 2011, and June 30, 2021 (Figure 7.3).

KGID also completed tests for E. coli coliform on 157 source water samples. During the 2020-2021 reporting year, six samples detected E. coli coliform with a maximum reading of 5.30 CFU/100 mL present, giving KGID an E. coli coliform detection rate of 3.82%. Consequently, the yearly mean for E. coli coliform was 0.07 CFU/100 ml. the annual median and 90% of E. coli coliform readings were both 0.00 CFU/100 mL (Table 7.1).

Table 11.1: KGID annual source water total and E. coli coliform data results from July 1, 2020, through June 30, 2021. Coliform analyses completed on samples collected daily from raw water at the KGID intake.

	Total coliform (# colonies/100 mL)	E. coli coliform (# colonies/100 mL)
Mean	6.36	0.07
Median	2.00	0.00
Max	69.70	5.30
90th Percentile	16.96	0.00
Colony Forming Samples	103.00	6.00
Total Number of Samples	157.00	157.00

Table 11.2: KGID monthly source water total and E. coli coliform data results from July 1, 2020, through June 30, 2021. Analyses completed on samples collected daily from raw water at the KGID intake.

	Monthly maximum total coliform (# colonies/100 mL)	Monthly mean total coliform (# colonies/100 mL)	Monthly maximum E.coli coliform (# colonies/100 mL)	Monthly mean E.coli coliform (# colonies/100 mL)
Jul-20	30.60	9.72	2.00	0.15
Aug-20	17.80	8.07	0.00	0.00
Sep-20	69.70	24.71	0.00	0.00
Oct-20	69.70	14.33	0.00	0.00
Nov-20	20.70	6.98	1.00	0.08
Dec-20	2.00	0.79	1.00	0.07
Jan-21	3.10	0.51	0.00	0.00
Feb-21	2.00	0.58	0.00	0.00
Mar-21	2.00	0.40	0.00	0.00
Apr-21	1.00	0.25	0.00	0.00
May-21	50.40	4.42	5.30	0.56
Jun-21	22.20	4.89	0.00	0.00

Figure 3.0: Monthly Mean and Max Turbidity Results for Kingsbury General Improvement District between July 1, 2020 and June 30, 2021.

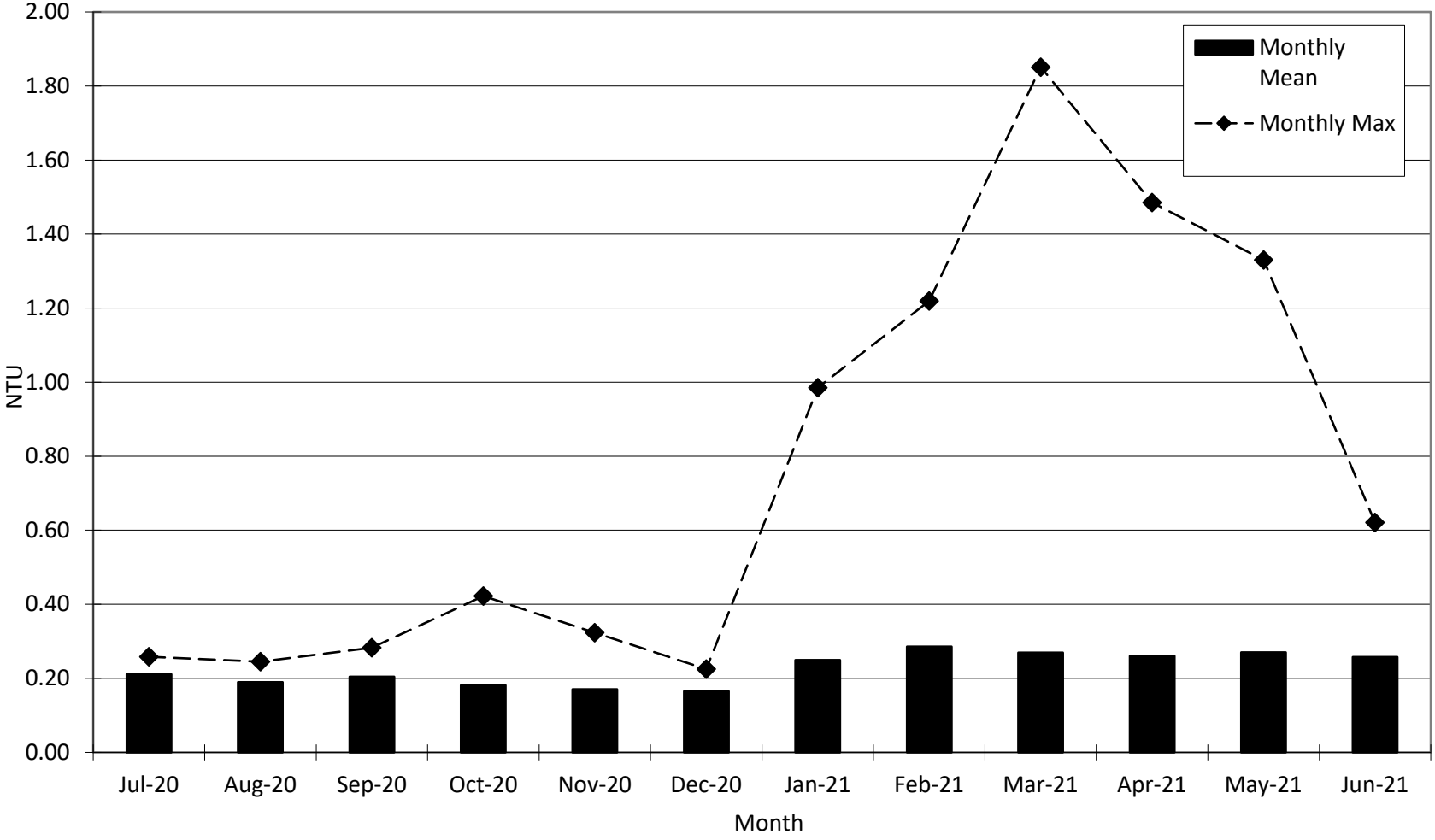


Figure 7.1: Yearly Mean and Max Turbidity Results for Kingsbury General Improvement District between July 1, 2011 and June 30, 2021.

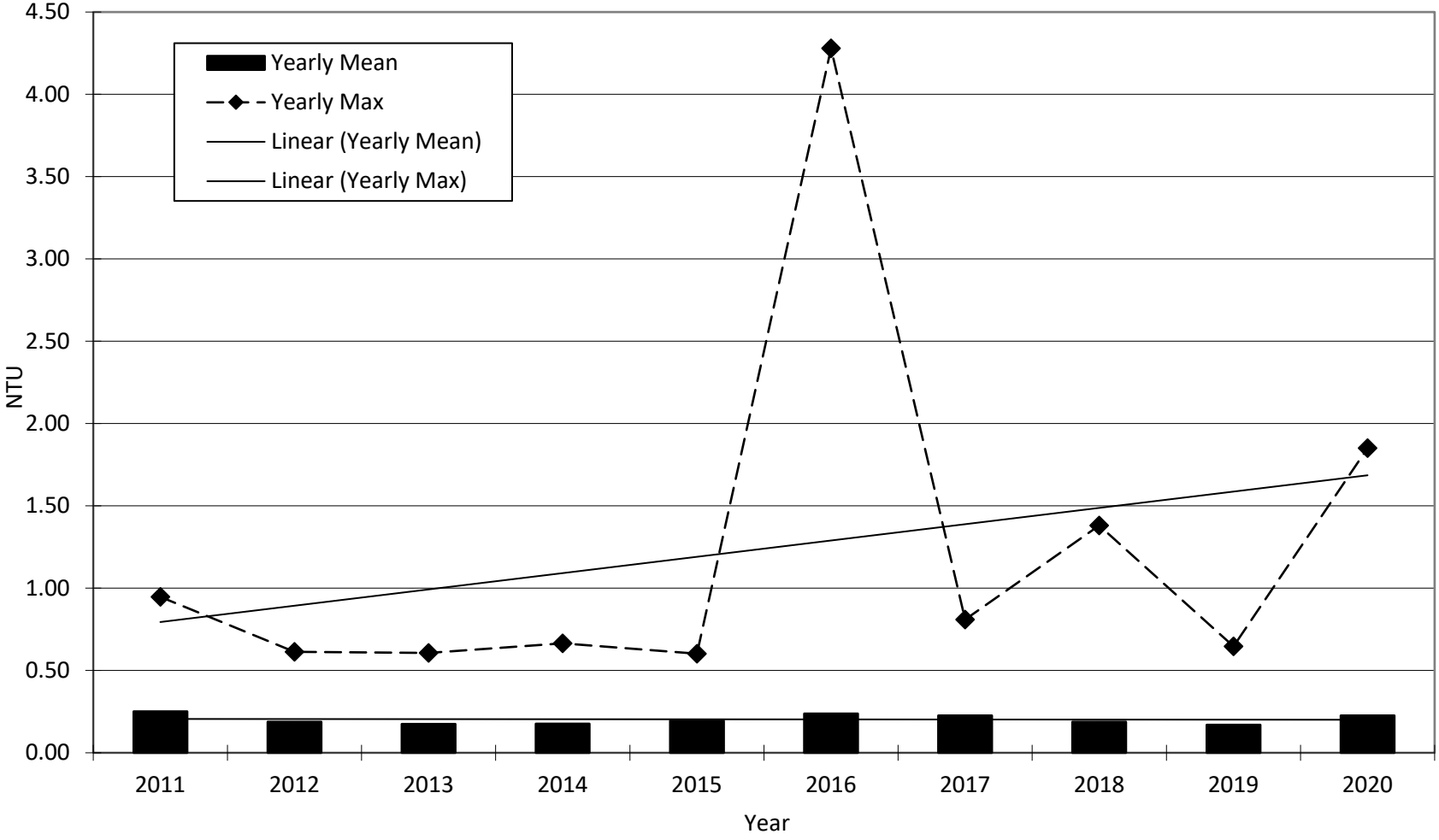


Figure 7.2: Monthly Mean and Max Coliform Results for Kingsbury General Improvement District between July 1, 2020 and June 30, 2021.

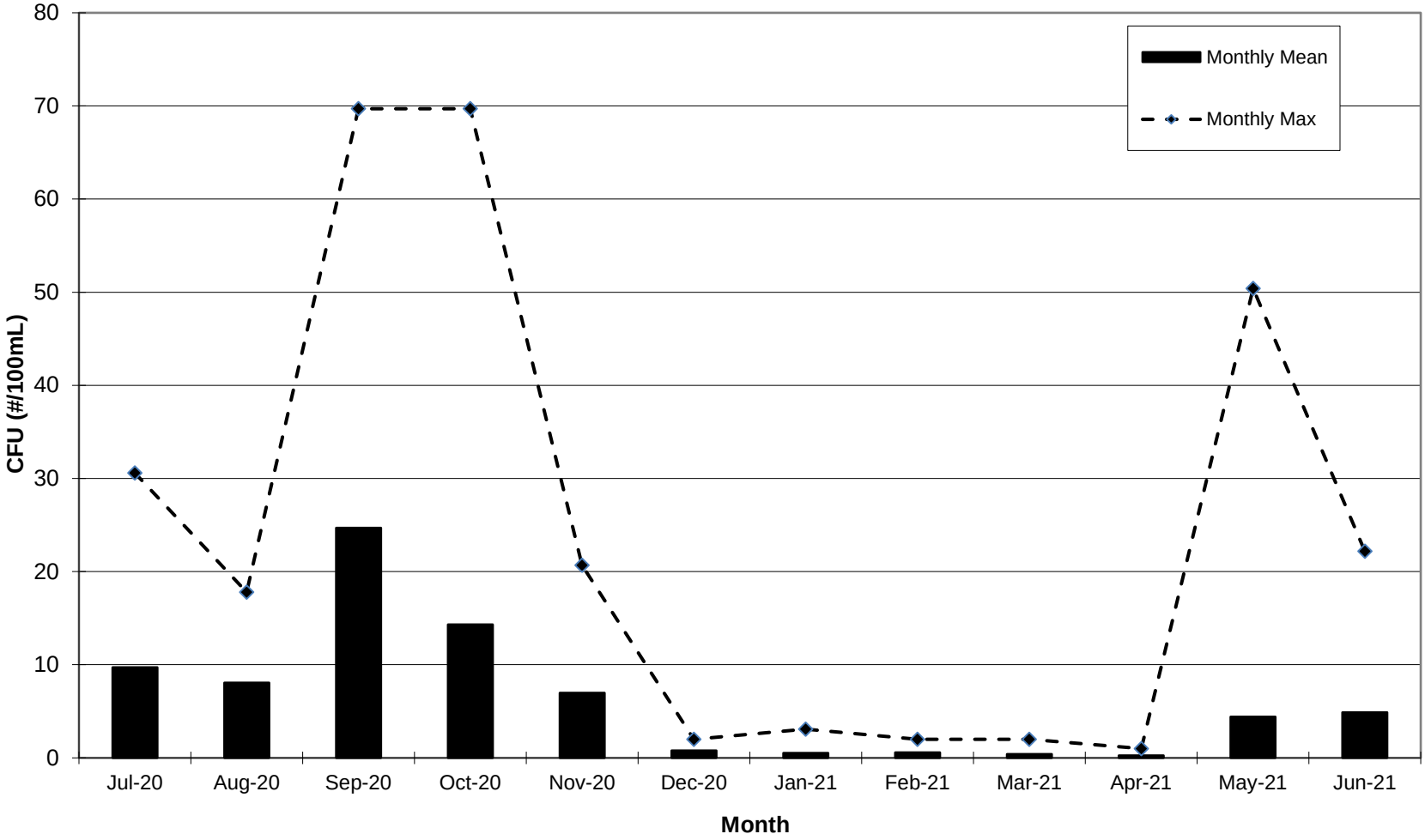
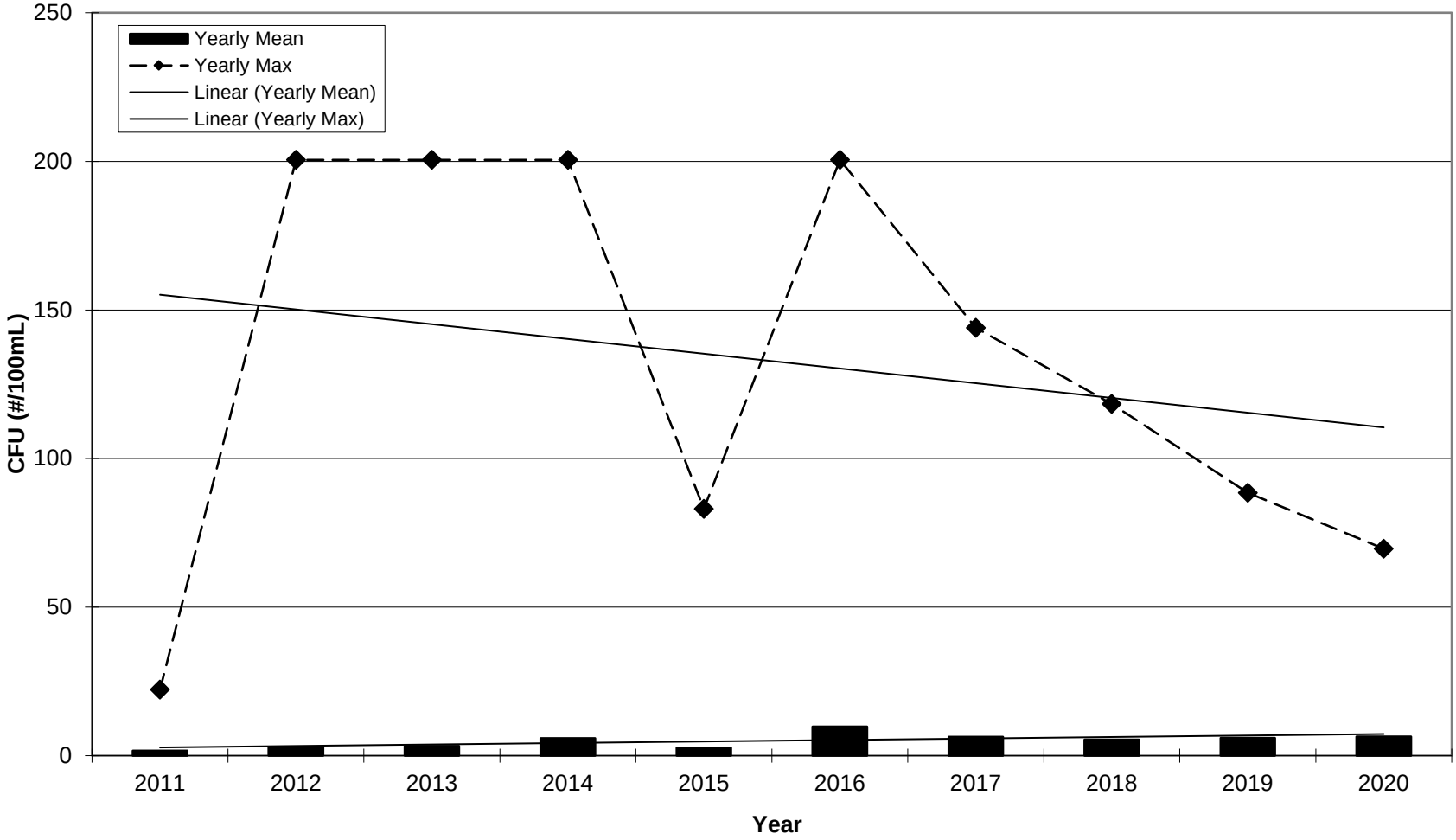


Figure 7.3: Yearly Mean and Max Coliform Results for Kingsbury General Improvement District between July 1, 2011 and June 30, 2021.



KINGSBURY GID
Consumer Confidence Report – 2021
Covering Calendar Year – 2020

This brochure is a snapshot of the quality of the water that we provided last year. Included are the details about where your water comes from, what it contains, and how it compares to Environmental Protection Agency (EPA) and state standards. We are committed to providing you with information because informed customers are our best allies. It is important that customers be aware of the efforts that are continually being made to improve their water systems. To learn more, please attend any of the regularly scheduled meetings. **For more information please contact Brandon Garden at 775-588-3548.**

Your water comes from:

Source Name	Source Water Type
LAKE TAHOE INTAKE STATION 1 RAW	Surface Water

We treat your water to remove several contaminants and we add disinfectant to protect you against microbial contaminants. The Safe Drinking Water Act (SDWA) requires states to develop a Source Water Assessment (SWA) for each public water supply that treats and distributes raw source water in order to identify potential contamination sources. The state has completed an assessment of our source water. For results of the source water assessment, please contact us.

Message from EPA

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons, such as those with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the Safe Drinking Water Hotline (800-426-4791).

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the EPA's Safe Drinking Water Hotline (800-426-4791).

The sources of drinking water (both tap water and bottled water) included rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Contaminants that may be present in source water before we treat it include:

Microbial contaminants, such as viruses and bacteria, may come from sewage treatment plants, septic systems, agricultural livestock operations and wildlife.
Inorganic contaminants, such as salts and metals, can be naturally-occurring or result from urban storm water runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming.
Pesticides and herbicides may come from a variety of sources such as storm water run-off, agriculture, and residential users.
Radioactive contaminants, can be naturally occurring or the result of mining activity
Organic contaminants, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, may also come from gas stations, urban storm water run-off, and septic systems.

In order to ensure that tap water is safe to drink, EPA prescribes regulation which limits the amount of certain contaminants in water provided by public water systems. We treat our water according to EPA's regulations. Food and Drug Administration regulations establish limits for contaminants in bottled water, which must provide the same protection for public health.

Our water system tested a minimum of 8 samples per month in accordance with the Total Coliform Rule for microbiological contaminants. Coliform bacteria are usually harmless, but their presences in water can be an indication of disease-causing bacteria. When coliform bacteria are found, special follow-up tests are done to determine if harmful bacteria are present in the water supply. If this limit is exceeded, the water supplier must notify the public by newspaper, television or radio.

Water Quality Data

The tables following below list all of the drinking water contaminants that were detected during the 2020 calendar year. The presence of these contaminants does not necessarily indicate that the water poses a health risk. Unless noted, the data presented in this table is from testing done January 1- December 31, 2020. The state requires us to monitor for certain contaminants less than once per year because the concentrations of these contaminants are not expected to vary significantly from year to year. Some of the data, though representative of the water quality, is more than one year old. **The bottom line is that the water that is provided to you is safe.**

Terms & Abbreviations

Maximum Contaminant Level Goal (MCLG): the "Goal" is the level of a contaminant in drinking water below which there is no known or expected risk to human health. MCLG's allow for a margin of safety.
Maximum Contaminant Level (MCL): the "Maximum Allowed" MCL is the highest level of a contaminant that is allowed in drinking water. MCL's are set as close to the MCLG's as feasible using the best available treatment technology.
Action Level (AL): the concentration of a contaminant that, if exceeded, triggers treatment or other requirements that a water system must follow.
Treatment Technique (TT): a treatment technique is a required process intended to reduce the level of a contaminant in drinking water.
Maximum Residual Disinfectant Level (MRDL): the highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.
Maximum Residual Disinfectant Level Goal (MRDLG): the level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLG's do not reflect the benefits of the use of disinfectants to control microbial contaminants.
Non-Detects (ND): laboratory analysis indicates that the constituent is not present.
Parts per Million (ppm) or milligrams per liter (mg/l)
Parts per Billion (ppb) or micrograms per liter (µg/l)
Picocuries per Liter (pCi/L): picocuries per liter is a measure of the radioactivity in water.
Millirems per Year (mrem/yr): measure of radiation absorbed by the body.
Million Fibers per Liter (MFL): million fibers per liter is a measure of the presence of asbestos fibers that are longer than 10 micrometers.
Nephelometric Turbidity Unit (NTU): nephelometric turbidity unit is a measure of the clarity of water. Turbidity in excess of 5 NTU is just noticeable to the average person.

Testing Results for KINGSBURY GID

Microbiological	Result	MCL	MCLG	Typical Source
TOTAL COLIFORM	0	0	N/A	Coliforms are bacteria that are naturally present in the environment and are used as an indicator that other, potentially harmful, bacteria may be present.

Disinfection By-Products	Monitoring Period	RAA	Range	Unit	MCL	MCLG	Typical Source
TOTAL HALOACETIC ACIDS (HAA5)	2020	18.0	4.0 - 51	ppb	60	0	By-product of drinking water disinfection
TTHM	2020	13.5	4.0 - 18	ppb	80	0	By-product of drinking water chlorination

Lead and Copper	Date	90TH Percentile	Unit	AL	Sites Over AL	Typical Source
COPPER	2017 – 2019	0.11	ppm	1.3	0	Corrosion of household plumbing systems; Erosion of natural deposits; Leaching from wood preservatives.
LEAD	2017 - 2019	Non Detect	ppb	15	0	Corrosion of household plumbing systems; Erosion of natural deposits.

Regulated Contaminants	Collection Date	Highest Value	Range	Unit	MCL	MCLG	Typical Source
ANTIMONY	8/11/2020	2	2	ppb	6	6	Discharge from petroleum refineries; fire retardants; ceramics; electronics; solder.
BARIUM	8/11/2020	0.010	0.010	ppm	2	2	Discharge of drilling wastes; Discharge from metal refineries; Erosion of natural deposits.
BROMATE	11/09/2020	5.2	1.0 – 5.2	ppb	10	1	By-product of drinking water disinfection

Radionuclides	Collection Date	Highest Value	Range	Unit	MCL	MCLG	Typical Source
No Detected Results were Found in the Calendar Year of 2020							

Secondary Contaminants	Collection Date	Highest Value	Range	Unit	SMCL	MCLG
CHLORIDE	8/11/2020	3.6	3.6	mg/L	400	
MAGNESIUM	8/11/2020	2.1	2.1	mg/L	150	
PH	8/11/2020	7.95	7.95	PH	8.5	
SODIUM	8/11/2020	7.4	7.4	mg/L	200	20
SULFATE	8/11/2020	1.7	1.7	mg/L	500	
TDS	8/11/2020	64	64	mg/L	1000	
TEMPERATURE (CENTIGRADE)	8/11/2020	20.6	20.6	C		
ZINC	8/11/2020	0.02	0.02	mg/L	5	

Health Information About Water Quality

While your water meets the EPA's standard for Lead, *if present at elevated levels* this contaminant can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. Your Water System is responsible for providing high quality drinking water but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your drinking water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at http://www.epa.gov/safewater/lead..

Violations

During the 2020 calendar year, KINGSBURY GID is required to include an explanation of the violation(s) in the table below and the steps taken to resolve the violation(s) with this report.

Type	Category	Analyte	Compliance Period
No Violations Occurred in the Calendar Year of 2020			

Edgewood Water Company
Water Quality Data Summary 2020-2021

During the reporting year, Edgewood Water Company remained within Federal and State water quality requirements. During the same period, the Environmental Protection Agency (EPA) notes no violation of the health, reporting, or monitoring requirements of the Safe Drinking Water Act (Table 5.9).

Turbidity

Between July 1, 2020, and June 30, 2021, Edgewood Water Company met Federal and State guidelines for turbidity by remaining within regulatory limits. The monthly maximum and mean turbidity measurements did not exceed 1.00 NTU (Figure 8.0). The highest turbidity reading for the 2020-2021 reporting year was 0.83 NTU taken on March 13, 2021. Wind of 0.5-17 mph from the southeast likely created mixing from wind-wave action during a precipitation event that produced 0.07 inches of rain (Table 5.1). The annual maximum for this reporting year was greater than the 2019-2020 reporting year maximum of 0.44 NTU. This maximum reading continues similar trends seen at Edgewood (Figure 8.1). The highest monthly mean turbidity reading, 0.29 NTU, occurred twice in the reporting year in September and October 2020. The highest monthly 90th percentile turbidity reading for the 2020-2021 reporting year, 0.39 NTU, occurred in October 2020 (Table 12.0).

Table 12.0: Edgewood Water Company Turbidity Data Summary, July 1, 2020, through June 30, 2021. Turbidity measurements are completed on samples collected daily from raw water at the Edgewood intake.

	Monthly max (NTU)	Date monthly max	Monthly mean (NTU)	Monthly median (NTU)	Monthly 90% (NTU)
Jul-20	0.37	1	0.25	0.24	0.32
Aug-20	0.39	29	0.26	0.29	0.30
Sep-20	0.44	25	0.29	0.28	0.36
Oct-20	0.47	2	0.29	0.28	0.39
Nov-20	0.46	27	0.24	0.21	0.33
Dec-20	0.26	30	0.20	0.20	0.23
Jan-21	0.45	1	0.20	0.18	0.28
Feb-21	0.51	14	0.22	0.20	0.26
Mar-21	0.83	13	0.17	0.13	0.21
Apr-21	0.32	3	0.13	0.14	0.15
May-21	0.42	15	0.18	0.14	0.25
Jun-21	0.39	26	0.22	0.21	0.27

Historically, Edgewood has maintained low turbidity measurements. The highest historical reading, 3.5 NTU, occurred in January 1997 during a 100-year storm event. The maximum turbidity measurement, 0.83 NTU, for the 2020-2021 reporting year was greater than the previous year's 0.44 NTU creating a decreasing trend of maximum turbidity results over a 10-year period of July 1, 2011, to June 30, 2021 (Figure 8.3). The annual mean turbidity measurement for the 2020-2021 reporting year was slightly lower than the previous reporting year, 0.22 NTU and 0.23 NTU, respectively (Figure 8.1). The annual mean turbidity data from 2011-2021 shows an increasing linear trend.

Coliform

Edgewood Water Company met Federal and State guidelines for total coliform. The maximum total coliform count was 17.8 coliform-forming units per 100 mL (CFU/100 mL), which occurred on August 24, 2020. The temperature on that day reached a high of 83.5^0 F, with a weekly mean temperature of 69.2^0 F. The increase in temperature 14.3^0 F above weekly average and to a maximum above 80^0 F, likely attributed to the result (Table 12.1, Table 5.4). The highest monthly mean of total coliform, 19.7 CFU/100 mL, occurred in October 2020 (Table 12.2).

Total coliform was detected in 69% of the 156 samples analyzed, lower than the previous years' 65%. The annual mean total coliform count was 3.69 CFU/100 mL, lower than the previous year's 4.23 CFU/100 mL. The annual median remained at 2 CFU for 2020-2021, and 90% of the samples were below 12 CFU (Table 12.1). Throughout the 2020-2021 reporting year, total coliform counts were similar to the previous year, with 107 and 100 colony-forming samples (Table 12.1). Over the 10-year reporting period, total coliform results show an increasing linear trend in annual maximum and mean (Figure 8.3).

Table 12.1: Edgewood Water Company annual source water total and E.coli coliform data results from July 1, 2020, through June 30, 2021. Coliform analyses completed on samples collected daily from raw water at the Edgewood Water Company intake.

	Total coliform (# colonies/100mL)	E.coli coliform (# colonies/100mL)
Mean	3.69	0.04
Median	2.00	0.00
Max	17.80	2.00
90th Percentile	9.90	0.00
Colony-Forming Samples	107.00	4.00
Total Number of Samples	156.00	156.00

Edgewood Water Company also completed tests for E. coli coliform on all samples tested for total coliform. E. coli coliform was detected in four samples during the 2020-2021 reporting year. The maximum E. coil coliform reading was 2.0 CFU/100 mL; this result was taken in October 2020 and November 2020. The annual mean E. coli coliform result was 0.04 CFU/100 mL, and 90% of the samples were below zero (Table 12.1).

Table 12.2: Edgewood Water Company monthly source water total and E. coli coliform data from July 1, 2020, through June 30, 2021. Analyses completed on samples collected from raw water at the Edgewood Water Company intake.

	Monthly maximum total coliform (# colonies/100 mL)	Monthly mean total coliform (# colonies/100 mL)	Monthly maximum E.coli coliform (# colonies/100 mL)	Monthly mean E.coli coliform (# colonies/100 mL)
Jul-20	8.70	3.69	0.00	0.00
Aug-20	17.80	5.22	0.00	0.00
Sep-20	16.40	5.97	1.00	0.07
Oct-20	15.00	9.17	2.00	0.17
Nov-20	15.00	8.33	2.00	0.17
Dec-20	11.00	3.29	1.00	0.07
Jan-21	7.50	1.76	0.00	0.00
Feb-21	3.10	1.18	0.00	0.00
Mar-21	4.20	1.67	0.00	0.00
Apr-21	5.30	0.95	0.00	0.00
May-21	3.10	0.62	0.00	0.00
Jun-21	11.10	2.94	0.00	0.00

Figure 8.0: Monthly Mean and Max Turbidity Results for Edgewood Water Company between July 1, 2020 and June 30, 2021.

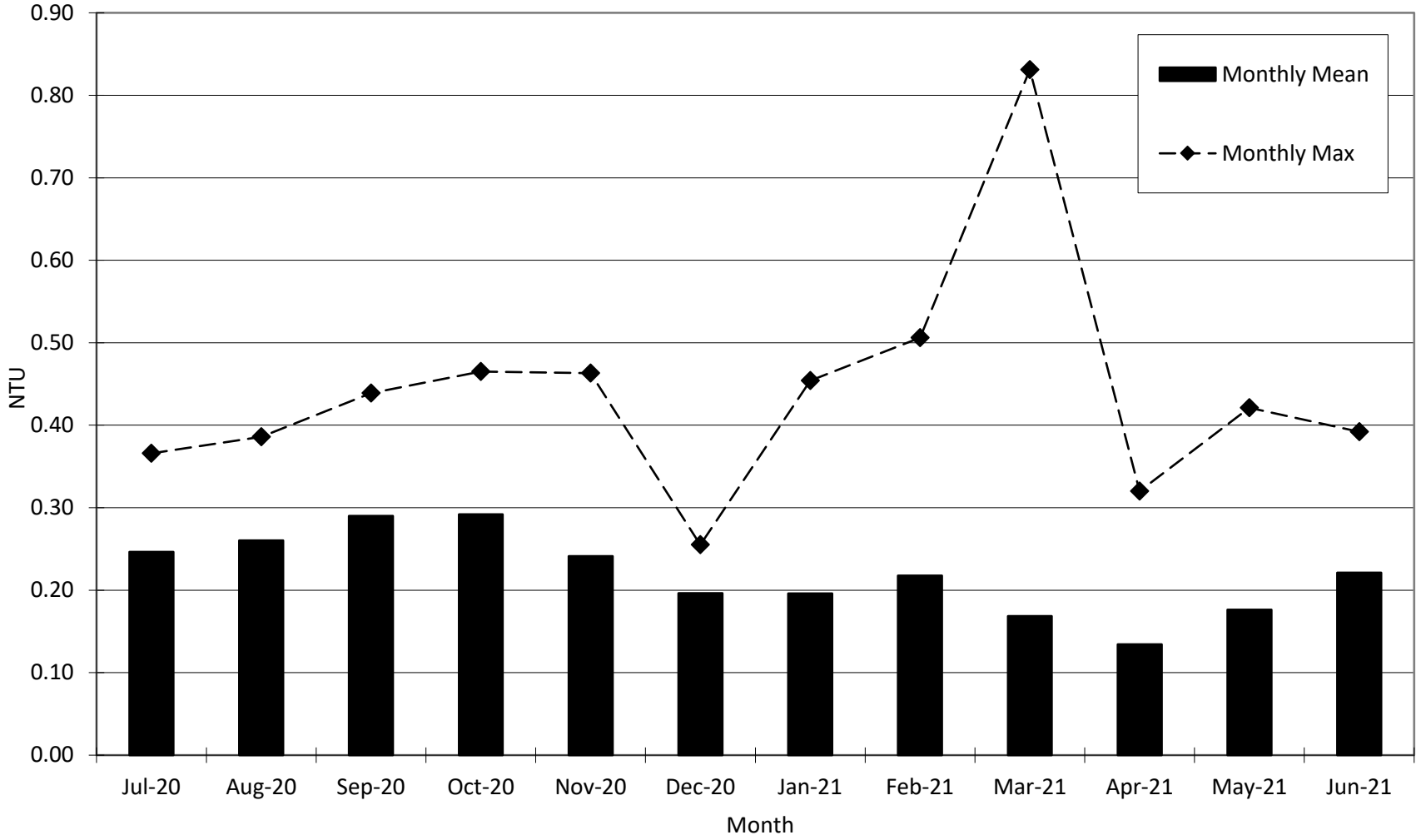


Figure 8.1: Yearly Mean and Max Turbidity Results for Edgewood Water Company between July 1, 2011 and June 30, 2021.

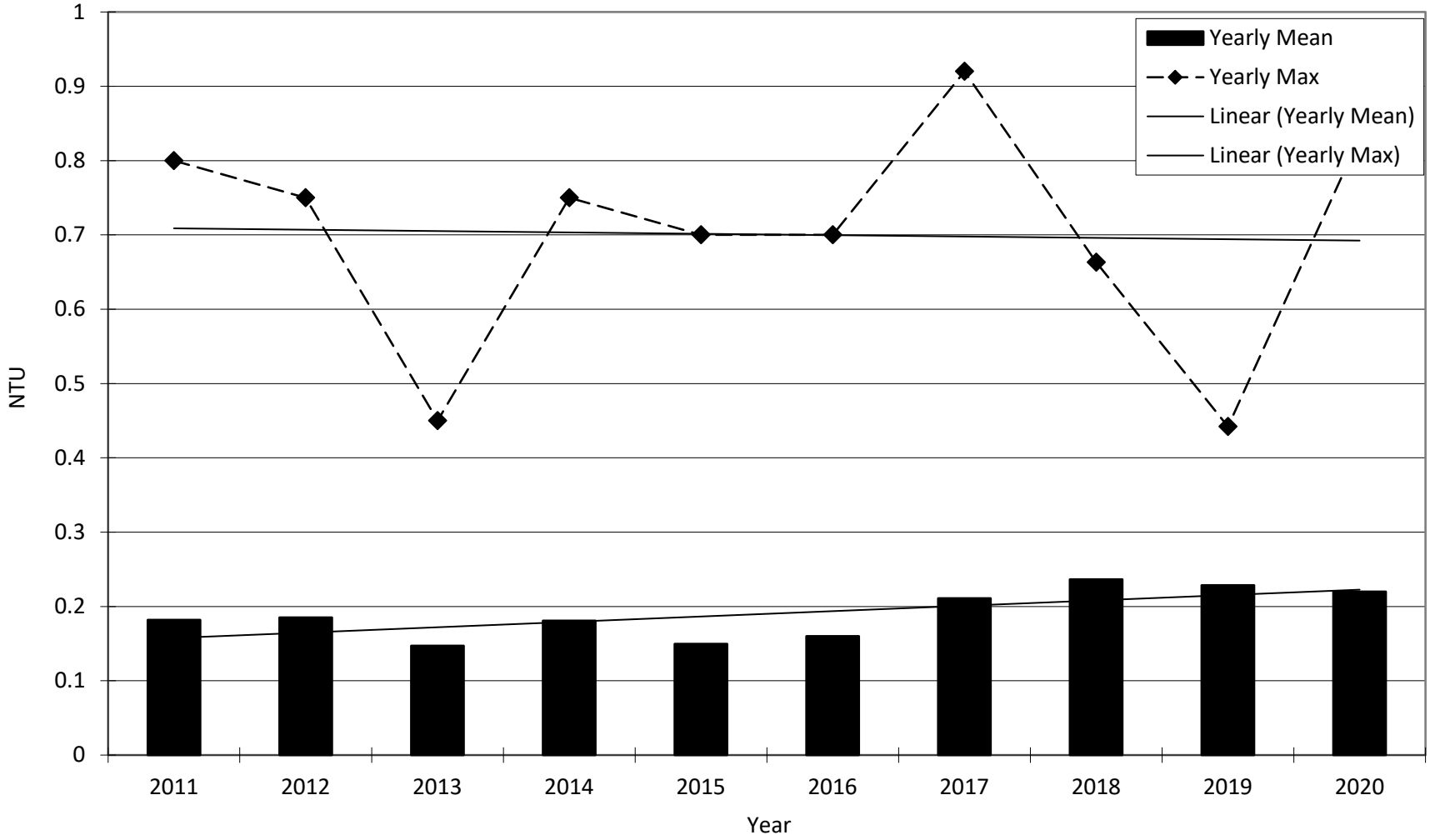


Figure 8.2: Monthly Mean and Max Coliform Results for Edgewood Water Company between July 1, 2020 and June 30, 2021.

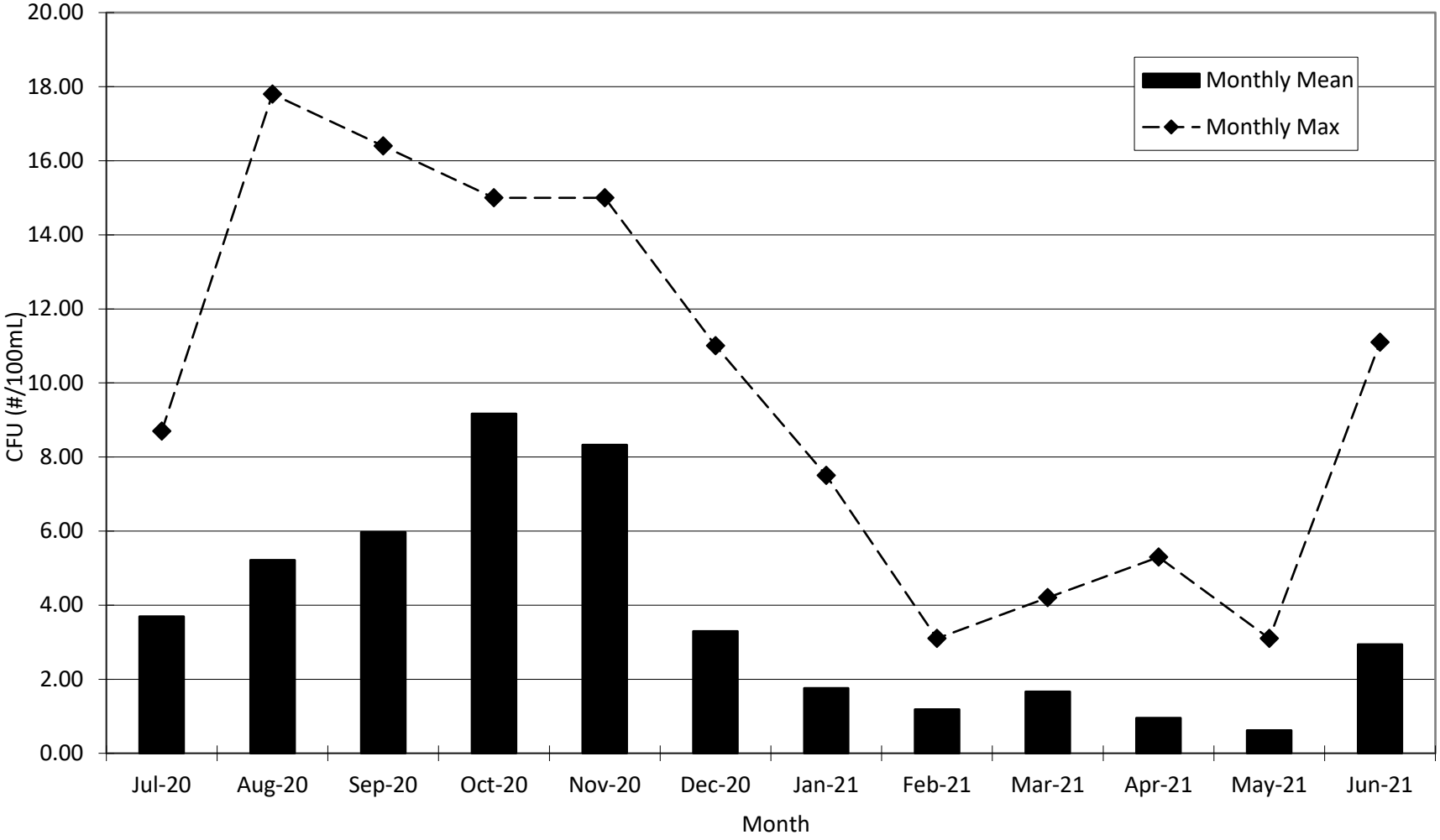
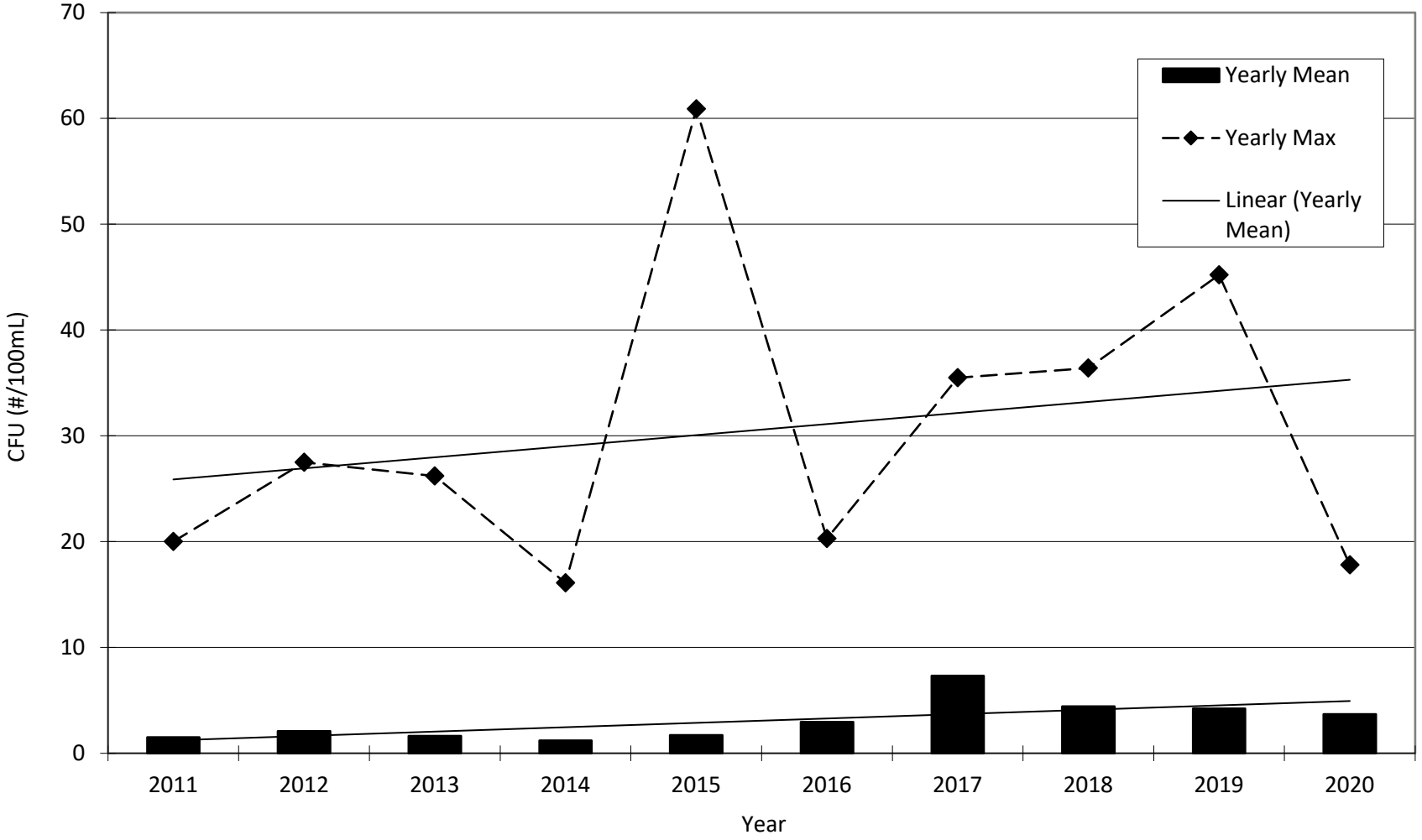


Figure 8.3: Yearly Mean and Max Coliform Results for Edgewood Water Company between July 1, 2011 and June 30, 2021.





Consumer Confidence Report

The Edgewood Water Company

Is Not Required

To Produce a Consumer Confidence Report

Lakeside Park Association
Water Quality Data Summary 2020-2021

During the 2020-2021 reporting year, Lakeside Park Association (LPA) remained in compliance with Federal and State water quality requirements. During the same period, the Environmental Protection Agency (EPA) notes no violation to the health, reporting, or monitoring requirements of the Safe Drinking Water Act (Table 5.9). The Consumer Confidence Report found at the end of this section provides additional regulatory information for LPA.

Turbidity

Between July 1, 2020, and June 30, 2021, LPA met Federal and State guidelines for turbidity by remaining within regulatory limits for a filtering water system. The highest turbidity reading for the 2020-2021 reporting year was 6.02 NTU and occurred on April 14, 2021. The winds on this day were 0.1-6.0 mph from the southeast, with gusts of 6.0 mph reported (Table 5.1). The annual mean turbidity for LPA was 0.61 NTU. The monthly mean turbidity result was highest in May at 1.30 NTU, higher than the 2019-2020 highest monthly mean turbidity of 0.57 NTU (Table 13.0 and Figure 9.1).

Table 13.0: LPA source water turbidity data results from July 1, 2020, through June 30, 2021. Turbidity analyses completed on samples collected daily from raw water at the LPA intake.

Month	Monthly Max (NTU)	Date Monthly Max	Monthly Mean (NTU)	Monthly Median (NTU)	90th Percentile
Jul-20	0.64	1	0.27	0.23	0.45
Aug-20	0.40	27	0.16	0.14	0.19
Sep-20	1.03	28	0.45	0.43	0.86
Oct-20	1.20	27	0.39	0.30	0.68
Nov-20	2.34	18	0.65	0.53	1.17
Dec-20	0.46	1	0.35	0.34	0.42
Jan-21	4.38	26	0.75	0.37	1.60
Feb-21	0.65	18	0.21	0.18	0.34
Mar-21	5.78	5	1.10	0.63	2.96
Apr-21	6.02	14	1.01	0.60	2.25
May-21	5.02	7	1.30	0.73	3.06
Jun-21	3.04	1	0.55	0.31	0.89

Historically, LPA has maintained maximum turbidity measurements lower than the regulatory standards of 5 NTU for non-filtering purveyors and filters the water to well below 1 NTU before distribution (Figure 9.1). The highest annual mean for turbidity reported at LPA in the 10-year reporting period of July 1, 2011-June 30, 2021, is 0.62 NTU reported in 2016, followed by 0.61 NTU this reporting year and 0.60 NTU in 2011. The 10-year reporting period shows a stable linear trend for annual mean turbidity (Figure 9.1). The 2020-2021 maximum turbidity reading of 6.02 NTU is greater than the previous reporting years' maximum of 4.59 NTU and similar to the 2015 maximum of 5.60 NTU. The highest annual

maximum result for the 10-year reporting period of 20.20 NTU was recorded in 2016. Annual maximum turbidity at LPA shows an increasing linear trend (Figure 9.1).

Coliform

LPA met Federal and State guidelines for total and E. coli coliform for filtering systems. The maximum total coliform count was 18.9 coliform-forming units per 100mL (CFU/100mL), a decrease from the previous year's 37.3 CFU/100mL. The maximum total coliform reading was taken on August 4, 2020, temperatures rose to 83.1^{o}F, from the weekly mean temperature of 66.7^{o}F, with sustained winds of 0.1-5.0 mph reported (Table 5.4). The increase in water temperature by 16°F above weekly mean and above 80°F likely attributed to the maximum total coliform result. The highest monthly mean total coliform result also occurred in August 2020 (Table 13.2, Figure 9.2). The 2020-2021 maximum total coliform result is lower than the previous reporting year and similar to the 2014 and 2016 results. Annual maximum total coliform has an increasing linear trend line for the 10-year reporting period of July 1, 2011-June 30, 2021 (Figure 9.3).

Total coliform was detected in 11 of the 23 samples analyzed, equaling 48% (Table 13.1). The yearly mean total coliform count was 3.09 CFU/100mL, a decrease from the 2019-2020 mean of 4.03 CFU/100mL, similar to results throughout the 10-year reporting period (Table 13.1, Figure 9.3).

LPA also completed tests for E. coli coliform on all samples tested for total coliform. Of the 23 samples analyzed for E. coli coliform, zero samples detected E. coli coliform (Table 13.1).

Table 13.1: LPA annual source water total and E. coli coliform data results from July 1, 2020, through June 30, 2021. Coliform analyses completed on samples collected daily from raw water at the LPA intake.

	Total coliform (# colonies/100 mL)	E coli coliform (# colonies/100 mL)
Mean	3.1	0
Median	0	0
Max	18.9	0
90th Percentile	0	0
Colony-Forming Samples	11	0
Total Number of Samples	23	23

Table 13.2: Lakeside Park Association monthly source water Total and E.coli Coliform data results from July 1, 2019, through June 30, 2020. Analyses completed on samples collected daily from raw water at the Lakeside Park Association intake.

	Maximum Total Coliform (# colonies/100 ml)	Mean Total Coliform (# colonies/100 ml)	Maximum E.coli Coliform (# colonies/100 ml)	Mean E.coli Coliform (# colonies/100 ml)
Jul-20	7.5	7.5	0	0
Aug-20	18.9	9.45	0	0
Sep-20	13.4	6.7	0	0
Oct-20	4.1	2.55	0	0
Nov-20	8.5	5.25	0	0
Dec-20	2	2	0	0
Jan-21	2	1	0	0
Feb-21	0	0	0	0
Mar-21	0	0	0	0
Apr-21	0	0	0	0
May-21	0	0	0	0
Jun-21	4.1	2.05	0	0

Figure 9.0: Monthly Mean and Max Turbidity Results for Lakeside Park Association between July 1, 2020 and June 30, 2021.

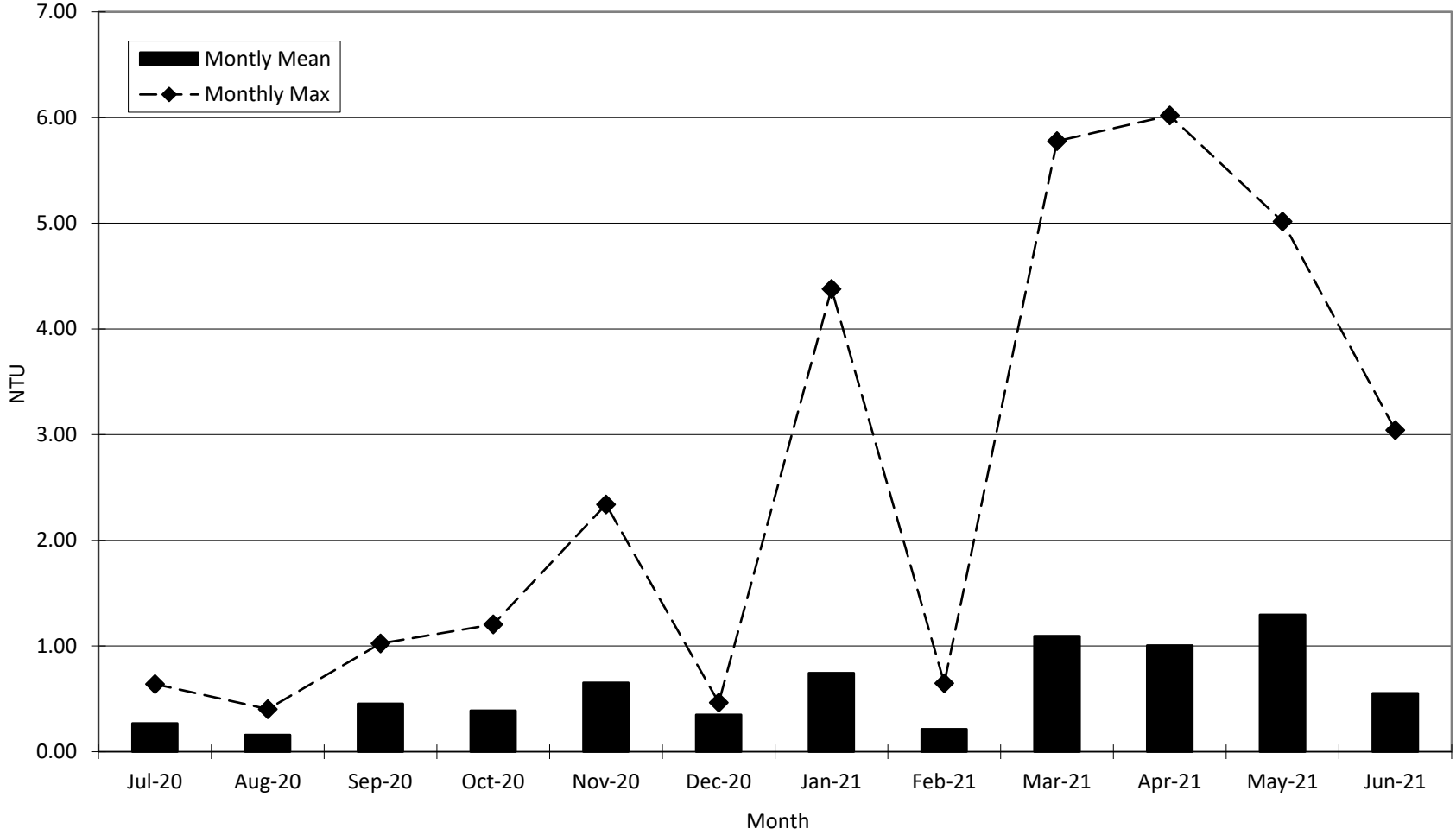


Figure 9.1: Yearly Mean and Max Turbidity Results for Lakeside Park Association between July 1, 2011 and June 30, 2021.

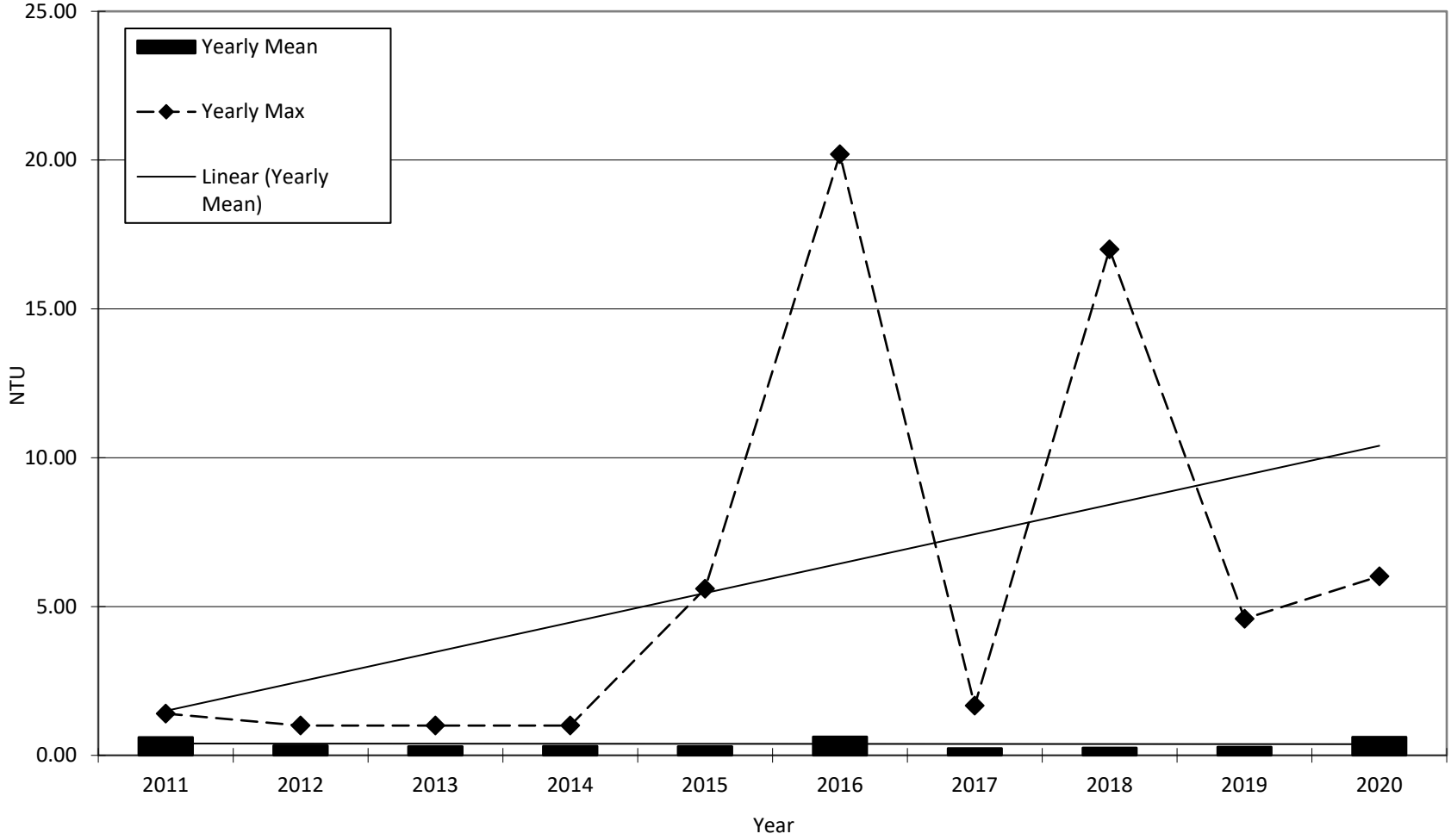


Figure 9.2: Monthly Mean and Max Total Coliform Results for Lakeside Park Association between July 1, 2020 and June 30, 2021.

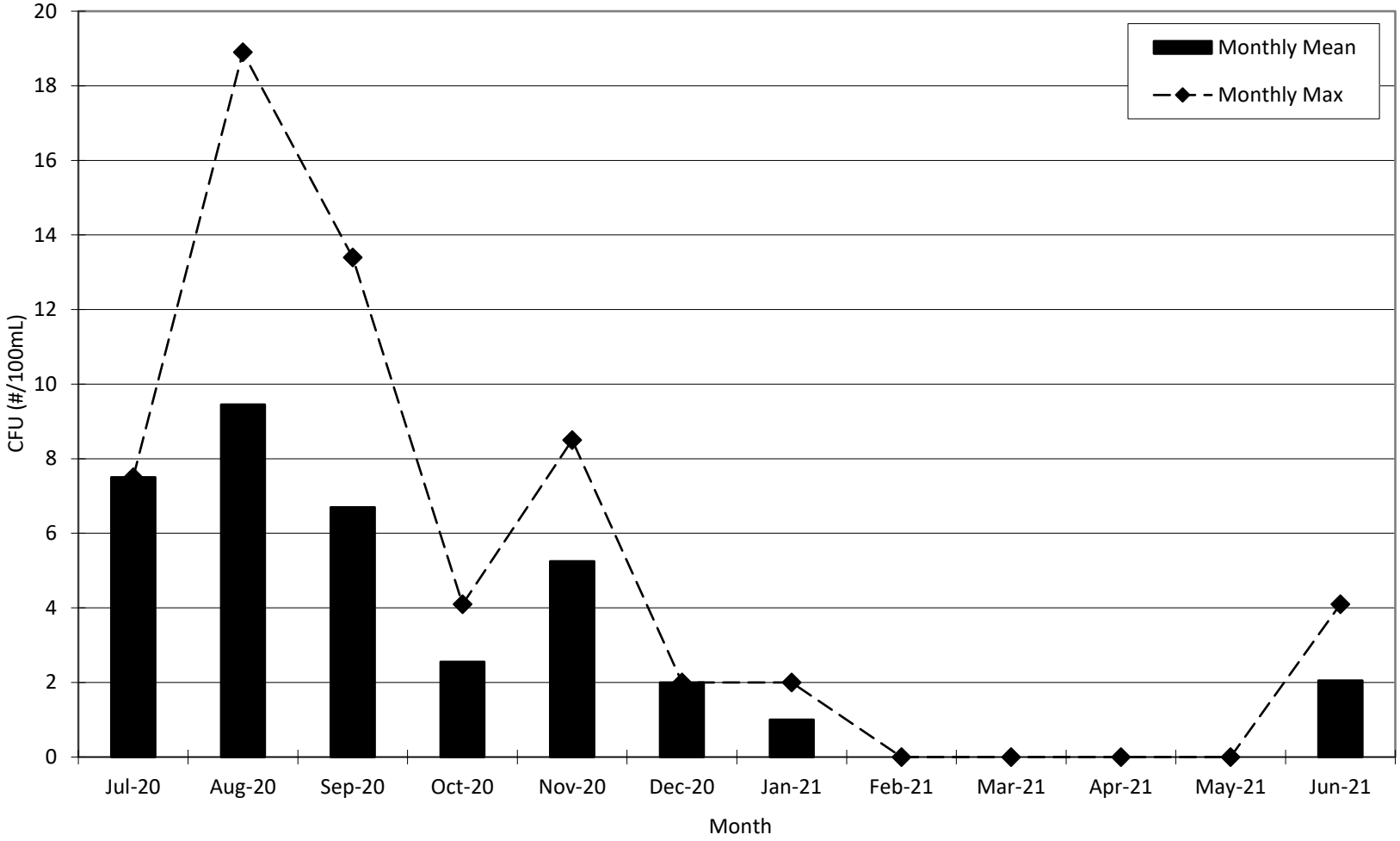
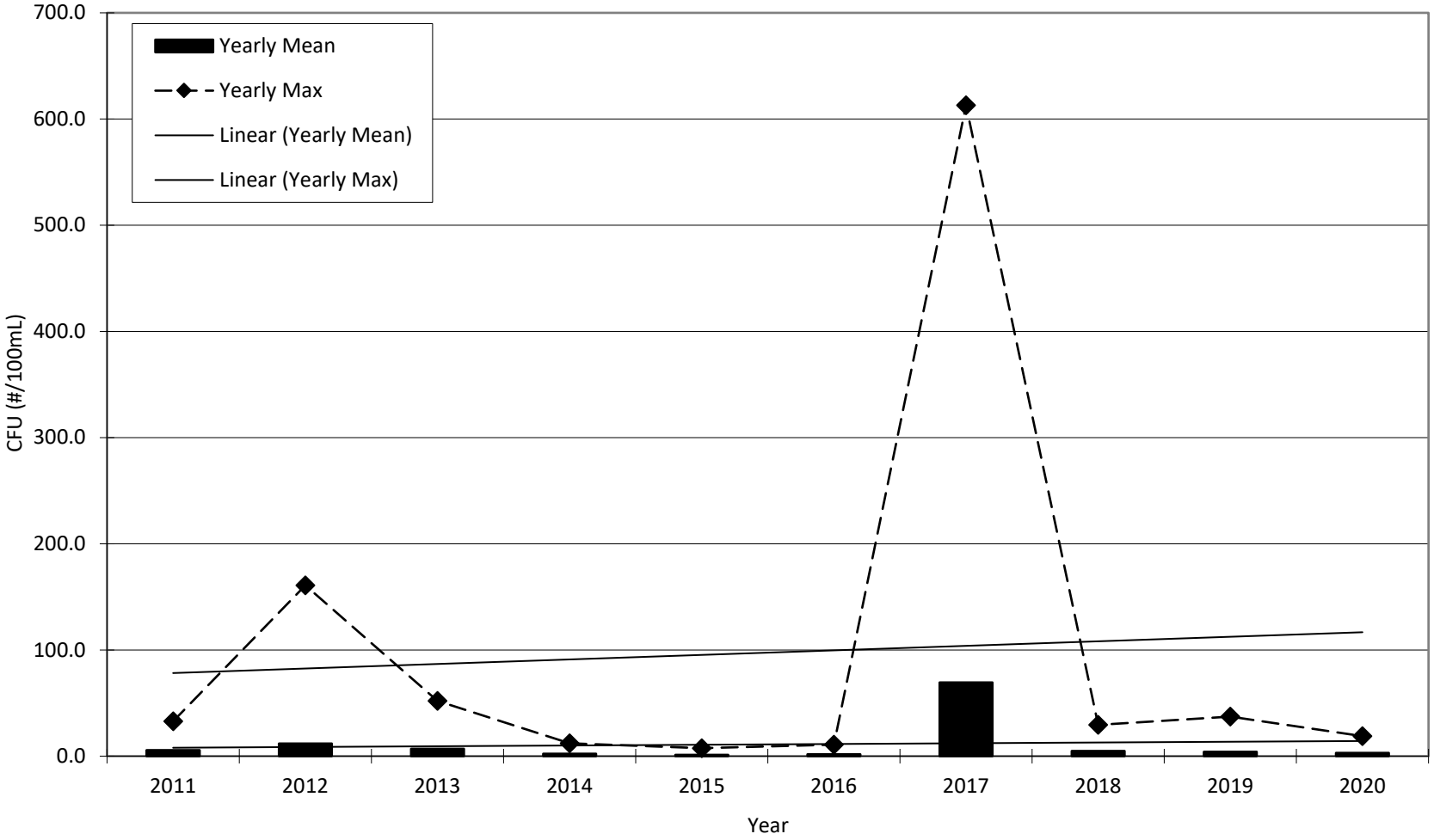


Figure 9.3: Yearly Mean and Max Total Coliform Results for Lakeside Park Association between July 1, 2011 and June 30, 2021.



2020 Consumer Confidence Report

Water System Name: **Lakeside Park Association, Mutual Water Company (LPA)** Report Date: **July 1, 2021**

We test the drinking water quality for many constituents as required by state and federal regulations. This report shows the results of our monitoring for the period of January 1 to December 31, 2020 and may include earlier monitoring data. Este informe contiene información muy importante sobre su agua para beber. Favor de comunicarse Lakeside Park Asociación a 4077 Pine Blvd. South Lake Tahoe, CA 96150 para asistirlo en español.

Type of water source(s) in use: LPA's primary source is from Lake Tahoe, supplemented during peak time by our well.

Name & general location of source(s): 4077 Pine Blvd., South Lake Tahoe, CA 96150. Primary Source: Lake Tahoe Secondary Source: a well located within the association boundaries.

Drinking Water Source Assessment information: Lake Tahoe is a water body susceptible to recreational activities and some geological erosion. A watershed sanitary survey was completed in 2020 in conjunction with the Tahoe water Systems Association. Watershed Control Program Reports are updated annually. Copies of these reports are available for viewing at the LPA office upon request.

Time and place of regularly scheduled board meetings for public participation: 2nd Tuesday of the Month at 5:30 p.m. LPA Office, 4077 Pine Blvd, SLT, CA.

For more information, contact: Nakia Foskett, Water Systems Manager Phone: (530) 542-2314

TERMS USED IN THIS REPORT

Maximum Contaminant Level (MCL): The highest level of a contaminant that is allowed in drinking water. Primary MCLs are set as close to the PHGs (or MCLGs) as is economically and technologically feasible. Secondary MCLs are set to protect the odor, taste, and appearance of drinking water.

Maximum Contaminant Level Goal (MCLG): The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are set by the U.S. Environmental Protection Agency (U.S. EPA).

Public Health Goal (PHG): The level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by the California Environmental Protection Agency.

Maximum Residual Disinfectant Level (MRDL): The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

Maximum Residual Disinfectant Level Goal (MRDLG): The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.

Primary Drinking Water Standards (PDWS): MCLs and MRDLs for contaminants that affect health along with their monitoring and reporting requirements, and water treatment requirements.

Public Health Goal: The level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by the California Environmental Protection Agency.

Secondary Drinking Water Standards (SDWS): MCLs for contaminants that affect taste, odor, or appearance of the drinking water. Contaminants with SDWSs do not affect the health at the MCL levels.

Treatment Technique (TT): A required process intended to reduce the level of a contaminant in drinking water.

Regulatory Action Level (AL): The concentration of a contaminant which, if exceeded, triggers treatment or other requirements that a water system must follow.

Variances and Exemptions: Permissions from the State Water Resources Control Board (State Board) to exceed an MCL or not comply with a treatment technique under certain conditions.

Level 1 Assessment: A Level 1 assessment is a study of the water system to identify potential problems and determine (if possible) why total coliform bacteria have been found in our water system.

Level 2 Assessment: A Level 2 assessment is a very detailed study of the water system to identify potential problems and determine (if possible) why an *E. coli* MCL violation has occurred and/or why total coliform bacteria have been found in our water system on multiple occasions.

ND: not detectable at testing limit
ppm: parts per million or milligrams per liter (mg/L)
ppb: parts per billion or micrograms per liter (µg/L)
ppt: parts per trillion or nanograms per liter (ng/L)
ppq: parts per quadrillion or picogram per liter (pg/L)
pCi/L: picocuries per liter (a measure of radiation)

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Contaminants that may be present in source water include:

- *Microbial contaminants*, such as viruses and bacteria, that may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.
- *Inorganic contaminants*, such as salts and metals, that can be naturally-occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming.
- *Pesticides and herbicides*, that may come from a variety of sources such as agriculture, urban stormwater runoff, and residential uses.
- *Organic chemical contaminants*, including synthetic and volatile organic chemicals, that are byproducts of industrial processes and petroleum production, and can also come from gas stations, urban stormwater runoff, agricultural application, and septic systems.
- *Radioactive contaminants* that can be naturally-occurring or be the result of oil and gas production and mining activities.

In order to ensure that tap water is safe to drink, the U.S. EPA and the State Board prescribe regulations that limit the amount of certain contaminants in water provided by public water systems. The U.S. Food and Drug Administration regulations and California law also establish limits for contaminants in bottled water that provide the same protection for public health.

Tables 1, 2, 3, 4, 5, and 6 list all of the drinking water contaminants that were detected during the most recent sampling for the constituent. The presence of these contaminants in the water does not necessarily indicate that the water poses a health risk. The State Board allows us to monitor for certain contaminants less than once per year because the concentrations of these contaminants do not change frequently. Some of the data, though representative of the water quality, are more than one year old. Any violation of an AL, MCL, MRDL, or TT is asterisked. Additional information regarding the violation is provided later in this report.

SAMPLING RESULTS SHOWING THE DETECTION OF LEAD AND COPPER

Lead and Copper (complete if lead or copper detected in the last sample set)	Sample Date	No. of Samples Collected	90th Percentile Level Detected	No. Sites Exceeding AL	AL	PHG	No. of Schools Requesting Lead Sampling	Typical Source of Contaminant
Lead (ppb)	9/23/20	10	ND	0	15	0.2	Not applicable	Internal corrosion of household water plumbing systems; discharges from industrial manufacturers; erosion of natural deposits
Copper (ppm)	9/23/20	10	0.084	0	1.3	0.3	Not applicable	Internal corrosion of household plumbing systems; erosion of natural deposits; leaching from wood preservatives

- Any violation of an MCL or AL is asterisked "* *". Additional information regarding the violation is provided below: **(There are no violations.)**

SAMPLING RESULTS FOR SODIUM AND HARDNESS

Chemical or Constituent (and reporting units)	Sample Date	Level Detected	Range of Detections	MCL	PHG (MCLG)	Typical Source of Contaminant
Sodium (ppm)	7/23/20	8.3		None	None	Salt present in the water and is generally naturally occurring
Hardness (ppm)	7/23/20	29	13 - 29	None	None	Sum of polyvalent cations present in the water, generally magnesium and calcium, and are usually naturally occurring

DETECTION OF CONTAMINANTS WITH A PRIMARY DRINKING WATER STANDARD						
Chemical or Constituent (and reporting units)	Sample Date	Level Detected	Range of Detections	MCL [MRDL]	PHG (MCLG) [MRDLG]	Typical Source of Contaminant
Chlorine (ppm)	2020	0.83	0.32 – 0.83	4.0 (as Cl2)	4.0 (as Cl2)	Drinking water disinfectant added for treatment
Gross Alpha Activity (pCi/L)	7/23/20	9.55	9.55	15 pCi/L	0	Erosion of natural deposits
Combined Radium 226 & 228 (pCi/L)	7/23/20	0.100 – 0.782	0.100 – 0.782	5	0	Some people who drink water containing radium 226 or 228 in excess of the MCL over many years may have an increased risk of getting caner.
TTHMs (Total Trihalomethanes) ppb	10/22/20	4.6	4.2-4.6	80	N/A	Byproduct of drinking water disinfection
Turbidity (NTU)	1/1/20 – 12/31/20	0.111	0.026 - 0.195	TT	N/A	Soil runoff
Uranium (pCi/L)	7/23/20	2.53	-	20	0.43	Erosion of natural deposits

DETECTION OF CONTAMINANTS WITH A SECONDARY DRINKING WATER STANDARD						
Chemical or Constituent (and reporting units)	Sample Date	Level Detected	Range of Detections	SMCL	PHG (MCLG)	Typical Source of Contaminant
Iron (ppb)	7/23/20	620	-	300	-	Leaching from natural deposits; industrial waste
Manganese (ppb)	7/23/20	11	-	50	-	Leaching from natural deposits
Total Dissolved Solids (ppm)	7/23/20	66	-	1000	-	Runoff/leaching from natural deposits

Additional General Information on Drinking Water

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that the water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the U.S. EPA's Safe Drinking Water Hotline (1-800-426-4791).

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. U.S. EPA/Centers for Disease Control (CDC) guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the Safe Drinking Water Hotline (1-800-426-4791).

Lead-Specific Language: If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. Lakeside Park Mutual Water Company is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you do so, you may wish to collect the flushed water and reuse it for another beneficial purpose, such as watering plants. If you are concerned about lead in your water, you may wish to have your water tested. Information

on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline (1-800-426-4791) or at http://www.epa.gov/lead.

For Systems Providing Surface Water as a Source of Drinking Water

SAMPLING RESULTS SHOWING TREATMENT OF SURFACE WATER	
Treatment Technique [a] (Type of approved filtration technology used)	Contact Clarification / Filtration
Turbidity Performance Standards [b] (that must be met through the water treatment process)	Turbidity of the filtered water must: 1 – Be less than or equal to 0.2 NTU in 95% of measurements in a month. 2 – Not exceed 1.0 NTU for more than eight consecutive hours. 3 – Not exceed 5.0 NTU at any time.
Lowest monthly percentage of samples that met Turbidity Performance Standard No. 1.	100%
Highest single turbidity measurement during the year	0.095 NTU
Number of violations of any surface water treatment requirement:	0

(a) A required process intended to reduce the level of a contaminant in drinking water.

(b) Turbidity (measured in NTU) is a measurement of the cloudiness of water and is a good indicator of water quality and filtration performance. Turbidity results which meet performance standards are considered to be in compliance with filtration requirements.

Tahoe City Public Utility District McKinney/Quail
Water Quality Data Summary 2020-2021

The Tahoe City Public Utility District (TCPUD) operates numerous small water supply facilities for the northwest shore of Lake Tahoe, from Dollar Hill to the Rubicon area. The following TCPUD water quality data relates to the McKinney/Quail filtering surface water intake. The TCPUD reactivated the McKinney/Quail intake in August 2004 when groundwater supplies could not meet water supply demands. The TCPUD McKinney/Quail intake operates during the summer months only under a temporary permit issued by the California State Water Resources Control Board, Division of Drinking Water Programs. The McKinney/Quail intake was taken off-line on September 28,2021 and will be decommissioned.

Filtering water suppliers are only required to report source water turbidity; coliform data has also been provided for comparison to other systems. During the 2020-2021 reporting year, TCPUD McKinney/Quail remained in compliance with Federal and State water quality requirements of a filtering water supplier. During the same period, the Environmental Protection Agency (EPA) notes no violation of the health, reporting, or monitoring requirements of the Safe Drinking Water Act (Table 5.9). Additional regulatory information for TCPUD is provided in the Consumer Confidence Report found at the end of this section.

Turbidity

Between July 1, 2020, and June 30, 2021, TCPUD McKinney/Quail met Federal and State guidelines for turbidity by remaining within regulatory limits. The surface water intake was online for the summer season of 2020 from July 1, 2020, to September 27, 2020, providing three months of data for this reporting year. The monthly maximum and mean turbidity measurements did not exceed 1.00 NTU (Figure 10.0). The highest turbidity reading for the 2020-2021 reporting year was 0.30 NTU. The maximum turbidity reading of 0.30 NTU occurred on four days during the reporting year: July 10th and 13th, August 22, and September 23, 2020. Full weather details are available (Table 5.1 (a)). All maximum turbidity readings included wind events from a northwesterly direction. The annual mean turbidity result was 0.22 NTU for the 2020-2021 reporting year, lower than the previous mean result of 0.27 NTU and equal to 2018. The highest monthly mean turbidity was 0.23 NTU, occurring in July 2020 (Table 14.0).

Table 14.0: Tahoe City Public Utility District (TCPUD) McKinney/Quail source water turbidity data results from July 1, 2020, through June 30, 2021. Turbidity analyses completed on samples collected daily from raw water at the McKinney/Quail intake.

	Monthly Max (NTU)	Date Monthly Max	Monthly Mean (NTU)	Monthly Median (NTU)	Monthly 90%
Jul-20	0.30	10, 13	0.23	0.22	0.27
Aug-20	0.30	22	0.21	0.21	0.26
Sep-20	0.30	23	0.21	0.21	0.25
Intake Permanently Offline 09/27/2020					

Historically TCPUD had annual maximum turbidity readings below 1.0 NTU, with the highest result in the 10-year reporting period reaching 0.60 NTU in 2017. Annual maximum turbidity was equal to the 2020-2021 reading of 0.31 NTU in 2014, with results less than 0.45 NTU from 2012-2015 (Figure 4.1). Linear trendline data for the 10-year period of July 1, 2011-June 30, 2021, shows an increasing trend in annual

maximum turbidity (Figure 14.1). Annual mean turbidity has been fluctuating around 0.20 NTU within the 10-year reporting period of July 1, 2011-June 30, 2021, with the highest annual mean recorded in 2011, 0.31 NTU, and the lowest annual mean, 0.17 NTU, in 2015. TCPUD annual mean turbidity data from 2011-2021 shows a decreasing linear trend (Figure 10.1).

Coliform

TCPUD met Federal and State guidelines for total coliform during the 2020-2021 reporting year. The maximum total coliform count was 42.8 coliform-forming units/100 mL (CFU/100 mL), greater than the 32.7 CFU/100 mL of the previous year (Figure 10.2). The maximum total coliform reading occurred on September 10, 2020. The total coliform result was likely influenced by the temperature rising to 65.5^{o}F, an increase of 6° from the weekly mean temperature of 59.5^{o}F (Table 5.4). The wind had minimal influence on the total coliform results due to speeds of 0.1-2.0 mph with gusts of 2.2 mph likely did not produce wave action at the TCPUD McKinney/Quail intake.

Table 14.1: TCPUD McKinney/Quail source water total and E. coli coliform data results from July 1, 2020, through June 30, 2021. Coliform analyses completed on samples collected daily from raw water at the McKinney/Quail intake.

	Total coliform (# colonies/100mL)	E. coli coliform (# colonies/100mL)
Mean	18.87	0.00
Median	9.70	0
Max	42.8	0
90th Percentile	36.18	0
Colony-Forming Samples	3	0
Total Number of Samples	3	3

Total coliform was detected in 100% of the three samples analyzed. The mean total coliform count was 18.87 CFU/100 mL, and the median number was 9.70 CFU/100 mL (Table 14.1). The 2020-2021 mean total coliform reading of 18.87 CFU/100 mL is greater than the previous reporting year and similar to the 2017 result (Figure 10.3). Linear trend line data for the ten-year reporting period of July 1, 2011- June 30, 2021, shows an increasing trend in annual mean and maximum total coliform (Figure 10.3).

TCPUD also completed tests for E. coli coliform on four source water samples. Of the three samples analyzed for E.coli coliform, zero samples detected E.coli coliform (Table 14.1).

Table 14.2: Tahoe City Public Utility District (TCPUD) McKinney/Quail monthly source water total and E.coli coliform data results from July 1, 2020, through June 30, 2021. Analyses completed on samples collected daily from raw water at the McKinney/Quail intake.

	Maximum Total Coliform (# colonies/100ml)	Mean Coliform (# colonies/100ml)	Maximum E.coli Coliform (# colonies/100ml)	Mean E.coli Coliform (# colonies/100ml)
Jul-20	4.1	4.1	0.00	0.00
Aug-20	9.70	9.70	0.00	0.00
Sep-20	42.80	42.80	0.00	0.00

Figure 10.0: Monthly Mean and Max Turbidity Results forTahoe City Public Utility District between July 1, 2020 and June 30, 2021.

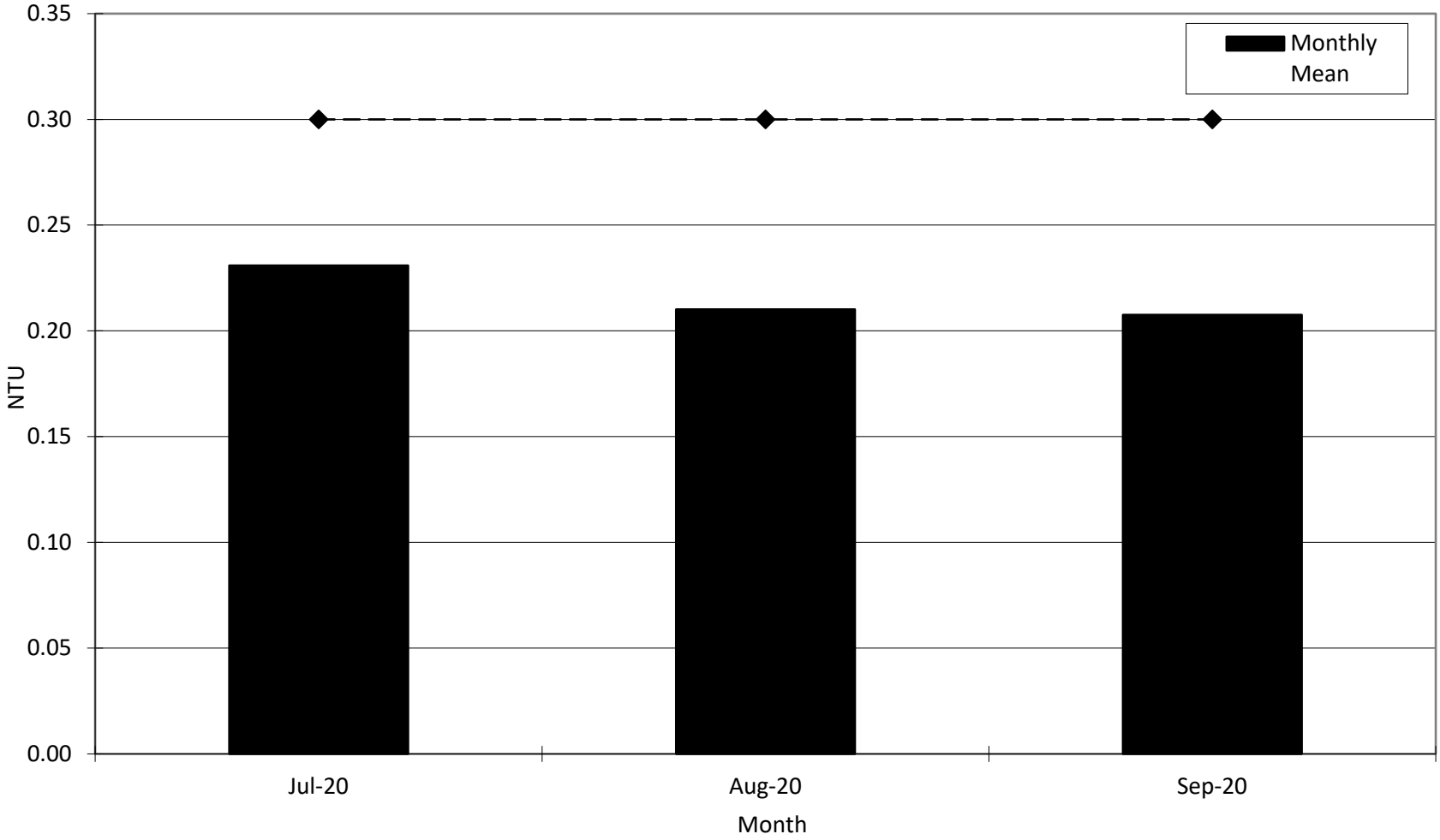


Figure 10.1: Yearly Mean and Max Turbidity Results forTahoe City Public Utility District between July 1, 2011 and June 30, 2021.

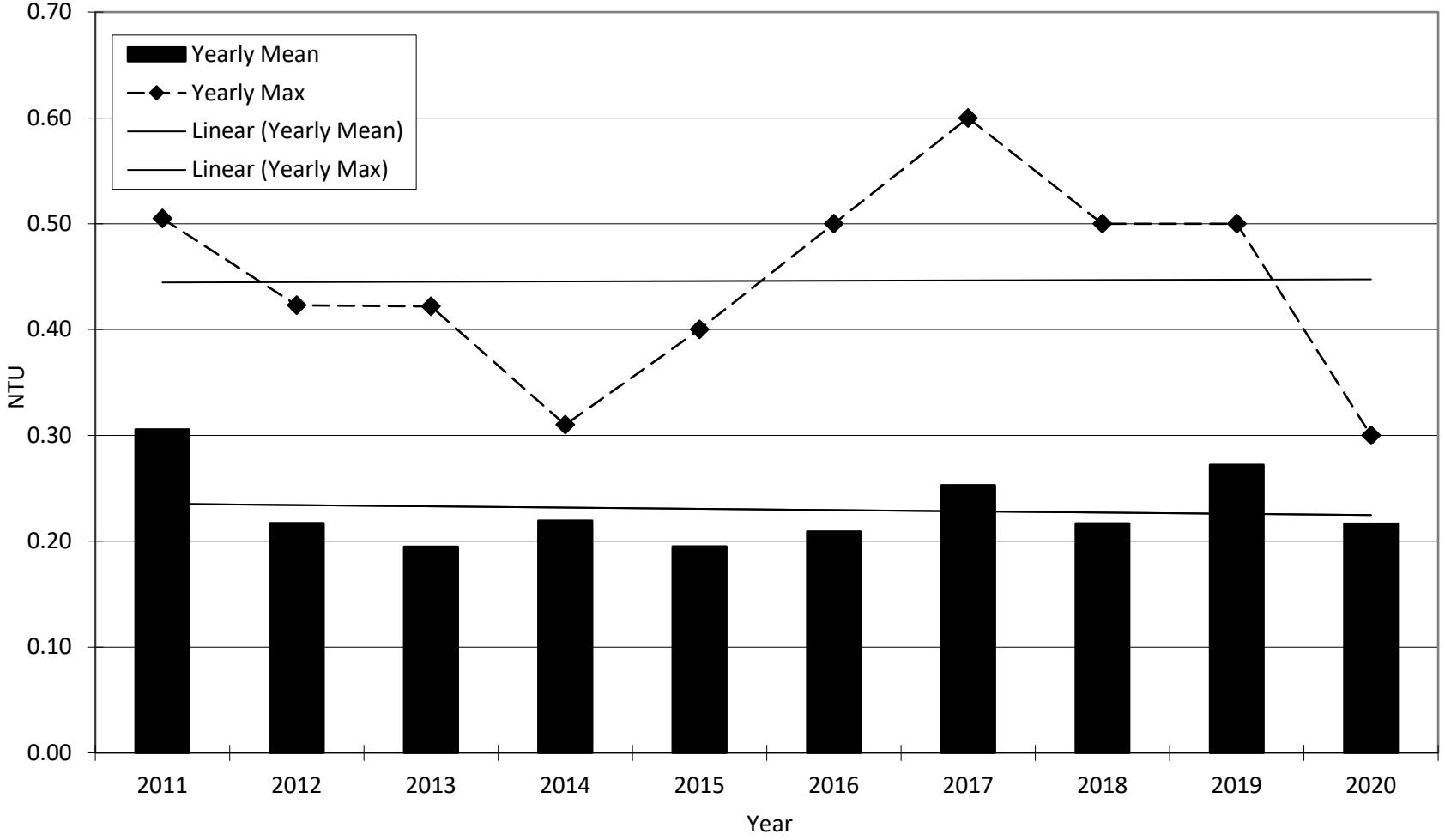


Figure 10.2: Monthly Mean and Max Total Coliform Results for TCPUD between July 1, 2019 and June 30, 2020.

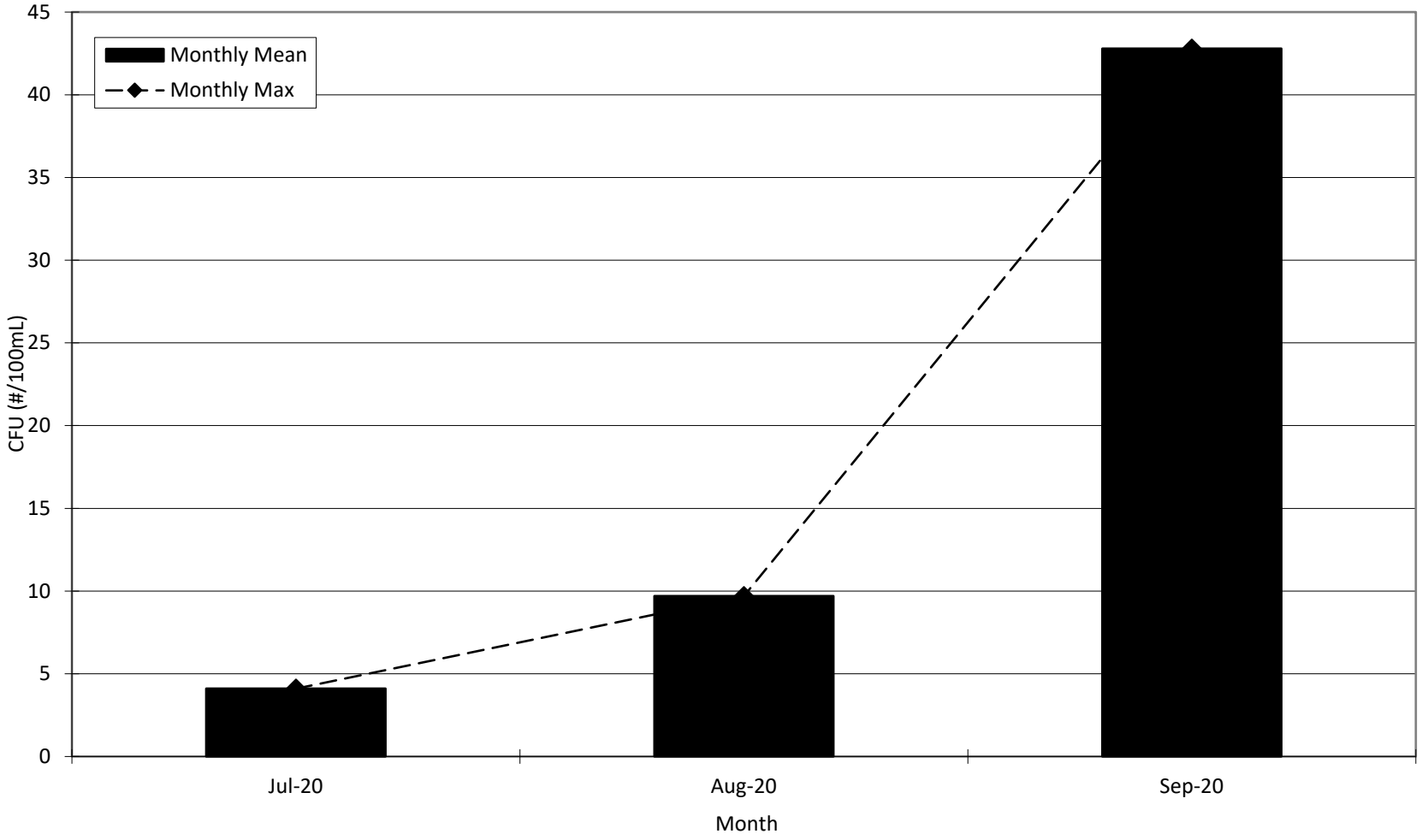
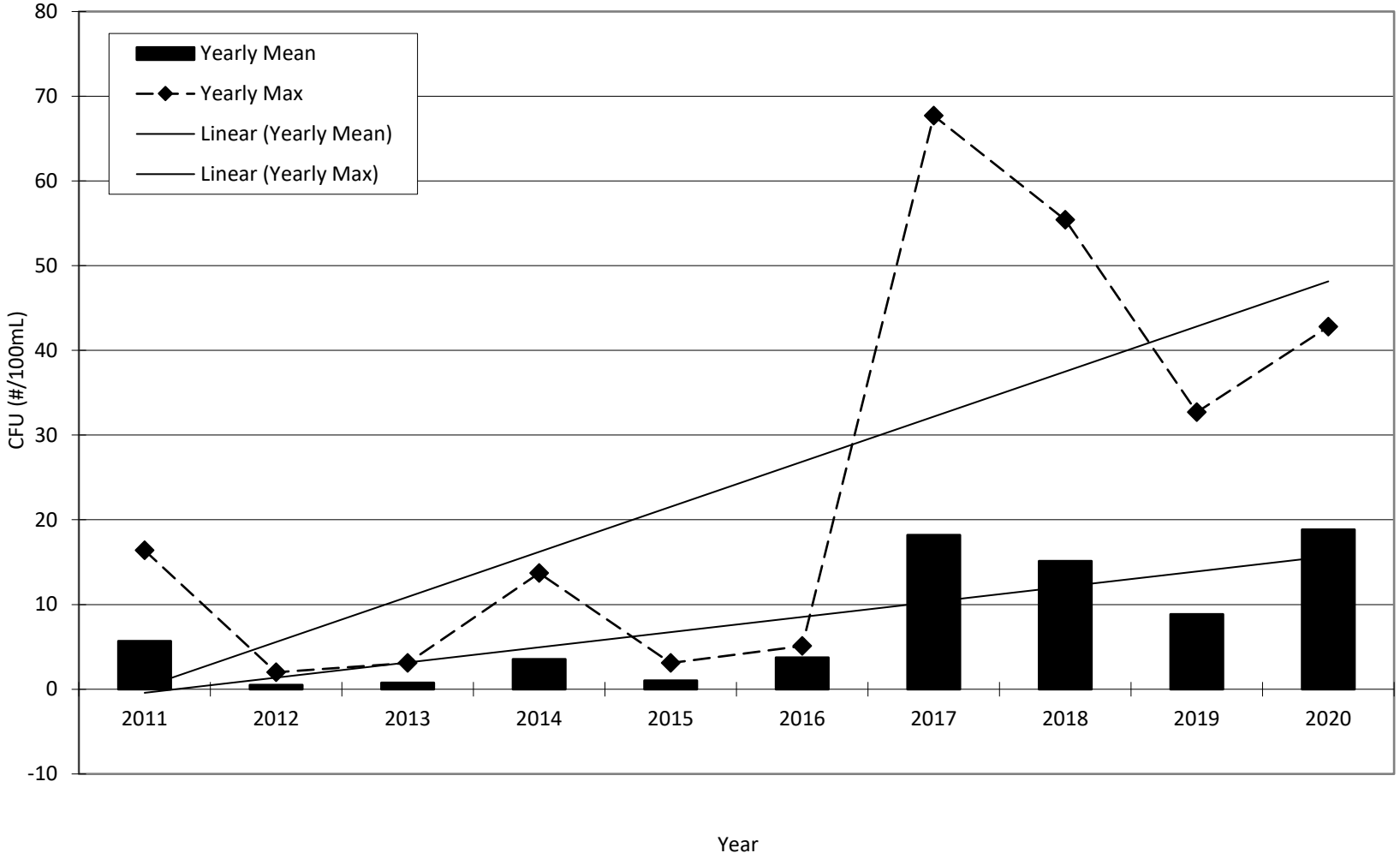


Figure 10.3: Yearly mean and max total coliform results for TCPUD between July 1, 2010 and June 30, 2021.



Tahoe City Public Utility District
2020 Annual Water Quality
Consumer Confidence Report

Este informe contiene información muy importante sobre su agua potable.
Traduzcalo o hable con alguien que lo entienda bien

To Our Valued Customers:

The enclosed information is a report of the quality and laboratory analysis of the drinking water that we delivered to you over the calendar year 2020. The Tahoe City Public Utility District (TCPUD) is pleased to report that all systems met all USEPA and State drinking water health standards. On pages two and three you will find a table containing all detected contaminants in the water as well as general information on water quality, lead and copper sampling results, and different health effect language for various contaminants. Page four has a map showing sources and basic system locations as well as system identification information. This report can also be viewed at our website at: www.tcpud.org/ccr/current.pdf

While TCPUD water is classified as either treated surface water or groundwater, it is important for you to understand all potential sources of drinking water. Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the U.S. EPA's Safe Drinking Water Hotline (1-800-426-4791). Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. U.S. EPA/Centers for Disease Control (CDC) guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the Safe Drinking Water Hotline (1-800-426-4791).

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity. Contaminants that may be present in source water include:

- Microbial contaminants such as viruses and bacteria that may come from sewage treatment plants, septic systems and wildlife.
- Inorganic contaminants such as salts and metals that can be naturally occurring or result urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming.
- Pesticides and Herbicides which may come from a variety of sources such as storm water runoff and residential uses.
- Organic chemical contaminants including synthetic and volatile organic chemicals that are byproducts of industrial processes and petroleum production, and can also come from gas stations, urban stormwater runoff, agricultural application, and septic systems.
- Radioactive contaminants which can be naturally occurring or be the result of oil and gas production and mining activities.

In order to insure that tap water is safe to drink, U. S. EPA and the State Water Resource Control Board (State Board) prescribe regulations that limit the amount of certain contaminants in water provided by public water systems. State Board regulations also establish limits for possible contaminants in bottled water that provide the same protection for public health.

For questions or additional information please call Utilities Superintendent, Dan Lewis, at (530) 580-6330 or the USEPA Safe Drinking Water Hotline at (800) 426-4791 or view their website: https://www.epa.gov/ground-water-and-drinking-water. To obtain general District information, to express your views, or to participate in the decision-making process of the TCPUD; you are welcome to attend or view online our Board of Directors meetings. The District Board of Directors meeting schedule, agendas and videos are available on our website www.tcpud.org or contact the District Clerk's office at (530) 580-6052.

Detected Compounds: The State allows us to monitor for some contaminants less than once per year because the concentrations of these contaminants do not cha
If a substance or contaminant is not listed, it is either not detected above the detection limit in our sources or not required to be reported a

				Identify your system >	Tahoe City Main				
Contaminant (Units)	Sample Year	MCL	PHG (MCLG)	Highlands Well #1	Highlands Well #2	T.C. Well #2	T.C. Well #3	Well #4	Tahoe Tevera Well
Primary Drinking Water Standards (PDWS)									
Arsenic (ppb)	2014 (2020)	10	4	(4.1)	(2.3)	ND	(ND)	(ND)	ND
Nickel (ppb)	2014 (2020)	100	12	20	20	20	21	(ND)	20
Secondary Drinking Water Standards (SDWS)									
Calcium (ppm)	2014 (2020)	N/A	N/A	7.6	7.5	12.3	10.2	(9.1)	16.7
Chloride (ppm)	2014 (2020)	500	N/A	0.5	0.6	0.5	0.3	(ND)	ND
Odor (TON)	2014 (2020)	1	3	ND	ND	ND	2	(9)	ND
Sodium (ppm)	2014 (2020)	N/A	N/A	14.6	11.6	5.0	5.2	(4.1)	5.3
Specific Conductance [E.C.] (µS/cm)	2014 (2020)	1600	N/A	215	189	164	160	(130)	217
Sulfate (ppm)	2014 (2020)	500	N/A	1.3	0.9	1.7	3.6	(1.7)	0.8
Total Alkalinity [as CaCO3] (ppm)	2014 (2020)	N/A	N/A	93.5	87.3	69.3	66.7	(60)	93.7
Total Dissolved Solids (ppm)	2014 (2020)	1000	N/A	72	80	83	98	(88)	125
Total Hardness [as CaCO3] (ppm)	2014 (2017)	N/A	N/A	44	41	59	51	(43)	74
Treatment Plant Turbidity **(See Note 1)**	2020	TT=95% of samples ≤ 0.5 NTU	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Turbidity (NTU)	2014 (2020)	5	N/A	0.25	0.45	0.17	0.23	(0.10)	0.19
Zinc (ppm)	2014 (2020)	5	N/A	ND	ND	ND	ND	(ND)	ND
Radiological Monitoring									
Radon 222 (pCi/L)	2003	N/A	N/A	547	1190	NS	1230	NS	1120
Disinfection By-product: and Disinfectant Residuals									
Total Trihalomethanes [TTHM] (ppb)	2020	80	N/A	ND					
Haloacetic Acids [HAA5] (ppb)	2020	60	N/A	ND					
Chlorine (ppm)	2020	4 (MRDL)	4 (MRDLG)	RAA: 0.35, RANGE: 0.00-0.47					
Microbiological Monitoring									
Total Coliform (P/A)	2020	1	(0)	159T / 159A / 0P					
E-Coli (P/A)	2020	1	(0)	159T / 159A / 0P					

Lead and Copper Sampling Results

Water System	Constituent	Year Sampled	# of Sites Sampled	90th % Results	# of Sites Exceeding Action Level	Action Level	PHG
Tahoe City Main	Lead (ppb)	2019	20	1.7	0	15	0.2
	Copper (ppm)		20	0.160	0	1.3	0.3
Alpine Peaks	Lead (ppb)	2020	5	8.75	0	15	0.2
	Copper (ppm)		5	0.0935	0	1.3	0.3
McKinney/ Quail	Lead (ppb)	2018	10	3.7	1	15	0.2
	Copper (ppm)		10	0.79	0	1.3	0.3
Rubicon	Lead (ppb)	2018	10	2.4	0	15	0.2
	Copper (ppm)		10	0.66	0	1.3	0.3
Zero schools were tested for Lead in 2020							
Typical Sources:	Lead: Internal corrosion of household water plumbing systems; discharges from industrial manufacturers; erosion of natural deposits						
	Copper: Internal corrosion of household plumbing systems; erosion of natural deposits; leaching from wood preservatives						

Note 1: Treatment Plant Turbidity results are for the McKinney/Quail Water Treatment Plant (Lake Tahoe Intake) only. Additional requirements include (1) shall not exceed 1 NTU for more than one continuous hour, (2) shall not exceed 1 NTU at four-hour intervals, and (3) shall not exceed 1.0 NTU for more than eight consecutive hours. TCPUD was in compliance with all Turbidity require-

Note 2. Note for Rubicon System Only- Monitoring Violation: TCPUD failed to monitor the **Rubicon** water system (population served = 70)) as required for drinking water standards in September 2020 and, therefore, were in violation of a regulation. Even though this was not an emergency in which we would have notified you immediately, as our customers you have a right to know the details of this situation. TCPUD is required to monitor your drinking water for specific contaminants on a regular basis. Results of regular monitoring are an indicator of whether or not our drinking water meets health standards. During September of 2020, we inadvertently only collected one bacteriological sample for coliform (opposed to the required two) and therefore, cannot be sure of the quality of the drinking water during that time period. Coliforms are bacteria that are naturally present in the environment and are used as an indicator that other, potentially harmful, waterborne pathogens may be present or that a potential pathway exists through which contamination may enter the drinking water distribution system. We have since routinely collected the required number of samples, which have all met drinking water standards. We have reevaluated our scheduling system to ensure this will not happen again. There is nothing you need to do at this time.

...ange frequently. Some of our data, though representative, are more than one year old.
...r sampled

Alpine Peaks	McKinney / Quail		Rubicon			MCL Violation	Major Origins in Drinking Water
Riley Spring	Lake Tahoe Intake	Crystal Way Well	Rubicon Well #1	Rubicon Well #2	Rubicon Well #3		
ND	ND	ND	ND	ND	ND	NO	Erosion of natural deposits
20	ND	ND	ND	ND	ND	NO	Erosion of natural deposits
10.1	7.9	11	8.8	10.2	8.1	N/A	Leaching from natural deposits
0.2	1.8	0.3	0.3	3.0	1.1	NO	
ND	ND	ND	ND	ND	ND	NO	Naturally-occurring organic materials
2.9	6.0	4.4	6.6	6.7	5.4	N/A	Leaching from natural deposits
115	99.2	119	111	127	78.8	NO	Substances that form ions when in water
ND	1.7	0.5	ND	ND	5.4	NO	Runoff/leaching from natural deposits
53.0	45.3	54.6	44.8	47.6	38.9	NO	Leaching from natural deposits
84	65	96	38	92	16	NO	Erosion of natural deposits
39	29	43	30	35	23	N/A	Leaching from natural deposits
N/A	100% ≤ 0.3 NTU	N/A	N/A	N/A	N/A	NO	Movement of sediments and minute deposits
0.16	N/A	0.13	0.15	0.55	0.15	NO	
ND	ND	ND	ND	ND	0.15	NO	Runoff/leaching from natural deposits
613	3360	485	613	513	422	N/A	Erosion of natural deposits
N/R	14		ND			NO	Byproduct of drinking water chlorination
N/R	15		ND			NO	
N/A	RAA: 0.52, RANGE: 0.00-0.90		RAA: 0.35, RANGE: 0.00-0.69			NO	Drinking water disinfectant added for treatment
24T/ 24A/ 0P	36T / 36A / 0P		24T / 24A / 0P (See Note 2)			NO	Naturally present in the environment
24T/ 24A/ 0P	36T / 36A / 0P		24T / 24A / 0P (See Note 2)			NO	Human and Animal Fecal Waste

Health Effects and General Information

Lead: If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. TCPUD is responsible for providing high quality drinking water but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you do so, you may wish to collect the flushed water and reuse it for another beneficial purpose, such as watering plants. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at http://www.epa.gov/lead. Infants and young children are typically more vulnerable to lead in drinking water than the general population. It is possible that lead levels at your home may be higher than at other homes in the community as a result of materials used in your home's plumbing. If you are concerned about elevated lead levels in your home's water, you may wish to have your water tested and/or flush your tap for 30 seconds to 2 minutes before using tap water. Additional information is available from the U.S. EPA Safe Drinking Water Hotline (1-800-426-4791).

Radon: Radon is a radioactive gas that you cannot see, taste, or smell. It is found throughout the U.S. Radon can move up through the ground and into a home through cracks and holes in the foundation. Radon can build up to high levels in all types of homes. Radon can also get into indoor air when released from tap water from showering, washing dishes, and other household activities. Compared to radon entering the home through soil, radon entering the home through tap water will in most cases be a small source of radon in indoor air. Radon is a known human carcinogen. Breathing air containing radon can lead to lung cancer. Drinking water containing radon may also cause increased risk of stomach cancer. If you are concerned about radon in your home, test the air in your home. Testing is inexpensive and easy. You should pursue radon removal for your home if the level of radon in your air is 4 picocuries per liter of air (pCi/L) or higher. There are simple ways to fix a radon problem that are not too costly. For additional information, call your State radon program (1-800-745-7236), the USEPA Safe Drinking Water Hotline (1-800-426-4791), or the National Safety Council on Radon Hotline (1-800-767-7236).

Arsenic: While your drinking water meets the federal and state standard for arsenic, it does contain low levels of arsenic. The arsenic standard balances the current understanding of arsenic's possible health effects against the costs of removing arsenic from drinking water. The U.S. Environmental Protection Agency continues to research the health effects of low levels of arsenic, which is a mineral known to cause cancer in humans at high concentrations and is linked to other health effects such as skin damage and circulatory problems.

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Tahoe City Public Utility District
P. O. Box 5249
Tahoe City, CA 96145
www.tcpud.org
530-583-3796

Save Our WATER
Californians Don't Waste

Terms and Abbreviations Used in This Report

A	Number of tests absent of bacteria	pCi/L	Picocuries Per Liter: Measure of radioactivity per 1 liter of water.
MCL	Maximum Contaminant Level: The highest level of a contaminant that is allowed in drinking water. Primary MCLs are set as close to the PHGs (or MCLGs) as is economically and technologically feasible. Secondary MCLs are set to protect the odor, taste, and appearance of drinking water.	PDWS	Primary Drinking Water Standards. MCLs and MRDLs for contaminants that affect health along with their monitoring and reporting requirements, and water treatment requirements.
MCLG	Maximum Contaminant Level Goal: The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are set by the U.S. Environmental Protection Agency.	PHG	Public Health Goal: The level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by the California Environmental Protection Agency.
MRDL	Maximum Residual Disinfection Level: The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.	ppb	Parts Per Billion: Parts contaminant for every 1 billion parts of water.
MRDL	Maximum Residual Disinfection Level: The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.	ppm	Parts Per Million: Parts contaminant for every 1 million parts of water.
		RAA	Running Annual Average
MRDLG	Maximum Residual Disinfection Level Goal: The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.	SDWS	Secondary Drinking Water Standards. Secondary MCLs are set to protect the odor, taste, and appearance of drinking water.
		T	Number of tests for bacteria (Laboratory analysis)
ND	Not Detected: Indicates contaminant was not detected in the source water.	TON	Threshold Odor Number
N/R	Not Regulated or Not Required	TT	Treatment Technique: A required process intended to reduce the level of contaminant in drinking water.
NTU	Nephelometric Turbidity Unit: Measure of water clarity using light scattering	Units	Number of units measured
NS	Not Sampled	µS/cm	Microsiemens: Measure of electrical current flow through a solution
P	Number of tests detecting presence of bacteria		

Where does your water come from?

All of the drinking water supplied to each water system, with the exception of the McKinney/Quail system, is classified as groundwater. Sources include wells and springs drilled deep into the ground, providing clean, high quality water that consistently meets all standards without significant treatment. The McKinney/Quail water system is comprised of both a treated surface water source and a groundwater source. The Tahoe City Main system serves all residents from Dollar Point south to the Tahoe Tavern area. The Alpine Peaks system serves the area of Alpine Peaks only. The McKinney/Quail system serves the area of Chamberland, Chambers Landing, McKinney Shores, Moana Circle, and Tahoma Meadows area. Lastly, the Rubicon system serves the areas of Meeks Bay south to Bliss State Park. A Source Water Assessment for each active source was completed in 2003. The source(s) are considered most vulnerable to the following activities not associated with any detected contaminants: Sewer Collection Systems, Surface Water, Above Ground Storage Tanks, Transportation Corridors, Historic Gas Stations, and Water Supply Wells. There have been no contaminants detected in the water supply, however the sources are still considered vulnerable to the activities located near the drinking water source. Well construction and security measures should provide protection from most contaminating activities. Copies of all source water assessments are available for review at the TCPUD offices during regular business hours. Upon request, copies can be sent to individuals by contacting the Utilities Superintendent at (530) 580-6330.



Water Conservation Links:

- www.saveourwater.com/
- www.h2ouse.org/ water-conservation/
- www.tcpud.org/utility-services/water/water-conservation
- www.epa.gov/watersense/
- www.wateruseitwisely.com/100-ways-to-conserve

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North Tahoe Public Utility District
Water Quality Data Summary 2020-2021

During the 2020-2021 reporting year, North Tahoe Public Utility District (NTPUD) remained within Federal and State water quality requirements. During the same period, the Environmental Protection Agency (EPA) notes no violation of the health, reporting, or monitoring requirements of the Safe Drinking Water Act (Table 5.9). Additional regulatory information for NTPUD is provided in the Consumer Confidence Report found at the end of this section.

Turbidity

Between July 1, 2020, and June 30, 2021, NTPUD met Federal and State guidelines for turbidity by remaining within regulatory limits. The monthly maximum and mean turbidity measurements did not exceed the filtration exemption maximum turbidity of 5 NTU (Figure 10.0, Table 14.0). The highest turbidity reading for the 2020-2021 reporting year was 0.60 NTU recorded on August 17, 2020, that corresponded with a wind event that produced sustained winds from the east-southeast of 3.8-11 mph (Table 5.1). The annual mean turbidity was 0.15 NTU, and 90% of results were below 0.20 NTU (Table 15.0). The highest monthly mean turbidity, 0.20 NTU, occurred in July and August 2020 (Table 14.0).

Table 15.0: NTPUD source water turbidity data results from July 1, 2020, through June 30, 2021. Turbidity analyses completed on samples collected daily from raw water at the NTPUD intake.

Month	Monthly max (NTU)	Date monthly max	Monthly mean (NTU)	Monthly median (NTU)	90th percentile
Jul-20	0.36	2	0.20	0.19	0.25
Aug-20	0.60	17	0.20	0.19	0.21
Sep-20	0.29	15	0.17	0.16	0.20
Oct-20	0.26	11	0.14	0.13	0.15
Nov-20	0.31	18	0.15	0.14	0.16
Dec-20	0.24	3	0.14	0.13	0.15
Jan-21	0.20	28	0.12	0.12	0.13
Feb-21	0.15	17	0.11	0.10	0.13
Mar-21	0.26	6	0.12	0.11	0.13
Apr-21	0.27	27	0.13	0.12	0.15
May-21	0.21	29	0.16	0.16	0.18
Jun-21	0.22	12	0.18	0.18	0.20

Historically annual maximum turbidity is variable at NTPUD. Annual maximum results range from 0.50 NTU-5.01 NTU over the 10-year reporting period of July 1, 2011-June 30, 2021, with three results greater than 1.0 NTU and seven below (Figure 11.1). The 2020-2021 annual maximum of 0.60 NTU is less than the previous reporting year's annual maximum of 0.85 NTU. Linear trend line analysis shows a decreasing trend in annual maximum for the 10-year reporting period. NTPUD has historically maintained mean turbidity values below 0.50 NTU, including 0.15 NTU for 2020-2021, the lowest annual mean in the TWSA data set for NTPUD from 2003-2021. Annual mean turbidity shows a decreasing linear trend over the 10-year reporting period (Figure 10.1).

Coliform

NTPUD met Federal and State guidelines for total coliform for the 2020-2021 reporting year. The annual maximum total coliform reading for NTPUD is 170 CFU/100 mL, higher than the previous reporting year maximum of 30.0 CFU/100 mL and greater than the 100 CF/100 mL requirement for filtration exemption. NTPUD analyzed 106 raw water samples for total coliform, and only one (1) result was greater than 100 CFU/100 mL equaling 0.96% of samples for the reporting period of July 1, 2020, to June 30, 2021 (Figure 10.2). Filtration exemption criteria require 90% of measurements from the previous six months to be below 100 CFU/100 mL. The maximum reading was taken on September 29, 2020, and was likely influenced by the increase in temperature to 70.0^{o}F from a weekly average of 60.0^{o}F paired with mixing caused by sustained winds of 1.5 mph - 8.2 mph (Table 5.4, Figure 11.2). Before September 29, 2020, NTPUD analyzed 79 raw water samples for total coliform between March 1, 2020, and September 30, 2020. Only one result was greater than 100 CFU/100 mL equaling 1.27% of measurements from the previous six-month period. Additionally, linear trendline analysis shows an increasing trend in annual maximum results over the 10-year reporting period of July 1, 2011, to June 30, 2021.

It should be noted that during the 2015-2016 reporting year, NTPUD reported three "too numerous to count" results of >1600 CFU that were attributed to high concentrations of pine pollen in suspension, as well as the rolling wave effect produced by easterly winds. Due to their obtuse, non-defined nature, these values have been omitted, and the NTPUD annual maximum was reported as 50 CFU, the highest true reading for the 2015-2016 reporting year.

The annual mean total coliform result for the reporting period of July 1, 2020, to June 30, 2021, is 4.10 CFU/100 mL. This result is greater than the previous reporting years' reading of 1.82 CFU/100 mL and similar to annual mean total coliform results in 2014 and 2011 (Figure 11.3). Over the 10-year reporting period of July 1, 2011-June 30, 2021, annual mean results show an increasing linear trend over time (Figure 11.3)

Table 15.1: NTPUD annual source water total and E. coli coliform data results from July 1, 2020, through June 30, 2021. Coliform analyses completed on samples collected from raw water at the NTPUD intake.

	Total coliform CFU (#colonies/100 mL)	E. coli coliform CFU (# colonies/20 mL)
Mean	4.10	0.31
Median	0	0
Max	170	23
90th Percentile	9.5	0
Colony-Forming Samples	38	4
Total Number of Samples	106	106

NTPUD also completed tests for E.coli coliform on all samples tested for total coliform. During the 2020-2021 reporting year, E. coli coliform was detected in 4 of the 106 samples (Table 14.1 and 14.2). The maximum E. coli coliform reading was 23 CFU/20 mL, the annual mean was 0.31 CFU/20 mL, and 90% of the samples were below 0 CFU/20 mL. The maximum E. coli coliform result was taken on February 25, 2021.

Table 15.2: NTPUD monthly source water total and E. coli coliform data results from July 1, 2020, through June 30, 2021 Coliform analyses completed on samples collected from raw water at the NTPUD intake.

	Maximum total coliform (# colonies/100 mL)	Mean total coliform (# colonies/100 mL)	Maximum E. coli coliform (# colonies/20 mL)	Mean E. coli coliform (# colonies/20 mL)
Jul-20	23.00	3.15	2.00	0.15
Aug-20	11.00	2.83	0.00	0.00
Sep-20	170.00	28.67	0.00	0.00
Oct-20	21.00	7.00	4.00	0.44
Nov-20	2.00	0.50	0.00	0.00
Dec-20	2.00	0.22	0.00	0.00
Jan-21	2.00	0.29	0.00	0.00
Feb-21	23.00	2.88	23.00	2.88
Mar-21	0.00	0.00	0.00	0.00
Apr-21	2.00	0.22	0.00	0.00
May-21	0.00	0.00	0.00	0.00
Jun-21	4.00	0.89	4.00	0.44

Figure 11.0: Monthly Mean and Max Turbidity Results for North Tahoe Public Utility District between July 1, 2020 and June 30, 2021.

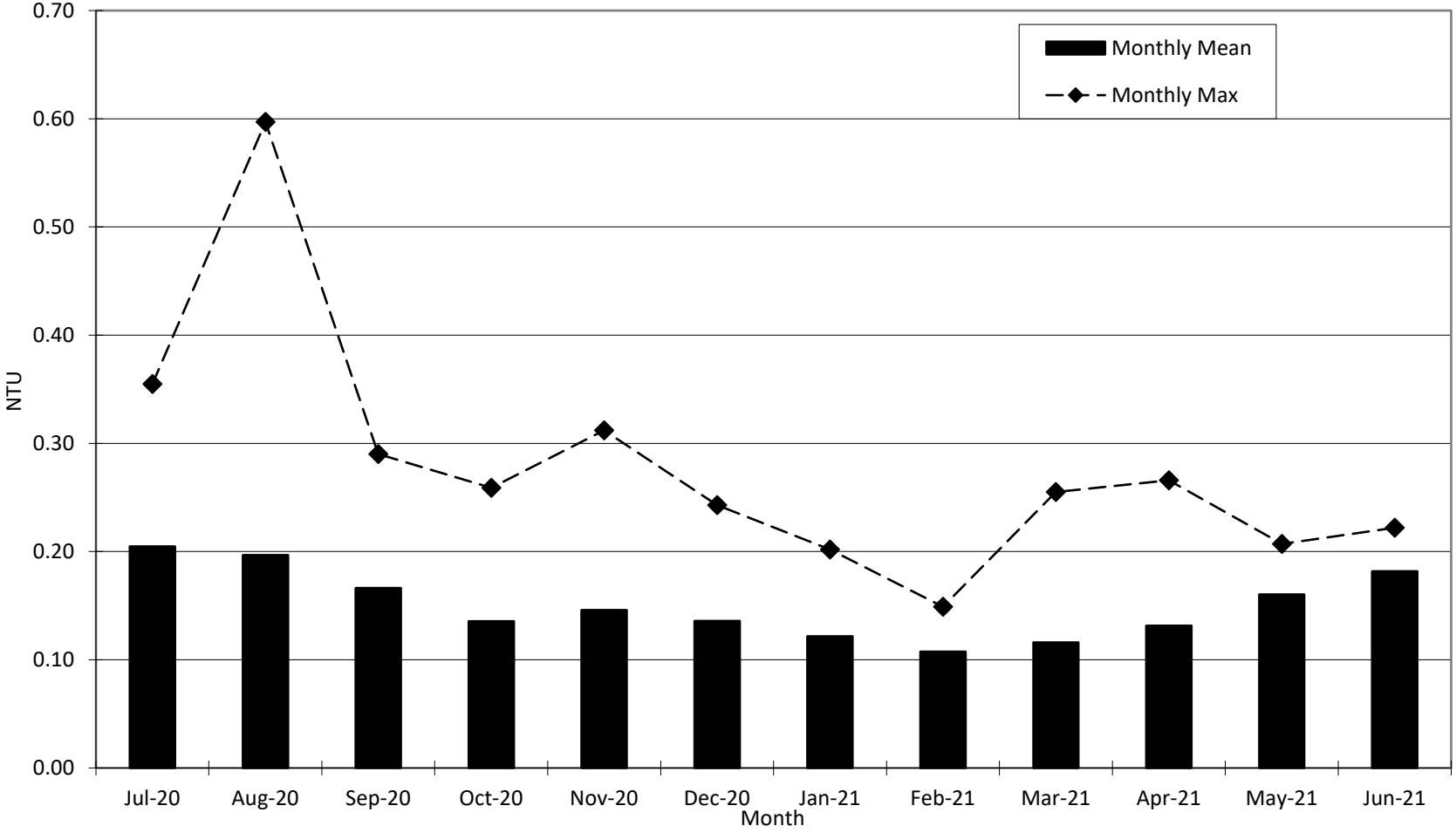


Figure 11.1: Yearly Mean and Max Turbidity Results for North Tahoe Public Utility District between July 1, 2011 and June 30, 2021.

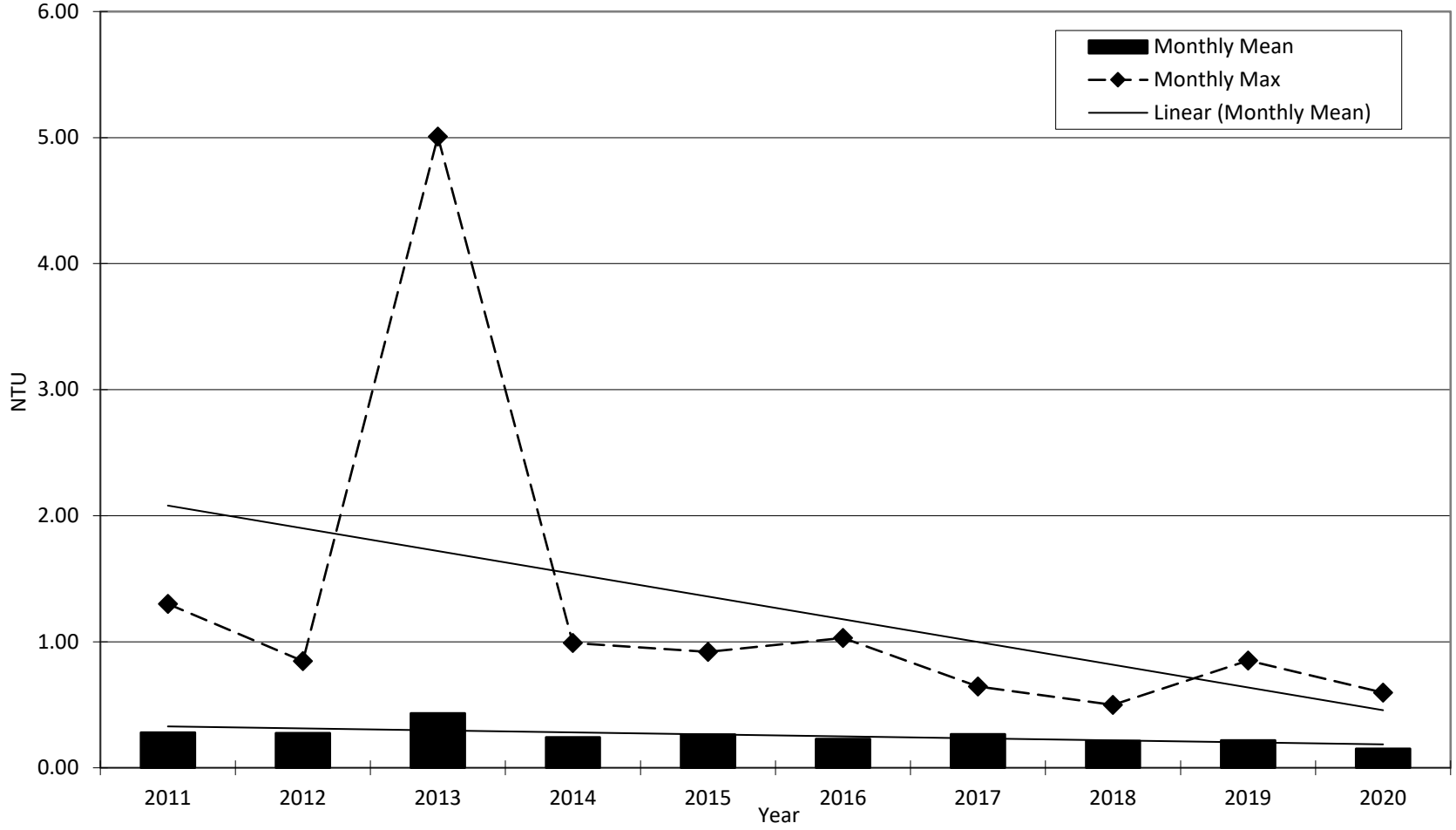


Figure 10.2: Monthly Mean and Max Total Coliform Results for North Tahoe Public Utility District between July 1, 2019 and June 30, 2020.

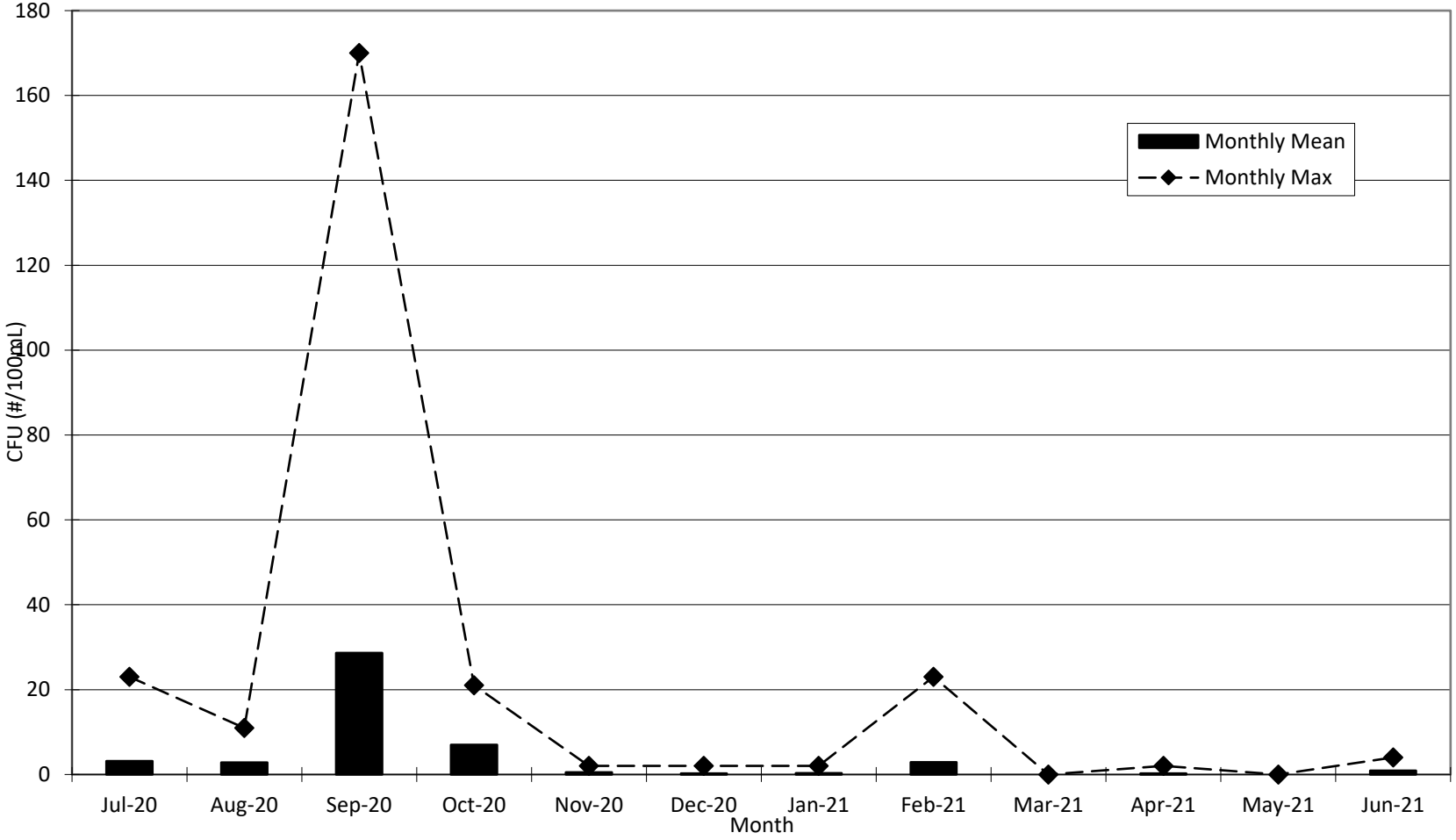
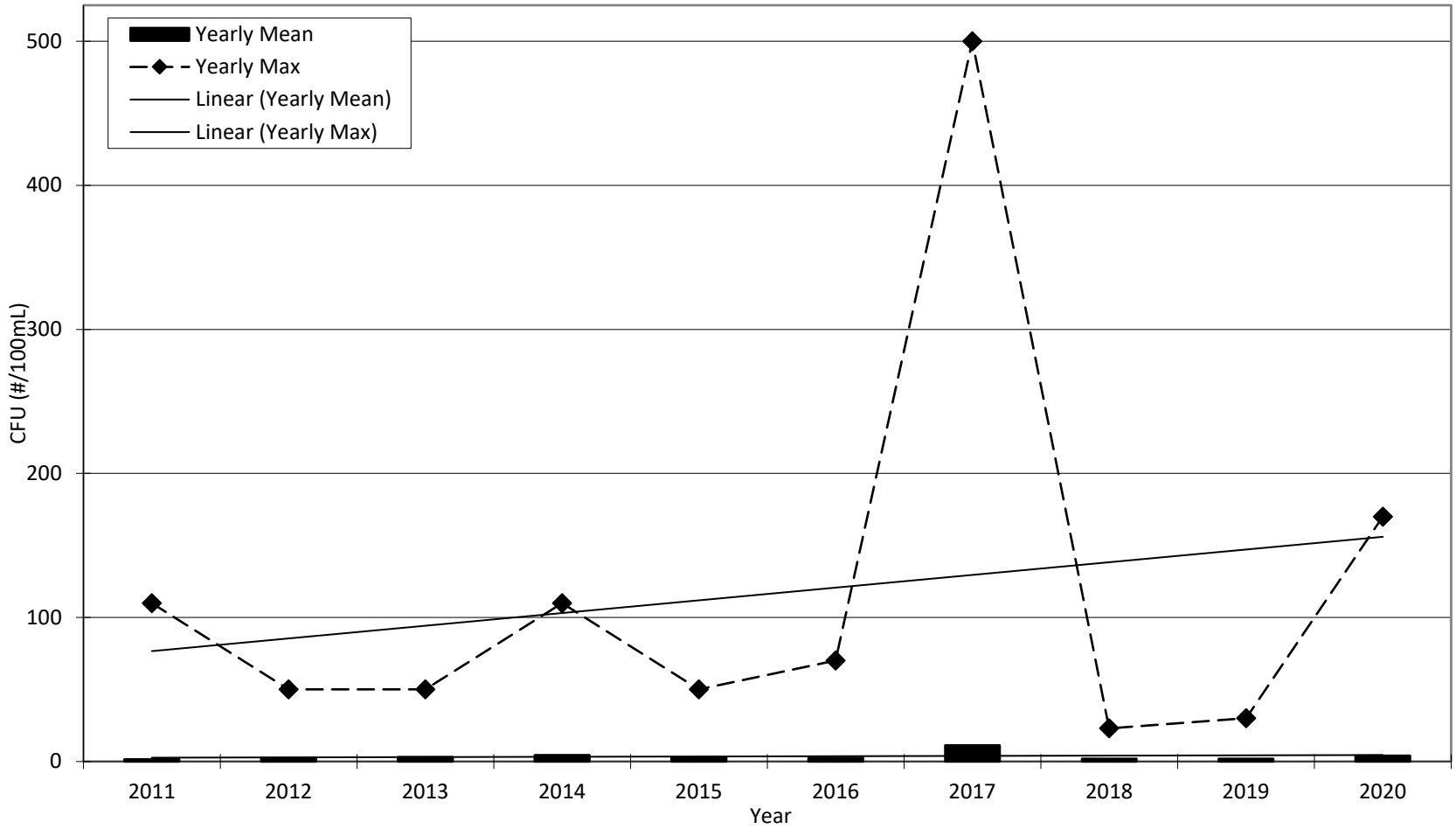


Figure 10.3: Yearly mean and max total coliform results for North Tahoe Public Utility District between July 1, 2011 and June 30, 2021.



NORTH TAHOE PUBLIC UTILITY DISTRICT
ANNUAL WATER QUALITY
CONSUMER CONFIDENCE REPORT FOR 2020

To Our Customers: This report contains important information about your drinking water.

Este informe contiene información muy importante sobre la calidad de su agua potable. Por favor lea este informe o comuníquese con alguien que pueda traducir la información.

Where does my water come from?

The North Tahoe Public Utility District services nearly 3,971 connections. These connections include single-family dwellings and business establishments, as well as separate irrigation and fire systems. The District operates three separate and independent water systems: Dollar Cove, Carnelian Bay, and the Tahoe Main system, comprised of Tahoe Vista, Kings Beach, and Brockway to the Nevada State Line. Dollar Cove is currently being supplied through the Tahoe City Public Utility District's Tahoe City system, by agreement of a joint well drilling project of the two Districts that is comprised of five separate wells (groundwater sources). Carnelian Bay draws its water from a single well (groundwater source). The Tahoe Main water system draws water from Lake Tahoe (surface water source) through an intake at the end of National Avenue in Tahoe Vista, as well as a single well (groundwater source) located in the North Tahoe Regional Park at the top of Donner Road. These combined sources supplied just under 381 million gallons of water to our customers in 2020.

How can I keep our drinking water safe and clean?

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the **USEPA's Safe Drinking Water Hotline (800-426-4791).** The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels in the environment it dissolves naturally occurring minerals, pick up substances from the presence of animals or human activity, and even radioactive material, in some cases. **Microbial contaminants,** such as viruses and bacteria, that may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife; **Inorganic contaminants,** such as salts and metals, that can be naturally-occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming. **Pesticides and Herbicides,** which may come from a variety of sources such as agriculture, urban stormwater runoff, and residential uses; **Organic chemical contaminants,** including synthetic and **Volatile Organic chemicals,** that are byproducts of industrial process and petroleum production, and can also come from gas stations, urban stormwater runoff, and septic systems; **Radioactive contaminants,** which can be naturally-occurring or be the result of oil and gas production and mining activities. To ensure that tap water is safe to drink, the Environmental Protection Agency (EPA) and California Department of Public Health, Division of Drinking Water and Environmental Management (Department), prescribe regulations that limit the amount of certain contaminants in water provided by public water systems. We treat our water according to their regulations. Food and Drug Administration (FDA) regulations establish limits for contaminants in bottled water that must provide the same protection for public health.

Why are there contaminants in my drinking water?

The drinking water that the District treats and provides for its customers comes from wells as well as the open water of Lake Tahoe. Many people don't see the link between the water you drink and the items that are put into the sewer system, but when people dispose of their waste incorrectly, it threatens the safety of our drinking water as well.

In the Tahoe basin, our storm drain system does not put runoff into the sewer system like so many other communities in this country. Most of the storm drains drain directly into the Lake! In addition to protecting our sewers, it is also extremely important that under no circumstances may substances be put directly into the storm drain.

Most liquid and automotive waste (oil, old gasoline) can be disposed of during one of the hazardous waste disposal days provided by Placer County and Tahoe Truckee Sierra Disposal at the Eastern Regional Landfill on Cabin Creek Road off Highway 89.

Water Quality Data

These system tables list all the drinking water contaminants that were tested for during the 2020 calendar year. The presence of these contaminants in the water does not necessarily indicate that the water poses a health risk. Unless otherwise noted, the data presented in this table is from testing done January 1—December 31, 2020. The EPA or the State requires us to monitor for certain contaminants less than once per year because the concentrations of these contaminants do not change frequently. See the last page for Terms and Abbreviations used in the report. This full report is available on our website at **ntpud.org/ccr**

Do I need to take special precautions?

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV / AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/Centers for Disease Control (CDC) guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the **Safe Drinking Water Hotline (800-426-4791)**.

Source water assessment and its availability

Our most recent watershed sanitary survey (Lake Tahoe) update was done in 2018.
Although the North Tahoe Basin sewage flows to Truckee and is treated, domestic sewage and wastewater disposal and collection are potentially contaminating activities (PCA) of key concern. Summer recreation on the lake is another PCA of key concern. The District does not have direct regulatory control or enforcement over the Lake Tahoe watershed; we rely on the regulatory powers of the Tahoe Regional Planning Agency (TRPA) and the Lahontan Regional Water Quality Control Board (RWQCB).

Lead

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. The North Tahoe Public Utility District is responsible for providing high-quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by running your tap for 30 seconds to 2 minutes before using water for drinking or cooking. Capture and use this water for household or garden plants. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at http://www.epa.gov/safewater/lead

Radon

Radon is a radioactive gas that you cannot see, taste or smell. It is found throughout the U.S. Radon can move up through the ground and into a home through cracks and holes in the foundation. Radon can build up to high levels in all types of homes. Radon can also get into indoor air when released from tap water from showering, washing dishes and other household activities. Compared to radon entering the home through soil, radon entering the home through tap water on most cases would be a small source of radon in indoor air. Radon is a known human carcinogen. Breathing air containing radon can cause cancer. Drinking water containing radon may also cause an increased risk of stomach cancer. If you are concerned about radon in your home, test the air in your home. Testing is inexpensive and easy. You should pursue radon removal for your home if the level of radon in your air is four (4) picocuries per liter of air (pCi/L) or higher. There are simple ways to fix a radon problem that are not too costly. For additional information, call your State radon program (1-800-745-7236), the USEPA Safe Drinking Water Hotline (1-800-426-4791), or the National Safety Council on Radon Hotline (1-800-767-7236).

Water Conservation – A California Way of Life

In April 2017 the State of California placed permanent restrictions on wasteful water practices. The following wasteful water practices are now permanently prohibited:

- Hosing off sidewalks, driveways and other hardscapes
- Washing automobiles with hoses not equipped with a shut-off nozzle
- Using non-recirculated water in a fountain or other decorative water feature
- Watering lawns in a manner that causes runoff
- Watering within 48 hours after measurable precipitation
- Irrigating ornamental turf on public street medians

20% by 2020

The 20% by 2020 state mandate is that all water purveyors reduce their per capita water use by 20% from the average usage of our customers over 10 years in the early 2000's. For most recent info go to : http://ntpud.org/water-regulations

District Water Conservation Regulations

- As of May 13, 2020 the District's Stage 2 water conservation measures will remain in effect. Visit http://ntpud.org/water-regulations

CURRENT Mandatory Reduction Measures (Stage 2)

- Outdoor irrigation schedule
  - EVEN addresses: Monday, Wednesday, Friday
  - ODD addresses: Sunday, Tuesday, Thursday
  - NO watering on Saturday
- Water may not be applied to hard surfaces (i.e. asphalt driveways), except for pavement resurfacing/sealing or public health/safety reasons
- Visitor accommodations may only wash linens upon request. A placard or notice shall be placed in each guest room.
- All public entities, hotels, motels, restaurants, and other visitor-serving facilities shall prominently display informational materials, placards, or decals provided by the District

CONTINUED Reduction Measures (Stage 1)

- Leaks must be repaired when found or within 10 days of District notification of leak. Note: The District will notify property owners following water meter reads if there is an unusually high reading.
- Irrigation, runoff, or flooding onto hard surfaces or any non-irrigated areas is prohibited
- Automatic shut off valves or nozzles are required on all hoses. Note: Free hose nozzles available at the District office.
- Irrigation must be winterized by Nov. 1 of every year
- Landscaping may not be irrigated:
  - Between the hours of 9am – 6pm
  - During, or within 48 hours after, measurable precipitation
  - When the air temperature is less than 40 degrees Fahrenheit

The District always operates at a Stage 1 level, which includes basic good practices and helps prevent waste. The Stage 2 regulations include conservation measures and use requirements to help the District meet the 20 percent reduction goal. View the full list of regulations for each stage. Learn more about water conservation methods.

For More Information

To obtain specific water quality or watershed data contact Michael Warren, Lead Water Quality Control Technician at (530) 546-4212 ext. 5452, or mwarren@ntpud.org. Visit www.ntpud.org to find more information.

Our Board of Directors meets on the second Tuesday of each month at the North Tahoe Event Center. We encourage participation in these meetings. For meeting times and agendas please visit our website http://ntpud.org or call the District office at (530) 546-4212.

NORTH TAHOE PUBLIC UTILITY DISTRICT
ANNUAL WATER QUALITY
CONSUMER CONFIDENCE REPORT FOR 2020

Detected Compounds

The State allows us to monitor comtaminants less than once per year because the concentrations of these comtaminates do not change frequently. Some of our data, though representive, are more than one year old. If a substance or contaminant is not listed, it is either not detected limit or not required to sampled.

Contaminant (UNITS)	Sample Year	MCL	PHG (MCLG)	Tahoe Main System #3110001 Lake Tahoe Nat'l Ave	Tahoe Main System #3110001 Groundwater Park Well	Carnelian Woods System #3110023 Groundwater Park Well	Dollar Cove System #3110036 Tahoe City PUD	Tahoe City PUD water supply to NTPUD constists of Highlands Well #1 #2, T.C. Well #2 #3, Tahoe Tavern Well Violation	Major Source in Drinking Water
Primary Standards									
Arsenic (ppb)	2016	10	0.004	ND	NR	NR	2014 (2020) (4.1) (2.3) ND/(ND)/ND	NO	Erosion of natural deposits
Nickel (ppb)	2016	100	10	ND	ND	ND	(2014)20/20/20/21/20	NO	Erosion of natural deposits
Microbiological Monitoring									
Total Coliforms (T / A / P)	2020	1	(0)	156T / 156A / 0P		29T / 24A / 5P*	159T / 158A / 0P	YES	Naturally Present in the enviroment
E-Coli (T / A / P)	2020	1	(0)	156T / 156A / 0P		29T / 29A / 0P	159T / 158A / 0P	NO	Human and Animal Fecal Waste
Radioactive									
Radon 222 (pCi/L)	2003	N/A	N/A	NR	NR	NR	547/1190/NS/1230/1120	N/A	Erosion of natural deposits
Radium 228 (pCi/L)	2020	5	0.019	ND/0.000	ND	ND	NR	NO	Erosion of natural deposits
Gross Alpha (pCi/L)	2017	15	(0)	2.32	NR	NR	NR	NO	Erosion of natural deposits
Inorganic									
Nitrate - As N (ppm)	2020	1(AS-N)	1(AS-N)	ND	ND	ND	NR	NO	Runoff & leaching from fertilizers, sepit tanks, sewage
Nitrite _ As NO3 (ppm)	2019	45 (NO3)	45 (NO3)	ND	ND	ND	NR	NO	Runoff & leaching from fertilizers, sepit tanks, sewage
Perchlorate (ppb)	2019	0.006	6	ND	ND	ND	NR	NO	Production of matches, flares, explosives, pyrotechnics
Aluminum (ug/L)	2016	1000	600	ND	ND	ND	NR	NO	Erosion of natural deposits
Antimony	2016	6	1					NO	Discharge from petroleum refineries, fire retardants
Barium (ug/L)	2016	1000	(2) mg/L	17.6	44.2	22.6	NR	NO	Oil drilling wastes, Erosion of natural deposits
Beryllium	2016	4	N/A	ND	ND	ND	NR	NO	Discharge from metal refineries, coal burning factories
Cadmium	2016	5	N/A	ND	ND	ND	NR	NO	Interanal corrosion of galvanized pipes, runoff
Chromium (ug/L)	2016	50	(100)	ND	NR	ND	NR	NO	Discharge from steel & pulp mills, chrome plating
Fluoride (F) Natural Source	2016	2	N/A	ND	ND	ND	NR	NO	Erosion of natural deposits
Mercury	2016	2	N/A	ND	ND	ND	NR	NO	Erosion of natural deposits, discharge from refineries
Selenium	2016	50	5	ND	ND	ND	NR	NO	Discharge from petroleum, glass & metal refineries
Thallium	2016	2	1	ND	ND	ND	NR	NO	Leaching from ore processing, discharge from glass
Disinfection By-Products									
Chlorine (ppm)	2020	(MRDL=4.0(as Cl2))		0.31-1.26 Annual RAA = 0.83		NR	Range 0.00 - 0.47 RAA = 0.35	NO	Drinking water disinfectant added for treatment
Disinfection By-Products	**Tahoe Main System #311001**			**Site #1 / #2 Annual**			**Site #3 Every Three Years**		
Total Trihalomethanes (ppm)	2020	0.080	1000	5.9/16		NR	(2020) ND	NO	By products of drinking water disnefection
Haloacetic Acids (ppm)	2020	0.060	1000	1.9/6.5		NR	(2020) ND	NO	By products of drinking water disnefection

Secondary Standards				Asethetic Standards Established by the State of California,Department of Health Services					
Clarity & Taste							2017		
Turbidity (NTU) - Raw Source	2020	TT/5 95%	NS	AVG .102 - .355	NR	NR	NR	NO	Soil runoff (erosion)
Bicarbonate as HCO3 (ppm)	2016	None/ppm	N/A	50.3	124	126	NR	NO	Erosion of natural deposits
Calcium (ppm)	2016	N/A	N/A	1.8	16.1	17.1	(2014) 7.6/7.5/12.3/10.2/16.7	NO	Erosion of natural deposits
Carbonates CO3 (ppm)	2016	N/A	N/A	ND	ND	ND	NR	NO	Erosion of natural deposits
Chloride (ppm)	2016	500	N/A	1.8	0.8	0.4	(2014)0.5/0.6/0.5/0.5/ND	NO	Erosion of natural deposits
Color	2016	15 Units	N/A	NR	ND	3	NR	NO	Erosion of natural deposits
Ordor (TON)	2016	3	3	N/A	ND	ND	(2014) ND/ND/ND/1/ND	NO	Naturally-occurring organic materials
Copper (ug/L)	2019	1000	160	ND	ND	ND	NR	NO	Erosion of natural deposits
Foaming Agents (MBAS)	2016	0.5	N/A	ND	ND	ND	NR	NO	Erosion of natural deposits
Hydroxide as OH	2016	N/A	N/A	ND	ND	ND	NR	NO	Erosion of natural deposits
Iron (ppb)	2016	300	N/A	ND	ND	ND	(2005)ND(1)/ND(125)/ND(1)/ND(1)/ND(1)/ND(1)	NO	Erosion of natural deposits
Magnesium (ppm)	2016	N/A	N/A	2.6	6.0	8.6	NR	NO	Erosion of natural deposits
Manganese (ppm)	2016	50	N/A	ND	ND	ND	(2005) ND	NO	Erosion of natural deposits
Methyl-tert-butyl-ether (ppm)	2007	0.0005	5ug/L	ND	ND	ND	NR	NO	Leaking underground fuel tanks
PH - Distred range	2016	6.5-8.5	N/A	8.2	8.2	7.7	NR	NO	Erosion of natural deposits, Some water treatment
Silver	2016	100	N/A	ND	ND	ND	NR	NO	Erosion of natural deposits
Sodium (ppm)	2016	N/A	N/A	6.3	11.9	5.9	(2014)14.6/11.6/5.0/5.2/5.3	NO	Erosion of natural deposits
SpecificConductance [E.C.] (uS)	2016	1600	N/A	101	192	185	(2014)215/189/164/160/217	NO	Substances that form ions when in water
Sulfate (ppm)	2016	500	N/A	1.7	0.3	0.3	(2014)1.3/0.9/1.7/3.6/0.8	NO	Erosion of natural deposits
Total Alkalinity [as CaCO3] (ppm)	2016	N/A	N/A	41.2	102	103	(2014)93.5/97.3/89.3/88.7/95.7	NO	Erosion of natural deposits
Total Dissolved Solids (ppm)	2016	1000	N/A	20	112	97	(2014)72/80/83/98/125	NO	Erosion of natural deposits
Total Hardness [as CaCO3] (ppm)	2016	N/A	N/A	32	65	76	(2014)46/41/58/51/76	NO	Erosion of natural deposits
Zinc (ppm)	2016	5	N/A	ND	ND	ND	(2014) ND	NO	Erosion of natural deposits
LEAD AND COPPER		Action Level	MCL	20 Samples Percentile	90th	10 Samples 90th Percentile	10 Samples 90th Percentile		
LEAD (ug/L)	2019	15	15	ND		ND	ND		Internal corrosion-plumbing; erosion nat'rl deposits.
Copper (ug/L)	2019	1300	1300	75		452	10 Samples 18.32		Corrosion of household plumbing systems

Lead

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. The North Tahoe Public Utility District is responsible for providing high-quality drinking water but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by running your tap for 30 seconds to 2 minutes before using water for drinking or cooking. Capture and use this water for household or garden plants. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at http://www.epa.gov/safewater/lead

Radon

Radon is a radioactive gas that you cannot see, taste or smell. It is found throughout the U.S. Radon can move up through the ground and into a home through cracks and holes in the foundation. Radon can build up to high levels in all types of homes. Radon can also get into indoor air when released from tap water from showering, washing dishes and other household activities. Compared to radon entering the home through soil, radon entering the home through tap water on most cases would be a small source of radon in indoor air. Radon is a known human carcinogen. Breathing air containing radon can cause cancer. Drinking water containing radon may also cause an increased risk of stomach cancer. If you are concerned about radon in your home, test the air in your home. Testing is inexpensive and easy. You should pursue radon removal for your home if the level of radon in your air is four (4) picocuries per liter of air (pCi/L) or higher. There are simple ways to fix a radon problem that are not too costly. For additional information, call your State radon program (1-800-745-7236), the USEPA Safe Drinking Water Hotline (1-800-426-4791), or the National Safety Council on Radon Hotline (1-800-767-7236).

Conservation – A California Way of Life

In April 2017 the State of California placed permanent restrictions on wasteful water practices. Th
prohibited:

- Hosing off sidewalks, driveways and other hardscapes
- Washing automobiles with hoses not equipped with a shut-off nozzle
- Using non-recirculated water in a fountain or other decorative water feature
- Watering lawns in a manner that causes runoff
- Watering within 48 hours after measurable precipitation
- Irrigating ornamental turf on public street medians

20% by 2020

For most recent info go to : http://ntpud.org/water-regulations

V. DESCRIPTION OF WATER SUPPLY

The purpose of describing a watershed that affects a drinking water supply is to provide information that will help to evaluate the vulnerability of the source (EPA 1999). TWSA purveyor members are located around Lake Tahoe, in California and Nevada. Most TWSA full members takes water directly from the lake to service both a permanent and visitor population. Several have auxiliary groundwater sources. South Tahoe Public Utility District, a TWSA associate member, utilizes groundwater sources only. The watershed description briefly summarizes general location and features of the basin and source water, water system, population and land ownership, and local agreements. The Lake's location, unique physical characteristics, and national support for its protection and preservation create a distinctive political backdrop and regulatory system.

Lake Tahoe is one of the deepest and clearest lakes in the world. As such, it is a highly sought out destination for recreation, tourism and home ownership. Clarity and exceptional water quality are the basis of Lake Tahoe water quality goals. These important features give Lake Tahoe important designations. Both the federal government and California government have designated Lake Tahoe an "Outstanding National Resource Water (ONRW) Tier 3 which is the highest designation available. Nevada has designated Lake Tahoe a "Water of Extraordinary Ecological or Aesthetic Value".

Designated as a Tier 3 303(d) Outstanding National Water Resource by CA Environmental Protection Agency (CAEPA) under the Clean Water Act (CWA), Lake Tahoe has been identified as an impaired body of water for not meeting applicable water quality standards established through the CWA. Along with this designation, comes the requirement to establish Total Maximum Daily Loads (TMDL) for the pollutants that contribute to the water quality impairments.

A public water system (PWS) is a system for the provision to the public of water for human consumption through pipes or other constructed conveyances, if such system has at least 15 service connections or regularly serves at least 25 individuals. EPA and delegated states and tribes regulate these public drinking water systems. Public drinking water systems may be publicly or privately owned, and provide drinking water to 90 percent of Americans.

Location and Hydrology

Lake Tahoe is a high alpine lake located within both the Nevada and California state lines. It is 22 miles long and 12 miles wide, with a surface area of 122,200 acres or 193 sq. miles. Approximately two-thirds of the land area is within California and one-third within Nevada. To the west, the Sierra Nevada Mountain range borders the basin across from the Carson Range on the east side of the lake. The basin is described as a high alpine and sub-alpine ecosystem. The primary soil type is granite (USGS 2003).

Lake Tahoe is the largest alpine lake on the North American continent and the second deepest lake in the United States. Lake Tahoe is the eleventh-deepest lake in the world with a maximum depth of 1,657 feet (505 meters) and an average depth of 1,027 feet (313 meters). The source of water for Lake Tahoe is precipitation. A majority of the precipitation falls into the lake directly (USGS 2003). The Lake Tahoe Basin (USGS watershed #16050101) has 63 sub watersheds draining into the lake and one outlet, the Truckee River.

Lake Tahoe contains an estimated 39.75 trillion gallons or 122 million acre feet of water. That's enough water to cover the entire state of California to a depth of 14.5 inches. The water that evaporates daily is 1.4 million tons, enough to supply the needs of 3.5 million people on a daily basis. The water in Lake Tahoe is 99.7 percent pure, about the same as distilled water.

With one outlet, it takes an average of 650-700 years for a particle to leave the lake (CTC 2003).

Uncommon Clarity

Historically, a white plate called a Secchi disk could be seen in the lake at depths of 100 feet. A Secchi disk is an indirect measurement of clarity. The clarity has been reduced on average by 1 foot per year over the last thirty years. The decrease in clarity was attributed to storm water runoff, urban development, air quality and erosion (EPA 2005).

Clarity levels at Lake Tahoe in 2019 and 2014 showed the biggest improvements, according to researchers at the University of California, Davis, who have studied the lake for the last half century. The improvements are in part due to continuous work from the Lake Tahoe community to lower pollutant addition to the lake. They were also influenced by the drought, as reduced precipitation meant fewer contaminants flowed into Lake Tahoe, particularly during the summer, when clarity levels were the highest recorded since 2002. (TERC 2015)

In addition to aesthetic enjoyment, the exceptional quality of water in the Lake Tahoe Basin supports a number of beneficial uses related to human and environmental health, including drinking water supply, water contact recreation, wildlife habitat, and aquatic life and habitat. During the development of the Lake Tahoe TMDL, the plan created to reverse the decline in deep-water transparency in Lake Tahoe and to restore clarity, it was discovered that up to two thirds of the decrease in clarity of Lake Tahoe can be attributed to fine sediment particles (FSP = less than 16 microns). Also determined through the development of the TMDL was that storm water runoff originating in urban areas accounted for 72% of the FSP that eventually enters the lake.

The clarity of Lake Tahoe has long been one of the most important indicators of the changing condition of this iconic water body. In 2019, Lake Tahoe's clarity decreased nearly 8 feet from the previous year's dramatic 10-foot improvement. The average annual value in 2019 was 62.7 feet. The lowest value was recorded in 2017, when clarity was 60 feet.

Such year-to-year and even day-to-day fluctuations are common. A truer picture of the clarity is often indicated by a five-year running mean, which shows a mean clarity of 67.3 feet, according to the data released by the UC Davis Tahoe Environmental Research Center. Lake Tahoe's average annual Secchi clarity measurements since 2000 are listed below. There are winter and summer clarity variables, winter tend to have more clarity depth.

- 2021 — 63 feet (19.2 meter)
- 2020 — 62.5 feet (19.05 meter)
- 2019 — 62.7 feet (19.1 meter)
- 2018 — 70.9 feet (21.6 meter)
- 2017*—59.7 feet (18.20 meter)
- 2016 — 69.2 feet (21.1 meter)
- 2015 — 73.1 feet (22.3 meter)
- 2014 — 77.8 feet (23.7 meter)
- 2013 — 70.1 feet (21.4 meter)
- 2012 — 75.3 feet (23 meter)
- 2011 — 68.9 feet (21 meter)
- 2010 — 64.4 feet (19.6 meter)
- 2009 — 68.1 feet (20.8 meter)
- 2008 — 69.6 feet (21.2 meter)
- 2007 — 70.1 feet (21.4 meter)
- 2006 — 67.7 feet (20.6 meter)
- 2005 — 72.4 feet (22.1 meter)

- 2004 — 73.6 feet (22.4 meter)
- 2003 — 71 feet (21.6 meter)
- 2002 — 78 feet (23.8 meter)
- 2001 — 73.6 feet (22.4 meter)
- 2000 — 67.3 feet (20.5 meter)

*Lake Tahoe's average annual clarity in 2017 was at its lowest level, 59.7 feet, since regular measurements began in 1968. This was likely due to the one-two punch of the end of a five-year drought followed by a winter of record-high precipitation levels that extended well into the spring. More sediment washed into the lake in 2017 than the previous five years combined. (Data Source: UC Davis TERC SOTL Report).

More than 80 percent of the watershed is vegetated (montane-subalpine type), covered predominantly by mixed coniferous forests, though bare granite outcrops and meadows are also common. About 2 percent of the watershed is impervious surface associated with urban development, which equates to over 5,000 acres (20 km2) (Minor and Cablk 2004). Much of the impervious land cover is adjacent to the lake or its major tributaries. 14 of the 63 individual watersheds have at least 10 percent impervious land area.

Most urban development exists along the lake's shoreline, with the largest concentration at South Lake Tahoe in the south, Tahoe City in the northwest, and Incline Village in the northeast. The north and west shores are less densely populated. Much of the east shore is undeveloped.

TWSA purveyors' combined service areas span 23 sub-watersheds in the Lake Tahoe Basin including: Bijou Park, Burke, Carnelian Bay, Carnelian Canyon, Cedar Flats, Dollar Creek, East Stateline Point, Edgewood, First, Glenbrook, Griff, Incline, Kings Beach, Logan House, McFaul, Mill, North Zephyr, Second, Slaughter House, Tahoe Vista, Third, Watson Creek and Zephyr creeks. The TWSA service areas are defined in [Plate 1].

TWSA service areas in California range from the City of South Lake Tahoe, (STPUD and Lakeside) north along the west side of Lake Tahoe to Tahoe City and then into North Tahoe PUD service areas, including Kings Beach, CA.

The western service and watershed boundaries of Tahoe City Public Utility District extend from north of Emerald Bay to Dollar Hill, and along the Truckee River to the Nevada County line. This service area is very large, encompassing almost 22 square miles. There are numerous small independent water companies (non-TWSA) within these areas as well. NTPUD areas include Carnelian Bay, Tahoe Vista, Kings Beach and Brockway, CA. Heading eastward into Nevada, TWSA service areas include the member agencies: Incline Village GID, Glenbrook, Douglas County (Cave Rock/Skyland/Zephyr Cove), Round Hill GID, Kingsbury GID and Edgewood Water Company.

Other water suppliers located within the Tahoe Basin include several small municipal systems and private homeowners.

Climate, Climate Change, Drought and Record Setting Precipitation
http://terc.ucdavis.edu/stateofthelake

In general, Tahoe's climate is characteristic of an alpine ecosystem. Summer average daily temperatures range between 57 ^{O} and 65 ^{O} F. Annual winter temperatures vary between 40 ^{O} and 50 ^{O}F with minimums ranging between 20 ^{O} and 25 ^{O} F. Snowfall occurs generally in October through March with

most snow precipitation accruing in January through March (WRCC 2005).

With air and water temperatures trending warmer, climate change is considered a major driver for ecological changes occurring in the lake, along with urbanization and invasive species. Stratification (lake mixing) has been affected by warming temperatures as well. During a typical summer the lake becomes stratified, with warmer waters on top and cooler water at depth. In the winter these layers mix, a process that refreshes the lake and keeps it healthy. The extended stratification season on Lake Tahoe has major implications for water quality. “A longer stratification period increases the risk of losing oxygen at the bottom of the lake,” Schladow explained, “and this can release a huge, almost infinite supply of phosphorus to the lake in a process known as internal loading.” Phosphorus is the limiting nutrient in Lake Tahoe. The more there is - the more algae can grow, causing a decline in water clarity. (TERC 2012)

Precipitation as rain and snow is the single most important factor influencing pollutant delivery to Lake Tahoe. Precipitation drives the mobilization and transport of pollutants from the landscape into the tributaries or directly into the lake. The lake’s surface area, which is relatively large compared to its watershed area, is an important factor because a significant amount of precipitation (36 percent) enters the lake directly. Therefore significant amounts of airborne pollutants (fine sediment, nitrogen, and phosphorus) enter the lake directly.

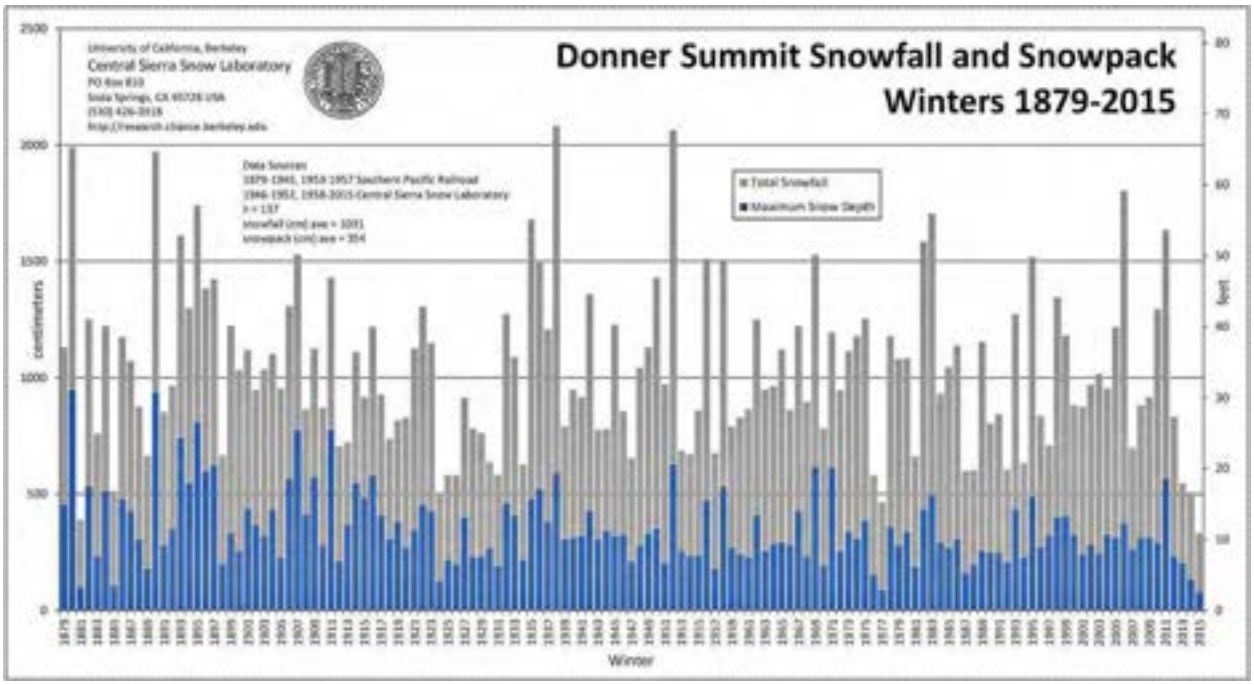
The Lake Tahoe Basin has a Mediterranean-type climate characterized by wet winters and dry summers. Most precipitation in the basin falls between October and May as snow at higher elevations and as snow/rain at lake level. Over 75 percent of the precipitation is delivered by frontal weather systems from the Pacific Ocean between November and March. However, precipitation timing can vary significantly from year to year (Coats and Goldman 2001, Rowe et al. 2002). Lower elevations receive about 20 inches (51 cm) of annual precipitation, but the upper elevations on the west side of the basin receive about 59 inches (150 cm) (USDA 2000).

The snow pack at higher elevations typically melts and runs off in May and June. However, at lower elevations near the lakeshore, the snow pack typically melts earlier in the spring and can even melt mid-winter, if temperature and solar radiation conditions are right. Commonly, the lower elevation snow pack melts completely before the tributaries crest with snowmelt from the higher, colder elevations.

Thunderstorms, especially rain-on-snow events, can lead to high runoff in a short amount of time, contributing to pollutant transport into Lake Tahoe and its tributaries. Thunderstorms in summer or fall can be intense and can generate large loads for short periods of time, typically in isolated geographic locations. However, summer thunderstorms contribute little to annual precipitation and typically are not responsible for significant pollutant loads to tributaries (Hatch et al. 2001, S. Hackley unpublished).

The effects of climate change are being studied by the Tahoe Science Consortium. Increased temperatures may shift more precipitation events to rain versus snow, which has the potential to increase runoff and affect forest health. Winter snowmelt is often occurring earlier and at a higher rate than in the recent past.

A well-defined rain shadow exists across the lake from west to east (Crippen and Pavelka 1970, Sierra Hydrotech 1986, and Anderson et al. 2004). The west shore averages about 35 inches/year (90 cm/year) of precipitation, while the east shore averages about 20 inches/year (51 cm/year).



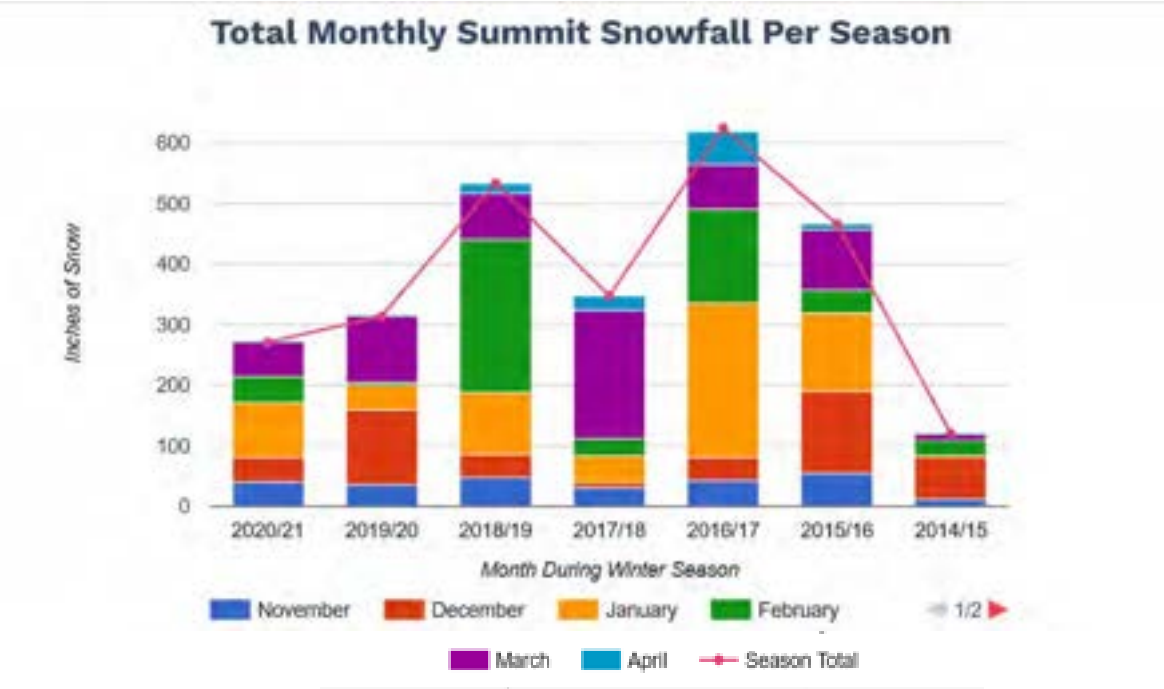
http://www.thestormking.com/Weather/Sierra_Snowfall/sierra_snowfall.html

Meteorologically, the long-term trends that have been prevalent do not change year-to-year. A changing climate is evident in almost all the long-term meteorological trends including rising air temperature and the declining fraction of precipitation as snow. The weather experienced in a given year can be far more variable.

By century's end, the Tahoe basin is projected to experience air temperatures up to 9 degrees higher than today's average. A shift from a snow-based to a rain-based climate will result in peak stream-flows occurring months earlier than present day, with those flows arriving as warmer water. Consequences could include changes to fish spawning, a loss of water storage and elevated wildfire risk.

That's according to the annual Tahoe: State of the Lake report, UC Davis Tahoe Environmental Research Center. The report presents data regarding lake clarity, temperature, snowpack, invasive species, algae, nutrient loads and more, all in the context of the long-term record.

The UC Davis Tahoe Environmental Research Center (TERC) is increasingly using new approaches to enrich the long-term data record for Lake Tahoe. These include real-time measurements at over 25 stations around the basin; remote sensing from autonomous underwater vehicles, satellites, and aerial drones; and the deployment of a suite of numerical models. These tools are all focused on quantifying the changes that are happening; and, at the same time, understanding what actions and measures will be most effective for control, mitigation, and management.
Precipitation totals are swinging drastically from year to year; and the percentage of snow/rain events as well.



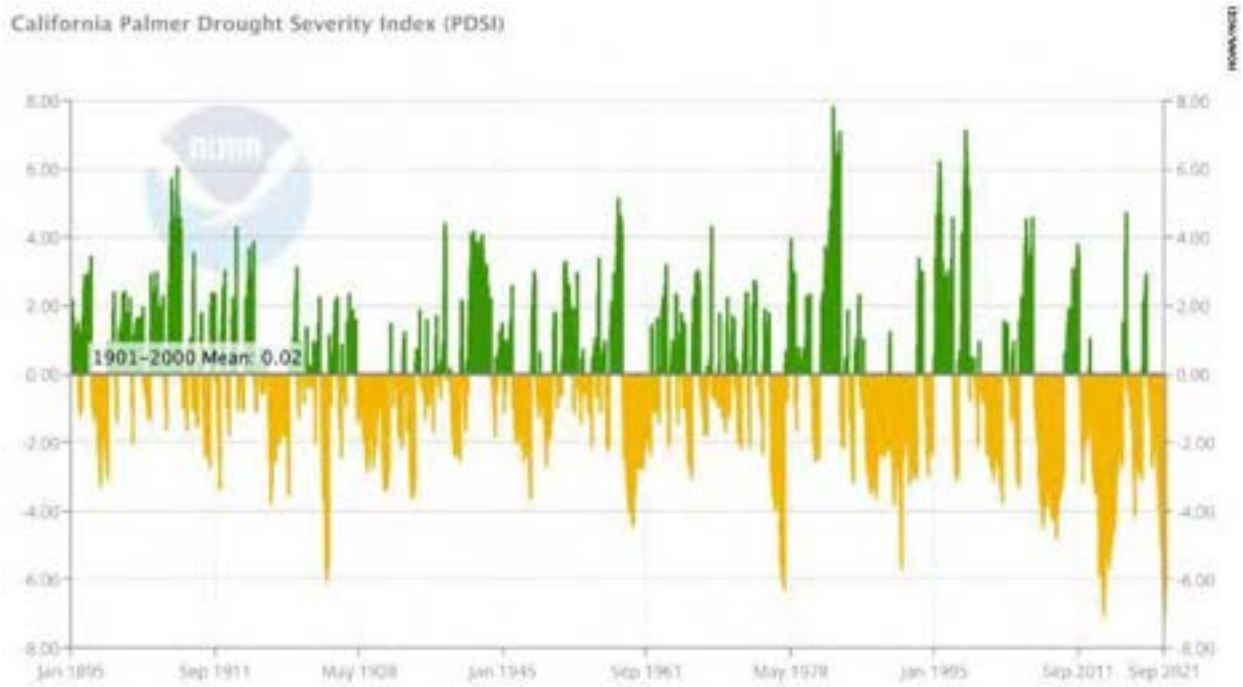
https://www.sierraattahoe.com/season-snow-totals

2020-21 Drought Deepens
https://www.cnn.com/2021/10/14/us/california-summer-drought-worst-on-record/index.html

Drought conditions in California this summer were the worst on record. The West's historic, multi-year drought is threatening water supply, food production and electricity generation. It has drained reservoirs at incredible rates and fueled one of the most extreme wildfire seasons the region has ever experienced.

In California, drought conditions this summer were the most extreme in the entire 126-year record -- a clear sign of the role climate change plays in the perilous decline of the state's water resources. Data from the National Oceanic and Atmospheric Administration shows that drought months are becoming the new normal, with rainy months becoming fewer and farther between.
Climate researchers say two major factors contributed to this summer's severe drought: the lack of precipitation and an increase in evaporative demand, also known as the "thirst of the atmosphere." Warmer temperatures increase the amount of water the atmosphere can absorb, which then dries out the landscape and primes the environment for wildfires.

"As we're getting these very extreme heat waves, it's just making the drought even worse, even though drought is initially caused by the lack of precipitation," Julie Kalansky, a climate scientist at Scripps Institution of Oceanography in San Diego, previously told CNN. "But during the dry months of much of the West, these heat waves just continue this drying throughout the summer and into the fall."
Based on the Palmer Drought Severity Index, July 2021 was the driest month on record in California since records began in 1895. June, July and August were three out of the states five driest months on record.



The value of the Palmer Drought Severity Index, a measure of the intensity of drought, for every month from January 1895 to September 2021. A more negative value indicates a worse drought. The index, also known as the PDSI, takes into account precipitation, runoff and how much moisture is evaporating out of the ground. It is used widely by scientists and researchers and is and a key factor that informs the weekly report of the US Drought Monitor. On the PDSI scale, anything below -4.0 is considered "extreme drought." California's PDSI this summer ranged from -6.7 in June to -7.07 in July.

This summer tied the Dust Bowl summer in 1936 for the hottest on record in the US. It was also the hottest summer on record in California, where the persistent heat pushed almost 50% of the state into what the US Drought Monitor classifies "exceptional drought" -- its most extreme classification.

The prolonged drought California is experiencing began in 2012. Since then, wet months have been rare, with just two notable wet periods: Winter 2016-2017 and Spring 2019.

Before this year, 2014 held the record for the most extreme drought conditions, with June and July that year facing similar circumstances as today.

Scientists reported in August that as the planet warms, droughts that may have occurred only once every decade or so now happen 70% more frequently. In the Southwest, officials at the National Oceanic and Atmospheric Administration predict drought there is about to get worse with La Niña on the horizon.

Justin Mankin, assistant professor of geography at Dartmouth College and co-lead of NOAA's Drought Task Force, previously told CNN that the only way to replenish the thirst of the atmosphere that's fueling the West's historic drought is to make deep cuts in global greenhouse gas emissions.
"The longer-term fate of this particular drought is murky, even though we expect more droughts to look like this one in the years to come," he said. "The temperatures and evaporative demands associated with this drought were not possible without the global warming that's occurred."

2019-20 Drought returns after record setting previous year
https://www.tahoedailytribune.com/news/everything-has-missed-us-after-record-setting-2019-tahoe-resorts-left-out-to-dry-in-february-2020/
While other ski resorts in the Western U.S. experienced record-breaking snowfall in February, those

around the Lake Tahoe Basin have been left out to dry. Squaw Valley Alpine Meadows had its snowiest month ever at Squaw's upper mountain, piling up 313 inches of snow in February 2019, compared to just 3 inches this month. The (to February) total was the sixth lowest on record, tracked since 1904.

Record setting precipitation was noted for winter 2018-19.
https://thetahoeweekly.com/2019/06/2019-a-top-10-winter-for-water-not-snow
"Local and even national media relentlessly touted "record snowfall" headlines for the Tahoe Sierra, but as is often the case these days, the claims were generally overblown. No doubt that ski resort snowfall tallies for February set new records, but it wasn't enough to bump seasonal snowfall amounts even close to historic levels measured at the Central Sierra Snow Laboratory (CSSL) near Donner Pass.

Precipitation, however, is a more critical metric than snow and the news in that category is good.

Characterized by intense snowstorms and prolonged periods of generally wet and often gloomy weather, the winter of 2019 resulted in an impressive amount of precipitation (rain plus snow water equivalent). The June 1 data dispatch from Randall Osterhuber, lead scientist at the CSSL, reported 84.4 inches of precipitation measured so far at Donner Pass. That ranks 2019 at No. 10 in precipitation since 1871, with the potential to surpass 2011 at No. 9 with just 0.6 inches more. Even so, 2019's current precipitation total at the snow lab is 37 inches shy of 2017's — the wettest winter of record.

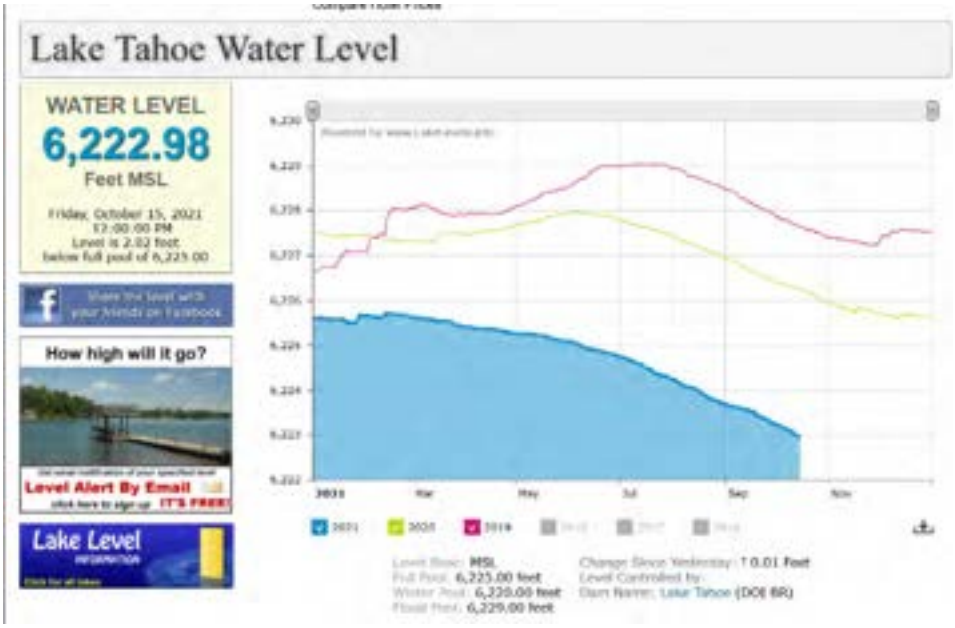
If you're a local who has lived in the Tahoe area since 1982, you have now enjoyed or endured eight of the Top 10 wettest years in history."

2016-17 was unique with another record setting winter precipitation level, almost 200% of normal precipitation. Some areas revived more than 700 inches (58 feet) of snow in winter 2016-17. The transition from extreme drought to record setting precipitation resulted in the lake completely filling up in 6 months, for the first time in 11 years, and allowing for seasonal releases downstream, for the first time in years.

Winter 2014-15 was noted as the lowest recorded snowpack in 150 years, with further estimation that it was the lowest snowpack in 500 years based on tree ring records. *http://phys.org/news/2015-09-sierra-nevada-snowpack-lowest-years.html.* Yet the recent winter of 2016-17, reversed this trend to be record setting precipitation.

MONTHLY - WEATHER AVERAGES SUMMARY
http://www.weatherbase.com/weather/weather.php3?s=608762
[Show All Data]
Long-term data sets on multiple precipitation and weather factors is available at this website.

October 2021 Tahoe's Natural Rim level is reached and becomes a terminal lake.



http://www.tahoe.uslakes.info/Level.asp

The lake has one outlet on its northwest side, forming the start of the Truckee River, which ultimately drains to Pyramid Lake, a terminal lake in Nevada. The lake's hydraulic residence time is 650 years, which means that on average it takes 650-700 years for water that enters the lake to leave the lake. Because of its volume, depth, and geographic location, Lake Tahoe remains ice-free year-round, though Emerald Bay has frozen over during some extreme cold spells.

A concrete dam was completed in 1913 to regulate water outflow at the Truckee River outlet in Tahoe City, California. In 1988, the dam was seismically retrofitted and enlarged to its current configuration. The upper six feet of the lake forms the largest storage reservoir in the Truckee River basin, with an effective capacity of 240 billion gallons (745,000 acre-feet) (Boughton et al. 1997). The dam is under federal control.

Lake Tahoe's natural rim sits at 6,223 feet, but lake maximum capacity, set by a legal decree in 1915 at 6,229.1 feet, which gives the water master the ability to control the lake's level between those six feet. Ongoing drought conditions have resulted in lower lake levels.

Lake Tahoe reached rim level in early October, 2021. It has fallen this low four times since 2004; the last time was 2014. The record low water level in recent history was in 1992, when the lake dropped to 6,220.26 feet.

Lake Tahoe is unique, the forces and processes that shape it are the same as those acting in all natural ecosystems. As such, Lake Tahoe is an analog for other systems both in western U.S. and worldwide. Extensive studies are conducted on climate change's potential effects on Lake Tahoe by UC Davis and other researchers. http://tahoe.ucdavis.edu/research/climate-change/modeling-climate.html

The following parameters have research information available at the website listed above.

REAL TIME MONITORING OF LAKE TAHOE
CLARITY MONITORING
LAKE MONITORING
MEASURING THE BLUENESS OF LAKE TAHOE
REMOTE SENSING OF THE NEARSHORE
ASIAN CLAMS IN EMERALD BAY
ZOOPLANKTON IN LAKE TAHOE
METEROLOGY OF LAKE TAHOE
PERIPHYTON MONITORING
THREE-DIMENSIONAL MODELING OF LAKE TAHOE
DYNAMICS OF THE SURFACE OF LAKE TAHOE
DEEP LAKE OXYGEN
WATER CURRENT DRIFTERS
MODELING LAKE CLARITY
PHYTOPLANKTON IN LAKE TAHOE
MODELING CLIMATE CHANGE IMPACTS
NUTRIENTS IN LAKE TAHOE

Climate Change Adaptations

Climate change now affects everything in the Lake Tahoe Basin. Climate scientists project increasingly common weather extremes that will transform Tahoe, with impacts on lake clarity, natural resources, communities, and the economy. Climate change has already affected facilities and restoration projects, and will continue to challenge how the agencies plan and implement in the future.

Climate change is increasing the lake's water temperature and affecting regional weather patterns in ways that could change the lake's ecosystem and cause more of a decline in the lake's clarity. Warmer water provides a more hospitable environment to algae and invasive species. Lake Tahoe's water is almost one degree F warmer than it was 30 years ago, according to UC Davis researchers. The average surface temperature in July has increased 5 degrees F since 1999. Average Tahoe temperatures have risen more than 2 degrees F. Spring snowmelt occurs a week earlier than in the 1950s, according to studies by the Scripps Institute of Oceanography in San Diego and the U.S. Geological Survey. In the coming decades, UC-Davis scientists predict more rain and less snow will fall in Tahoe, and there will be more flood-causing storms where rain falls on snow. Streams and rivers will flow with greater intensity, causing more fine sediment to flow into the lake.

California Tahoe Conservancy

https://tahoe.ca.gov/programs/climate-change

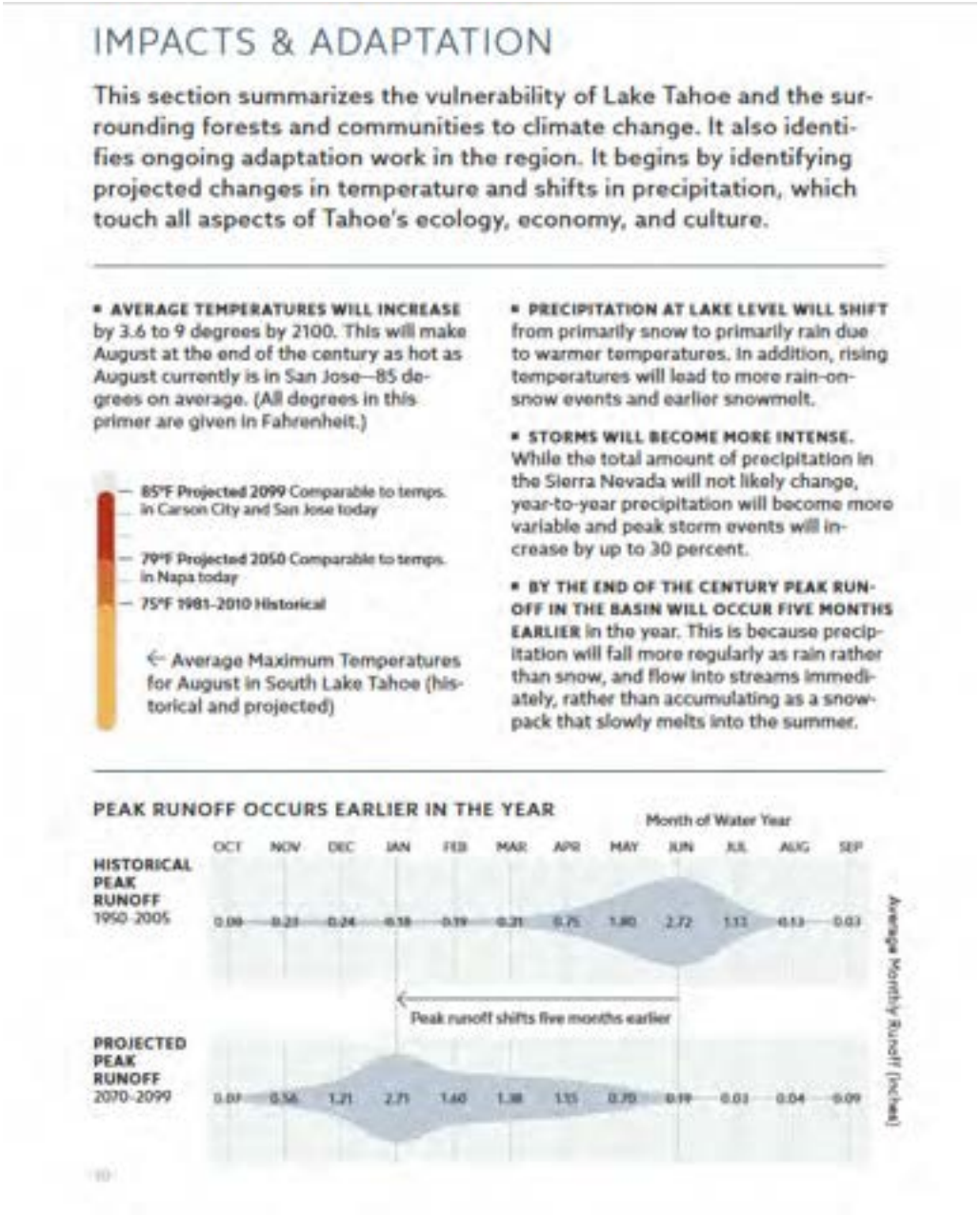
The Conservancy's strategic plan includes a goal to foster basinwide climate change adaptation and sustainable communities. To achieve this goal, the Conservancy focuses on four areas:

1. Developing the Lake Tahoe Climate Adaptation Action Portfolio (CAAP)
2. Providing grants to support climate change adaptation
3. Adapting the Conservancy's own programs
4. Engaging partners and collaborating with scientists

Tahoe Climate Adaptation Primer

https://tahoe.ca.gov/wp-content/uploads/sites/257/2021/06/Tahoe-Climate-Adaptation-Primer.pdf

This primer reviews:
1. Anticipated climate change impacts based on the integrated vulnerability assessment;
2. Ongoing adaptation work by existing partnerships involving California and Nevada agencies, the TRPA, federal agencies, the Washoe Tribe, local jurisdictions, nonprofit organizations, and businesses;
3. This information is categorized into three Basin sub-systems: Lake Tahoe, Forested Uplands, and Communities;
4. The primer concludes with what lies ahead for Tahoe. It reviews ongoing and upcoming statewide planning led by California and Nevada;
5. It also reviews the goals of a new Basinwide mitigation, adaptation, and resilience initiative led by the TRPA, as well as local jurisdiction plans and initiatives.



IMPACTS & ADAPTATION

This section summarizes the vulnerability of Lake Tahoe and the surrounding forests and communities to climate change. It also identifies ongoing adaptation work in the region. It begins by identifying projected changes in temperature and shifts in precipitation, which touch all aspects of Tahoe's ecology, economy, and culture.

- **AVERAGE TEMPERATURES WILL INCREASE** by 3.6 to 9 degrees by 2100. This will make August at the end of the century as hot as August currently is in San Jose—85 degrees on average. (All degrees in this primer are given in Fahrenheit.)

85°F Projected 2099 Comparable to temps. in Carson City and San Jose today

79°F Projected 2050 Comparable to temps. in Napa today

75°F 1981-2010 Historical

← Average Maximum Temperatures for August in South Lake Tahoe (historical and projected)

- **PRECIPITATION AT LAKE LEVEL WILL SHIFT** from primarily snow to primarily rain due to warmer temperatures. In addition, rising temperatures will lead to more rain-on-snow events and earlier snowmelt.
- **STORMS WILL BECOME MORE INTENSE.** While the total amount of precipitation in the Sierra Nevada will not likely change, year-to-year precipitation will become more variable and peak storm events will increase by up to 30 percent.
- **BY THE END OF THE CENTURY PEAK RUNOFF IN THE BASIN WILL OCCUR FIVE MONTHS EARLIER** in the year. This is because precipitation will fall more regularly as rain rather than snow, and flow into streams immediately, rather than accumulating as a snowpack that slowly melts into the summer.

PEAK RUNOFF OCCURS EARLIER IN THE YEAR

Month of Water Year

OCT NOV DEC JAN FEB MAR APR MAY JUN JUL AUG SEP

HISTORICAL PEAK RUNOFF 1950-2005

0.09 0.23 0.24 0.18 0.19 0.21 0.75 1.80 2.72 1.11 0.13 0.03

Peak runoff shifts five months earlier

PROJECTED PEAK RUNOFF 2070-2099

0.07 0.56 1.21 2.71 1.60 1.38 1.15 0.70 0.19 0.03 0.04 0.09

Average Monthly Runoff (inches)

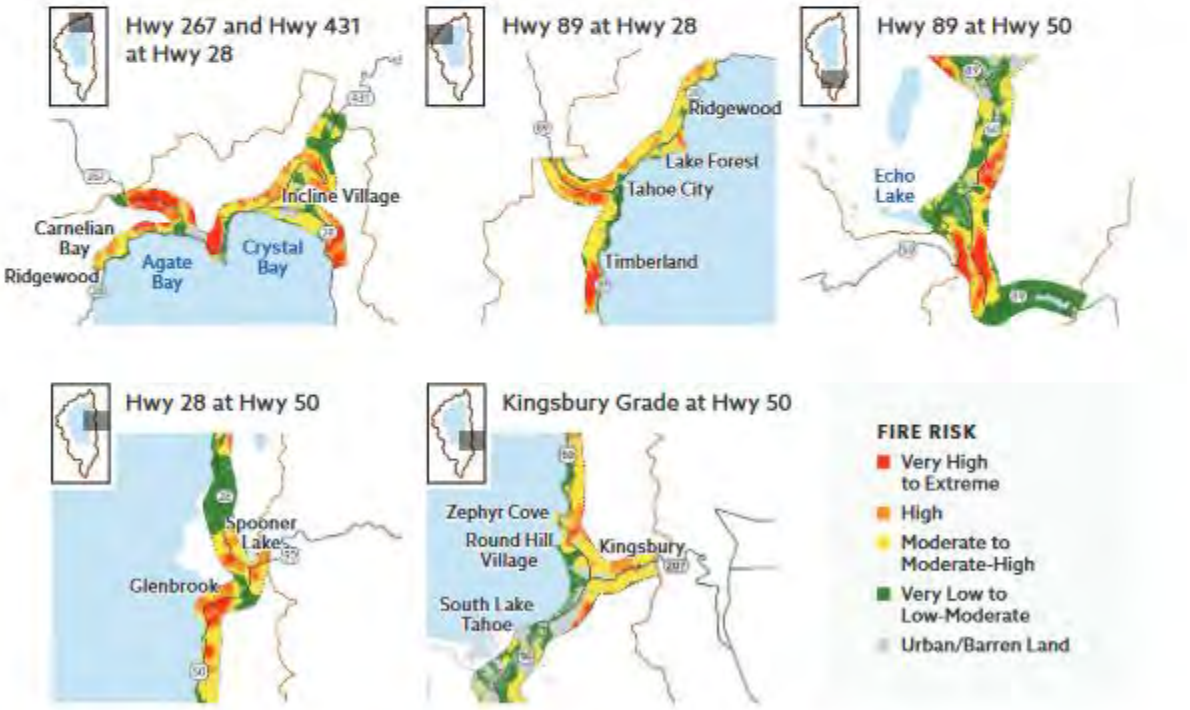
WATER, POWER, AND COMMUNICATION INFRASTRUCTURE

IMPACT **Extreme precipitation events will increase erosion and water pollution, interrupt water supplies, damage wastewater and recreation infrastructure, and threaten the Lake's famed clarity and aquatic biodiversity.**

ADAPTATION EXAMPLE

Through the **Powerline Resilience Corridors strategy,** Liberty Utilities and NV Energy are protecting high risk communities by removing hazards near utility lines, while the LTBMU, Nevada Tahoe Resource Team, and other participating TFFT agencies simultaneously improve the health of the surrounding forest. This approach can reduce wildfire ignitions, protect infrastructure, and create efficiencies by working across jurisdictions.

WILDFIRE RISK SURROUNDING HIGHWAYS (Current conditions)



Fires grow faster on steep slopes. Climate change is expected to amplify the risk of wildfires to highways, leading to implications for mobility and evacuation routes.

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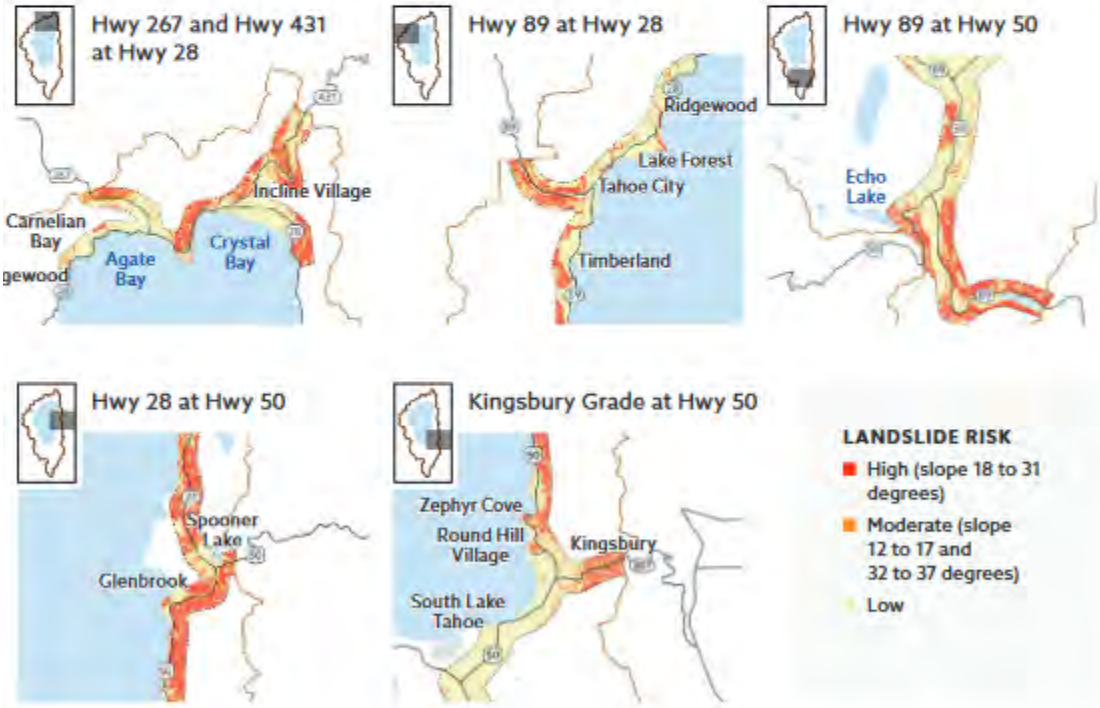
UPGRADING INFRASTRUCTURE TO WITHSTAND FUTURE HAZARDS

→ State and regional agencies as well as private companies are assessing the risks of extreme events to water and communication infrastructure, and monitoring this infrastructure for damages during winter storms and high wind events.

→ Local utility and fire districts are assessing the vulnerability of critical services such as drinking water supply, firefighting water supply, and wastewater systems, and upgrading this infrastructure accordingly.

LANDSLIDE RISK SURROUNDING HIGHWAYS (Current conditions)



Landslides occur more frequently on moderately steep slopes. Climate change is expected to amplify the risk of landslides to highways, leading to implications for mobility and evacuation routes.

TRPA Climate Resiliency
https://www.trpa.gov/programs/climate-resiliency/

TRPA and its partners in the bi-state Lake Tahoe Region have long been recognized as leaders in sustainability. A significant new environmental threat, one that many believe will affect sustainability of the entire planet, has emerged: climate change. The Lake Tahoe Basin is already experiencing the direct impacts of climate change. These include rapid change to the ecological composition of our natural environment, more severe and frequent hazard events, retreating snowpack, and socio-economic shifts (such as fluctuation of trends in visitation). Climate change directly impacts the ability of TRPA and regional partners to achieve and maintain thresholds and will cause major disruptions to the region's economic, social, and ecological systems.



TAHOE REGIONAL PLANNING AGENCY

The TRPA has started a new Climate Resilience Strategic Initiative. Through stakeholder collaboration and public engagement, the TRPA will use the 2014 Lake Tahoe Sustainability Action Plan as a basis for developing a Tahoe Climate Resiliency Strategy. The TRPA will integrate the states' actions into the strategy. Partners will identify and prioritize mitigation, adaptation, and resiliency actions that fill climate information and implementation gaps. Ultimately, the TRPA will create a bi-state climate strategy that guides its environmental review, code, policy, and plan amendments. The TRPA will also update its sustainability indicator dashboard to create a real-time climate scoreboard to track regional progress.

IMPLEMENTATION OF EXISTING CLIMATE ACTION PLANS

Several state and local jurisdictions have already started or will begin to implement their recently completed climate plans. These include:

- → Lahontan Water Board's 2019 Climate Change Mitigation and Adaptation Strategy
- → Placer County's 2020 Sustainability Plan
- → City of South Lake Tahoe's 2020 Climate Action Plan
- → South Tahoe Public Utility District's 2019 Climate Adaptation Plan

OPPORTUNITY AREAS

Basin partners can provide additional state and national climate adaptation leadership by aligning more closely with California and Nevada planning frameworks in the following areas:

1. Demonstrating the importance of equity and climate justice, including engaging tribal, low-income, and minority communities.
2. Developing an implementation and monitoring plan to track adaptation success and adjust strategies as needed.
3. Evaluating co-benefits and synergies between adaptation strategies to maximize multiple-benefit outcomes.
4. Filling critical knowledge gaps, focusing on the research and monitoring needs identified by the Tahoe Science Advisory Council in its Science to Action Plans.

Through continued partnership, the Basin can get ahead of the climate change curve, and ensure that all Californians, all Nevadans, and all visitors to Lake Tahoe can enjoy its natural beauty and welcoming mountain culture far into the future.

Water Systems Descriptions / Service Records 2020-21

TWSA full member water purveyors:
Maintained approximately 22,415 service connections. [Table 1]
Supplied water to an estimated 33,958 full-time residents. [Table 1]
Note: Seasonal visitation can double or triple community occupancy.

Average water flows ranged between 115,890 and 2,849,000 gallons per day (gpd). [Table 2]
Annual peak water flow ranged between 235,800 and 5,634,000 gpd. [Table 2]

Table 1: Number of customers and service connections for TWSA partner agencies.

Agency	**County, State**	**Full Time / Year Round Population Served / Customer Number ***	**Number of Service Connections**
Kingsbury GID	Douglas, NV	3,839	2,655
Round Hill GID	Douglas, NV	1,200	479
Zephyr Water Utility	Douglas, NV	1,200	480
Cave Rock / Skyland	Douglas, NV	1,235	550
Incline Village GID	Washoe, NV	9,462[+]	8100
Glenbrook Water Cooperative	Douglas, NV	1,000	282
Edgewood Water Company	Douglas, NV	0-5000 (seasonal)	27
North Tahoe Public Utility District	Placer, CA	4161	3974 Total 3416 – Tahoe Main System 283 – Carnelian Bay System 275 – Dollar Cove System
Tahoe City Public Utility District	Placer/El Dorado, CA	6607 (utility system total) 319 (McKinney/Quail system)	5,729 (utility system total) 559 (McKinney/Quail system)
Lakeside Park Association	El Dorado, CA	254	139
Total		**33,958**	**22,415**

sources:
* water purveyor (default)
^Safe Drinking Water Information System (SDWIS)
[+] *https://www.census.gov/quickfacts/fact/table/inclinevillagecdpnevada/INC110219*

Table 2: Average annual flows and peak daily flow for TWSA partner agencies – 2018 to 2021, in gallons per day (gpd).

Agency	2018-2019		2019 -2020		**2020-2021**	
	Average Daily Flow	Peak Daily Flow	Average Daily Flow	Peak Daily Flow	**Average Daily Flow**	**Peak Daily Flow**
Cave Rock/Skyland Water System	366,119	768,838	360,797	722,870	**369,279**	**743,566**
Edgewood Water Company	577,149	1,083,200	506,004	833,200	**537,314**	**1,704,300**
Glenbrook Water Cooperative	280,197	583,133	243,845	630,290	**274,652**	**547,000**
Incline Village GID	2,541,000	5,560,000	2,449,000	5,330,00	**2,849,000**	**5,634,000**
Kingsbury GID	786,482	1,233,729	730,300	1,140,887	**810,802**	**1,181,047**
N. Tahoe PUD Tahoe intake withdrawals/ NTPUD full system	808,687/ 1,004,203	1,932,988 (intake only-no data for full system)	843,732/ 999,654	1,534,747 (intake only-no data for full system)	**852,363 / 1,015,294**	**1,583,693** (intake only – no data for full system)
Round Hill GID	195,718	439,600	190,100	487,700	**205,632**	**536,200**
McKinney-Quail / TCPUD Tahoe intake withdrawals/ TCPUD full system	110,000 / 1,472,000	288,000 /3,574,000	156,000 / 1,084,931	252,000 / 2,258,333	**137,000/ 1,181,000**	**305,000/ 2,306,440**
Zephyr Water Utility	190,371	363,419	197,769	374,387	**200,140**	**375,833**
Lakeside Park Association	197,330	489,000	115,000	457,000	**115,890**	**235,800**

Intakes

The majority of TWSA purveyors pull water directly from Lake Tahoe to service their customers. Nevada State Law provides recommendations that drinking water intakes extend 1,000 feet (ft.) from the shore, set 15 ft. below the surface, and 4 ft. from the bottom. (NAC 445A.6698, NRS 445A.860). The TWSA purveyors' intakes range from 500 ft. to 5,500 ft. long, 17 ft. to 600 ft. deep and set 3 ft. to 6.5 ft. above the lake bottom [Table 3.0].

Table 3: TWSA partner agencies' intake length (ft.), depth (ft.) and distance from Lake Bottom (ft.). Intake depth is dependent on the lake level. The depth is measured from Lake Rim.

Agency	Length (ft.)	Depth (ft.)	Bottom (ft.)
Kingsbury GID	750	60	5
Round Hill GID	2,450	52	4
Zephyr Water Utility Company	1,100	63	6.5
Incline Village GID	670	30	4
Glenbrook Water Cooperative	2,000	60	6
Edgewood Water Company *	5,500	535	4

North Tahoe PUD	1,800	28	4.75
Tahoe City PUD (McKinney/Quail System)	800	26	3
Cave Rock/Skyland ^	500 ft. 1800 (pre 9/2013)	17 ft. 65 (pre 9/2013)	4 ft. 6 (pre 9/2013)
Lakeside Park Association	2,300	37	4

^Sept. 2013: CR/S Intake was shortened with NDEP approval – to increase efficiency based on need to remove inline pumps.

*2017: Edgewood Water Company extended the lake intake an additional 3,000 feet out and 600 feet down to access water suitable for use in the heat exchangers in the Edgewood Lodge Project. EWC has also rerouted part of the raw water line and distribution line and added approximately 2 miles of distribution line to meet the demands of the Edgewood Lodge project. *(comments: J. Summers)*

Population and Land Ownership

TWSA suppliers service the needs of both a small permanent and a large, seasonal visitor population. The Tahoe Basin is home to approximately 55,000 full time, year-round residents.
More than half the full-time, year-round population is based in the South Lake Tahoe area. There is no established estimate for the entire Tahoe Basin. Below is a sampling of available data.

Tahoe Basin Full-Time/Year–Round Population Estimates

(source: http://www.census.gov/popfinder)
https://www.census.gov/quickfacts/fact/table/inclinevillagecdpnevada/INC110219_2020)
https://www.census.gov/quickfacts/southlaketahoecitycalifornia

Incline Village, NV	9,462
Placer County, CA (Tahoe only)	10,448
Douglas County, NV (Tahoe only)	5,402
South Lake Tahoe / El Dorado County (Tahoe) only , CA	21,197 (SLT City limits) 30,728
Total	56, 040

Tahoe as a Tourist Destination – More visitors than previously estimated

http://www.trpa.org/tahoe-facts/

Lake Tahoe and the surrounding area continue to rank as a top holiday destination for both international and domestic vacationers. Heavy seasonal visitation (primarily summer and winter ski season) greatly increases the service requirements for area water providers. **Revised tourism numbers now estimate 15+ million visitors a year.** Year-round resident population is estimated at 55,000.

Annual visitation is more than the combined number of visitors to Grand Canyon National Park (3.2 million), Yosemite National Park (4 million) and Yellowstone National Park (2.7 million). Prior visitor population estimates were much lower, ranging between 3 million (TERC 2012) to 5 million (LTBMU 2012) annually.

2015 NLT Tourism Master Plan

https://www.gotahoenorth.com/wp-content/uploads/2015/09/2015-North-Lake-Tahoe-Tourism-Master-Plan1.pdf

The 2015 North Lake Tahoe Tourism Master Plan (2015 Tourism Master Plan) lays out a framework of tourism investment strategies that can work in concert to continue to transform North Lake Tahoe into a national and international destination. Visitors have historically retreated to North Lake Tahoe for its tremendous natural beauty and recreational opportunities. The combination of high mountain peaks, a 125,000 acre lake and charming small communities make North Lake Tahoe a place loved by many.

Almost 45% of current visitors come from the Bay Area, Northern California and western Nevada (Over 25% of visitors come from the San Francisco/Oakland/San Jose area, 13% from Sacramento/Stockton/Modesto and almost 6% from Reno). Approximately 8% of visitors are international. 42% of visitors are day visitors with overall visitation concentrated on weekends and peak holiday periods.

Tahoe Tourism Economic Influences
https://tahoeprosperity.org/wp-content/uploads/measuring-for-prosperity-community-and-economic-indicators-for-the-lake-tahoe-basin-2018.pdf
The Tahoe Prosperity Center's "Measuring for Prosperity Report" details the current status of the Tahoe Basin's community and economy. To ensure prosperity in the Tahoe Basin, we must first understand where we have been, and where we are heading. The Measuring for Prosperity Report analyzed trends in several economic and community indicators, areas of success, and areas, which require improvement. Tahoe's Annual Economic Input was estimated at $5.1 Billion (in 2015 dollars) with Visitor Services contributing $3.2 billion of the total.

In addition to this report, Tahoe Prosperity Center's current programs include:

- **Alert Tahoe** – adding emergency preventative fire cameras around the lake to protect Tahoe from catastrophic wildfire (and to protect our community,environment and economy).
- **Connected Tahoe** – expanding high-speed internet access and cell phone coverage.
- **Tahoe Workforce Housing** – getting rid of blight and building local workforce housing.
- **Workforce Tahoe** – ensuring Tahoe businesses and residents are prepared for the changing jobs, regional influences and education needs in the new global economy.



TABLE 4
UPDATED ALTERNATE ESTIMATE OF TAHOE BASIN VISITOR DAYS

SKIER DAYS	4,200,000
SUMMER @150% OF SKIERS SHOULDER	6,300,000
SEASONS @75% OF SUMMER	4,725,000
TOTAL VISITOR DAYS	15,225,000

Source: ADE, Inc.

The cell phone data is picking up all travel into the Basin and counts a separate trip each time a person enters the Basin, even though this may entail multiple vehicle trips during the same sustained visitor trip as defined above. While it correlates fairly well to vehicle counts on the incoming roadways, the cell analysis must infer the purpose of the trips. There are several other trip components that could comprise a portion of the 24 million trips measured by TTD. The TTD data estimates about 185,000 inbound trips by work commuters in the month of July, which would translate to about 1.76 million annual trips. However, census journey-to-work data suggests that as many as 19,500 workers may commute into the Basin regularly, with 13,500 commuting out, at least occasionally.[7] The high housing costs in the Tahoe area have meant that many workers must find lodging in less expensive communities in the Carson Valley or in Truckee. ADE estimates this could account for 4.9 million in-commuter trips per year and 1.4 million out-commuter trips.

Therefore, it is possible that some of the trips classified as "visitors" in the cell phone data are in fact workers on an irregular commute pattern. In addition, there is a component of business related travel (deliveries and other business related trips) that are not separated out in the cell phone data.

On the other hand, the high number of second homes in the region means that homeowners are driving in to their properties from their permanent residence locations. Many of these trips may not be counted in the conventional tourism numbers but would show up in the traffic data and cell phone records. Based on the percentages of second homes by county provided later in this report (see Table 7), we estimate there are about 58,600 houses in the Tahoe Basin with absentee owners. A portion of these may be rented to long term residents of the Basin, but many are short term rentals or kept for occasional use by their owners and their friends. Conventional tourist visitor estimates include short term vacation rentals where data is available (e.g., South Lake Tahoe permit program), but with the increasing popularity of AirBNB and other platforms, it is likely many of these visitors are missed. In addition, the conventional visitor counts would not include owners' occasional use of their own units. We estimate this would account for as many as 3.5 to 7.0 million trips into the Basin per year just based on two to four trips per month to each unit.

[6] Dean Runyan Associates, The Economic Significance of Visitor Travel to the North Lake Tahoe Area, 2012.

[7] Strategic Marketing Group, South Shore Vision, Economic Impact Analysis, 2012.

[7] Longitudinal Employer-Household Dynamics database, calibrated to American Community Survey labor force data.

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Applied Development Economics, Inc.

This influx creates unique potential impacts to communities, transportation and water quality. During a busy summer weekend day, 300,000+ visitors are estimated to enter the basin. The area includes 14 ski resorts, 14 golf courses, 35 public beaches, 180.5 miles of bike paths, and 425 miles of official unpaved trails. (TRPA 2002). The basin supports an estimated 23 million visitor 'days' per year (US Census 2000). The most current 2010 National Visitor Use Monitoring (Regional Annual Visitation Use Estimate) for the Lake Tahoe Basin Management Unit (LTBMU) shows 5,786,000 National Forest visits* to the National Forest lands here, and 8,999,000 Site Visits. (Source: LTBMU 2012)

*A "visit" is defined as the entry of one person upon a National Forest to participate in recreation activities for an unspecified period of time. A National Forest visit can be composed of multiple site visits. (Meaning that a single person doing multiple visits might be counted multiple times). *A "site visit" is the entry of one person onto a National Forest site or area to participate in recreation activities for an unspecified period of time. Local Chambers use their own estimate of around 3,000,000 visitors over the entire Lake Tahoe Basin, so you can see the numbers do vary. (Don Lane. USFS (LTMBU) pers. comm.)

Development and Growth

The Tahoe Basin is primarily "built-out". The Tahoe Regional Planning Agency (TRPA), a bi-state environmental regulatory agency, is responsible for balancing human development and environmental protection in the Lake Tahoe Basin. Land coverage is strictly allocated and limited. Most available land coverage is already allocated, therefore most major projects are redevelopment focused rather than

expansive. Development within the basin occurs almost entirely on the low-lying, gentle slopes near the lake shore. Much of the Tahoe Basin urban area is built-out, with efforts focusing on low-impact, re-development (LID) of existing properties. Most development is regulated by the local jurisdictions and TRPA.

A majority of the land (~80%) in the Tahoe Basin is either owned by the US Forest Service or is state land. The Lake Tahoe Basin Management Unit (LTBMU) manages 150,000 acres of National Forest Land in the Lake Tahoe Basin. It is the largest basin landholder. LTBMU's programs include watershed management, urban lots, recreation and wildlife. Approximately, 20-25% of the land in the Tahoe Basin is privately owned [Plate 2] (NTCD 2002, HDR 1992).

Lake Tahoe Real Estate Trends

Tahoe Real Estate market performs quite differently than the national average. In 2020, from Covid-19 impacts (work from home opportunities) the Tahoe housing market experienced a record setting price surge and limited inventory. Second home ownership and occupancy in those units increased. Even in an area the size of Lake Tahoe, market trends can vary dramatically from neighborhood to neighborhood. Land prices and housing costs in the Tahoe Basin are some of the highest in the nation.

South Lake Tahoe Real Estate Market Overview
https://www.homeintahoe.com/south-lake-tahoe-market-report-5

Kings Beach Real Estate Market Overview
https://www.redfin.com/city/23616/CA/Kings Beach/housing-market

Incline Village Real Estate Market Overview
https://www.redfin.com/city/31207/NV/Incline-Village/housing-market
https://www.trulia.com/real_estate/Incline_Village-Nevada

Agreements-Regulatory Controls

Lake Tahoe's famous clarity is a result of the unique physical environment and has gained world support for its protection and preservation. The Tahoe Basin, cradled between Nevada and California, presents a complex political backdrop for protecting Lake Tahoe as a water source. The local governments include: two states, six counties, one city and multiple special districts.

Lake Tahoe is one of the most regulated watershed basins in the country. Much of the attention of the regulatory authorities and scientific community have been directed towards Lake Tahoe's famous clarity, which does not directly address many of the concerns of the drinking water suppliers. An ongoing goal of TWSA members is to incorporate drinking water issues into basin planning, and community programs through education and outreach.

Lake Tahoe was designated a Tier III Outstanding Natural Resource Water (303d) under the Clean Water Act in 1972. Lake Tahoe has the highest level of protection as an ONRW water body and non-degradation rule applies. The effort to protect Lake Tahoe consists of the participation and development of numerous regulatory agencies and special interest groups including: the Tahoe Regional Planning Agency, Lake Tahoe Basin Management Unit, Lahontan Regional Water Quality Control Board and the Nevada Department of Environmental Protection. Historically, the focus has been on protecting its unique clarity.

The Lake Tahoe Basin is a unique system that has gained world-wide recognition. The lake location and unique status as one of two alpine lakes in the world of its character (the other is Lake Baikal, in Siberia,

Russia) creates a complex political system of government, non-profit, special district, and concerned citizens.

The Tahoe Regional Planning Agency (TRPA) is responsible for balancing human development and environmental protection in the Lake Tahoe Basin. TRPA is responsible for meeting nine environmental thresholds. The thresholds include: water quality, air quality, soil conservation, vegetation, fisheries, wildlife, scenic resources, community design, recreation, and noise (Bi-Compact 1980). TRPA addresses source water protection issues in the TRPA Code of Ordinances. Lake Tahoe's nearshore conditions are now receiving more attention in the regulatory arena. As one of its strategic initiatives, the Tahoe Regional Planning Agency worked with community members and stakeholders for almost 20 years, to update its shoreline policies and regulations. The plan was approved in October, 2018. For more information about the Shoreline Plan, visit www.shorelineplan.org .

The Nevada Division of Environmental Protection and the Lahontan Regional Water Quality Control Board enforce state law and policies, respectively, to protect public health, water quality and to sustain ecosystems.

The **Nevada Division of Environmental Protection Bureau of Safe Drinking Wate**r is the regulating authority for Lake Tahoe water suppliers within Nevada.

The California Bureau of Health Protection Services regulated water suppliers within California until June 30, 2014. On July 1, 2014, the **CA Drinking Water Division** was transferred into the State Water Board.

The Tahoe Regional Planning Agency, USDA Forest Service, the Lahontan Regional Water Quality Control Board and the Nevada Division of Environmental Protection work together to update their agencies' resource management plans for the Lake Tahoe Basin.

The Tahoe region is undergoing development of several long term strategic plans. These include an updated Tahoe Regional Plan to serve as the guiding documents for TRPA. Because TRPA is exploring new territory in the field of environmental planning, the Regional Plan will continue to mature as we learn more about how man impacts the environment. The Code of Ordinances is the most visible of several documents that make up the Regional Plan. *http://www.trpa.org/regional-plan/code-of-ordinances*

The Code regulates, among other things: land use, density, rate of growth, land coverage, excavation and scenic impacts. The regulations are designed to bring the region into conformance with the threshold standards established for water quality, air quality, soil conservation, wildlife habitat, fish habitat, vegetation, noise, recreation and scenic resources.

At the same time, the Lake Tahoe Basin Management Unit (LTBMU) has sought public comment on the Forest Plan revision; which is designed to serve as a long term guide for managing National Forest System lands in the Tahoe Basin. *http://www.sierraforestlegacy.org/FC_ProjectsPlans/FPR_LTBMU.php*

The Lahontan Regional Water Quality Control Board (LRWQCB) also revised regulations relative to pollution discharges in its region. *http://www.swrcb.ca.gov/rwqcb6*

A revised Basin Plan removes the former prohibition on direct water application of herbicides/pesticides within the LRQWCB jurisdiction, replacing it with a project review/exemption review regulation. This

statutory change opens up the potential for aquatic invasive species management within Lake Tahoe using chemical methods. TWSA has been and remains a vocal opponent of the approval to allow potential project use of aquatic herbicides and pesticides in Lake Tahoe. The Tahoe Keys Control Methods test is slated for review in 2022.
https://www.waterboards.ca.gov/lahontan/water_issues/programs/tahoe_keys_weed_control

Details of various agency, programs, plans, policies and actions are provided in later sections of this report.

Long Term 2 Enhanced Surface Water Treatment Rule (LT2 rule/ LT2ESWTR)
http://water.epa.gov/lawsregs/rulesregs/sdwa/lt2/index.cfm
The deadline for compliance was October 1, 2014. All TWSA members have achieved compliance.

The USEPA developed the Long Term 2 Enhanced Surface Water Treatment Rule (LT2 rule/LT2ESWTR) to improve drinking water quality and provide additional protection from disease-causing microorganisms and contaminants that can form during drinking water treatment. Pathogens, such as Giardia and Cryptosporidium, are often found in water, and can cause gastrointestinal illness (e.g., diarrhea, vomiting and cramps) and other health risks. In many cases, water needs to be disinfected through the use of additives such as chlorine to inactivate (or kill) microbial pathogens.

Cryptosporidium is a significant concern in drinking water because it contaminates surface waters used as drinking water sources, it is resistant to chlorine and other disinfectants, and it has caused waterborne disease outbreaks. Consuming water with Cryptosporidium, a contaminant in drinking water sources, can cause gastrointestinal illness, which may be severe in people with weakened immune systems (e.g., infants and the elderly) and sometimes fatal in people with severely compromised immune systems (e.g., cancer and AIDS patients).

The purpose of LT2ESWTR is to reduce disease incidents associated with Cryptosporidium and other pathogenic microorganisms in drinking water. The rule applies to all public water systems that use surface water or ground water that is under the direct influence of surface water. The rule will bolster existing regulations and provide a higher level of protection of your drinking water supply by:

- Targeting additional Cryptosporidium treatment requirements to higher risk systems;
- Requiring provisions to reduce risks from uncovered finished water storage facilities;
- Providing provisions to ensure that systems maintain microbial protection as they take steps to reduce the formation of disinfection byproducts.

This combination of steps, combined with the existing regulations, is designed to provide protection from microbial pathogens while simultaneously minimizing health risks to the population from disinfection byproducts. This includes about 14,000 systems serving approximately 180 million people.

Requirements of the rule
Systems initially monitor their water sources to determine treatment requirements. This monitoring involves two years of monthly sampling for Cryptosporidium. To reduce monitoring costs, small filtered water systems first monitor for E. coli–a bacterium that is less expensive to analyze than Cryptosporidium and monitor for Cryptosporidium only if their E. coli results exceed specified concentration levels.

Treatment
Filtered water systems were classified in one of four treatment categories (bins) based on their monitoring results. Most systems classified in the lowest bin and will face no additional requirements. Systems classified in higher bins were required to provide additional water treatment to further reduce Cryptosporidium levels by 90 to 99.7 percent (1.0 to 2.5-log), depending on the bin. Systems will select from different treatment and management options in a "microbial toolbox" to meet their additional treatment requirements. All unfiltered water systems must provide at least 99 or 99.9 percent (2 or 3-log) inactivation of Cryptosporidium, depending on the results of their monitoring.

Unfiltered water systems required to add treatment (redundancy)
Previously, existing regulations did not require unfiltered systems to provide any treatment for Cryptosporidium. Although unfiltered systems maintain watershed control programs to protect water quality, recent national surveys have shown Cryptosporidium to be present in the sources of unfiltered systems. Without treatment, these Cryptosporidium will pass into the water distributed to consumers. Available data indicate that the average risk from Cryptosporidium in unfiltered systems is higher than in filtered systems, so that treatment by unfiltered systems is required to achieve comparable public health protection. Further, with available technologies like UV and ozone, treatment for Cryptosporidium is feasible for all unfiltered systems. Consequently, EPA is establishing requirements under the LT2ESWTR for all unfiltered systems to treat for Cryptosporidium, with the required degree of treatment depending on the source water contamination level.

Filtration Avoidance General Criteria
For a drinking water system to qualify for filtration avoidance under the Surface Water Treatment Rule (SWTR) the system cannot be the source of a waterborne disease outbreak, must meet source water quality limits for coliform and turbidity and meet coliform and total trihalomethane MCLs. Disinfectant residual levels and redundant disinfection capability must also be maintained. Filtration avoidance also requires that a watershed control program be implemented to minimize microbial contamination of the source water. This program must characterize the watershed's hydrology, physical features, land use, source water quality and operational capabilities. It must also identify, monitor and control manmade and naturally occurring activities that are detrimental to water quality. The watershed control program must also be able to control activities through land ownership or written agreements. (Filtration avoidance criteria are detailed in 40 CFR §141.71.)

There are 160,000 public water systems in the United States.
60 systems possess filtration avoidance permits.
6 of those systems are at Lake Tahoe; all are TWSA members.

TWSA OPERATORS UNDER FILTRATION EXEMPTION *
Ozone plus Ultra Violet Disinfection; chlorine residual for delivery:
Incline Village General Improvement District (IVGID)
Kingsbury General Improvement District (KGID)
Edgewood Water Company (Edgewood)
Zephyr Water Utility District (ZWUD)
Glenbrook Water Cooperative (Glenbrook)

Ultra-violet (UV) disinfection and chlorine residual for delivery:
North Tahoe Public Utility District (NTPUD)

TWSA OPERATORS USING FILTRATION

Filtration and chlorine residual for delivery:
Tahoe City Public Utility District (TCPUD); McKinney Quail System (coagulation, pressure filter)
Skyland Water Company (Skyland) (micro-filtration; .2 micron)
Cave Rock Water System (Cave Rock) (micro-filtration; .2 micron)
Round Hill General Improvement District (RHGID) (direct filtration; Trimate micropfloc)
Lakeside Park Association (LPA) (direct filtration; Trimate micropfloc)

*** Treatment Requirements for Filtration Avoidance**

Water Quality Parameter	SWTR	SWTR + LT2ESWTR
Giardia	3 log removal/inactivation	3 log removal/inactivation
Virus	4 log removal/inactivation	4 log removal/inactivation
Cryptosporidium		2 log removal/inactivation
Turbidity	< 5 NTU	< 5 NTU
Total Coliform	<100/100 ml	<100/100 ml
Fecal Coliform	<20/100 ml	<20/100 ml

(Source: USACE Risk Assessment Report 2008)

TWSA Member Actions to Achieve LT2 Compliance
Regulatory requirements for raw water testing preceded any LT2 treatment upgrades. During this required testing, no Cryptosporidium detections were reported by TWSA members. As of the required deadline of October 1, 2014, the TWSA members had achieved LT2 Compliance (or had regulatory extension).

The Safe Drinking Water Information System (SDWIS)
http://water.epa.gov/scitech/datait/databases/drink/sdwisfed/index.cfm

EPA's Safe Drinking Water Information System (SDWIS) databases store information about drinking water. The federal version (SDWIS/FED) stores the information EPA needs to monitor approximately 156,000 public water systems. The state version (SDWIS/STATE) is a database designed to help states run their drinking water programs.

SDWIS contains information about public water systems annual water quality, including any violations of EPA's drinking water regulations, as reported to EPA by the states. These regulations establish maximum contaminant levels, treatment techniques, and monitoring and reporting requirements to ensure that water systems provide safe water to their customers. This search will help you find your drinking water supplier and view its violations and enforcement history.

The online database *(http://www.epa.gov/enviro/facts/sdwis/search.html)* allows anyone to select systems either by locating systems within a geographic area or by entering the water system ID number. For more detailed information about the water you drink, contact your local water supplier directly or call your state drinking water agency. To find the phone number for your state's drinking water agency, visit: *http://water.epa.gov/drink/local/index.cfm* or call the Safe Drinking Water Hotline at 1-800-426-4791.

Consumer Confidence Reports (CCRs)

- Copies of member agency CCRs are included in Chapter 4 in this report.

All TWSA Members were well within compliance standards for drinking water quality provided to customers in the reporting year. Tahoe Tap ® water continues to rank among the best drinking water in the nation.

Community water systems are public water systems that have at least 15 service connections or regularly serve at least 25 year-round residents. The Consumer Confidence Rule requires public water suppliers that serve the same people year round (community water systems) to provide consumer confidence reports (CCR) to their customers. These reports are also known as annual water quality reports or drinking water quality reports. CCRs summarize information regarding sources used (i.e., rivers, lakes, reservoirs, or aquifers) any detected contaminants, compliance and educational information. The reports are due to customers by July 1, annually.

Online postings of the CCRs are available by visiting the water agencies website, or by contacting the agency. New US EPA regulations allow for electronic delivery opt-out by customers. Due to the small customer base, the primary delivery method for TWSA members is printed, mailed CCRs.

Links to Member CCRs

TCPUD
http://www.tahoecitypud.com/ccr/current.pdf
NTPUD
http://ntpud.org/ccr
IVGID
https://www.yourtahoeplace.com/public-works/about-public-works/forms-documents
Douglas County, Cave Rock/Skyland
http://www.douglascountynv.gov/DocumentCenter/View/6843
Douglas County, Zephyr
http://www.douglascountynv.gov/DocumentCenter/View/6851
KGID
http://kgid.org/consumer-confidence-reports/
RHGID
http://www.rhgid.org/past_newsletters.html
LPA
http://lakesideparkassociation.org
STPUD
*http://stpud.us/customers/water-quality-report**s***
GLENBROOK
Contact water agency for CCR information (775) 790-0711.
EDGEWOOD
CCR not required; contact water agency for information (530) 588-4111.

More information

For a detailed report on TWSA and member agency water quality sampling procedures, reporting and analysis please see "*DRINKING WATER QUALITY INDICATOR REPORTING OPTIONS FOR THE TAHOE BASIN" at this link:*
https://www.fs.fed.us/psw/partnerships/tahoescience/documents/p079_DrinkingWaterQualityIndicatorReporting.pdf

Urban Water Management Plans (UWMP)
The State of California Urban Water Management Planning Act (Act) requires each urban water supplier with 3,000 or more connections, or supplies at least 3,000 acre-feet per year (AFY) of water, to submit UWMPs to the California Department of Water Resources (DWR) every five years. The UWMP Act requires urban suppliers to report, describe, and evaluate water deliveries and uses, water supply sources, efficient water uses, and demand management measures (DMMs), including implementation schedule and strategy. The purpose of developing an UWMP is to evaluate whether a water supplier can meet the water demands of its water customers as projected over a 20 or 25 year period. The UWMP Act directs water agencies in carrying out their long-term resource planning responsibilities to ensure adequate water supplies are available to meet existing and future demands. This evaluation is accomplished through analysis of current and projected water supply and demand for normal or average conditions, as well as during water shortages.

NTPUD: *http://ntpud.org/master-plans*
TCPUD: *http://www.tahoecitypud.com/download/general/uwmp.pdf*
STPUD: *http://www.stpud.us/plan_documents.html*

The **Nevada State Water Plan** is designed to guide the development, management and use of the state's water resources. It assesses the quantity and quality of our water resources, identifies constraints and opportunities which affect water resource decision making, and seeks to coordinate future actions to ensure that Nevadans obtain the greatest benefit from their water resources in the years to come. The first state water plan, *Water for Nevada,* was developed in the late 1960s and early 1970s. It identified a variety of issues and contained recommendations for improved water management, many which have now been implemented. Administration and management of the state's water resources has continued to evolve much to the benefit of the state's residents and the resources themselves.
http://water.nv.gov/programs/planning/stateplan/documents/sum-es.pdf

TWSA Member Agency Capital Improvement Projects and Infrastructure Upgrades
(in addition to LT2 Compliance)

Kingsbury GID (KGID):
KGID has completed a waterline replacement project. This project consisted of replacing approximately 2,250 linear feet of a 4" steel line with 6" C-900 and added 2 new fire hydrants to this section. Improving water quality and fire protection. A new pressure reducing vault was installed to replace an old one. The old vault was in the roadway creating traffic control issues when service and maintenance was performed. The new vault was installed off of the roadway to alleviate this issue. 21 galvanized and copper service lines have been replaced with Polyethylene lines. Lastly 200 linear feet of 6" spiral welded steel watermain was replaced with 6" C-900.

KGID has pre-placed 2 large FSAA compound meters within the service area, for use with wirelsss metering, to access two (difficult to access -confined space entry) private locations with fire hydrants.

Previous CIP:
KGID completed replacing the 12" steel line in Hwy 50 that serves as the secondary feed for the Lakeside Inn and Casino. The replacement of the steel 12" from Kahle to the Nugget PRV is also completed, approximately 100' of pipe. A 6"FSAA with a ¾" X 2" compound bypass has been purchased to replace the Abbey Rd vault meter. A 8"FSAA with a 1" X 3" compound bypass has been purchased to replace the Kahle Community Center vault meter. These are both purchased but not installed.

Sewer rates have now been adjusted to cover future CIP costs.

The Kingsbury General Improvement District's (KGID) new $19 million water treatment plant was activated in 2015. KGID completed construction of a new, state of the art water treatment plant to come into compliance with LT2. The facility is a 6 MGD plant utilizing UV and Ozone, as well as onsite chlorine generation. Construction began in September of 2014 and the plant came online December 2015.

A new luxury development, Tahoe Beach Club will consist of 143 Luxury Condominium Residences. Plans include a 160-foot floating pier extension near the KGID intake. Construction related activities had the potential to present problems for the District due to the proximity to the intakes. Post construction activities will be assessed for the potential for contamination of the source water. KGID is working with the developer and is preparing comments. NDEP has commissioned an additional Risk Assessment Study for this intake.

Round Hill GID (RHGID):
RHGID rebuilt 5 Pressure Reducing Valves (PRV's) on water mains.

RHGID is currently in the process of replacing meter mains at the Castle Rock subdivision, which is funded through the NDEP SRF. All precautions have been made as per contract and regulations. Our fire hydrant replacement in conjunction with STPUD grant project is complete. We are scheduled to have an assessment to begin rehabilitation and/or replacement of 2 PRV's in the lower portion of our water system.

RHGID replaced a 50 year old, dilapidated, 500,000 gallon concrete water storage tank located in the upper pressure zone with a new 500,000 gallon welded steel tank.

RHGID is in the process of updating their water conservation plan. Water and sewer rates increased in October 2019. ($126.19 combined monthly).

Edgewood Water Company (EWC):
No new CIP- previous CIP noted here:
EWC installed a second VFD for pump #2 at our pump house. Installation was completed by Arctic Electric and controls were done by Sierra Controls. The second VFD gives us the redundancy we were looking for as well as giving the #1 pump some down time. The #1 pump has been running 24/7 since May 2017.

Edgewood Water Company was involved in the expansion/modification of the water treatment and distribution system to accommodate the 150 room Edgewood Lodge and 40 shared residences that are part of the Edgewood Lodge Project. The project was completed and opened in June, 2017.
http://www.edgewoodtahoe.com

EWC has completed the LT2 project that included new UV treatment using the Calgon Carbon UV system. Also as part of LT2, EWC upgraded the ozone system with new ozone generators, dryers, destruct systems and analyzers.

EWC constructed a lake intake extension (5,500 feet out and 600 feet down) to access water suitable for use in heat exchangers to be used by the Edgewood Lodge Project. The intake extension allowed for a unique HVAC modification, cold lake water is used in circulation on the properties for the property cooling needs. EWC rerouted part of the raw water line and distribution line in addition to adding approximately 2 miles of distribution line to meet the demands of the Edgewood Lodge Project.

Lakeside Park Association (LPA):
CIP Projects:

New Pump Control Panel w/ Operator Interface & Surge Protection
Replace / install two new Marathon Motors
Install new variable frequency drives at all 3 motors
New VPN for remote capabilities / support
Install redundant transmitters for reliability
Install new check valves & piping

Greenwood – Hill Water Main Replacement Project. The project included installation of approximately 612 lf of 8" water main, reconnection of 10 services and related improvements.

New metal roof for the existing water plant building.
Lakeside Park Mutual Water bills its customers a bimonthly flat rate.
Prior Projects:
Ultraviolet C Pilot Test for aquatic weeds control 2017-2019.
http://www.laketahoenews.net/2017/03/ultraviolet-light-used-kill-tahoe-weed
https://tahoercd.org/wp-content/uploads/2019/02/UV_Plant_Control_Pilot_2018_Monitoring_FINAL.pdf

Killing aquatic invasive weeds in Lake Tahoe with ultraviolet C light was tried for the first time summer 2017. The California Tahoe Conservancy Board on March 16 agreed to spend $260,128 on the pilot project in South Lake Tahoe. The money was awarded to the Tahoe Resource Conservation District, which has been integral in working on ways to eradicate various invasive species from Lake Tahoe. John J. Paoluccio of Inventive Resources Inc. has developed a system in which the plants are killed – almost like getting a lethal sunburn. The light damages the DNA and cell structure of the aquatic invasive weeds. This stops reproduction and eliminates the weed in a few days. The CTC staff report says, "The project will help the Tahoe RCD determine the optimum intensity and duration of treatment necessary for eradication of AIS plants."
https://tahoercd.org/aquatic-invasive-species-control-projects

Cedar Water Line Replacement Project completed in 2016. This project included replacement of 760 feet of 6" and 2" steel water line with 8" c900 water main. New services and a fire hydrantadded.

Security fencing placed around water treatment site.

Glenbrook:
In 2015, volunteers in the League to Save Lake Tahoe's Eyes on the Lake program discovered a new infestation of aquatic invasive plants in Glenbrook Bay, on Lake Tahoe's eastern shore. In 2016/17 Glenbrook homeowners and League volunteers pitched in to help remove the infestation using manual methods. See how they did it: *https://www.youtube.com/watch?v=bRspQNXY4CM*

Glenbrook replaced the ozone generators and installed new UV reactors. The Glenbrook Water Treatment Plant upgrade was completed by September 2014.

In February 2016, officials from the Glenbrook Water Cooperative in Glenbrook, NV accepted the Gold Medal Award at the Great American Water Taste Test. Glenbrook was selected by a panel of judges at the GAWTT finals from thousands of entries.

Incline Village GID (IVGID):

https://www.yourtahoeplace.com/ivgid/resources/construction-updates

The Incline Village General Improvement District (IVGID) currently maintains 90 miles of water mains to deliver safe and reliable potable water to all areas of Incline Village and Crystal Bay. Unfortunately, water infrastructure doesn't last forever and, as a substantial portion of the District was developed using corrosion and leak prone thin wall steel pipe, the District has a robust annual water main replacement program. Since 1982, the District has replaced approximately 38 miles of steel water mains throughout Incline Village and Crystal Bay at a cost of $17-million, not adjusted for inflation. There is approximately six miles of steel water mains (roughly seven percent of the District's total water main inventory) still slated for replacement.

Water Resource Recovery Facilities (WRRF) Aeration System Improvements:
The aeration process of wastewater treatment supplies oxygen to facilitate the biological activity that converts raw sewage into treated wastewater effluent. The plant has six 200,000-gallon aeration basins with two jet aeration clusters per basin supplied by computer controlled multistage centrifugal aeration blowers. This project funds the design and replacement of the aeration equipment. The Board awarded the work to KG Walters on December 11, 2019. Construction commenced and is anticipated to continue until December 2020. Progress meetings are held every two weeks.

Water Reservoir Safety and Security Improvements – Phase 1:
This project replaces the ladders that access the top of ten out of thirteen of the District's potable water tanks, and install intermediate access platforms, protective railings and new fall protection devices. Exterior access to the roof area is required to meet the needs of the District for water quality monitoring and to perform routine repairs to radio communication equipment. The ladders also need to be secured from access by the public. The reservoir ladders, fall protection, platforms, and protective railings will meet the current Occupational Safety and Health Administration (OSHA) safety standards. Due to budget constraints, the Board awarded the contract for ten reservoirs out of the thirteen bid to Resource Development Company on April 10, 2019. Two change orders have been issued to extend the construction contract time, only, due to COVID 19 concerns.

Water Reservoir Safety and Security Improvements- Phase 2: The second phase of this project will provide the same safety and security improvements to the other three potable water reservoirs not awarded with Phase 1, above. This work was awarded to Paso Robles Tank at the June 10, 2020 Board of Trustees meeting. Construction is substantially complete.

2020 Watermain Replacement & Fire Flow Enhancement Project, Martis Peak Road: **A 2020 Capital** Improvement Project, this project included slip lining a 14-inch water main under State Route 28 and replacing aging steel water main in Martis Peak Road and Rifle Peak Court. IVGID Engineering Staff completed the design and the construction contract was awarded at the June 23, 2020 Board of Trustees meeting. Construction is complete.

Building Upgrades, Water Resource Recovery Facility: A 2021 Capital Improvement Project, this project replaces the existing non-operable sliding gate at the Water Resource Recovery Facility with a new electronic vertical pivot security gate. The vertical pivot gate will operate in all weather conditions. Installation of the gate is required in order for the District to be in compliance with AWIA 2018 safety and security protocols for water and sewer infrastructure.

Crystal Shores AIS Treatment: A local HOA worked with Tahoe RCD on identification and bottom barrier/diver control of a small infestation of Eurasian Water Milfoil at the Crystal Shores marina. The aquatic plant removal work implemented at Crystal Shores West, Crystal Shores East, and Crystal Shores Villas is part of a multi-year lake-wide strategy to remove aquatic invasive plants from the nearshore of Lake Tahoe Basin. Together with removal and/or reduction of all aquatic invasive species (including invertebrates and warm water fish), these projects contribute to the Environmental Improvement Program (EIP # 01.04.02.06).

Key accomplishments of project:

- Acres of Invasive Species Inventoried: 1.5 acres
- Acres Treated for Invasive Species: 3 acres

https://eip.laketahoeinfo.org/Project/FactSheet/01.04.02.0051

North Tahoe PUD (NTPUD):
https://ntpud.org/watersewer

On 8/18/2020 we had a "Total Coliform present" on one of our routine distribution samples in our Carnelian system. We followed our protocol and treated the system. Repulled samples as required and the system was back to normal operation.



- Backyard waterline relocation project continues.
- Began National Sewer Pump Station Rehabilitation project to reduce risk of sanitary sewer overflow to source water.
- Began N-1 Satellite Sewer Pump Station Rehabilitation project to reduce risk of sanitary sewer overflow to source water.
- Completed the Oxford Court Easement Vegetation Maintenance project to gain better access to one of our sewer easements.
- Completed Kingswood West Water Storage Tank Rehabilitation project.
- Relocated and upgraded the Kingswood West Booster Cannon Plug and SCADA Antenna to improve communication reliability and emergency stand-by generator capabilities.
- Installed two E-series meters.
- Kingswood West Water Storage Tank Rehabilitation (Project #2031): Rehabilitation of a 500,000-gallon water storage tank in the Kingswood West subdivision. Summer 2020
- N-1 Satellite Sewer Pump Station Rehabilitation (Project #1952): Project includes new pumps/motors, controls, generator, station valves/piping, new influent gravity main, and fence for scenic improvements.

- Easement & Vegetation Clearing (Project #2024): Survey staking (marking) easement limits and subsequent vegetation removal as applicable for select locations as deemed applicable.
  Status: Multiple locations. Summer 2020
- National Avenue SCADA Improvements – Phase 3 (Project #1622). Fall 2020.
  Base Facilities Emergency Power Distribution (Project #1953): Provides Annex, fuel pumps, and shop power supply from Base emergency generator. Project is partially grant funded (75%) through FEMA/CalOES. December, 2020
- Kingswood West SCADA Hub Rehabilitation: Full rehabilitation of platform, back-up power supply, cabinets, and all SCADA and Radio components. SCADA hub located adjacent to Kingswood West tank and serves the District's entire SCADA and hand-held Radio communications backbone. 2020
- Zone 2 Watermain Loop (Project #21XX): 250 feet of 8" watermain to loop upper portion of pressure zone 2 enhancing fire flow capacities. 2020.
- National Sewer Pump Station Rehabilitation (Project #1953): Full rehabilitation of sewer pump station. The last of four (4) main pump stations to receive full rehabilitation in this current rehabilitation cycle. 2021.

  Completed Water/Sewer Projects:

  - Kingswood Water Main Replacement Project
  - Secline Pump Station Rehabilitation
  - C-1 Wet Well and Dry Well Modifications
  - Carnelian Bay Water West Main Replacement
  - Zone 2 Water Tank Project
  - Tahoe Marina Estates Water Line Replacement Project (In conjunction with Placer County Erosion Control Project)
  - Cutthroat Water Main Replacement
  - Kingswood Booster Pump Station Stairs
  - Dollar Cove Water Treatment Study
  - Lincoln Green Water Line Replacement
  - Kingswood West Tank Security Fence
  - Beaver Street Water and Sewer Line Replacement Project (In conjunction with Placer County Erosion Control Project)

  NTPUD continues an aggressive water conservation education and services program including a low-flow toilet rebate credit program for water customers.

- Began installing E-series meter and Cellular smart meters
- Implemented annual water and sewer rate adjustments for all customers on July 1, 2020 and July 1, 2021, per the District's 5-year rate adjustment plan.
- Continued Stage 2 Water Conservation regulations in alignment with the State of California's emergency drought declaration and to maintain our mandated 20% by 2020 standard.

Tahoe City PUD (TCPUD)
http://www.tcpud.org/capital-improvement-projects

CIP Completed:

- Bunker Water Tank (1.2 MG Steel Tank),
- Tahoe Cedars Interconnection (4,900 feet of 12" water main connecting McKinney Quail System to Tahoe Cedars System)
- Rideout Well (Redundant Source for Timberland System)
- Timberland Water System Replacement (4,000 feet of water main, 64 water services/meters and 12 new fire hydrants)
- Madden Creek Interconnection (2,000 feet of 12" water main connecting McKinney Quail System to Madden System)
- Bunker Water Tank completed. This work included construction of a new 1.2 million gallon water steel storage tank to replace the existing undersized and aged redwood tank. The existing water tank, constructed of redwood in 1960, has a storage capacity of 500 k gallons. This project was the highest priory due to current deficiencies, including continued water leakage.
- TCPUD consolidated three private water systems on January 2, 2018, adding 1,573 connections or 38% increase in water customer base. For a current map of District systems, visit: *http://tahoe.360-biz.com/sites/default/files/images/DistrictWaterServiceAreas_2018_1.pdf*

- **West Lake Tahoe Regional Water Treatment Plant**
  http://www.tcpud.org/capital-improvement-projects/west-lake-tahoe-regional-water-treatment-plant-8126
  The Tahoe City Public Utility District (TCPUD) is undertaking the construction of a permanent, year round, 1 MGD, surface water, drinking water treatment plant to replace the temporary seasonal treatment plant located at Chambers Landing.

  In 2021, The Tahoe City Public Utility District (TCPUD) began construction of a new drinking water treatment plant in Tahoma, California, on the west shore of Lake Tahoe. The new water treatment plant will be located at 275 Lodge Drive. The water treatment plant will become the primary source of drinking water to the McKinney-Quail Water Service Area, with the capacity to expand to other water systems along Lake Tahoe's west shore, resulting in a coordinated regional solution for drinking water and fire protection. The investment in this project, currently estimated at over $20 million, represents one of the most significant investments made by the TCPUD Board of Directors to improve and protect the reliability of the water supply for a significant portion of Lake Tahoe's west shore.

  Major aspects of the project include installation of submersible pumps and replacement of water intake pipe in Lake Tahoe, construction of a lake intake pump station building, installation of new waterlines from Lake Tahoe to the treatment plant, construction of the treatment plant, replacement of existing waterlines, and demolition of existing temporary water treatment facilities. This TCPUD landmark project started in 2013.

  This multi-year construction project was expected to begin in mid-July 2021, to continue through 2024. Future updates will provide details on the phases of construction impact areas. If you have questions regarding the project, contact the TCPUD Project Manager, Sarah Hussong Johnson, Senior Civil Engineer at sjohnson@tcpud.org and 530.580.6338.

  In October of 2015, the TCPUD Board of Directors completed the California Environmental Quality Act (CEQA) review process for the project, adopting a Mitigated Negative Declaration and Mitigation

Monitoring & Reporting Program and approving the project. More information may be found on the Environmental Review Page.



Other recent projects include:

- Madden Creek Systems Acquisition and Intertie
  In January 2018, TCPUD acquired and began operating the Madden Creek Water System (formerly Mid Sierra Utilities). Since the acquisition, TCPUD Board of Directors has dedicated significant time towards understanding how to invest in and improve the water supply and fire suppression capabilities of the Madden System.

  TCPUD identified a high priority need for backup water supply and additional water storage for the Madden System. To accomplish this, the District developed this project to interconnect the Madden System to the TCPUD's McKinney-Quail Water System. The Project will provide the needed backup water supply and emergency water storage, in addition to replacement of critical water system components to enhance fire protection and improve water delivery and pressure.

  Due to the size and complexity of the Project, it has been broken into a two-phased construction schedule; the first phase includes the McKinney-Quail interconnection and associated high pressure transmission line replacement, and the second phase includes water distribution, servicing, and fire protection improvements. Phase 1 construction was scheduled to start in late summer 2019.The project will benefit the public by enhancing water supply and reliability as well as improving fire protection within the water system service area.

- Timberland Water Company Interconnection and Distribution Improvements
  In January 2018, TCPUD acquired the former Timberland Water Company and began providing water service to Timberland's former customers on January 2, 2018. TCPUD staff identified the Project as a

high priority capital improvement project to begin construction activities in 2019. The first phase of the Project includes installation of approximately 4,440 linear feet of 8-inch water main, 487 linear feet of 4-inch water main, 80 service reconnections and meters, 10 new fire hydrants, and 6 refurbished fire hydrants to replace the varying 2-inch to 6-inch existing system infrastructure.

Since acquiring the Timberland Water System in 2018, TCPUD Board of Directors has dedicated significant time understanding how to invest in and improve the water supply and fire suppression capabilities of the system. The Board has approved over $2 million in 2019 towards this estimated $3.7 million capital infrastructure project. The project will benefit public health through enhancement of water supply and reliability as well as improving fire protection within the water system service area. Project construction is planned for two phases, starting mid-June 2019.

- Tahoe City Mainline Emergency Water Supply
  The work consists of constructing approximately 1,400 feet of 12-inch raw water line along Grove Street from the existing Grove Street lake intake to the Tahoe City Golf Course property. The Tahoe City water system currently relies on groundwater wells for drinking water production. The waterline will provide the District with the ability to utilize the existing Grove Street lake intake as a backup water supply source, if drought conditions continue. The waterline will provide the District with the ability to supply raw water to the golf course for irrigation.

- Grouse Drive and Upper Ellis Water Line Replacement Project
  The work on Grouse Drive consisted of the replacement of 1,005 feet of 6" waterline with new 12" waterline from Bald Eagle Rd to the eastern Snowbird Loop. The work will include the installation of new fire hydrants and replacing service lines to the existing meter pits. The upper Ellis Road work will consist of the replacement of approximately 1,214 feet of 4” and 6” waterline with new 12” waterline from Snowbird Loop to the valve just south of the existing PRV located near lot 100.This work will also include installation of new fire hydrants and replacing service lines to the existing meter pits.

- Highway 89 Conductor Casing Crossings
  Install empty conductor casing crossings at various points along Highway 89 between Tahoma and Tahoe City. These casings will allow for installation of future water line crossings for anticipated transmission system improvements. Key locations may include areas currently served by other water purveyors. For the next 2-3 years CalTrans will be constructing their environmental improvement project from Tahoma to Tahoe City. Installation of these casings prior to or during the CalTrans project will allow the casing to be installed by open cut method. After the CalTrans project is complete the same conductor would have to be installed by bore and jack, which is both costly and not always successful due to rock and soil conditions.

- Tahoe City Public Utility District Water & Sewer Rate Study
  HDR Engineering, Inc. (HDR) presented the draft report on the water and sewer rate study update conducted for the Tahoe City Public Utility District (District). For this update, the study objectives were to provide an independent review of the five-year financial plan, develop rate structure alternatives for Board consideration, and develop a five-year rate schedule that will result in sufficient revenue to fund the operating and capital needs of the water and sewer utilities.

- Tahoe City Well Replacement Project
  Tahoe City Main water system (Dollar Hill to Tavern Heights) relies primarily on the Tahoe City Wells No. 2 and 3 for source water. During the summer months both wells are required to meet maximum day demand. The loss of one of the wells may require the use of a lake intake depending on the time of year.

Use of a lake intake would require heavy chlorination and the posting of a boil water advisory. The existing Well No. 1 is of good water quality, however similar to Well No. 2 was not drilled deep enough originally. The well was drilled in 1958 and was not cased below 50'. A new well will need to be drilled, however, all of the existing infrastructure can be reused saving considerable expense on other items. This project could delay the need for the development of another water source (surface water treatment plant) for the Tahoe City Main water system.

- Highland and Rubicon Line Replacements
  This work consisted of the replacement of the District-owned portion of approximately 139 water service lines in the Highlands subdivision and 150 in the Rubicon Water System. All of the lines in the Highlands are located in easements at the back of the properties, while all of the lines in Rubicon are in the road. The service lines located in these areas have experienced significant failures due to polybutylene pipe material becoming brittle and pipe connection methods. Over 25 laterals in each area have been repaired in the last three years. Replacing all of the services at once will save a significant amount of crew time and overall material cost, as well as limiting water loss and property damage due to failure.

- Tahoe City Sewer System Rehabilitation Project
  The Tahoe City Public Utility District (District) completed a project to rehabilitate a portion of the Tahoe City sewer system. The sewer lines in the project area were constructed in 1952 and are some of the oldest in the District's system. As part of the project, the District and its consultants will be working within the neighborhood to locate and investigate the condition of existing sewer lines and laterals. Construction occurred in 2015.

TCPUD continues an aggressive water conservation education and services program including rebate credit programs for water customers.

Douglas County Water Systems (Cave Rock, Skyland, Zephyr):
Douglas County is currently in the process of a system wide SCADA upgrade for water systems at Lake Tahoe and Carson Valley. The upgrade is a key component to providing safe, reliable drinking water to customers of Douglas County. The County has recently consolidated all water systems under the responsible care of Douglas County into one Lake Tahoe and Carson Valley water rate structure. The water rate consolidation and increase will provide revenue to implement a robust 10 year Capital Improvement Plan for water systems at both Lake Tahoe and the Carson Valley.

Douglas County has recently adopted a consolidated water rate structure for water systems at both Lake Tahoe and the Carson Valley. The consolidated water rate includes a 6% increase in the rate. See Douglas County website for additional information.

Cave Rock evaluation for intake line replacement or upgrade was conducted in 2015-16, in the event that the lake level continues to drop due to the drought.

U V addition to ZWUD Treatment plant was competed and online spring of 2015.

Marla Bay Intake - 10" check valve was replaced fall of 2015.

Uppaway Booster Station was completed summer of 2015.

2019 TRPA "Best in the Basin" Awards (no updates in 2020 or 2021)
https://www.trpa.org/trpa-recognizes-six-projects-with-best-in-basin-awards

The Tahoe Regional Planning Agency (TRPA) awarded six exceptional projects with Best in Basin awards. Now in its 29th year, TRPA's annual Best in Basin awards program each year showcases projects around the lake that demonstrate exceptional planning, implementation, and compatibility with Tahoe's natural environment and communities.

The project implementers recognized with awards built new mountain trails, reduced stormwater pollution, improved forest health, and wildfire preparedness, and worked to prevent the spread of aquatic invasive species at the lake. This year's Best in Basin award winners are:

Incline Flume Trail: Thanks to public and private partnerships, this family-friendly backcountry trail is complete and accessible to nearly all abilities. The project began with the USDA Forest Service officially adopting the trail, which allowed local groups to make significant improvements. The Friends of Incline Trails recognized that this old flume path needed major repair and enhancement. More than 1,500 volunteer hours combined with professional work crews from the USDA Forest Service and American Conservation Corp made the trail possible. The Incline Flume Trail starts just off the Mount Rose Highway and across to Tunnel Creek Road.

Meeks Bay Trail Project: A little more than three-quarters of a mile long, this Class 1 multi-use path is a major addition to the West Shore trail system. The trail links two significant recreational centers on Tahoe's West Shore—Sugar Point Pine State Park southward to the entrance of Meeks Bay Resort. The pathway runs parallel to Highway 89 and significant engineering hurdles were overcome while constructing the trail. The path was constructed in just one season and within existing USDA Forest Service and Caltrans right of ways. Seventy percent of the project required retaining walls, as well as the construction of a large bridge. Central Federal Lands Division of the Federal Highway Administration was the lead agency on this project.

Restoration of Fire Adapted Ecosystems: There are approximately 4,700 acres of meadow in the Lake Tahoe Basin, and the USDA Forest Service manages some 2,700 acres. TRPA has identified meadows as important areas for restoration. In 2018, the USDA Forest Service completed restoration of Baldwin Meadow. Nearly all trees were removed from the meadow and perimeter trees were thinned. Additional restoration tools used included willow planting, channel repair, and re-routing trails. Forest Service crews also completed a controlled burn of the meadow. Meadow restoration will allow the land to adapt to future conditions brought on by climate change.

Tahoe Keys Bubble Curtain: Invasive plants like Eurasian watermilfoil and curlyleaf pondweed have been growing out of control in the Tahoe Keys for years now, and their proliferation has threatened to spread out into Lake Tahoe proper. The Tahoe Keys Property Owners Association and the League to Save Lake Tahoe teamed up with experts from Canada to create an underwater "bubble curtain." An underwater hose emits a strong current of bubbles that keeps plant fragments from escaping out and into Lake Tahoe. The hose is fanned out in a V-shaped pattern, pushing plant fragments to the outer walls of the channel, which are then collected every afternoon. The goal of the project is containment of the invasive plants, while scientists look for a long-term solution to control the infestation.

Upper Truckee River Reach 5 Restoration Project: Restoration along the Upper Truckee River is the culmination of 7 years of planning by the USDA Forest Service Lake Tahoe Basin Management Unit and the California Tahoe Conservancy. Staging for the project began in 2012, and channel construction

continued from 2013 through 2016. Then from 2017-2018, the adaptive management and stabilization phase was completed. The project restored 120 acres and required the re-channeling of 7,340 feet of the Upper Truckee River. The new channel allows for improved aquatic habitat and increased channel and floodplain connectivity while reducing stream bank erosion. During the planning phase, an estimated 10,000 native Western Pearlshell mussels were identified in the project area. The Upper Truckee River is the only river known to contain this mussel in the Lake Tahoe Basin. In the end, some 25,000 mussels were re-located and returned to the river. A significant amount of hand work was required to complete this project by crews from the California Conservation Corps, the Generation Green program, and members of the Youth Conservation Corps.

Country Club Heights Erosion Control Project: This project was completed by the El Dorado County Department of Transportation and tackled runoff and erosion issues in the Country Club Heights area between Meadow Vale Drive and Elks Point Drive. Runoff and erosion were a persistent problem along Boca Raton Drive because of inadequate infrastructure. New improvements include curb and gutter, sediment traps, and infiltration basins, which allow for the re-wetting of the existing meadow system. The meadow now does its proper job of spreading and infiltrating stormwater runoff. This project is an outstanding example of using hardscape and natural systems to capture and treat stormwater runoff.

Securing Funding for Watershed Control Programs

Appointed staff members from each participating water agency form the TWSA Board of Directors. The largest partner, IVGID, offers its Resource Conservationist as the Association's Executive Director. IVGID provides additional staff support for TWSA activities with the services of the Director of Public Works and Resource Conservation Technician. A partner agreement stipulates cost sharing of the expenses incurred by IVGID on behalf of the association. Members pay an annual fee, in part proportional to the size of their service areas and in part, in equal amounts representing common administrative costs. The average annual budget is now $145,000.

This funding is used to support TWSA programs including: staffing costs, agency advocacy, event sponsorship, customer handouts such as dog waste campaign expenses, refillable water bottles, radio and print advertising, member staff training, school programs, scholarships and TWSA publications. Other projects such as the USACE Lake Tahoe Risk Assessment Model are cost shared above the annual budget, as needed.

Public Education

The Tahoe Water Suppliers Association has a defined public outreach and education campaign for the Lake Tahoe Basin. Our websites are *www.TahoeH2O.org (and) www.DrinkTahoeTap.org*. Key outreach messages included: "Drink Tahoe Tap ® ", the "Tap It"" network; "Do You Know Where Your Drinking Water Comes From?", "Protect the Source" and "They Drop It; You Drink It". Extensive information of the various TWSA outreach campaigns are listed in the Action Plan Highlights earlier in this report. 2020 had major new Drink Tahoe Tap / Take Care campaigns launch.

TWSA provides referral to the Nevada Tahoe Conservation District and Tahoe Resource Conservation District free BMP landscape evaluation services. By working with partner agencies, the topic of aquatic invasive species prevention is provided to the public. Water conservation, appreciation of tap water, watershed protection and pollution prevention messages are delivered to the public. The primary means of distribution for the educational campaigns include: a website, videos, print media, web, tv and radio ads, public service announcements and personal interaction at community events. TWSA has an ambitious program of sponsorship of refillable water containers (bottles) as a major outreach component.

Water Efficiency (Water Conservation) Activities

Water conservation plans and outreach are an integral part of the member agencies' messages to customers. Efforts concentrate on outdoor water usage rather than indoor usage. In the past 3 years, many of the TWSA members have lowered base gallon allocations, reduced tier trigger levels, and increased consumption and service rates.

The California systems are making efforts to achieve the CA 20 x 2020 rule (20% reduction in water use by year 2020). The 20x2020 *Water Conservation Plan* sets forth a statewide road map to maximize the state's urban water efficiency and conservation opportunities between 2009 and 2020, and beyond. It aims to set in motion a range of activities designed to achieve the 20 percent per capita reduction in urban water demand by 2020. These activities include improving an understanding of the variation in water use across California, promoting legislative initiatives that incentivize water agencies to promote water conservation, and creating evaluation and enforcement mechanisms to assure regional and statewide goals are met. The 20x2020 Plan discusses these many activities in detail.
https://www.waterboards.ca.gov/water_issues/hot_topics/20x2020

Free landscape water use audits are offered to limited areas within the TWSA watersheds.

TWSA provided leak detection tablets and water conservation information in outreach materials.

TWSA / Waste Not education programs, categorized by group, scope, and extent of public outreach.

Water Efficiency - Education and Outreach Programs

Program	Detail	Estimate of Potential Reach
Staff	3 full time staff assigned to Waste Not (and Tahoe Water Suppliers Association) education and outreach. Current staff are AWWA Water Efficiency Practitioner Grade I certified and attended (Irrigation Association) Irrigation Auditor Training	All IVGID customers, all TWSA customers
Print Media / Ads	Tahoe Tribune Newspaper Tahoe.com print Tahoe Quarterly Magazine Tahoe Local Magazines	2 to 5 ads annually (Tribune) 20,000 newspapers distributed per issue (Other publications) 60,000- 100,000 copies per printing
Television and radio	Public service announcements	1-12 assorted messages annual; custom or regional Take Care messaging
Utility Bill Flyers	Information focused on water conservation	4,200 "PW News" newsletters mailed to utility customers 12 x annually. Water conservation information featured in summer months.

Brochures to class participants, utility customers and attendees at public events	"Drink Tahoe Tap" "Protect the Source". "Keep your Water Clean" "Tahoe Top 10 Water Conservation Tips" "Water Conservation at Home" "Native Plants" "Leak Detection" "IVGID Water System" IVGID Wastewater System"	500 to 2000 of each flyer printed and distributed annually
Watershed Protection Signage / Tools	Dog Waste Stations; Cigarette Butt bins; Take Care signage	100 Dog waste stations distributed within the watershed ; 125 cigarette bins distributed in watershed; multiple signage placements
Websites: Tahoe Water Suppliers Association IVGID Social Media	www.TahoeH2O.org www.DrinkTahoeTap.org www.ivgid.org Facebook: Drink Tahoe Tap; IVGID Public Works	5,000 – 10,000 annual hits Custom and regional Take Care messaging
Conservation Tools for customers	Dye tabs, leak detection cards, shower times, Tahoe Landscape Guide, native wildflower seeds, refillable water bottles, dog waste bags	5,000 -10,000 annual
Efficiency Rebates	$100 HE appliance rebates (ULF toilet/HE clothes washer)	1-100 customers; annual
Landscape Water Use Consultations & Audits	District staff provides free, on-site analysis of irrigation practices for customers. Full audits conducted on as-need basis.	1-10 per summer
"Water Waste" door hangers	District staff posts educational door hanger at properties observed with runoff, poor irrigation practices, daytime watering, etc…..	50 per summer
High Water Use 'courtesy alert' messages	Customers with monthly bills trigger high use; leak detection warning; customized billing messages; advertising the free water use consultations.	25 to 300 per month; summer
Billing Analysis	Meter reads are analyzed by District Meter Reader and billing staff for large increases attributed to leaks, over-irrigation.	15 to 100 customers per month

Presentations	Presentations to local schools (K-20), Homeowner Association, Board of Realtors, etc. Ongoing classroom presentations on source water protection and water conservation.	1-6 presentations annually on IVGID services and programs, including water conservation. Presented to various grades at Incline Village Elementary, Middle School, High School. (200-500 students) Sierra Watershed Education Partnership Trashion Shows focus on water conservation and Drink Tahoe Tap ®.
Public Events		
Earth Day (2 annual)	Water Conservation / Water Quality education booth	5,000+ attendees (North Shore) 800 attendees (South Shore)
Children's Science Days (2 annual)	Water Conservation / Water Quality education booth	1000+ elementary grade students
SnapShot Day	Tahoe to Pyramid Lake regional citizens monitoring program	Over 300 volunteers watershed-wide, annual event
Other Community Outreach events	Collaboration at environmental education events held in Incline Village; North and South Lake Tahoe. Staff provides a Water Quality/Conservation education booth, taste test and activities.	50-2000 attendees per event; average 1-2 events monthly.
Demonstration Garden Classes	Classes related to native plant gardening, irrigation , composting	5 to 10 students at each class; series of 4-6 classes offered each summer.
NTCD BMP Classes	3 hour BMP workshops	3 to 5 classes annually; 20 attendees per class
Beach sampling	District staff conducts regular sampling at 6 Incline Village locations.	12-18 samples annual

Metering

Water conservation efforts by the purveyors have increased with additional purveyors going to metered systems.

- IVGID has all metered connections, with a 3 tier increasing block rate structure.
- NTPUD is a fully metered system, with a 2 tier increasing block rate structure.
- KGID is a fully metered system, with a 3 tier increasing block rate structure.
- Glenbrook is not metered.
- Douglas County has some meters installed in the Cave Rock and ZWUD systems.
- TCPUD is fully metered and began consumption based water rates for residential customers in 2009.
- Edgewood changed out all meters in 2009-2010.
- RHGID is a fully metered system, with a 3 tier increasing block rate structure.

Leak Detection

- IVGID meter reading staff conducts monthly billing analysis and on-site leak detection assistance for customers. Distribution system leak detection is ongoing. The district has reduced system water loss to less than 10%.
- TCPUD's program includes annual leak detection. TCPUD completes a system-wide water audit program, monthly. Thirteen separate areas comprising the entire water service area are audited monthly. A running annual audit is also conducted for the entire system using AWWA provided software. TCPUD installed a backwash recycling system at the McKinney Quail Water Treatment facility. Over 90% of backwash water is now recycled. TCPUD also started a large meter testing program.
- NTPUD has installed the next generation MLOG radio. Itron has combined the MLOG technology with their ERT series and it is called the 100W + Leak Sensor. When deployed, it monitors the segment of the distribution system around the clock, acoustically surveying the integrity of the system. The 100 Series module collects and stores up to 40 days of hourly reads from the customer-side leaks. At the same time, it is also collecting and storing the data from the leak sensor. The leak sensor samples the pipe conditions every 22.5 minutes, totaling 64 times per day. These readings are collected from the 100W at the same time the automated meter reading is done. Each sensor will cover up to 300 linear feet. The District began installing the 100W with each new meter upgrade and/or ERT replacement. Presently, the 100W + sensors are being installed in areas of habitual main leaks that warrant constant monitoring.
- KGID conducts in house detection, ongoing.
- RHGID tracks unaccounted for water.

Water Use Efficiency (Conservation) in California

California water conservation policy mandates extensive education, outreach and enforcement measures.

Common conservation measures implemented include: tiered rates, irrigation restrictions, probation on water use on hardscaping, requirements for water efficient indoor fixtures, online water waste reporting forms and more.

North Tahoe Public Utility District (NTPUD) http://ntpud.org/conservation

The North Tahoe Public Utility District has set conservation restrictions; details are on the website.

High Efficiency/Energy Star Toilet, Dishwasher, Clothes Washer Rebates
Low Flow Faucets & Showerhead rebate
Weather Based "Smart" irrigation controller rebate

South Tahoe Public Utility District (STPUD) http://stpud.us/waterconsv

STPUD has a dedicated Water Conservation Specialist on staff. The South Tahoe Public Utility District has set conservation restrictions. Information is detailed on their website.

Toilet Rebate
High-Efficiency clothes washer rebate
Turf By Back Program
Irrigation Equipment upgrade to High Water Efficiency system
Water Wise House call

Lakeside Park Association http://lakesideparkassociation.org

LPA issued letters to customers on watering restrictions and enforcement. Additional measures can be required of commercial customers.

Tahoe City PUD http://www.tahoecitypud.com

The Tahoe City Public Utility District has set conservation restrictions and information in posted on their website. 2016: Through the self-certification process TCPUD, the District certified a water supply surplus; setting the conservation goal at zero. TCPUD is offering rebate programs for WaterSense and

Energy Star appliances specifically, dishwashers, clothes washing machines, and Smart Irrigation sensors and devices.
TCPUD has been acquiring and upgrading several older water systems on Tahoe's north and west shores. TCPUD is also in the planning stages to upgrade the McKinney Quail Intake to accommodate a regional filtration plant for the west shore.

http://www.tahoecitypud.com/utility-services/water/water-conservation
High Efficiency/Energy Star Toilet, Dishwasher, Clothes Washer Rebates
Smart Irrigation Sensors and Devices
State of CA Turf Removal Rebate (SaveOurWaterRebates.com)

Water Efficiency (Conservation) in Nevada
The State of Nevada did not declare a drought emergency; however, water providers enacted conservation education and voluntary water reductions.

Incline Village GID's Water Conservation Plan, was updated in 2020, and can be viewed here: http://water.nv.gov/programs/planning/plans/InclineVillageGID.pdf
IVGID launched a Water Sense appliance rebate for residential customers in 2019. $100 rebates are offered for ultra-low flow toilet or high efficiency clothes washer appliances. The program awarded 80% of allocated rebates in its first year. https://www.yourtahoeplace.com/news/ivgid-public-works-launches-water-efficient-appliance-rebate-program
The Douglas County Water Conservation Plan is available at: http://www.douglascountynv.gov/DocumentCenter/Home/View/1137.
Round Hill GID's Water Conservation Plan is being updated, viewed here: http://water.nv.gov/programs/planning/plans/Round_Hill_GID.pdf
Kingsbury GID's Water Conservation Plan can be viewed here: http://water.nv.gov/programs/planning/plans/KingsburyGID.pdf
Edgewood updated their water conservation and Integrated Resource Plans in 2018. They are working with key customers on submetering and water efficiency measures.

Governor Sandoval established the Nevada Drought Forum
(http://drought.nv.gov/About/Executive_Order)
On April 8, 2015, Governor Sandoval convened the Nevada Drought Forum – bringing together interested stakeholders to assess the drought in Nevada, identify best conservation practices and policy needs, and make recommendations regarding next steps.

Miscellaneous Water Conservation Measures
All member agencies maintain leak detection programs to reduce system water losses. Members offer customer leak detection tools, services, and investigate water loss.

Member agencies' rate structures vary, either using flat rates or increasing tier rate structures.
No members use decreasing block rates.

TWSA Staff maintain AWWA Water Efficiency Practitioner Certification (level 1) and have been trained in irrigation auditing. Water conservation information is featured on the TWSA website and in outreach materials offered at regional events. IVGID, TCPUD, NTPUD and STPUD offer water conservation fixture rebates and water conservation tools to residents.

IVGID and Nevada Tahoe Conservation District (NTCD) offer free landscape design and outdoor water use audits to the Nevada side of the Lake Tahoe Basin. The Tahoe Resource Conservation District offers similar services on the California side.

Mapping (See maps located at end of report)
Using the 2002 Sanitary Survey updates and corresponding watershed maps as a template, the Tahoe Water Suppliers Association started a watershed mapping program in 2003. TWSA staff has developed extensive reference maps, defined by watershed, on the Lake Tahoe basin as a method to: describe the watersheds, identify land ownership and land use changes, ascertain potential sources of drinking water contamination, and locate potential areas of future monitoring. Maps have been created for the water purveyors that describe: land ownership, land use, general description and location, service boundaries, potential contaminating sources and recreation. The maps have been useful in describing the watershed features, identifying inconsistencies and areas of improvement for basin-wide mapping programs, locating potential sources of contamination, and structuring education and monitoring programs.

Fire Flow / Emergency Interties
Regional fire-flow funding update is provided in earlier section "Action Plan Highlights".

Beginning in 2007- 2008, TWSA members began to research the feasibility of additional infrastructure to link several district water supplies, in order to increase water availability during potential emergencies. It was determined the agencies in the southeastern section of the lake had the most potential to intertie.

- The Douglas County systems worked with JWA engineering on an intertie evaluation.
- In 2008, KGID and Edgewood completed an intertie.
- LPA completed a 10" intertie with STPUD in 2007.
- TCPUD completed an emergency intertie with Tahoe Park Water Company in 2016 proving water to Tahoe Park only.
- IVGID and NTPUD have an emergency intertie available.

TWSA/United States Army Corps of Engineers (USACE)
Lake Tahoe Source Water Risk Assessment 2008
Current research in the Tahoe Basin includes studies on the effect of shoreline activities on drinking water quality. Perri Standish-Lee of Black and Veatch completed a study on the effects of human recreation on drinking water quality in 2006. Results indicate that any activities capable of introducing contaminants to Lake Tahoe's Near Shore Zone can have a direct impact on water quality. Water quality degradation can result in a possible waterborne disease outbreak or a loss of filter avoidance; thus, putting the burden of water filtration installation costs on local residents.

The Risk Assessment Project/Model (Phase 1), primarily funded by USACE with some TWSA matching funds, was completed in the fall of 2008. This project quantified the risk of contamination from potential sources for three of the TWSA water suppliers' drinking water intakes, and provided a working spreadsheet to evaluate potential risks form spills and Shorezone development. The Risk Assessment can be used to identify potential mitigation for high risk activities and/or emergencies. Importantly, the assessment will help identify response time necessary, based on time of travel maps, to protect human health during an emergency. The development of the model provides water purveyors with a hands-on system to quantify immediate potential threats to the raw water used in the municipal water delivery systems, from proposed projects. It also helps to identify potential mitigations for a proposed activity,

and it will provide water suppliers with information to react to emergency spills and/or leaks of potential contaminants within their watersheds.

TWSA Risk Assessment / Model Projects (RAM)
Copies of the Risk Assessment Reports are available by contacting the TWSA Executive Director madonna_dunbar@ivgid.org.

2013-14 Refinements of 2008 Model
The NDEP began discussion of further refinement of the 2008 Report and initiated a contract with the Tahoe Science Consortium (TSC) through IVGID as a fiscal agent in June 2013. Working collaboratively with researchers at the TSC, the NDEP and TWSA commissioned the study to use new, more highly refined, water current data in the model and re-evaluate at a minimum the southeastern corner of Lake Tahoe (Intake areas for Edgewood/Kingsbury/Lakeside).

"2014 Lake Tahoe Flow Modeling, Potential Pathogen Transport and Risk Modeling Report"
S. Geoffrey Schladow, Andrea Hoyer, Francisco Rueda and Michael Anderson/ June 2014:

In spring 2013, NDEP initiated discussion with TWSA to fund Phase 2 of the Lake Tahoe Risk Assessment Model developed in 2008 (Black & Veatch, B&V Project No. 41717). Phase 2 was funded by NDEP ($74,000) and TWSA ($19,000) for a total of $95,000 in 2013-14.
There has been significant improvement in the data available on lake currents since 2008, so the upgrades were allowed to provide better modeling with more refined area grids based on this new data. This project re-analyzed lake water current patterns in the southeastern corner of Lake Tahoe, in the area of the Edgewood and Kingsbury intakes. The analysis is related to public water systems at Lake Tahoe and the impact that local potential contaminating activities have on the source water. In addition to new data, new potential contaminating activities have been proposed near the public water system intakes, which will also impact system specific risk models.

Flow Modeling and Pathogens (PO # S004422)

Executive Summary
Swimming and other body-contact recreational activities have been identified by the USEPA, the Nevada Division of Environmental Protection, the California Department of Health Services and other public health professionals as a potential source of microbiological contamination of recreational waters.

This study was undertaken to quantify the impacts of body contact recreation on microbial water quality at the Kingsbury General Improvement District (KGID) and Edgewood Water Company intakes on Lake Tahoe.

This study builds upon the risk assessment conducted previously (Black and Veatch, 2008), and specifically incorporates 5 new features:

(i) Findings of new 3-D hydrodynamic simulations for the nearshore southeastern portion of Lake Tahoe;

(ii) Development of a finer-scale 50 m x 50 m finite-segment pathogen fate-consumer risk model;

(iii) Additional recreational use associated with the proposed Beach Club and Edgewood Lodge/Resort developments;

(iv) Risk assessment for the Edgewood Water Company intake; and

(v) Treatment plant upgrades at KGID and Edgewood that include UV disinfection meeting the requirements of the Long Term 2 Enhanced Surface Water Treatment rule (LT2). As in the prior study, this risk assessment focused on Cryptosporidium because of its low infectious dose, environmental persistence and resistance to conventional disinfection.

Mean annual Cryptosporidium concentrations were predicted using a Monte Carlo-based pathogen fate-consumer risk model. Dose-response calculations applied to predicted concentrations following treatment provided probabilistic estimates of health risks resulting from consumption of recreationally-impacted treated drinking water.

Model simulations demonstrate that the additional recreational use at Beach Club and Edgewood Lodge/Resort beaches, in conjunction with improved understanding of transport, results in increased potential for Cryptosporidium to reach the KGID and Edgewood intakes.
For example, the median annual concentration at the KGID intake increased from 0.0018 oocysts/100 L (Black and Veach, 2008) to 0.0082 oocysts/100 L, although the additional 3-log removal achieved with UV disinfection following ozonation greatly lowered treated water concentrations and substantially lowered risk of infection. The predicted median annual risk of infection was lowered from 0.23 (Black and Veatch, 2008) to 0.0011 infections/10,000/yr (this study) for KGID, while the probability of exceeding the USEPA target of 1 infection/10,000/yr was reduced from 4.9% (Black and Veatch, 2008) to <0.02 infections/10,000/yr (the lowest probability limit based upon the number of simulations). The median predicted annual risk level for the upgraded ozone+UV Edgewood plant was 0.0007 infections/10,000/ yr, with <0.02% probability of exceeding the USEPA target (lowest probability limit).

The modeling results that underpinned these conclusions provide a number of additional insights to minimizing pathogen entrainment into drinking water intakes. Primarily, by using a technique developed under this project, it is now possible to determine the source area of pathogens (or any other contaminant) that arrive at a water intake. The results also provide insight into the complex interplay between the windfield, the strength of the lake's thermal stratification and the transport patterns of pathogens. Most notably, having an intake located below the maximum depth of the thermocline greatly reduces the frequency of pathogen arrival at the intake. This has other implications with respect to lake level and drought conditions.

With prolonged drought episodes (predicted to be more frequent under future climatic conditions), lake level will be lower and thereby reduce the depth of the water intakes. Under those conditions the period of time favorable for pathogen transport to the intakes is likely to increase significantly. Similarly, the time of water withdrawal can be used to minimize risk. Night time and early morning withdrawals seem to pose the greatest risk, as pathogens released the previous day have had little opportunity to be de-activated by solar radiation. This highlights the linkage between drinking water quality and maintenance of high water clarity, particularly in the nearshore region. Maximizing the penetration of UV radiation from solar radiation into the water column provides "free" water treatment.

The release of a surrogate for herbicide transport from the vicinity of Tahoe Keys was simulated, and showed that herbicide could be transported to the vicinity of the nearshore regions of south-east Lake Tahoe within a 24 hour period. Within that period, material did not actually arrive at any of the water intakes, but based on other results in this report, that would occur within less than 48 hours. It must be borne in mind that these results are a first estimate of the fate of herbicides. No account has been taken of the dilution that a real plume of herbicide would be subject to, and the possible breakdown into other chemicals. Likewise the toxicity (if any) of the herbicide for the case of consumption or body contact recreation has not been considered as it was beyond the scope of the study. However, should

the use of herbicides be permitted at Lake Tahoe, there is a strong case that a more complete study of the fate of these products on public health should be undertaken.

A TWSA sponsored workshop on this report and the current data was offered on Nov. 5 and 6, 2014 by Dr. Schladow at both north and south Tahoe locations. The presentations were covered by local media.
http://www.laketahoenews.net/2014/11/scientists-studying-life-below-tahoes-surface/
and at
http://www.recordcourier.com/news/13714581-113/lake-tahoe-schladow-wind

2008 Phase 1:
Executive Summary - TWSA B&V Project 41717
Summary & Conclusions
Time of travel maps were developed for the watershed. Watershed travel times varied with flow; at low flow rates, the time to reach Lake Tahoe from 1 to 2 miles ((1.6 – 3.2 km) away in the watershed was less than 16 hours, while high flow resulted in travel times from anywhere in the watershed to be less than 10 hours.

Pathogen fate-consumer risk model calculations found water quality to be generally good at the Burnt Cedar, McKinney-Quail and Kingsbury Grade intakes, although body contact recreation does represent a potential threat to drinking water quality for intakes with high levels of recreation use nearby and, most importantly, limited removal at the treatment plant.

Three primary variables most directly influence the risk posed to water quality at the water supply intakes in Lake Tahoe:

- Recreational use (including the number of recreators, location of recreation and prevalence of infection within the recreator population).
- Direction and magnitude of advective currents in the vicinity of the intake.
- Effectiveness of treatment processes at the water treatment plant (WTP).

The vulnerability of the intakes to sewage and fuel spills and other contaminating events within the watershed will also be dependent upon the location and magnitude of an input, the direction and speed of advective and dispersive transport, dilution, contaminant losses within the water column.

Risk Assessment Model 2008
As part of the Risk Assessment, a model was developed. The model serves as a tool for decision making, by evaluating potentially contaminating activity within one quarter mile (1320 feet) of intakes and can help determine the level of risk of human disease, transmission, and infection.
The RAM can be used to identify potential mitigation for high risk activities and/or emergencies. Importantly, the assessment will help identify response time necessary, based on time of travel maps, to protect human health during an emergency.

ARkStorm@Tahoe Project
http://tahoescience.org/arkstorm-project
Addressing social and ecological impacts of extreme winter storm events in the Lake Tahoe region. What is an ARkStorm? Atmospheric rivers (ARs) are large flows of water vapor that typically occur in fall and winter, bringing huge amounts of moisture over the Pacific to the U.S. West Coast. Landfalling ARs are storm events with the potential to deliver extreme amounts of precipitation to the West Coast, including California and Nevada, over a just a few days. The name “ARkStorm” was coined to describe large AR storm sequences, which, for instance, can produce precipitation in California that in places can exceed totals experienced only once every several hundred to 1,000 years. Scientists with the U.S. Geological

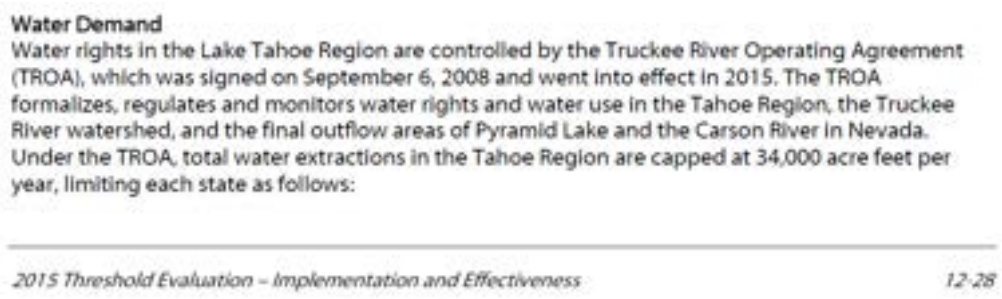
Survey (USGS) Multi Hazards Demonstration Project (MHDP) designed a scientifically-plausible winter ARkStorm scenario for California emergency managers, stitching together historical AR storms from 1969 and 1986, separated by only 4 days.

This hypothetical ARkStorm would rival but not exceed the intense California winter storms of 1861 and 1862 that left the Central Valley of California flooded and the state's economy destroyed. It was designed to exceed any single storm in the 20th Century. On September 12, 2013 a meeting was facilitated at Incline Village General Improvement District (IVGID) for the TWSA members and other agency representatives to discuss the operations of water and sewer supply systems during a potential long-term storm event. A March 14, 2014 Tabletop Exercise (TTX) was run at the Regional Emergency Operations Center (REOC) in Reno, NV.

Winter 2016-17 became an 'test' ArkStorm situation, with flooding impacts in the Truckee River Corridor and Reno/Carson areas.

Water Demand and Sewer Services

TRPA: http://www.trpa.org/wp-content/uploads/18_Ch12_Implementation_FINAL_9_30_2016.pdf



Water Demand

Water rights in the Lake Tahoe Region are controlled by the Truckee River Operating Agreement (TROA), which was signed on September 6, 2008 and went into effect in 2015. The TROA formalizes, regulates and monitors water rights and water use in the Tahoe Region, the Truckee River watershed, and the final outflow areas of Pyramid Lake and the Carson River in Nevada. Under the TROA, total water extractions in the Tahoe Region are capped at 34,000 acre feet per year, limiting each state as follows:

2015 Threshold Evaluation – Implementation and Effectiveness 12-28

California:	23,000 acre feet per year
Nevada:	11,000 acre feet per year

The Tahoe Region has numerous public water systems, including large-scale and small-scale (i.e., less than 200 households) systems. In addition, there are many single-use intake lines along Lake Tahoe's shoreline and wells. The large-scale water and wastewater treatment systems in the Tahoe Region are provided by public utility districts (PUDs) and general improvement districts (GIDs). On the California side of the Region, PUDs may acquire, construct, own, complete, use, and operate a variety of services, including water, electricity, recreational facilities, drainage facilities, street lighting, and fire protection. Similarly, Nevada GIDs oversee the development, maintenance, and use of public facilities such as water and sewer systems, streets and sidewalks, and parks and open space. Since 1968, all wastewater in the Tahoe Region has been treated and pumped out of the Region to avoid discharge into the lake. Districts are bound by service areas and directed through boards created by local governments.

The following PUDs and GIDs operate within the Tahoe Region:

Cave Rock Estates GID	Oliver Park GID
Incline Village GID	Round Hill GID
Kingsbury GID	South Tahoe PUD
Lakeridge GID	Tahoe City PUD
Logan Creek Estates GID	Zephyr Cove GID
Marla Bay GID	Zephyr Heights GID
North Tahoe PUD	Zephyr Knolls GID

The Tahoe Water Suppliers Association (TWSA, 2015) consists of public water suppliers in the Lake Tahoe Region that use Lake Tahoe as their source of drinking water. TWSA consists of:

Cave Rock Water System (Cave Rock; Douglas County)
Edgewood Water Company (Edgewood)
Glenbrook Water Cooperative (Glenbrook)
Incline Village General Improvement District (IVGID)
Kingsbury General Improvement District (KGID)
Lakeside Park Association (LPA)
Zephyr Water Utility (Zephyr; Douglas County)
North Tahoe Public Utility District (NTPUD)
Round Hill General Improvement District (RHGID)
Skyland Water Company (Skyland; Douglas County)
South Tahoe Public Utility District (STPUD)
Tahoe City Public Utility District (TCPUD)

In 2015, TWSA suppliers served approximately 20,597 service hookups, supplying water to approximately 34,410 residents. The average daily water flow for TWSA suppliers ranges from 100,000 gallons per day (gpd) to 2,690,000 gpd. Peak daily water flow ranges from 424,000 gpd to 5,945,000 gpd (TWSA, 2015).

Numerous water purveyors distribute water from groundwater sources throughout the Region, including South Tahoe Public Utility District, Lukins Brothers Water and the Tahoe Keys Water Company.

Water demand in the Lake Tahoe Region varies year to year due to changes in resident and/or visitor populations, length of summer growing seasons (for outdoor irrigation), and drought conditions (which can lead to local water restrictions imposed by local utility districts). Water conservation is encouraged by many Lake Tahoe water purveyors. The South Tahoe Public Utility District (STPUD), for example, provides a lawn turf buy-back program, water-efficient appliance rebates, leak detection assistance, and irrigation efficiency evaluations.

Sewage Disposal

The Porter-Cologne Act in California, and an executive order by the Governor of Nevada dated January 27, 1971, prohibit discharges of domestic, municipal or industrial wastewaters to Lake Tahoe, its tributaries, groundwater, or the portion of the Truckee River within the Tahoe Region.[8] As a result, Tahoe Region wastewater is generally collected, treated, and discharged to locations outside of the Region in one of the following four sewer export systems:

1. South Tahoe Public Utility District – Wastewater for the City of South Lake Tahoe and unincorporated portions of El Dorado County (south of Emerald Bay) is exported to Alpine County, California, via a sewer export line over Luther Pass (California State Route 89).
2. Douglas County Sewer Improvement District – Wastewater for Douglas County is exported to the Carson Valley in Nevada, via a sewer export line over Daggett Pass (Nevada State Route 207, Kingsbury Grade).
3. Incline Village General Improvement District – Wastewater for Washoe County is exported to the Carson City/Stewart area, Nevada, via a sewer export line over Spooner Summit (U.S. Highway 50).
4. Tahoe City and North Tahoe Public Utility Districts – Wastewater for Placer County and the portion of El Dorado County north of Emerald Bay is exported to the town of Truckee, California, via a sewer export line in the Truckee River Canyon (along California State Route 89).

Exceptions may be granted to discharges under alternative plans (for wastewater disposal authorized by state law, and approved by a state agency with appropriate jurisdiction). TRPA may also approve sewage holding tanks or other no-discharge systems in accordance with Subparagraph 60.1.3.C of the TRPA Code of Ordinances as a temporary measure, or as a permanent measure in remote public or private recreation sites, where a sewer system would create excessive adverse environmental impacts.

The California Water Quality Control Board, Lahontan Region, has authority to issue wastewater discharge waivers in the California portion of the Lake Tahoe Region. In Nevada, this authority rests with the Nevada Department of Environmental Protection (NDEP). Exceptions have been given to cabins in remote summer home tracts on the California side of the Region (including Upper and Lower Echo Lakes, Fallen Leaf Lake, Lily Lake, Glen Alpine, and Emerald Bay). Some summer homes are allowed to discharge "gray water" to leach field systems, but are also required to contain and transport "black water" sewage to an approved sewer dump station for treatment in a sewer plant.

[8] *See section 60.1, TRPA Code of Ordinances*

There are five sewer treatment plants located in the Tahoe Region, each of which exports treated sewage into one of the four export lines noted above. Existing sewage capacity for these plants, including "reserved" capacity, is summarized in Table 12-18, below. As the table indicates, none of the five Tahoe sewer treatment plants are near their total capacity. In discussions with sewer plant officials, all five sewer plants were originally designed for a much larger population than currently expected at Lake Tahoe. Excess plant capacity is a result of a number of factors, including TRPA growth controls and localized population decreases, combined with water conservation efforts, and public purchases of environmentally sensitive lands.

Table 12-18. *2015 Sewage Disposal Capacity in Millions of Gallons per Day (MGD)*

Sewer Collection District	Approximate 2015 Peak Sewer Flow	Approximate Capacity[1]	Approximate Reserve Capacity
North Tahoe PUD	0.65[3]	6.00	5.35
Tahoe City PUD[2]	1.16	7.80	6.64
South Tahoe PUD	4.93	7.70	2.77
Incline Village GID	1.61	3.00	1.39
Douglas County SID	2.31	3.75	1.44

Notes:

1. The North Tahoe and Tahoe City Public Utility Districts share a common North Shore sewer export line to Truckee, where sewage is combined with four other sewer collection districts for treatment by the Tahoe-Truckee Sanitation Agency (T-TSA). Sewer plant capacity for NTPUD and TCPUD is, therefore, a factor of export line capacity and total capacity of the T-TSA treatment facility (9.60 million gallons per day).
2. TCPUD's sewer collection is split between a North Shore and a West Shore collection system. TCPUDs portion of the shared TCPUD-NTPUD North Shore export line has a capacity of 3.5 MGD. TCPUD's West Shore collection system has a capacity of 4.3 MGD, and is "fixed" by pumping capacity at their Sunnyside pump station.
3. Equals 2015 average sewer flow. A peak flow estimate was not available from NTPUD.

Source: Tahoe Region Sewer Districts

Tahoe Basin Water Systems. Graphic courtesy of STPUD.



EPA Reference on Unfiltered Systems



EPA United States Environmental Protection Agency

Comprehensive Surface Water Treatment Rules Quick Reference Guide: Unfiltered Systems

Overview of the Rules

Title	**Surface Water Treatment Rule** (SWTR) - 40 CFR 141.70-141.75 **Interim Enhanced Surface Water Treatment Rule** (IESWTR) - 40 CFR 141.170-141.175 **Long Term 1 Enhanced Surface Water Treatment Rule** (LT1ESWTR) - 40 CFR 141.500-141.571
Purpose	Improve public health protection through the control of microbial contaminants, particularly viruses, *Giardia*, and *Cryptosporidium*.
General Description	The **Surface Water Treatment Rules**: ▸ Applies to all public water systems (PWSs) using surface water or ground water under the direct influence of surface water (GWUDI), otherwise known as "**Subpart H systems.**" ▸ Requires all Subpart H systems to disinfect. ▸ Requires Subpart H systems to filter unless specific filter avoidance criteria are met. ▸ Requires unfiltered systems to perform source water monitoring and meet site specific conditions for control of microbials.

Overview of Requirements

The purpose of this table is show how the requirements for the IESWTR and LT1ESWTR build on the existing requirements established in the original SWTR.

APPLICABILITY: PWSs that use surface water or ground water under the direct influence of surface water (Subpart H) that do not provide filtration.		**Final Rule Dates**		
		SWTR 1989	**IESWTR 1998**	**LT1ESWTR 2002**
Population Served	≥ 10,000	✓	✓	
	< 10,000	✓	N/A (except for sanitary survey provisions)	✓
Regulated Pathogens	99.99% (4-log) inactivation of viruses	✓	Regulated under SWTR	Regulated under SWTR
	99.9% (3-log) inactivation of *Giardia lamblia*	✓	Regulated under SWTR	Regulated under SWTR
	99% (2-log) removal of *Cryptosporidium* (through watershed control)		✓	✓
Residual Disinfectant Requirements	Entrance to distribution system (≥ 0.2 mg/L)	✓	Regulated under SWTR	Regulated under SWTR
	Detectable in the distribution system	✓	Regulated under SWTR	Regulated under SWTR
Unfiltered System Requirements	Avoidance Criteria	✓	✓	✓
Disinfection Profiling & Benchmarking	Systems must profile inactivation levels and generate benchmark, if required		✓	✓
Sanitary Surveys (state requirement)	CWS: Every 3 years NCWS: Every 5 years		✓	Regulated under IESWTR
Covered Finished Reservoirs/Water Storage Facilities (new construction only)			✓	✓
Operated by Qualified Personnel as Specified by State		✓	Regulated under SWTR	Regulated under SWTR

(CWS) Community Water System (NCWS) Non-community Water System

Disinfection

Disinfection must be sufficient to ensure that the total treatment process of the system achieves at least:

- 99.9% (3-log) inactivation of *Giardia lamblia*.
- 99.99% (4-log) inactivation of viruses.

Currently, *Cryptosporidium* must be controlled through the watershed control program and no inactivation credits are currently given for disinfection. Systems must also comply with the maximum residual disinfectant level (MRDL) requirements specified in the Stage 1 Disinfectants/Disinfection Byproducts Rule (Stage 1 DBPR).

Residual Disinfectant Monitoring and Reporting Requirements

Location	Concentration	Monitoring Frequency	Reporting (Reports due 10th of the following month)
Entry to distribution system.	Residual disinfectant concentration cannot be < 0.2 mg/L for more than 4 hours.	Continuous, but states may allow systems serving 3,300 or fewer persons to take grab samples from 1 to 4 times per day, depending on system size.	Lowest daily value for each day, the date and duration when residual disinfectant was < 0.2 mg/L, and when state was notified of events where residual disinfectant was < 0.2 mg/L.
Distribution system - same location as total coliform sample location(s).	Residual disinfectant concentration cannot be undetectable in greater than 5% of samples in a month, for any 2 consecutive months. Heterotrophic plate count (HPC) # 500/mL is deemed to have detectable residual disinfectant.	Same time as total coliform samples.	Number of residual disinfectant or HPC measurements taken in the month resulting in no more than 5% of the measurements as being undetectable in any 2 consecutive months.

System Reporting Requirements

Report to State:	What to report:
Within 10 days after the end of the month:	▸ Source water quality information (microbial quality and turbidity measurements). ▸ In addition to the disinfection information above, systems must report the daily residual disinfectant concentration(s) and disinfectant contact time(s) used for calculating the CT value(s).
By October 10 each year:	▸ Report compliance with all watershed control program requirements. ▸ Report on the on-site inspection unless conducted by state in which the state must provide the system a copy of the report.
Within 24 hours:	▸ Turbidity exceedances of 5 NTU and waterborne disease outbreaks.
As soon as possible but no later than the end of the next business day:	▸ Instance where the residual disinfectant level entering the distribution system was less than 0.2 mg/L.

Filtration Avoidance Criteria

Since December 30, 1991, systems must meet source water quality and site specific conditions to remain unfiltered. If any of the following criteria to avoid filtration are not met, systems must install filtration treatment within 18 months of the failure. The following table outlines the avoidance criteria established by the SWTR and later enhanced by the IESWTR and LT1ESWTR.

Filtration Avoidance Criteria

		Requirement	Frequency
SOURCE WATER QUALITY CONDITIONS	**Microbial Quality**	Monitor fecal coliform or total coliform density in representative samples of source water immediately prior to the first point of disinfectant application: ▸ **Fecal coliform density** concentrations must be ≤ 20/100 mL; **OR** ▸ **Total coliform density** concentrations must be ≤ 100/100 mL. Sample results must satisfy the criteria listed above in at least 90% of the measurements from previous 6 months.	1 to 5 samples per week depending on system size and every day the turbidity of the source water exceeds 1 NTU.
	Turbidity	Prior to the first point of disinfectant application, turbidity levels cannot exceed 5 NTU.	Performed on representative grab samples of source water every four hours (or more frequently).
SITE SPECIFIC CONDITIONS	**Systems must:**	Calculate total inactivation ratio daily and provide 3-log *Giardia lamblia* and 4-log virus inactivation daily (except any one day each month) in 11 of 12 previous months (on an ongoing basis).	Take daily measurements before or at the first customer at each residual disinfectant concentration sampling point: ▸ Temperature ▸ pH (if chlorine used) ▸ Disinfectant contact time (at peak hourly flow) ▸ Residual disinfectant concentration measurements (at peak hourly flow)
	System must comply with:	▸ MCL for total coliforms in 11 of 12 previous months (as per Total Coliform Rule). ▸ Stage 1 Disinfection Byproducts Rule requirements (as of January 1, 2002, for systems serving ≥ 10,000 or January 1, 2004, for systems serving < 10,000).	
	Systems must have:	▸ Adequate entry point residual disinfectant concentration (see disinfection requirements). ▸ Detectable residual disinfectant concentration in the distribution system (see disinfection requirements). ▸ Redundant disinfection components or automatic shut-off whenever residual disinfectant concentration < 0.2 mg/L. ▸ A watershed control program minimizing potential for contamination by *Giardia lamblia* cysts and viruses in source water; IESWTR and LT1ESWTR update this requirement by adding *Cryptosporidium* control measures. ▸ An annual on-site inspection by state or approved third party with reported findings. ▸ Not been identified as a source of a waterborne disease outbreak.	

Disinfection Profiling and Benchmarking Requirements

A **disinfection profile** is the graphical representation of a system's microbial inactivation over 12 consecutive months.

A **disinfection benchmark** is the lowest monthly average microbial inactivation value. The disinfection benchmark is used as a baseline of inactivation when considering changes in the disinfection process.

Disinfection Profiling and Benchmarking Requirements Under IESWTR & LT1ESWTR

The purpose of disinfection profiling and benchmarking is to allow systems and states to assess whether a change in disinfection practices creates a microbial risk. Systems should develop a disinfection profile that reflects *Giardia lamblia* inactivation (systems using ozone or chloramines must also calculate inactivation of viruses), calculate a benchmark (lowest monthly inactivation) based on the profile, and consult with the state prior to making a significant change to disinfection practices.

REQUIREMENT	IESWTR	LT1ESWTR
AFFECTED SYSTEMS:	Community, non-transient non-community, and transient systems.	Community and non-transient non-community systems only.
BEGIN PROFILING BY:	April 1, 2000	▸ July 1, 2003 for systems serving 500-9,999 people. ▸ January 1, 2004 for systems serving fewer than 500 people.
FREQUENCY & DURATION:	**Daily** monitoring for 12 consecutive calendar months to determine the total logs of *Giardia lamblia* inactivation (and viruses, if necessary) for each day in operation.	**Weekly** inactivation of *Giardia lamblia* (and viruses, if necessary), on the same calendar day each week over 12 consecutive months.
STATES MAY WAIVE DISINFECTION PROFILING REQUIREMENTS IF:	TTHM annual average <0.064 mg/L and HAA5 annual average <0.048 mg/L: ▸ Collected during the same period. ▸ Annual average is arithmetic average of the quarterly averages of four consecutive quarters of monitoring. ▸ At least 25% of samples at the maximum residence time in the distribution system. ▸ Remaining 75% of samples at representative locations in the distribution system.	One TTHM sample <0.064 mg/L and one HAA5 sample <0.049 mg/L: ▸ Collected during the month of warmest water temperature; **AND** ▸ At the maximum residence time in the distribution system. Samples must have been collected after January 1, 1998.
DISINFECTION BENCHMARK MUST BE CALCULATED IF:	Systems required to develop a disinfection profile and are considering any of the following: ▸ Changes to the point of disinfection. ▸ Changes to the disinfectant(s) used. ▸ Changes to the disinfection process. ▸ Any other modification identified by the state. Systems must consult the state prior to making any modifications to disinfection practices.	Same as IESWTR, and systems must obtain state approval prior to making any modifications to disinfection practices.

Office of Water (4606) EPA 816-F-04-001 www.epa.gov/safewater August 2004

VI. POTENTIAL SOURCES OF POLLUTION

Watershed Control Programs provides information on the potential sources of pollution in order to identify and control activities that may lead to the deterioration of the quality of a drinking water source (EPA 2003). General threats to source water quality are defined in federal and state regulations. Previous sanitary surveys have identified threats specific to the watersheds contributing to the purveyor's source water. Sources of pollution are identified through sourcewater quality and land use monitoring.

This chapter is a summary of activities in the Lake Tahoe Basin, which are characterized in general, as potential sources of pollution by the U.S. Environmental Protection Agency, other regulatory agencies, previous sanitary surveys or by other means. The popularity of Lake Tahoe as a recreationdestination for 15+ million visitors a year creates unique potential impacts to water quality.

The TWSA Risk Assessment Models (2014/2008) and earlier studies for North Tahoe PUD conducted by Black & Veatch, analyzed the potential release of fecal coliform and other viral and bacteriological contaminants from swimmers on Tahoe North Shore beaches. The study indicated that intake location and water current patterns show minimal potential for contamination, but potential exists.

The Environmental Protection Agency defines general watershed characteristics and activities that are detrimental to drinking water quality as:

Point sources of contamination such as wastewater (sewage) treatment plants, industrial discharges, barnyard feedlots, orprivate septic systems	Animal populations specific to the discussion of Giardia contamination
Effect of precipitation, terrain, soil types,and land cover	Discharge to ground water which rechargesthe surface source
Road construction	Logging
Pesticide usage	Grazing animals
Recreation activities	Unauthorized activity in the watershed

Potential pollution sources in purveyors' watersheds have been identified in previous sanitarysurveys including:

- Sewer system breaks/spills
- Recreation
- Trash disposal
- Changes in land ownership, zoning or land activities that affect water clarity
- Erosion, stream pollution, storm run-off, and urban run-off which contributes to the pathogenic contamination of source water
- Wildfire
- Wildlife

TRPA Water Quality (208) Plan
http://www.trpa.org/wp-content/uploads/Final-U.S.-EPA-Adopted-Lake-Tahoe-208- WQMP_2013.06.19.pdf
In June 2013, TRPA released the 208 Plan required for certain areas by the Federal Clean Water Act (section 208). These plans promote efficient and comprehensive programs for controlling water pollution in a defined geographic area. The Lake Tahoe 208 Plan was updated by TRPA on December12, 2012, which initiated the need for parallel updates of the Plan by the states of Nevada and California and the U.S. Environmental Protection Agency.

The Lake Tahoe Water Quality Management Plan (also known as the 208 Plan or WQMP) is a framework that sets forth the components of the water quality management system in the Lake Tahoe Region, the desired water quality outcomes for the Tahoe Basin, and the mechanisms adopted by all the relevant entities to achieve and maintain those outcomes. The WQMP is organized to reflect the water quality management plan elements required by the U.S. Environmental Protection Agency's (U.S. EPA) regulations at 40 C.F.R. Section 130.6, which implements Sections 208 and 303(e) of the Clean Water Act, as well as the unique situation in theLake Tahoe Region.

Sewer Systems and Wastewater Treatment
All sewage is exported out of the Tahoe Basin, and there are strict stormwater and TMDL management requirements. Wastewater treatment is a major area of concern for water quality. In 1966, a significantcontrol action (Porter-Cologne Act) took place to protect the pristine quality of Lake Tahoe when Nevada and California acted to prohibit the discharge of treated wastewater effluent into the lake.
Treatment plants were retrofitted with export pipelines and pump stations to transport the effluent outof the basin. Sewage systems were expanded to export untreated wastewater to the Town of Truckee, California, for treatment and disposal for the north and west shores. In 1971, both states prohibited septic tanks and required that all sewage generators be connected to an existing sewage system.

In Tahoe, these programs are administered by the CA Lahontan Regional Water Quality Control Board (LRWQCB) and the Nevada Department of Environmental Protection (NDEP).

All treatment and collection facilities participate in local and county spill notification programs.

The Lake Tahoe Wastewater Treatment Infrastructure Partnership (LTWIP) was formed in 2007, as an association of local agencies providing wastewater services. Group activities are referenced in detail inlater sections of this report.

The following are excerpts:

TABLE 2 – WQMP COMPONENTS AND SUBSEQUENT AMENDMENTS INCORPORATED BY REFERENCE

AGENCY	DOCUMENT
TRPA	July 26, 2012 Bi-State Recommendations
	Regional Plan
	Code of Ordinances
	Regional Plan EIS
	BMP Handbook
Lahontan Regional Water Quality Control Board	Water Quality Control Plan for the Lahontan Region (Lahontan Basin Plan)
	Lake Tahoe TMDL for the California portion of the Region
	Lake Tahoe TMDL Substitute Environmental Document
	Other TMDLs for California 303d listed waters in the Region
Nevada Division of Environmental Protection	Lake Tahoe TMDL for the Nevada portion of the Region
	Other TMDLs for Nevada 303d listed waters in the Region
The Counties, City of South Lake Tahoe, and State Departments of Transportation	Load Reduction Plans
	Conforming Area Plans
U.S. Forest Service	U.S. Forest Service Forest Plan for the Lake Tahoe Region
	Conforming Area Plans
	U.S. Forest Service Soil and Water Conservation Handbook in California
	U.S. Forest Service BMP Manual in Nevada

CHAPTER 3: EFFLUENT LIMITATIONS

Effluent limitations are restrictions imposed on quantities, discharge rates, and concentrations of pollutants discharged into waters of the United States.[29] The CFR requires WQMPs to include water quality based effluent limitations as a plan element in accordance with CWA Section 303.[30]

3.1 NPDES PROGRAMS

Section 402 of the CWA establishes the National Pollutant Discharge Elimination System (NPDES) permit program to regulate discharges of pollutants into waters of the United States. An NPDES permit sets specific pollutant discharge limits, monitoring and reporting requirements, and other special conditions as appropriate. [31] The CWA allows the U.S. EPA to authorize state and other governments to implement the NPDES Program, including permit issuance and enforcement authorities. The U.S. EPA has oversight responsibilities and works closely with the authorized states and tribes on strategic planning, priority-setting and measurement of results.[32] Since its introduction in 1972, the NPDES permit program is responsible for significant improvements to water quality in the United States.[33]

The States of California and Nevada are approved by the U.S. EPA to implement the NPDES Program in their respective states and their NPDES permits are subject to U.S. EPA review. The LRWCB administers the NPDES program for the California portion of the Lake Tahoe Region and the NDEP Bureau of Water Pollution Control administers it for the Nevada portion.

The NPDES program regulates both stormwater and non-storm discharges from point sources and issues stormwater permits for the following:

- Municipal Separate Storm Sewer Systems (MS4s) of certain sizes or as designated by the permitting authority;
- Industrial facilities in any of the 11 designated categories that discharge to an MS4 or to waters of the United States; and
- Construction activity that disturbs one or more acres of land or disturbs less than one acre but is part of a larger plan of development.[34] All eligible discharges must prepare and implement a Storm Water Pollution Prevention Plan (SWPPP) that includes a monitoring and reporting program. [35]

The following NDPES permits, which may be subject to change through the permit modification, reissuance and termination process, are currently either applicable state-wide or to the Lake Tahoe Region specifically:

California NPDES Permits

CHAPTER 4: MUNICIPAL AND INDUSTRIAL WASTE TREATMENT

The CFR requires WQMPs to identify municipal and industrial waste treatment operations in accordance with Section 208 of the CWA.[50]

California prohibited the discharge of treated wastewater into Lake Tahoe through enactment of the Porter-Cologne Act, and Nevada did the same through the Executive Order by the Governor of Nevada dated January 27, 1971.[51] Both states prohibited septic tanks and required that all sewage generators be connected to an existing sewage system.[52]

The TRPA Regional Plan Public Services and Facilities Element includes goals and policies that provide for adequate level of public services while the Water Quality Subelement includes provisions that protect Lake Tahoe's water quality.

The TRPA Code of Ordinances Chapter 60 – Water Quality prohibits the discharge of domestic, municipal, or industrial wastewater to Lake Tahoe and its tributaries.[53] Chapter 32 of the Code of Ordinances includes wastewater service requirements for projects proposing construction of a new structure or reconstruction or expansion of an existing structure.[54]

The TRPA BMP Handbook includes technical guidance on best practices for waste management and material pollution prevention.[55]

4.1 LARGE UTILITIES, PUBLIC UTILITY DISTRICTS AND GENERAL IMPROVEMENT DISTRICTS

Wastewater treatment in the Tahoe Region is provided by public utility districts (PUDs) and general improvement districts (GIDs). Districts are bound by service areas and directed through boards created by local governments.

On the California side of the Region, PUDs may acquire, construct, own, complete, use, and operate a variety of services, including water, electricity, recreational facilities, drainage facilities, street lighting, and fire protection. The following Public Utility Districts operate various wastewater collection and treatment operations in the California portion of the Lake Tahoe Region in accordance with federal, state and regional law:

North Tahoe Public Utility District (NTPUD) provides sewer services to the residents of the north shore of Lake Tahoe. The District's boundary ranges from the Nevada state line in Crystal Bay to Dollar Hill in California and includes the communities of Kings Beach, Tahoe Vista, Brockway Vista, Carnelian Bay, Cedar Flat and Agate Bay.[56]

South Tahoe Public Utility District provides sewage collection, treatment, and export to protect Tahoe's delicate ecosystem for portions of El Dorado County within the Tahoe Region.[57]

Tahoe City Public Utility District (TCPUD) provides sewer services for a 31 square mile area within both Placer and El Dorado Counties, extending from Emerald Bay to Dollar Hill, and along the Truckee River to the Nevada County line.[58]

In Nevada, maintenance of public facilities including sewers within private developments is the responsibility of the property owners within the development. Under the authority of NRS, a county may establish a General Improvement District (GID) for this purpose.[59] Nevada GIDs oversee the development, maintenance, and use of public facilities such as water and sewer systems, streets and sidewalks, and parks and open space.[60] The following GIDs operate various wastewater collection and treatment operations in the Nevada portion of the Lake Tahoe Region in accordance with federal, state and regional law:

Cave Rock Estates GID serves approximately 80 properties in Douglas County adjacent to Lake Tahoe Cave Rock formation.[61]

Douglas County Sewer Improvement District operates a sewer treatment facility for portions of Douglas County within the Lake Tahoe Region.[62]

Kingsbury General Improvement District (KGID) provides sewer collection services to Stateline Nevada residences off of State Route 207 or Kingsbury Grade.[63]

Incline Village General Improvement District (IVGID) is responsible for processing and removing sewage and wastewater for communities of Incline Village and Crystal Bay, Nevada.[64]

Lakeridge GID[65] and Logan Creek Estates GID[66] serve portions of Douglas County.

Marla Bay GID serves residents of Marla Bay, Nevada.[67]

Oliver Park GID serves a portion of Douglas County, Nevada off of Kahle Drive.[68]

Round Hill General Improvement District provides wastewater collection service to 470 private residential customers and 50 commercial customers in Zephyr Cove, Nevada.[69]

Zephyr Heights GID[70], Zephyr Cove GID[71] and Zephyr Knolls GID[72] serve portions of Douglas County.

Treatment plants of four local districts (Tahoe-Truckee Sanitation Agency, IVGID, Douglas County Sewer Improvement District #1, and STPUD) are retrofitted with export pipelines and pump stations to transport treated effluent out of the Region.[73] Since

1968, all wastewater in the Tahoe Region is pumped from treatment plants out of the Region to avoid discharge into the Lake.[74]

LOCAL SOLID WASTE COLLECTION AND DISPOSAL

South Tahoe Refuse (STR) provides refuse and recycling service within the City of South Lake Tahoe, the unincorporated El Dorado County areas and the Tahoe Township area of Douglas County.[75] STR collects more than 100,000 tons of waste each year. This waste is collected and sorted for recycling at the South Tahoe Refuse Materials Recovery Facility (MRF) located at STR's transfer station in South Lake Tahoe, California. The MRF initiates or improves separation of aluminum cans, glass, plastics, cardboard, different grades of paper, tin, metals, appliances, milled wood, green waste, stumps, construction debris (concrete, asphalt), and tires.[76]

Incline Village General Improvement District (IVGID) with Waste Management, Tahoe Truckee Sierra Disposal (TTSD)[77], and the WASTE NOT program provides trash and recycling services for communities of Incline Village and Crystal Bay, Nevada.[78]

The Tahoe-Truckee Sierra Disposal Company, Inc. (TTSD) provides waste removal services for the Lake Tahoe Region from Emerald Bay to Crystal Bay. The company handles approximately 63,000 tons of solid waste per year. All materials collected by TTSD, including garbage and recyclables, are hauled to the Eastern Regional Materials Recovery Facility (MRF), located between Truckee and Squaw Valley in Placer County, where they are sorted in an effort to meet California's mandatory solid waste diversion requirements. The MRF, which was built in 1994–1995, handles household recyclables, including plastics, aluminum, tin, glass, cardboard, newspaper, carpet, and computers. Also, the facility recycles "white goods," such as refrigerators and freezers, and waste wood, which includes dimensional wood (e.g., construction remnants) and lot clearing debris. Material that is not recyclable is treated as solid waste and taken to the Western Regional Sanitary Landfill in Roseville or to the Lockwood landfill in Nevada.[79]

Trash or Hazardous Waste Spills

No trash or hazardous waste spills from solid waste collection or transportation companies have been reported to the EPA during the past year. All solid waste is collected and transferred out of thebasin. There are no active landfill sites within TWSA member boundaries or the Tahoe Basin.

Household Hazardous Waste (HHW) collection sites and collection days are located throughout thebasin, in order to provide an easy way for homeowners to drop off small quantities of home- generated wastes, potentially harmful to water quality if disposed on improperly. HHW Sites are maintained at Incline Village GID (NV), Tahoe Douglas Fire Protection District (NV) and the Cabin Creek and South Tahoe Refuse Transfer Stations (CA). These programs offer a valuable service to water quality protection, by offering services for proper disposal of toxic substances. The IVGID sitehandles approximately 30 ton of combined HHW/electronic waste materials annually.

Don't Trash Tahoe

Over the past several years, the presence of litter and trash in the communities and on public lands has been gaining local and national attention. He League to Save Lake Tahoe has been spearheadingmonthly cleanups around the basin, and organizing community teams called "Tahoe Blue Crews". www.keeptahoeblue.org/our-work/shoreline-protection/tahoe-blue-crew-why .

IVGID Waste Not and other area partners host episodic volunteer trash cleanup events for theIncline Village, Crystal Bay, NV and Tahoe Nevada (east shore) regions.

The **Tahoe Take Care** campaign provides multiple outreach messages on stewardship actions for locals and visitors. https://takecaretahoe.org/ . This topic was great expanded in 2020 with new messaging developed about reducing plastic waste, refilling with tap water, and other messages. Many of the top suggestions touch on existing Waste Not /TWSA outreach messages and programs.

Clean Tahoe Program
Since 1988, Clean Tahoe has provided litter cleanup service to the City of South Lake Tahoe and El Dorado County. Field crew workers drive regularly scheduled routes throughout neighborhoods and remove visible litter and illegally dumped items. In all, more than 350 miles of public thoroughfares are serviced in South Tahoe alone. They also respond to calls each day from citizens reporting illegally dumped items and animal-in-trash incidents. The Clean Tahoe field crew is also responsible for servicing certain trash and recycle cans throughout the communities.

2021 North Shore Expansion: A unified agency response for on-going litter and trash issues emerge for Tahoe's north shore; with the opening of a Clean Tahoe Team office in Kings Beach; servicing Truckee, Kings Beach, Tahoe City, Incline Village, and Crystal Bay**.** A $350,000+ investment by multiple jurisdictions and was pooled for this one year pilot.

Cigarette Butts
IVGID Waste Not/TWSA, the League to Save Lake Tahoe and Keep America Beautiful have teamedup on a cigarette butt bin disposal project to place 250 bins at high use areas. To date, half have been installed in the inaugural year of distribution.
https://www.keeptahoeblue.org/news/press-releases/250-cigarette-butt-collection-canisters-to-be- installed-at-lake-tahoe

Cigarette Canister Program Keeps Butts out of Lake Tahoe
https://takecaretahoe.org/success-stories/cigarette-cannister-program-keeps-butts-out-of-lake- tahoe/

"Stop at a Tahoe beach, popular trail or parking lot after any nice day in the Basin, and you're boundto find cigarette butts littered on the ground. They're unavoidable. In fact, at volunteer clean-up events organized by the League to Save Lake Tahoe (the League), cigarette butts were the top collected trash item in 2018. In that year alone, volunteers picked up more than 27,600 butts!

In June of 2019, the League to Save Lake Tahoe and the Tahoe Waters Suppliers Association launched a program to combat cigarette litter. Their initiative calls for distributing an initial 250 cigarette butt collection canisters at high-use locations around Lake Tahoe. You can spot them bytheir Take Care Tahoe and Keep Tahoe Blue branding. The aim of the "Tahoe Cigarette Disposal Program" is to reduce toxic chemicals from littered cigarette butts leaching into the environment inorder to protect wildlife, reduce litter on Lake Tahoe's shoreline and protect Lake Tahoe's famed water clarity.

As of December 2020, 125 cigarette canisters have been installed at key locations, including trailheads, beaches and businesses. The cigarettes collected in the canisters are gathered and shipped to TerraCycle, a recycling and waste reduction organization. The program has thus far been a success, and there are plans to install more than the initial round of250 canisters. The League to Save Lake Tahoe, in collaboration with its partners, continue to organize volunteer community clean-up events around the Basin after popular vacation dates like Labor Day weekend, the 4th of July and Earth Day.

If you are a business owner who would like to adopt and install a canister, or if you are a concernedcitizen

who would like to inform the League of a hot spot where a canister would help, please email cigarettedisposal@keeptahoeblue.org. "

Over 27,600 cigarette butts picked up at Keep Tahoe Blue cleanups in 2018 - Lake Tahoe, CA
The League to Save Lake Tahoe and the Tahoe Waters Supplies Association (TWSA) are in the process of distributing an initial run of 250 cigarette butt collection canisters at key locations aroundLake Tahoe. The aim of the Tahoe Cigarette Disposal Program is to reduce toxic chemicals from littered cigarette butts from leaching into the environment, to protect wildlife, and to reduce litter on Lake Tahoe's shoreline and vicinity. The program came about after the League noticed that
cigarette butts were the top collected items at cleanup events. At the League's most recent cleanups this month (the Tahoe City Cleanup and the Bike Path Cleanup) over 4,500 cigarette butts were collected. Last year more than 27,600 cigarette butts were collected in and around Lake Tahoeby the League. That number was a call to action.

"We are so excited to be partnering with the TWSA to build the awareness that cigarette butts are atoxic form of litter that doesn't biodegrade," said Marilee Movius, community engagement managerfor the League. "With the help of these new cigarette butt canisters, it will be easy for everyone to properly dispose of cigarette butts and Keep Tahoe Blue. We are looking forward to collecting data
to analyze again next year and hoping to see a dramatic drop in the amount of cigarette litter," sheadded. An estimated 98 percent of cigarette filters are made of plastic fibers, which means they do not biodegrade and can become a form of micro-plastic.

Micro-Plastics as an Emerging Contaminant
Micro-plastics have emerged as a potential contaminate of concern in freshwater surface waters, including Tahoe. Despite Tahoe's unique situation of a self-contained basin, with no major upstreaminfluences such as industrial discharges or sewage, recent research has shown micro-plastics to be present in both shoreline sediment samples. Probable vectors of distribution include atmospheric deposition and trash/ urban runoff. Two area research agencies are conducting micro-plastic sampling efforts, of open water, selected drinking water intakes and stormdrain sites.

TWSA and other partners initiated a special outreach campaign on this topic. Details are in Executive Summary section. Launching in October, 2019 IVGID/TWSA began working on an Nevada Division of Environmental Protection (NDEP) Nonpoint Source (NPS) Program Grant for the proposal titled "Pilot Project to Reduce Sourcewater Plastic Pollution in Lake Tahoe" , approved for grant funding up to the amount of $61,995.00.

In additional, NDEP secured $25,000 in funding from the 2019 Multipurpose Grant to support alimited scope of research described in the proposal "Baseline Plastics Research on the Fate of Plastics in Lake Tahoe."

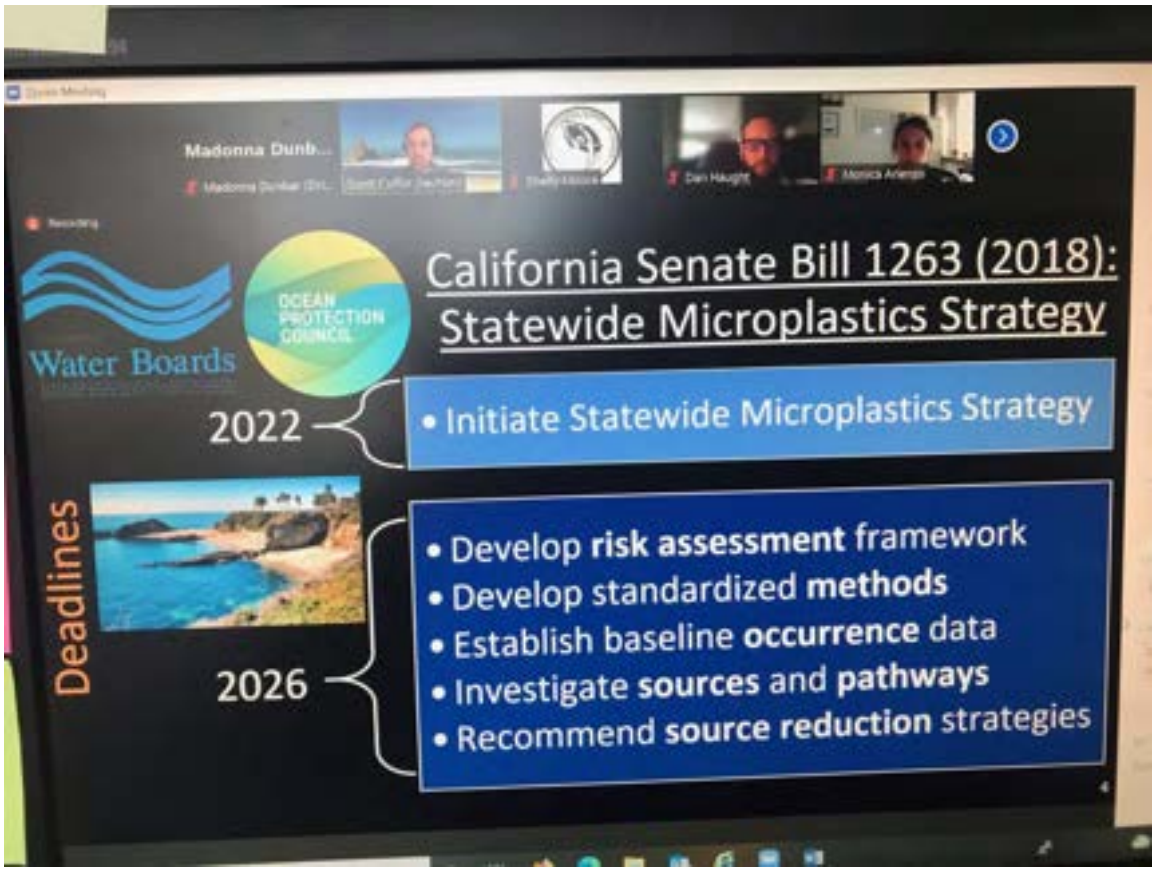
CA Begins Program to Monitors Microplastics in Drinking Water
https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/microplastics.html

On March 19, 2020, a proposed definition of 'microplastics in drinking water' to be considered for adoption by the State Water Board was made available, along with a draft Staff Report. A proposed definition of 'microplastics in drinking water' prepared on February 1, 2020 was reviewed by an external panel of experts. The draft definition reviewed by the expert panel and their comments comments are available.

As stated in Health and Safety Code section 116350 *et seq.*, California Safe Drinking Water Act (Act) requires the State Water Resources Control Board (State Water Board) to administer provisions related to drinking water to protect public health. The Act allows the State Water Board to conduct research, studies, and demonstration programs to ensure provision of a dependable, safe supply of drinking water, which may include improving methods to identify and measure the existence of contaminants in drinking water and to identify the source of the contaminants. The Act also grants the State Water Board the authority to implement regulations that may include monitoring of contaminants, and requirements for notifying the public of the quality of the water delivered to customers.

On September 28, 2018, Senate Bill No. 1422 was filed with the Secretary of State , adding section 116376 to the Health and Safety Code, and requiring the State Water Board to adopt a definition of microplastics in drinking water on or before **July 1, 2020**, and on or before **July 1, 2021**, to adopt a standard methodology to be used in the testing of drinking water for microplastics and requirements for four years of testing and reporting of microplastics in drinking water, including public disclosure of those results.

Press Release: State Water Board addresses microplastics in drinking water to encourage public water system awareness (06/16/2020)



Big Problems in Tiny Pieces
Researchers conduct complementary research to determine the threat of microplastics at Lake Tahoe
https://storymaps.arcgis.com/stories/0a2ceba61c47470e8e18566268f9bfcf
January 19, 2021

Microplastics originate from people but they enter the environment in a number of ways. Scientists have narrowed down some likely sources including wastewater, litter, roadways, storm drains, and deposition from the atmosphere. TERC and DRI are studying several of these potential sources to Lake Tahoe.

Litter has long been a concern around Lake Tahoe, and is assumed to be a primary avenue for microplastics getting into the lake. Litter left on beaches or entering the water directly from recreational boating are the most likely pathway. Streams and storm drains that flow into the lake pick up and carry plastic on their way to Lake Tahoe. The League to Save Lake Tahoe (Keep Tahoe Blue) and DRI collaborate on a citizen science project to collect storm drain water for microplastics testing.

Roadways are a major contributing source of microplastics as tires are commonly made of synthetic rubber (plastic) which wears down over time. These small pieces of tire can easily wash into the lake through storm drains.

Wastewater, which is domestic, industrial, commercial, or agricultural water that has been contaminated by human use, can be a major source of microplastics in many places. Synthetic fibers from clothing, such as synthetic fleece, enter wastewater as they shed off of clothing in washing machines. However, because domestic and commercial wastewater is pumped out of the Lake Tahoe Basin, it is not a source of microplastics in the Basin.

Media Coverage of Trash and Plastics Issue

The microplastics project has received extensive media coverage. A sampling:

https://www.kolotv.com/2020/07/02/raleys-working-with-tahoe-organizations-and-uc-davis-to-reduce plastic-waste/
https://www.sierrasun.com/news/environment/microplastic-cleanup-research-continues-at-lake-tahoe/
https://www.tahoedailytribune.com/news/microplastic-clean-up-research-continues-at-lake-tahoe/?fbclid=IwAR0ZrNliqsQD21ULLd0GsJrFmsEffgh3r2lg8wG7EQQS01oMkzxNnuQQaTk
https://www.ktvn.com/story/42349550/incline-village-raleys-encourages-customers-not-to-buy-plastic-water-bottles-as-part-of-new-initiative
https://www.sierrasun.com/opinion/columns/darcie-goodman-collins-tina-dvon-gallier-save-lake-tahoe-from-single-use-plastics/
https://www.sierrasun.com/news/the-fate-of-plastics-in-lake-tahoe/
https://www.sierrasun.com/news/environment/clean-up-the-lake-pulls-more-than-8200-pounds-of-trash-from-tahoe-donner/
https://www.sierrasun.com/news/pack-it-in-pack-it-out-locals-protest-surge-of-litter-left-in-truckee-tahoe-area/
https://www.sierrasun.com/news/power-of-the-people-how-truckee-tahoe-locals-are-taking-to-beaches-to-clean-up-litter-left-by-visitors/
https://www.sierrasun.com/news/placer-county-temporarily-increases-trash-service-in-north-lake-tahoe/
https://www.sierrasun.com/news/environment/trash-problem-piling-up-around-lake-tahoe/
https://www.sierrasun.com/news/litter-mitigation-on-tap-at-truckee-town-council/
https://www.sierrasun.com/news/mitigating-microplastics-what-types-of-plastics-are-getting-into-lake-tahoe-and-landing-on-beaches/
https://www.sierrasun.com/news/community/moop-the-lake-collects-over-200-pounds-of-trash/
https://takecaretahoe.org/success-stories/raleys-is-first-tahoe-area-grocery-store-to-encourage-customers-not-to-buy-single-use-water-bottles/
https://www.tahoedailytribune.com/news/partnership-aims-to-get-more-people-drinking-tahoe-tap-water/

Microplastics are found in Lake Tahoe's waters for first time ever (8/26/19)

https://www.latimes.com/environment/story/2019-08-26/lake-tahoe-microplastic-pollution- detected

LAKE TAHOE, Calif. — Scientists have detected microplastic pollution in Lake Tahoe's deep bluewaters for the first time. Now they are trying to determine its source and potential harm to thelake's flora and fauna. Preliminary analyses of water samples collected by researchers at the Desert Research Institute in Reno revealed the presence of particles of synthetic fiber and bits of red and blue plastic no bigger than the head of a pin. "On one level, we're heartbroken and disappointed by this discovery," said Monica Arienzo, an assistant research professor at the institute and leader of the investigation. "We really hoped wewouldn't find much of this material in Tahoe's water, which is almost entirely snowmelt." At the same time, she said, the team is looking forward "to diving deep into the many questions and concerns it raises."

Tracing the particles to their source won't be easy. Recent studies have shown that particles from discarded plastic products — flip-flops, toys, toothbrushes, water bottles, synthetic clothing, Styrofoam packaging and myriad others — can be transported long distances through the atmosphere by wind, rain and falling snow. As a result, the pollution in the basin cradling Tahoe's water could be local, or from locations aroundthe world. "Right now, we're not sure where it came from," Arienzo said. "But we're definitely goingto try and figure it out."

The finding complicates a long struggle against erosion, sewage effluent, unbridled development, invasive clams and algae to save the lake, 6,225 feet in elevation. Federal state and local governments have spent more than $2 billion over the last six decades buying land and developingerosion control and wetlands restoration projects.

It didn't take long for the researchers, part of the Nevada System of Higher Education, to find what they were looking for. They used a system of pumps, funnels, tubing and filters to collect watersamples 20 feet from the water's edge at six locations, including areas of both high and low human activity.

The sampling was conducted throughout the spring at Tahoe Keys, a popular boating resort; Emerald Bay State Park, where boat access is limited; and at three stormwater outfalls into Lake Tahoe. The work was done in collaboration with the nonprofit League to Save Lake Tahoe's citizenscience program.

The team also collected water samples at other Nevada waterways including Lake Mead and the LasVegas Wash. To isolate particles caught in the filters, researchers oxidized organic matter such as insects, twigsand algae. Next, a high-density liquid-separation method was used to allow sediments to settle tothe bottom and plastics to float to the top. The team has since been examining the particles they collected under powerful microscopes forclassification by size, shape, color, GPS coordinates and chemical composition.

Microplastic debris is an emerging concern among scientists and environmentalists. Researchersrecently found surprisingly high levels of microplastics in Arctic snow, demonstrating the global reach of these tiny particles of pollution.

About 245 million tons of plastic are produced annually around the world, according to industry estimates. That represents 70 pounds of plastic annually for each of the 7.1 billion people on theplanet, scientists say. Microplastics, potentially toxic and not biodegradable, have become a ubiquitous contaminant inthe Pacific Ocean and seas around the world, scientists say. Much of it comes from densely populated coastal watersheds such as Southern California.

By contrast, the study of microplastics in freshwater alpine lakes such as Lake Tahoe is still in its infancy.

https://www.sierrasun.com/news/the-fate-of-plastics-in-lake-tahoe/

FREE | Vol. 148 • No. 181



The fate of plastics in Lake Tahoe?

JOE PROUDMAN / UC DAVIS

UC Davis staff Research Associate Katie Senft checks the sand for plastic at Incline Beach, Lake Tahoe. While the majority of research on microplastic and the environment has centered on oceans, UC Davis Tahoe Environmental Research Center (TERC) researchers are studying Lake Tahoe's plastic pollution to gain insights on the fate of the lake.

Michelle Gartner
Special to the Sierra Sun

If the sun hits the blue waters of Lake Tahoe just right, and it's a calm day off the point where the Cal Neva Resort & Casino sits quiet, stand up on your paddleboard or lean over the bow of your kayak and look for plastic floating on the surface or at varying depths.

Following major wind events, you might find a mini "garbage patch" forming on the surface.

Surface currents formed by wind create two large systems of rotating currents that mimic an ocean gyre, one on the north end of the lake and one on the south. Gyres are generated by three phenomena: global wind patterns, Earth's rotation and Earth's landmasses. The mountains affect wind patterns in the lake allowing smaller gyres to also manifest near the shoreline, in coves or around inlets.

> "The research UC Davis is doing right now is looking at the fate of the microplastics (in Lake Tahoe) ... because most of the research that has been done on microplastics and plastic pollution has been based on oceans."
>
> — **Heather Segale**
> Tahoe Environmental Research Center education and outreach director

The large gyre near the North Shore circles counter-clockwise and on the south another circles clockwise, coaxing plastics as well as other debris to collect in specific areas of the lake. Litter on the North Shore can get carried west from Sand Harbor to Hidden Beach and continue to Kings Beach.

As a result, patches of plastics can be seen in the water within a couple of hundred yards from the shore, specifically between the spot where old hot springs sit at Brockway Springs Drive and Stateline Point near the Cal Neva.

UC Davis, Tahoe Environmental Research Center (TERC) researchers created a computer simulation of surface currents for a 2-1/2 day period in August.

"The currents are 'driven' by the wind, which is recorded every 10 minutes on buoys and docks at 13 locations at Lake Tahoe," explained Professor S. Geoffrey Schladow and a team of researches with the Tahoe Environmental Research Center.

"At the beginning of the model run (time 0) a set of colored 'balls' are distributed across the lake surface – a different color in each quadrant. Watch as the currents then move them about. The green arrows also show the current velocity and direction across the lake.

"While the motion may at first appear chaotic, notice

PLASTICS, 17

PLASTICS

From page 1

that there is a lot of regularity to the motion. There are two main circles (or gyres) that the bulls trace out. These gyres are usually anti-clockwise in the north, and clockwise in the south. Sometimes there are smaller gyres closer to shore, especially at the very south of the lake. Things to note are the time it takes these gyres to undergo a complete revolution (about 1.5 days) and the pulsating motion that the gyres exhibit. This is due to the daily variation in the strength of the winds at Lake Tahoe, with stronger winds typically occurring in the afternoon," said Schladow.

Understanding surface currents is important because currents are responsible for the transport of contaminants, invasive species, urban storm water and floating debris."

NEW STUDIES START

Heather Segale, TERC education and outreach director, talked about funding received to study the fate of microplastics in Lake Tahoe and how it will be utilized.

"The research UC Davis is doing right now is looking at the fate of the microplastics (in Lake Tahoe) ... because most of the research that has been done on microplastics and plastic pollution has been based on oceans."

Segale added, "More types of plastics will float and float longer (in salt water)" as compared to less dense fresh water where not as many types of plastic float and the ones that do, don't float as long.

Salt, temperature and pressure affect water density. Salt water is more dense than fresh water and as the temperature or pressure increases, density increases for both salt and fresh water.

Fresh water is most dense just above freezing, becoming less dense as water temperatures rise.

"Our research right now is looking at the fate of those plastics. Are they mostly staying at the top? The answer is no, not really," Segale said. "Are they going down... where the density gradient changes from where the warmer water sits on top of the colder water? Or are they sinking to the bottom? Or are they getting eaten up by the different filter feeders that are in the lake like kokanee salmon or zooplankton?"

At Hidden Beach in Nevada, debris gets pushed on shore after one of these wind events, Segale said, emphasizing "the amount of plastic we found these couple of times that we're gone after a wind event is just incredible."

Where plastics get deposited and what effects the Lake Tahoe environment have on the plastic is something UC Davis TERC is looking to learn.



PHOTO BY MICHELLE GARTNER

Trash collected from the garbage patch that forms between the hot springs and Stateline Cal Neva point.

8,000 POUNDS PULLED OUT

According to the United States Department of Justice, it wasn't that long ago that dumping became illegal in the U.S.

"Beginning in the 1970s, Congress enacted a set of laws to protect the nation's air, water, and lands from uncontrolled pollution," the Justice Department website states. "These laws responded to the consequences of unregulated industrial development that had fooled those resources to the point where rivers were not fishable, air was unhealthy to breathe, and land contamination put Love Canal at the forefront of national consciousness."

Over 8,000 pounds of garbage have been pulled out of both Lake Tahoe and Donner Lake over the last two years. In addition to the obvious pieces of plastic from trash not properly disposed, smaller pieces often invisible to the naked eye are also being carried by Tahoe's currents around the lake.

"We are seeing lots of trash from decades ago, things like a bicentennial diet Pepsi can," said Colin West of Clean Up the Lake, which over the last two months managed crews that pulled up most of that garbage.

Storm water, air and humans are likely the only things contributing to the plastics in Lake Tahoe, as there is no waste water allowed to be discharged into the lake.

Polypropylene sandbags are one an example of what could be adding to the microplastics in Lake Tahoe. Tarps made of the same material are also commonly used around the lake to cover boats, kayaks and protect things from the wind and the sun's rays, the exact thing that speeds up the deterioration of the plastic.

Ultraviolet rays "increase the degradation rate" of woven polyethylene. Sandbaggy, a high-end manufacturer, states "our sandbags have 1600 (hours) of UV protection, meaning they can last for about six months under the sun before deteriorating." Yet, at a minimum, most sandbags used for construction on the shores of Lake Tahoe are in place for the duration of a two-year building permit.

It's important to note that larger projects often take several years to complete.

"My research so far has not shown a definitive remove-by date," said Jeff Cowen, public information officer with the Tahoe Regional Planning Agency. "However, since we do not allow this kind of pollution, there may be a guideline somewhere that needs to be better described."

Michelle Gartner is a freelance writer who lives in Gardnerville, Nevada.

Hazardous Algae Blooms (HABs)
A live and archive portal is maintained at:
https://www.waterboards.ca.gov/lahontan/water_issues/programs/swamp/harmful_algal_blooms.html

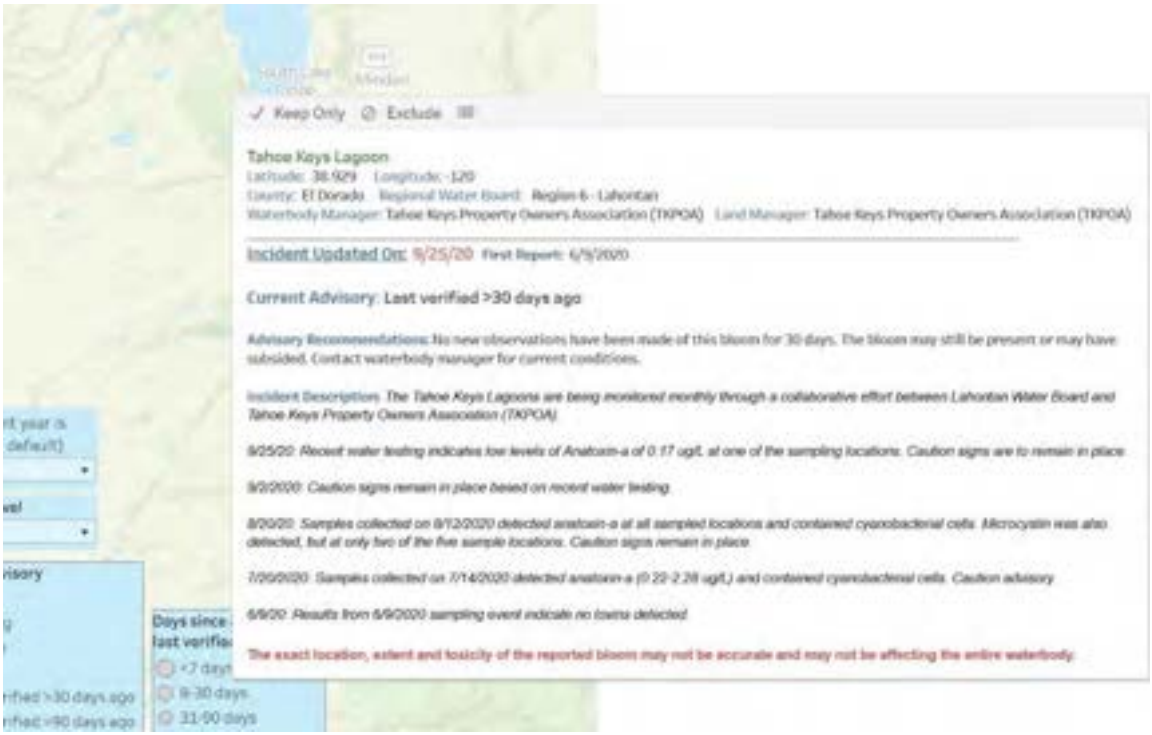
Freshwater CyanoHABs Program (Blue-Green Algae)
https://www.waterboards.ca.gov/water_issues/programs/swamp/freshwater_cyanobacteria.html

Observations of harmful algal blooms (HABs) and algal toxins have increased globally in recent years. HABs are problematic because they can affect multiple beneficial uses including recreation, aquatic life, and drinking waterby reducing aesthetics, lowering dissolved oxygen concentration, causing taste and odor problems, and producing potent toxins.

See an algae bloom? Click here to report it!

Water Board staff are working with state and local entities to identify and respond to HAB incidents throughout California. The Water Board first began to formally address this issue in 2005 when it formed the Blue Green Algae Work Group, later renamed the California Cyanobacteria Harmful AlgalBloom Network (CCHAB). An initial product of this group was the Voluntary Guidance Document (original release 2010, updated 2016). Subsequently, SWAMP prepared California Freshwater HAB Assessment and Support Strategy to articulate a coordinated program to assess, communicate and manage HABs in California. Since then staff at both the State and Regional Water Boards have worked to coordinate monitoring and follow up when algal blooms are detected. SWAMP has also developed the infrastructure (bloom reporting form, guidance documents, field and lab procedures, etc.) to support the strategy and to coordinate monitoring when blooms are detected.

HAB Incidents (Tahoe region): Visit https://mywaterquality.ca.gov/habs
Suspected algae blooms are reported in Lahontan's Sierra and Lake Tahoe regions in each summer.
http://southtahoenow.com/story/08/26/2019/algae-testing-underway-water-south-lake-tahoe- beach



Spill Incidents for the Reporting Year

Spill information is compiled annually from the Nevada Division of Environmental Protection SpillReporting Program and the Lahontan Regional Water Quality Control Board records. The list includes incidents occurring on the Nevada and California sides of the lake. The list is not comprehensive to include all incidents.

Nevada Tahoe area spills are reported as they occur, to TWSA through the

NDEP Spill Hotline notification system: https://nevadaenvironmentalactivities.ndep.nv.gov/Spill/ReportForm.aspx

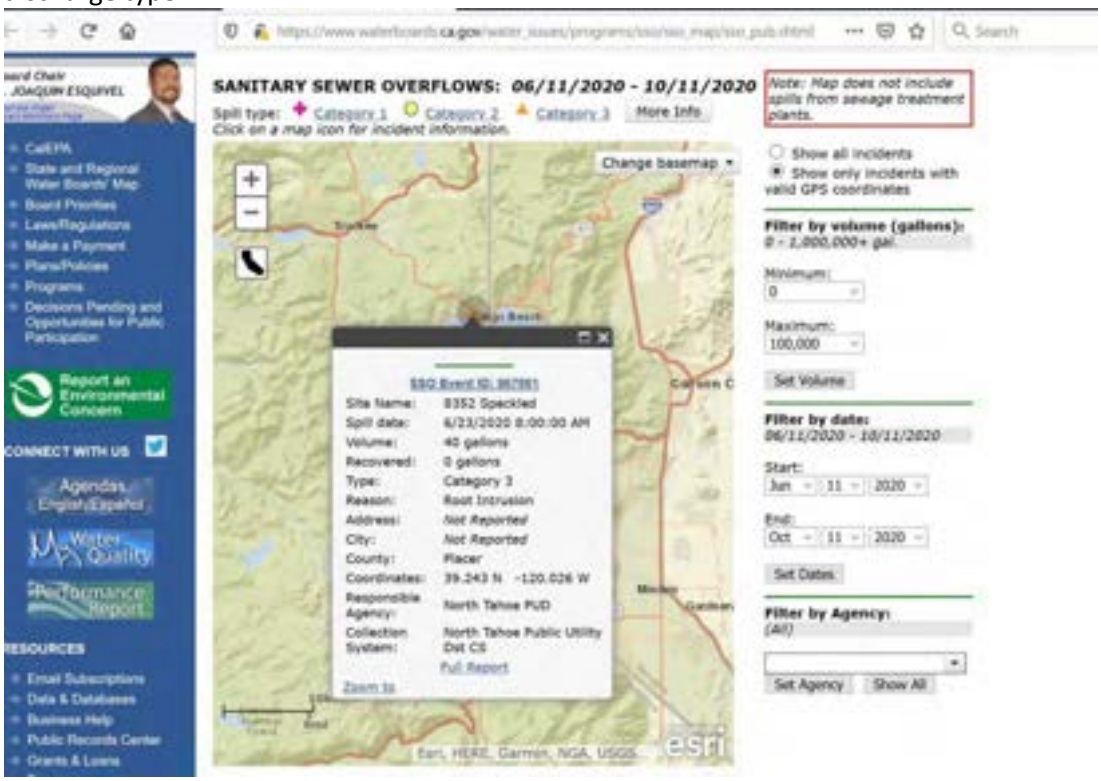
Telephone: 1-888-331-6337

Each year, TWSA staff receives a summary of spills which are reviewed.This information is requested from NDEP annually, contact is Rebecca Bodnar (Rebecca.bodnar@ndep.nv.gov) .

In California, there are new resources available to track hazardous waste spills, including an annual state-wide sanitary sewer overflow compliance report:
https://www.waterboards.ca.gov/water_issues/programs/sso/docs/ .
A search of this database yields several small incidents for the reporting year.

Sanitary Sewer spills are reported via the California Water Board Web Portal:
http ://www.waterboards.ca.gov/water_issues/programs/ciwqs/publicreports.shtml#sso

This portal focuses on sanitary sewer overflow reports. The reports are logged on an interactive mapby discharge type.



Sanitary Sewer Overflows (SSOs) Reports

Interactive SSO Report

Sanitary sewer system agencies covered under Statewide General Waste Discharge Requirements for Sanitary Sewer Systems (WQO No. 2006-0003-DWQ), referred to as Enrollees, are required to report all SSOs for which their agency has responsibility into the State Water Resources Control Board's SSO database. Enrollees are also able to report sewage discharges from privately owned laterals or collection systems, for which the Enrollee has knowledge of the event but is not responsible, on a voluntary basis. These discharges are known as private lateral sewage discharges (PLSDs) and are separate from SSOs. Please visit the SSO

Program Web Page for additional information on SSO reporting and the State Water Board's regulatory efforts to reduce the numbers and volumes of SSOs statewide.

The SSO Report allows users to view summary information of SSOs and private lateral sewage discharges reported by Enrollees as well as complete reports submitted for specificsewage discharge locations

Public Sewage Spill Incident Map

These interactive geographic information system (GIS) maps, updated nightly, plot allcertified sanitary sewer overflows (SSOs) and Private Lateral Sewage Discharges fromsanitary sewer collection systems (not including any spills from wastewater (sewage) treatment plants), reported by agencies into the state's online California Integrated Water Quality System. This includes the spill location, amount, source, and name of the responsibleor reporting agency.

Private Lateral Spill Incident Map

A second map allows users to see Private Lateral Sewage Discharges, voluntarily reported from enrollees in the program from pipes which empty into public sewer collection systems.Private lateral spills are caused from failures in pipes that tie private businesses and homes into the public sewer collection system, and are maintained by individual property owners. They often suffer from overflows which can affect public sewer collection systems.

SSO Data Flat Files

The CIWQS SSO database provides information entered by Enrollees of General Order 2006-0003-DWQ. The data are available to the public, agencies, and interested stakeholders. The data files include: Enrollee spill data, no-spill certification statements, private lateral sewagedischarges, sewer system management plan elements data, and sanitary sewer facility information.

Storm Water Facilities Reports

https://www.waterboards.ca.gov/water_issues/programs/ciwqs/publicreports.html#facilities

Facility-At-A-Glance

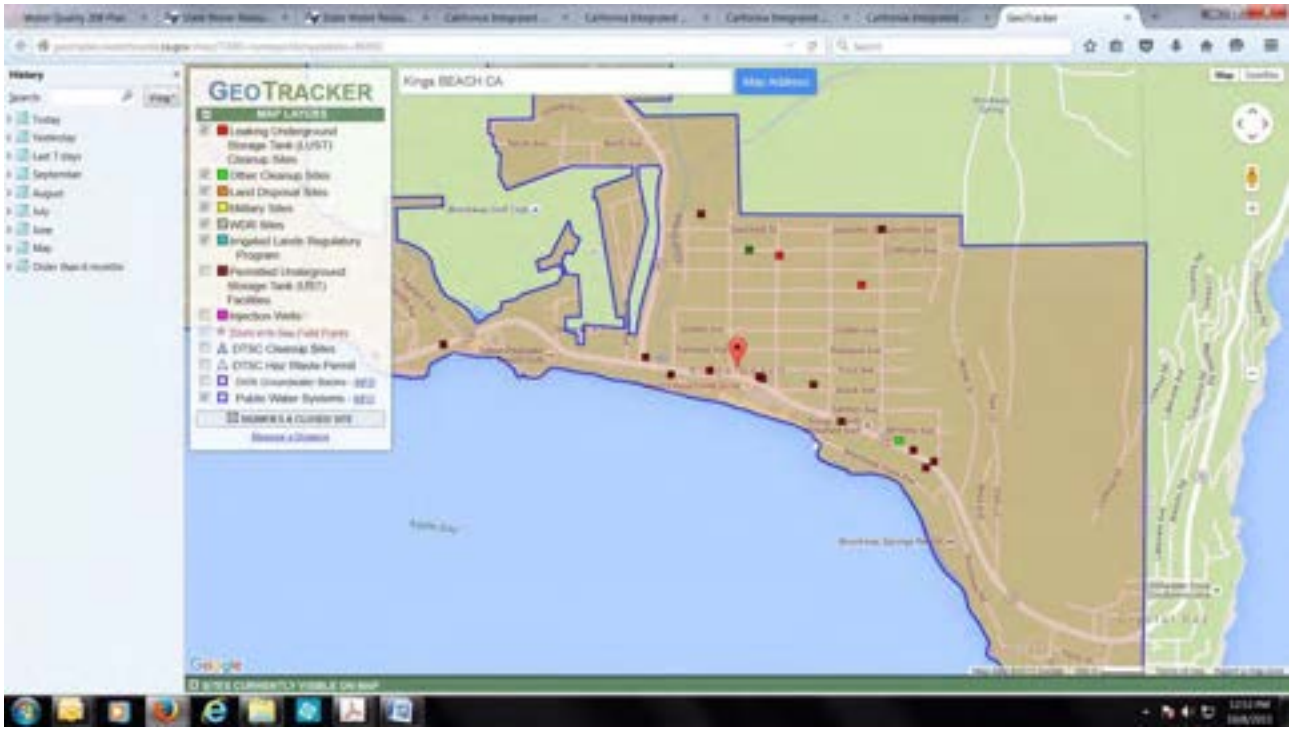
This report allows users to view a wide range of information regarding a specific facility onone screen. This includes owner, violations, inspections, and orders and other regulatory measures issued to a facility. For more information about the report and how to navigate,we have developed a Fact Sheet.

Interactive Regulated Facilities Report

This report allows the user to display information by city, county, or region. The user canselect a program, agency type, and permit status. They are then shown a summary tablebased on their criteria, which enables them to drill down for more information.

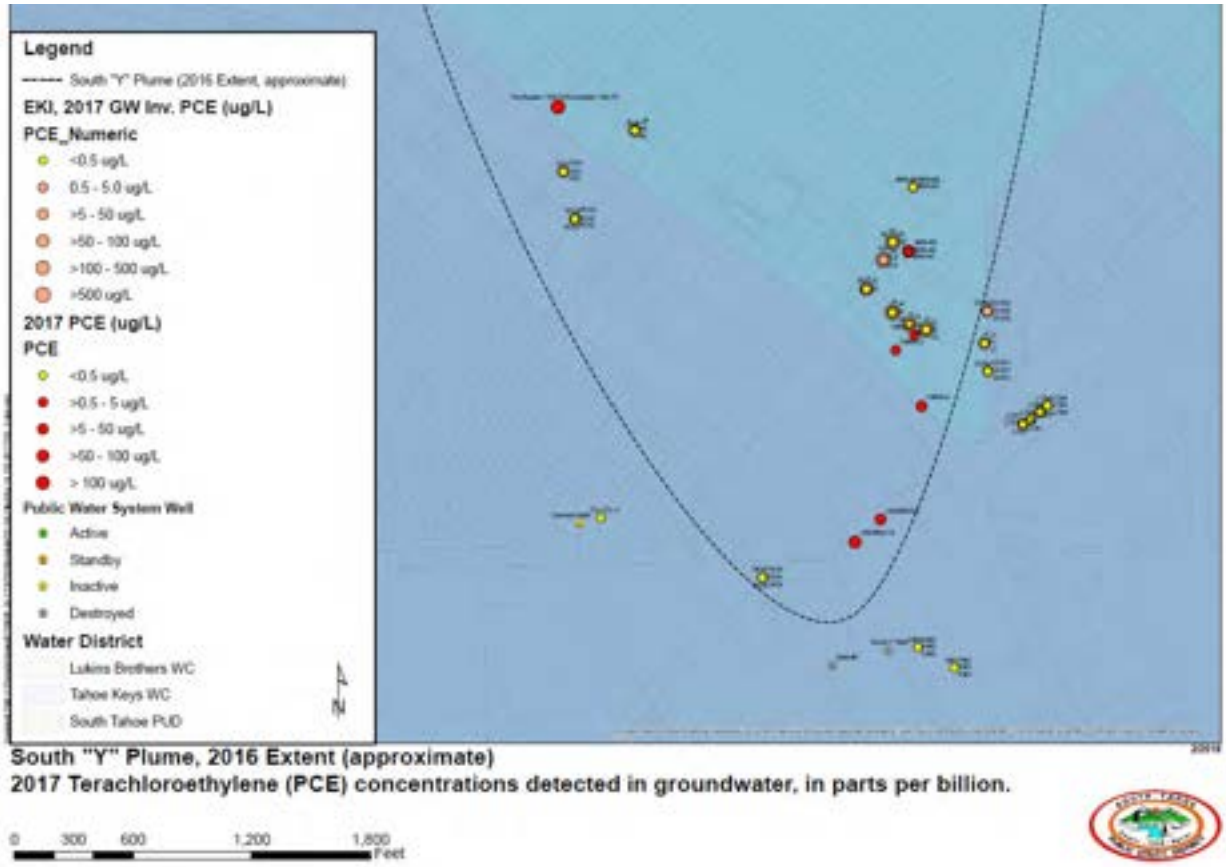
SMARTS Database – Click on the "Public User Menu" button on the SMARTS website

In addition, the CA Water Board operates **Geotracker** an **interactive database on former and current hazardous waste sites** at: http://geotracker.waterboards.ca.gov/map/?CMD=runreport&myaddress=89450



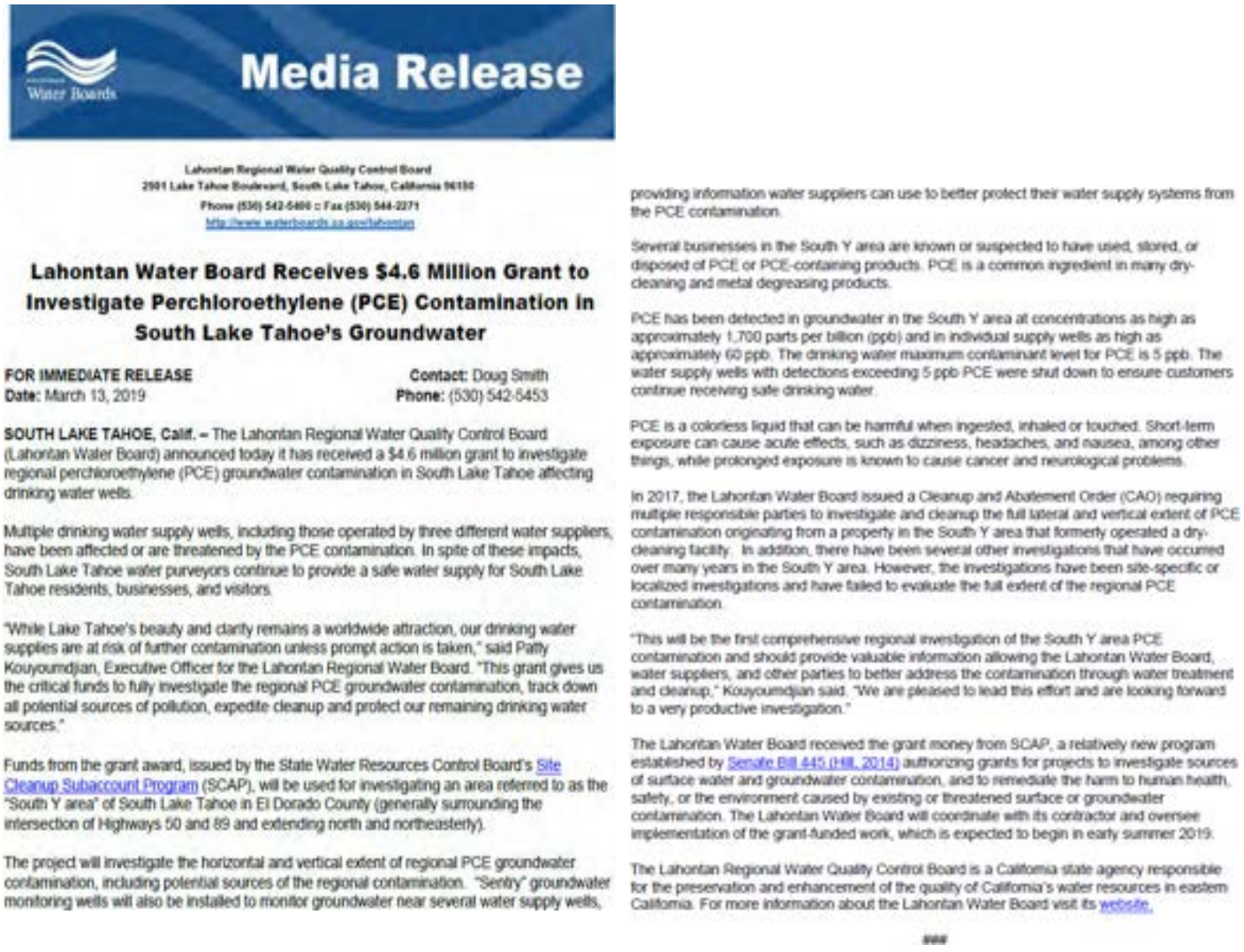
PCE and Uranium levels create groundwater contamination in South Lake Tahoe
These contaminants are not an immediate concern for Lake Tahoe surface water, however groundwater contamination is a growing concern in the south Tahoe Basin. Surface water can be influenced by groundwater, and directional flow is towards the lake. These issues are being monitored by TWSA staff.

PCE Groundwater Contamination at South Tahoe "Y" Area
https://stpud.us/groundwater
In 1989, the contaminant tetrachloroethylene (PCE) was first found in drinking water wells near the intersection of Highways 50 and 89, referred to locally as the South "Y" area. Today, the PCE remains in groundwater and forms a contaminant plume believed to cover an area of more than 400 acres. PCE is a manmade chemical that was used from the early 1960s through the mid-1980s as a solvent for dry cleaning clothes and degreasing metal. During the late 1980s, concerns about the toxicity of PCE led Federal and State environmental agencies to list PCE as a probable carcinogen and as a toxic pollutant. Presently, five public drinking water wells in the South "y" area have been impaired by the PCE Plume. None of (STPUD's) District wells are currently affected. When PCE is detected in a well, the well is shut down and treatment is added to remove the contaminant; or an alternative source of drinking water supply is provided. Water suppliers and regulatory agencies in the South Lake Tahoe area are working together to protect and sustain our groundwater resource ensuring that safe drinking water is provided to all of our customers.



- Fact Sheet
- Frequently Asked Questions
- Press -Since the contaminant tetrachloroethylene (PCE) was first found in drinking water wells near the South “Y” in 1989, the issue has been extensively covered in the news.
- Public Meeting Flyer
- PCE Plume Map (LARGE)
- Groundwater at the South Y (Groundwater Partnership, February 7, 2018)
- South Y Pre-Design Investigation Workplan (Agreement D1712508) (KJC, March 23, 2018)
- Baseline Health Risk Assessment (KJC, January 2019)
- Groundwater Fate and Transport Modeling Report (DRI, June 2019)
- Pre-Design Investigation Report (KJC, July 2019)
- Groundwater Fate and Transport Modeling Report – Addendum (DRI, September 2019)
- Feasibility Study Report (KJC, May 2020)
- Interim Remedial Action Plan (KJC, May 2020)
- Public Webinar IRAP Presentation (03/31/2020)
- Responsiveness Summary (STPUD, 6/12/2020)

Lahontan Water Board Issues Cleanup Order for PCE Contamination in South Lake Tahoe
STPUD update on the PCE groundwater contamination in South Lake Tahoe (www.STPUD.us):



Water Boards

Media Release

Lahontan Regional Water Quality Control Board
2501 Lake Tahoe Boulevard, South Lake Tahoe, California 96150
Phone (530) 542-5400 :: Fax (530) 544-2271
http://www.waterboards.ca.gov/lahontan

Lahontan Water Board Receives $4.6 Million Grant to Investigate Perchloroethylene (PCE) Contamination in South Lake Tahoe's Groundwater

FOR IMMEDIATE RELEASE
Date: March 13, 2019

Contact: Doug Smith
Phone: (530) 542-5453

SOUTH LAKE TAHOE, Calif. – The Lahontan Regional Water Quality Control Board (Lahontan Water Board) announced today it has received a $4.6 million grant to investigate regional perchloroethylene (PCE) groundwater contamination in South Lake Tahoe affecting drinking water wells.

Multiple drinking water supply wells, including those operated by three different water suppliers, have been affected or are threatened by the PCE contamination. In spite of these impacts, South Lake Tahoe water purveyors continue to provide a safe water supply for South Lake Tahoe residents, businesses, and visitors.

"While Lake Tahoe's beauty and clarity remains a worldwide attraction, our drinking water supplies are at risk of further contamination unless prompt action is taken," said Patty Kouyoumdjian, Executive Officer for the Lahontan Regional Water Board. "This grant gives us the critical funds to fully investigate the regional PCE groundwater contamination, track down all potential sources of pollution, expedite cleanup and protect our remaining drinking water sources."

Funds from the grant award, issued by the State Water Resources Control Board's Site Cleanup Subaccount Program (SCAP), will be used for investigating an area referred to as the "South Y area" of South Lake Tahoe in El Dorado County (generally surrounding the intersection of Highways 50 and 89 and extending north and northeasterly).

The project will investigate the horizontal and vertical extent of regional PCE groundwater contamination, including potential sources of the regional contamination. "Sentry" groundwater monitoring wells will also be installed to monitor groundwater near several water supply wells, providing information water suppliers can use to better protect their water supply systems from the PCE contamination.

Several businesses in the South Y area are known or suspected to have used, stored, or disposed of PCE or PCE-containing products. PCE is a common ingredient in many dry-cleaning and metal degreasing products.

PCE has been detected in groundwater in the South Y area at concentrations as high as approximately 1,700 parts per billion (ppb) and in individual supply wells as high as approximately 60 ppb. The drinking water maximum contaminant level for PCE is 5 ppb. The water supply wells with detections exceeding 5 ppb PCE were shut down to ensure customers continue receiving safe drinking water.

PCE is a colorless liquid that can be harmful when ingested, inhaled or touched. Short-term exposure can cause acute effects, such as dizziness, headaches, and nausea, among other things, while prolonged exposure is known to cause cancer and neurological problems.

In 2017, the Lahontan Water Board issued a Cleanup and Abatement Order (CAO) requiring multiple responsible parties to investigate and cleanup the full lateral and vertical extent of PCE contamination originating from a property in the South Y area that formerly operated a dry-cleaning facility. In addition, there have been several other investigations that have occurred over many years in the South Y area. However, the investigations have been site-specific or localized investigations and have failed to evaluate the full extent of the regional PCE contamination.

"This will be the first comprehensive regional investigation of the South Y area PCE contamination and should provide valuable information allowing the Lahontan Water Board, water suppliers, and other parties to better address the contamination through water treatment and cleanup," Kouyoumdjian said. "We are pleased to lead this effort and are looking forward to a very productive investigation."

The Lahontan Water Board received the grant money from SCAP, a relatively new program established by Senate Bill 445 (Hill, 2014) authorizing grants for projects to investigate sources of surface water and groundwater contamination, and to remediate the harm to human health, safety, or the environment caused by existing or threatened surface or groundwater contamination. The Lahontan Water Board will coordinate with its contractor and oversee implementation of the grant-funded work, which is expected to begin in early summer 2019.

The Lahontan Regional Water Quality Control Board is a California state agency responsible for the preservation and enhancement of the quality of California's water resources in eastern California. For more information about the Lahontan Water Board visit its website.

###

72% of the water supply in South Lake Tahoe is under threat from PCE contamination (see map). Immediate steps are necessary to protect South Lake Tahoe's drinking water supply. While Lahontan Regional Water Quality Control Board (Lahontan) is working to hold the polluters accountable, the water suppliers are taking a parallel track to protect South Lake Tahoe's community water supply from further contamination. The South Lake Tahoe water suppliers (South Tahoe Public Utility District, Lukins Brothers Water Company and Tahoe Keys Water Company) have met with Lahontan staff, State Water Resources Control Board staff and presented during the public comment period at the Lahontan Board meeting on September 13, 2018 on the immediate steps necessary to protect South Tahoe's drinking water supply.

As of August 2018, the following progress has been made: The State Water Board Division of Financial Assistance is moving forward with processing LukinsBrothers Water Company application to install granular activated carbon
(GAC) treatment to restore 750 gpm of lost water supply.

The State Water Board Division of Drinking Water requested South Lake Tahoe water suppliersdevelop an Emergency Response Plan to address the possible use of impaired sources for emergency response. A multi-agency Emergency Response Plan was identified as a priority by the water suppliers to ensure the continued availability of potable water. The water suppliers are applying for a planning grant through the Division of Financial Assistance to develop this plan. The Division of Drinking Water will help fast track the application.

Lahontan received SB445 funding to start a groundwater contaminant investigation (spring 2019) which would involve: regional plume delineation; installation of sentinel wells to monitorcontaminant movement; and contaminant source area identification.

Lahontan staff and the water suppliers plan to meet monthly to identify next steps and secure additional funds to address the PCE groundwater contamination. Lahontan plans to work with thewater suppliers to host quarterly public meetings to keep the public up to date on the PCE groundwater contamination clean-up process.

Uranium Detection in Tahoe Keys Wells
One Tahoe Keys well down due to uranium levels - no landscape irrigation allowed summer 2021
http://southtahoenow.com/story/03/16/2021/one-tahoe-keys-well-down-due-uranium-levels-no-landscape-irrigation-allowed

SOUTH LAKE TAHOE, Calif. - One well of the Tahoe Keys Property Owners Association (TKPOA) has been taken off line due to too much naturally occurring uranium in the water and there is high probability a second one will be shut down April 1, 2021. Due to this situation, TKPOA has informed all homeowners that landscape irrigation will be banned in the Tahoe Keys from April 1 to November 1, 2021.

Uranium in Well #2 exceeded the Maximum Contaminate Level (MCL) of 30 parts-per-billion (ppb) for uranium and it was taken off line in December 2020. "It is not uncommon to have elevated concentrations of uranium in areas with lots of granitic rock, such as the Tahoe Basin and throughout the Sierra Nevada," said Ben Letton of the Lahontan Regional Water Quality Control Board.

If the Division of Drinking Water (DDW) finds excessive levels of uranium in Well #3, it too will be required to be taken off line. Should that happen, just one well, the 50-year-old Well #1, will serve the Tahoe Keys commercial and residential properties. The Tahoe Keys Water Company (TKWC) will be limited to Well #1 and just one other viable water source, the South Tahoe Public Utility District intertie.

Well #1 can currently produce a maximum of 1,478 GPM and the STPUD intertie can supply a maximum of 478 GPM. This is a shortfall on average of 836 GPM or 601,920 gallons during high demand hours.

In comparison, water use with TKWC during the peak season from May – October 2020 produced 305 million gallons of water; this is 89 percent of the 340 million gallons of water produced for the entire year.

The TKWC is also concerned because the two water sources are geographically located on the eastside of the Tahoe Keys. Heavy demands between the eastside and westside of the Tahoe Keys would cause the water pressure to drop below the required threshold of 25 ‘pounds per square inch’ (PSI) on the westside requiring an ongoing, system-wide Boil Water notice.

Due to the real threat of not enough water to serve just personal water needs of residents, TKPOA sent a rule change to all water customers on March 13, starting a 28-day rule change review process. After 28 days the rule change goes to the TKPOA Board of Directors.

The landscape irrigation prohibition order will include all TKPOA common areas, all Cove Townhome landscaping, all single-family home landscaping, and commercial water customer properties landscaping. "It will be the Property Owners responsibility to notify their landscape contractors, and tenants if their property is rented, that irrigating has been suspended. Any penalties or fines for violating the 'Cease and Desist' order imposed by the Tahoe Keys Property Owners Association Board of Directors will be the sole responsibility of the property owner," said Daniel Larson, Tahoe Keys Water Company/Water Quality Manager, in the letter to property owners.

Once a permanent solution is in place for the TKWC to provide the required water service levels to allow for landscape irrigation and meet all other water demands this rule can be modified or repealed by the Board of Directors, as appropriate. Normally uranium in drinking water is removed with granulated activated carbon, with it absorbing impurities as the water passes through it. TKPOA and TKWC are working with MC Engineering to install temporary uranium treatment units at both Wells #2 and #3 to bring them back online in a limited capacity.

The Tahoe Keys is a 740-acre private marina community laced with eleven miles of inland waterways located at the southern tip of Lake Tahoe in South Lake Tahoe, California. Most of the 1529 members who own homes, townhouses or vacant lots.

Water Distribution from Well #3 (Uranium Contamination) summer 2021
https://tkpoa.com/water-shortage/water-distribution-from-well-3-uranium-contamination
Kirk Wooldridge July 4, 2021

"Due to the high water demand throughout the Fourth of July weekend, the Tahoe Keys Water Company (TKWC) is providing water from the TKWC Well #1, Lukins Brothers Water Company (LBWC) Inter-Tie, South Tahoe Public Utility District (STPUD) Inter-Tie and TKWC Well #3, in this order.

The TKWC Well #3 is currently providing water that is more than the Maximum Contamination Level (MCL) for Uranium that is determined safe by the Environmental Protection Agency (EPA) and the California State Water Resources Control Board (SWRCB) – Division of Drinking Water. The use of Well #3 water will vary throughout the time period of July 3rd, 2021 until July 12th, 2021, based on the water demand.

The SWRCB has provided guidance that providing water from these five sources (including Well #3) is the recommended current operation of the TKWC [ID# 0910015], rather than risk a low pressure event in the water system that would create boil water conditions. Even with the current Prohibition of Landscape Irrigation Rule the TKWC is unable to guarantee consistent water distribution without all five sources available for utilization.

The naturally occurring Uranium that has been detected in our TKWC Distribution System has required the shutdown of TKWC Well #2 through a SWRCB issued Citation (No. 01-09-21C-001) and based on recent test results a shutdown of Well #3 in the upcoming week is expected. Well #3 tested at 36 ppb on July 2nd, 2021, the MCL limit is 30 ppb.

The TKWC Staff will continue to monitor the Water Distribution System to minimize the use of the TKWC Well #3 through the time period of July 3rd, 2021 until July 12th, 2021, through manually operating the system.

Be assured the TKPOA is taking these unfortunate circumstances very seriously, and the TKWC has been in the process implementing the approved short term and intermediate plans to provide consistent water

distribution that meet all SWRCB requirements. The TKWC expects this implementation completed by the end of July.

This notification is being provided to the TKPOA Property Owners and their guests, so they can make informed decisions regarding their water use and water conservation throughout this time period."

Shorezone Recreation and Boating Activity
As one of its strategic initiatives, the Tahoe Regional Planning Agency worked with community members and stakeholders to update its shoreline policies and regulations. Significant changes toregulations, enforcement and monitoring on the impacts of watercraft recreation, both on the water and associated land developments/structures, are proposed.

The shoreline of Lake Tahoe is of both local and national significance. The 72 miles of Lake Tahoe's shoreline offers a diversity of views that range from sandy beaches to isolated coves, rocky shorelines, and steep cliffs. While Lake Tahoe's clarity goals, measured near the center of the lake, are of utmost importance, the shoreline is where most locals and visitors interact with Tahoe's bluewaters.

Lake Tahoe Shoreline Plan
http://shorelineplan.org
https://www.trpa.org/programs/shorezone

The TRPA Governing Board approved a new Shoreline Plan for Lake Tahoe in October 2018. The plan supports boating, paddling, swimming, and other water-based recreation, while also ensuring effective natural resource management for continued attainment of environmental goals in the Lake Tahoe Region. Adoption of the Shoreline Plan occurred October24, 2018. Since 2015, the Tahoe Regional Planning Agency (TRPA), along with critical stakeholder partners, has developed the Shoreline Plan to develop guidelines for appropriate uses along the shore of Lake Tahoe.

This Shoreline planning initiative updates the shorezone element goals and policies in TRPA's Regional Plan and the shorezone chapters in the TRPA Code of Ordinances. The overarching goal of the Shoreline Plan is to enhance the recreational experience along Lake Tahoe'sshores while protecting the environment and responsibly planning for the future.

PERMITTING
The Shoreline Plan lifts a longstanding moratorium on new shorezone structures at Lake Tahoe, setting caps and regulations for new shorezone structures such as piers, moorings, and public boat ramps. The plan also creates a framework for marinas to enhance their facilities if environmental improvements are made part of the project. For more information about TRPA permits for moorings, structures, and other shorezone activities, please review the fact sheets at the bottom ofthis page or visit TRPA's Applications & Forms Page.

TWSA provided comment in this process. Comments were submitted on water quality concerns.
A request was submitted in for expansion of the zone of protection (requiring notification to water providers) around intakes from the current 600 ft. buffer to 1,320 ft. This larger zone of protection (partly by ordinance, partly by review process) is now incorporated in newregulatory review process.

On March 22, 2017, RPIC endorsed a set of policies (see page 131 of the Governing Board packet available at: http://www.trpa.org/wp-content/uploads/March-22-2017-Governing-Board-Packet.pdf) that included the following language: "Public drinking water intakes: within ¼ mile of water intakes, water purveyors will be notified and consulted on project conditions." (source: Brandy McMahon, bmcmahon@trpa.org, correspondence)

BOATING

The Shoreline Plan creates new programs to ensure shoreline structures and boating activity do not harm the environment, scenery, or recreation experiences at Lake Tahoe. These programs include coordinated enforcement against illegal boat moorings on the lake, more projects to prevent the spread of harmful aquatic invasive species, enhanced monitoring to better assess noise and scenic impacts from boating activity and shoreline structures, stronger boating safety education, and new provisions to keep boats with aftermarket exhaust systems that exceed TRPA, California, andNevada noise limits from operating on the lake.

The cost of these programs will be paid for through new fees apportioned to various shoreline usersand structures. These fees include annual mooring registration fees, an increase in boat sticker fees,and boat rental concession fees. Lake Tahoe watercraft inspection sticker fees increased by $12 in 2019. This increase is needed to help pay for boater education, no-wake zone enforcement, and projects to prevent the spread of harmful aquatic invasive species in Lake Tahoe.

NO-WAKE ZONES

The new shoreline program includes stronger boater education and enforcement of the 600-footno-wake zone at Lake Tahoe. The plan expands the no-wake zone to include all Emerald Bay and creates a 100-foot no-wake zone buffer around swimmers and paddlers and a 200-foot no-wake zone buffer around shoreline structures. These no-wake zones are in place to prevent unsafe boating in areas where boaters, paddlers, and swimmers share the lake, and to reduce noise impacts from boating.

Environmental documents were prepared in 2017. See http://shorelineplan.org/wp-content/uploads/2017/09/Shoreline-EIS-Scoping-Summary-Report_Sept.2017.pdf

Key policy issues that the plan addresses:

- Recreational Access
- Marinas and Boating
- Environmental Effects of Access
- Recreational Facilities
- Low Lake Levels
- Streamlining the Approval Process
- Public and Private Access to the Lake

Tahoe Water Suppliers Association
Protect the Source

1220 Sweetwater Road
Incline Village, Nevada 89451
775-832-1212

TWSA Members:
Cave Rock Water System
Edgewood Water Company
Glenbrook Water Cooperative
Incline Village GID
Kingsbury GID
Lakeside Park Association
North Tahoe PUD
Round Hill GID
Skyland Water Company
South Tahoe PUD
Tahoe City PUD
Zephyr Water Utility

July 2, 2018

Ms. Rebecca Cremeen
Shoreline Plan EIS Comments
Tahoe Regional Planning Agency (TRPA)
PO Box 5310
Stateline, NV 89449

Thank you for taking the time to meet with Tahoe Water Suppliers Association (TWSA) staff on 6/26/18 to discuss the water provider concerns regarding the proposed Shoreline Plan. As was discussed, the TWSA Board supports the formal codification of a '¼ mile requirement of notification' in the Shoreline Plan for *all shoreline structures*, for protection of drinking water infrastructure. Our organization's #1 priority is the protection of the public drinking water sources located here at Lake Tahoe.

On behalf of the Tahoe Water Suppliers Association Board (TWSA), we would like to submit two specific comments, and two general comments, regarding the proposed Shoreline Plan Code of Ordinance language.

The TWSA Board is in support of Alternative 1, *pending adoption of the following language revisions:*

Section 84.4.3:

1) We request that the word "pier" be replaced by "shoreline structure", to read as follows:

   Development Standards: "For an additional ~~pier~~ "shoreline structure" located within ¼ mile of a public drinking water intake, TRPA shall notify and consult with the appropriate water provider(s) as part of the application process."

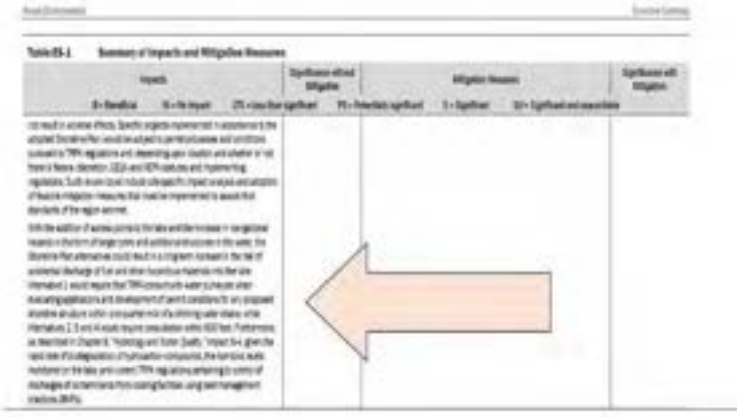
   This suggested language revision would clarify Section 84.4.3 to match the definition in Section 50.11. (Section 50.11 - Allocation of Shorezone Structures:
   "Structures in the shorezone and lakezone shall be allocated pursuant to applicable provisions in Chapter 84, Development Standards in the Shorezone and Lakezone. The following subsections address allocation of shorezone structures: 84.3 Mooring Structures / 84.4.Piers")

2) Add the suggested language below to Section 84.3.2.E.7 (page 84-4)
   (84.3 Mooring Structures, 2. General Standards, E. Allocation, and Permitting:
   Add: 7.) "For additional structures located within 1/4 mile of a public drinking water intake, TRPA shall notify and consult with the appropriate water purveyor(s) as part of the application process."

The comments below outline the reasoning behind the requested language changes.

- All structures have potential impact to drinking water supply infrastructure. There have been multiple instances where buoy blocks and anchor lines have been moved by littoral drift, and/or deliberate human alteration. This has placed boats very close to municipal water intakes. Some intakes here at Lake Tahoe have suffered damage from these actions. Boats have sunk close to, and on top of, active intake lines. Having a greater ability to consult with TRPA, and TRPA enhanced enforcement regarding mooring placements, would provide greater protection to the water supply.

- The EIS summarizes the intent for consultation within ¼ mile for "any proposed shoreline structure", and the potential for impacts to water supply, in the EIS Summary section 15.3, excerpt below.

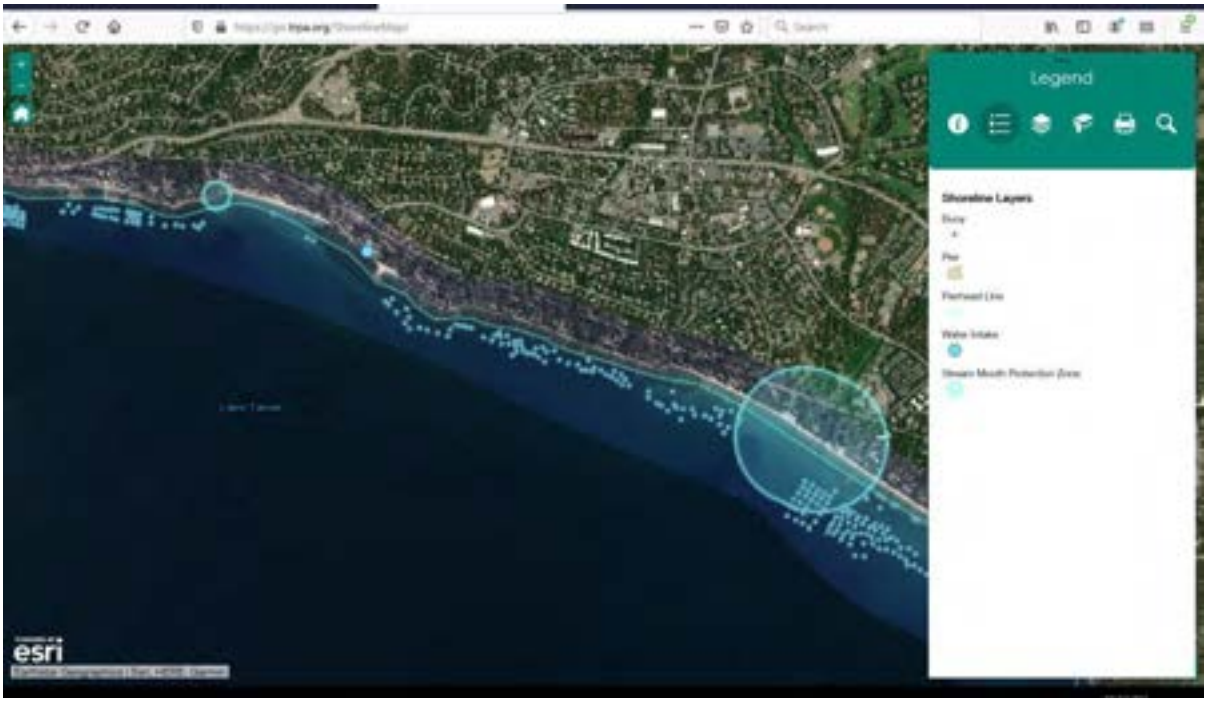


TWSA Comment summary:

Tahoe Water Suppliers Association	Concerned with zone of protection for water supply intakes. Suggests using Marina Best Management Practices to control debris, oil and AIS fragments, such as trash skimmer and/or water 'air gates'.	Water Quality

Tahoe Water Suppliers Association	Concerned with potential contamination from nearshore development, impacts from boating (especially buoy fields which are encroaching on intake infrastructure and fuel spills), AIS management issues in Tahoe and the Keys, and human water contact recreational bacterial/viral potential contamination.	Public Health and Safety, Recreation, Water Quality
North Tahoe Public Utility District	Concerned about boats sinking near water intakes due to weather. Suggests setting and enforcing a deadline for boats to be removed from the water, especially on buoys around water intakes.	Recreation, Water Quality

To view a map of Lake Tahoe's shoreline including an inventory of shoreline structures (such asmarinas and boat ramps), natural features, and environmental constraints go to:
http://gis.trpa.org/ShorelineMap



Process: TRPA and its partners selected an internationally recognized mediation entity, the Consensus Building Institute (CBI), to design and implement a strategic, organized process that engages stakeholders on all issues. Click here for a detailed outline of the process and timeline.

Shoreline Studies – Resources: A number of studies and reports completed in the past have focusedon the impacts of shoreline activities and boating. These studies are helping inform TRPA's ongoing shoreline planning initiative and are being made available on the website as a resource for the public. www.shorelineplan.org

Topics: Air Quality/Boating and Watercraft Use/Carrying Capacity/Dredging/Economics Fisheries/Low Lake Level Adaptation/Miscellaneous/Noise/Scenic/Water Quality

Findings – Findings summary available here:
http://shorelineplan.org/wp-content/uploads/2016/06/CBI-Shoreline-Assessment-Findings-for- Public-Review.pdf

Boating
https://tahoeboatinspections.com

The revised Shoreline Plan has strong boater (and marina) education, policies, restrictions BMP and enforcement components. http://shorelineplan.org

TRPA boating regulations and information about the mandatory boat inspection program isincluded later.

Recreational boating presents a potential source of pollution. Accidental boat submersion, release of fuel, release of sewage, and the potential introduction of aquatic invasive species (AIS) are all areas of concern. TRPA and other agencies have worked to educate boaters on clean boating practices. TRPA established a blue boating program under the 2008 Shorezone Ordinance; however,the Blue Boater Program (which included water quality monitoring and additional boat inspection requirements on engine tuning) is not in operation.

TRPA's current ordinance does require:
All boats are prohibited from sewage release except at designated pump-out stations.
All motorized boats are required to undergo a vigorous AIS inspection before launch.
All boat launch ramps are locked if there is no inspector on site.
Any spill incidents are reported to the US Coast Guard and state regulatory agencies whothen notify water providers of any potential problems near their intakes.
All watercraft engines must be 4 stroke to reduce hydrocarbon emissions.
All non-motorized watercraft are requested to undergo voluntary inspection.
TRPA boating regulations and information about the mandatory boat inspection program isincluded in the next chapter of this report.

Shorezone Development and Projects
TWSA staff regularly attends monthly Interagency Shorezone Coordination Group meetings, in orderto keep TWSA purveyors informed of development with possible impacts to the drinking water intakes. A ¼ mile (1320 ft.) buffer is the trigger for prompting water provider input on potential permanent projects.

Since 2008, TWSA staff has been receiving copies of re-issued and newly permitted boat buoy permits from Nevada State Lands. Many of these structures are located outside the ¼ mile intake buffer, and as a result, the water providers do not provide comment. Any project of significance tothe water providers is

forwarded to the applicable agency for comment submittal to Nevada State Lands.

Over this time, several large development projects were under recent review for potential impacts: the GlenbrookBuoy Field Expansion, the Beach Club on Lake Tahoe and the Edgewood Lodge and Golf Course Improvement Project. See excerpts below:

Edgewood Lodge and Golf Course Improvement Project
http://www.tahoedailytribune.com/news/local/edgewood-celebrates-completion-of-100m-lodge

They broke ground on the new Edgewood Lodge at the south shore of Lake Tahoe in October of 2015, but plans and environmental improvements began years before that in preparation for thenew 169,000 square-foot hotel and spa with dining, shopping and adventures options along with154 rooms.

Some of the environmental improvements completed to date include: moving the stormwater off the casino corridor and pulling through the ponds on the golf course, a dam system at Friday's Station that supplies water to the course and Edgewood Creek improvements, a cooling system using lake water, dredging the current ponds around the course and bring back to their natural stateand the daylighting of Edgewood Creek.

TWSA staff and member agencies were involved in public comment regarding potential impacts to Edgewood Water Company's drinking water quality from an expanded beach access area near theintakes. The Edgewood Tahoe Lodge Project includes significant and water quality improvements for theEdgewood Creek watershed. The plan includes the transfer of development rights from blighted sites within city limits to the Lodge Project.

During the summer of 2012, the project proponent (Edgewood Companies) contract engineer (R.O. Anderson) and Project Manager (Brandon Hill) held several meetings and conference calls to address NDEP Bureau of Safe Drinking Water and TWSA Member concerns.

These concerns centered on:
Potential increased microbial contamination from the new beach access area (area will havelimited access capped at 250 people/day). Requesting use of the TWSA Risk Assessment Model (which was then conducted) and additional support material to verify the contactor submission that project would have no impact to water quality.

Correspondence from NDEP and R.O. Anderson Engineering on behalf of Edgewood Companies providing information on the Risk Assessment run conducted July 2012 and other studies reinforcing theirposition. This information is archived in earlier TWSA Annual Reports.

Beach Club on Lake Tahoe Development - KGID Treatment Plant Relocation
http://southtahoenow.com/story/07/28/2016/old-kgid-treatment-plant-and-trailers-removed-new- luxury-project

The Kingsbury General Improvement District's (KGID) new $19 million water treatment plant was relocated to the back of the property in 2015. The state of the art facility utilizes ultraviolet treatment to the ozone disinfection, which meets Environmental Protection Agency requirements."This is a great example of the partnership between private industry and the public sector coming together to make both projects happen" said Cameron McKay, general manager of KGID.

What was once home to 155 mobile homes and the old KGID water treatment plant took one big step

towards being a luxury condominium project when developers tore down the plant. Going up on the 20-acre site is the Tahoe Beach Club Lakefront, a 143 two-five-bedroom luxury condominium residences. The first phase, completed in Fall 2017, includes 48 residences.

The buildings are LEED-certified to improve and restore its natural surroundings. Streams spanning over two acres will be restored and native vegetation will be utilized throughout the property. Once finalized the project will reduce the number of sediment run-off from approximately11,000 to 600 pounds a year. Greenhouse gas emissions anticipate to be reduced by more than 60 percent.

The project also complements the Nevada Tahoe Conservancy District's efforts to restore ecological function of Rabe Meadow within the Burke Creek channel, reduce pollutants into the lake and improve safety in case of a flood.

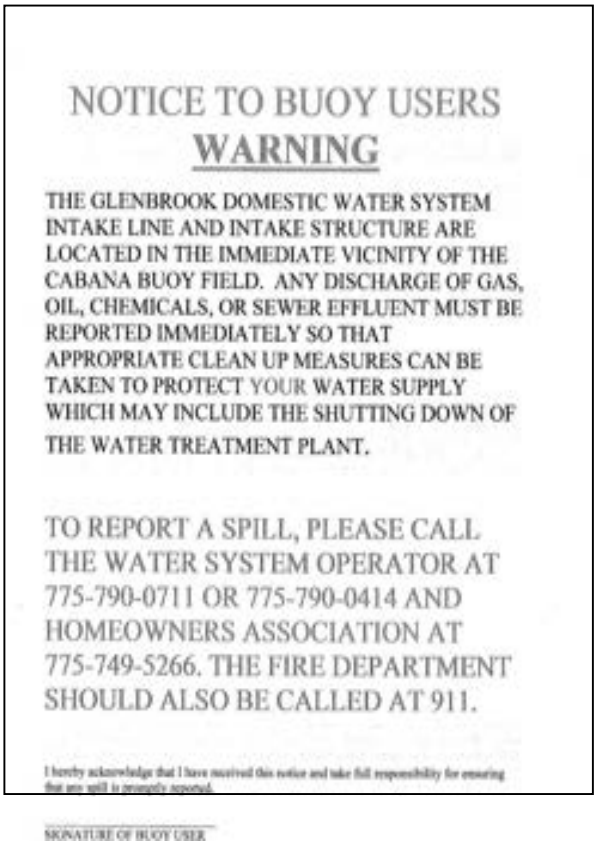
Editor Notes: On February 29, 2008 NDEP submitted comments that the DEIS did not fully address potential impacts to theKingsbury GID water system. The DEIS noted that water lines would need to be re-routed, and that buildings will be adjacent to the existing surface water treatment plant. The proposed pier was adjacent to the drinking water intake.
As of 2014, several problems had been resolved, allowing for the project to progress.

Glenbrook Buoy Field Expansion(DO-2814-07)
http://www.trpa.org/documents/agendas/hearings%20officer/summaries/2007/may_8_2007_Summaries.pdf

Expansion to the buoy field adjacent tothe Glenbrook Water Company intake was determined by NDEP as a potentialsource of contamination due to potential source water contamination events from increased boating activity. Mitigation measures agreed upon by NDEP staff include the yearly signing ofa notice of awareness for proper boating practices by the buoy users. TWSA has a digital copy of the annual letters on file. In 2008, the Glenbrook Homeowners Association began the required annual notices and reported no incidents since the mitigation process began.

Buoy assignments are given out annually by lottery. Buoy occupants arerequired to sign a letter stating that they are aware of the proximity of the Glenbrook water intake to the buoy field,and that any accidents spill incidents need to be reported immediately.

This documentation is maintained by the Glenbrook Homeowners Association and provided to TWSA for review and archiving. The Nevada Bureau of Safe Drinking Water has stated in association with this project that if increased microbial contamination occurs, the agency will re-evaluate the purveyor's filtration avoidance status.



NOTICE TO BUOY USERS

WARNING

THE GLENBROOK DOMESTIC WATER SYSTEM INTAKE LINE AND INTAKE STRUCTURE ARE LOCATED IN THE IMMEDIATE VICINITY OF THE CABANA BUOY FIELD. ANY DISCHARGE OF GAS, OIL, CHEMICALS, OR SEWER EFFLUENT MUST BE REPORTED IMMEDIATELY SO THAT APPROPRIATE CLEAN UP MEASURES CAN BE TAKEN TO PROTECT YOUR WATER SUPPLY WHICH MAY INCLUDE THE SHUTTING DOWN OF THE WATER TREATMENT PLANT.

TO REPORT A SPILL, PLEASE CALL THE WATER SYSTEM OPERATOR AT 775-790-0711 OR 775-790-0414 AND HOMEOWNERS ASSOCIATION AT 775-749-5266. THE FIRE DEPARTMENT SHOULD ALSO BE CALLED AT 911.

I hereby acknowledge that I have received this notice and take full responsibility for ensuring that any spill is promptly reported.

SIGNATURE OF BUOY USER

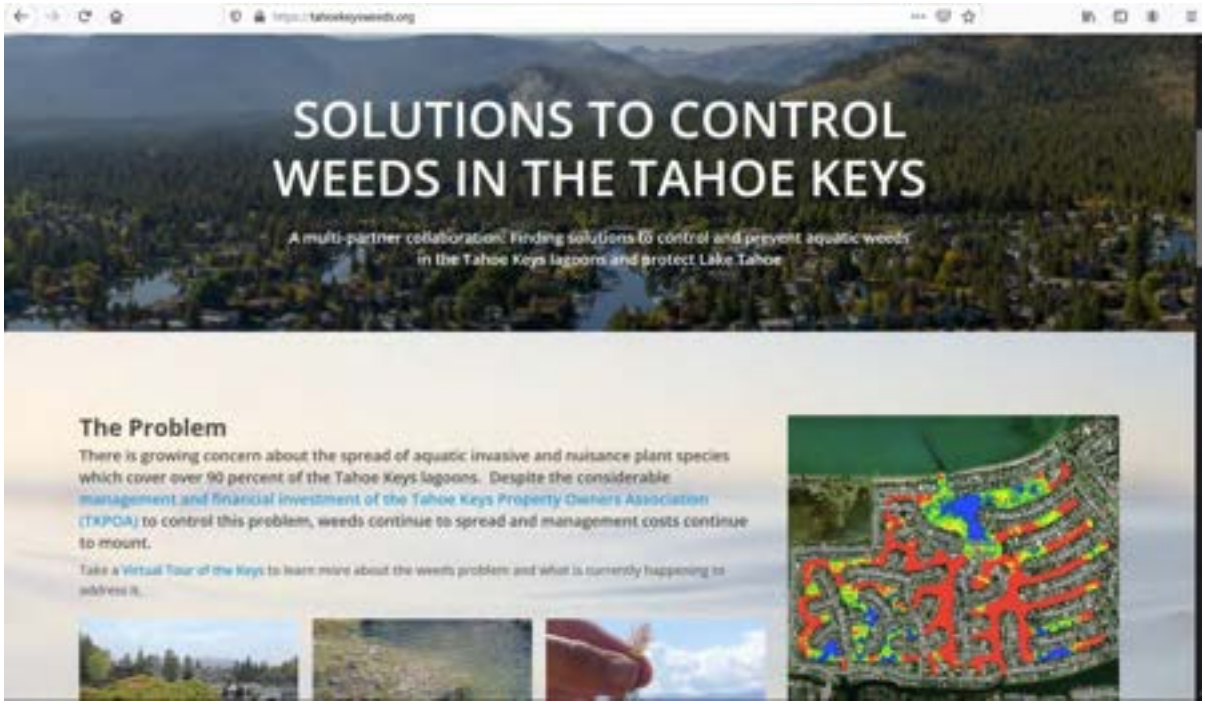
or

Chemical and Pesticide Usage - Potential Use of Herbicides in Lake Tahoe
This is a rapidly developing topic. The use of aquatic herbicides has not been authorized (to date) for use in Lake Tahoe. A proposal (TKPOA Control Methods Test) is currently under review by multiple state and federal agencies. Extensive information on the topic and TWSA involvement is included in this next section. The final decision on approval of an herbicide exemption lies with the Lahontan RWQCB Board, with additional approval needed from TRPA. Current information is posted at: https://tahoekeysweeds.org

TWSA members have expressed great concern over the potential impacts to drinking water quality for the past 10+ years. TWSA staff and members attend monthly meetings with the TKPOA working group, which includes the League to Save Lake Tahoe, Tahoe Sierra Club, Lahontan staff, TRPA staff and other stakeholders. TWSA has provided ongoing public comment on the plan at the TRPA Governing Board, CA State and Lahontan Water Board meetings.

In 2018, the Tahoe Keys Property Owners Association (TKPOA) submitted the Tahoe Keys Lagoons Aquatic Weed Control Methods Test (CMT) Application, to Lahontan Water Board. This triggered theneed for an Environmental Impact Report (EIR) required by the California Environmental Quality Act (CEQA) and Lahontan Regional Water Quality Control Board (Lahontan Water Board), and an Environmental Impact Statement (EIS) required by the Tahoe Regional Planning Agency (TRPA).

The Control Methods Test application proposes the use of targeted herbicides as one weed controlmethod to test (along-side and in combination with other methods) to reduce and control the abundant growth of invasive and nuisance aquatic weeds that are compromising water quality anddegrading beneficial uses of the Tahoe Keys lagoons, as well as threatening the future ecosystem and water quality of Lake Tahoe.



The environmental analysis (CEQA and Antidegradation Analysis) will determine if the use of U.S. Environmental Protection Agency (EPA) and the Department of Pesticide Regulation (DPR) approved herbicides can meet the strict environmental standards of Lake Tahoe's classification as a Tier Three, Outstanding National Resource Water. The regulatory review processes anticipated to be ongoing into 2022.

EPA Approval given for Lahontan Basin Plan Amendment Changes, Sept. 10, 2015.
Regulatory changes, initiated in 2011, by the Lahontan Regional Water Quality Control Board (LRWQCB) to the "Lahontan Basin Plan Amendment", removed a former prohibition on aquatic herbicides/pesticides and replaced it with a project review process.
EPA approval was given Sept. 10, 2015.The U.S. Environmental Protection Agency (EPA) has reviewed the California State Water ResourcesControl Board (SWRCB) Resolution Number 2012-0018; Amendment to the Water Quality Control Plan for the Lahontan Region (Basin Plan): To Replace a Pesticide Water Quality Objective with a Waste Discharge Prohibition on Pesticides with Exemption Criteria (the Amendment).

Aquatic Invasive Species Overview
The focus on control of aquatic invasive species (AIS) has become a leading topic of concern in Tahoe over the past 10 years. Greater understanding of the extent of the subject has become morerelevant in agency management programs. The spread of the more aggressive Curlyleaf Pondweed in the Tahoe Keys waters is of mounting concern. The following excerpts summarize historical process and status of management options.



Tahoe Lakewide AIS Map, 2019
All current control methods are non-chemical. https://tahoekeysweeds.org



2017 Update

The AIS Challenge at Lake Tahoe

The Latest on the Fight to Control Aquatic Invasive Species

Photos: League to Save Lake Tahoe (left), peterspain.com (right)

AUGUST 2017

A brief history of aquatic invasive species at Lake Tahoe

In 2008, with some of the most destructive aquatic invasive species (AIS) known, quagga and zebra mussels, approaching Lake Tahoe's doorstep, Lake Tahoe Basin partners jumped into action to launch the nation's most comprehensive boat inspection program. Now nine years later and with no invasions, the Lake Tahoe AIS Program is widely considered a national model for how to effectively keep new AIS from entering a water body.

However, prior to shutting the door on new AIS in 2008, nearly 30 non-native species had already made their way into the lake. Documentation of these species and their locations around the lake began in the mid-1990s even though many were introduced (both intentionally and accidentally) many decades prior. Since their introduction, they have established into infestations and are spreading rapidly, altering the environment in ways that could change Tahoe forever.

Aquatic invasive plants, warm water fish and invertebrates have the adaptive ability to make their surroundings more hospitable for themselves and other invasives, while simultaneously threatening the well-being of Tahoe's native species. These AIS are thriving in the lake right now. By cycling nutrients, altering food webs, preying on native species and covering pristine beaches with clam shells and mats of weeds, they threaten a $5 billion economy while destroying the unique clarity that makes Lake Tahoe an annual destination for over 24 million visitors. The good news is that Tahoe agencies have a plan in place to systematically control these species and take back the lake.

Plan for the control of aquatic invasive species at Lake Tahoe

In 2015, researchers at the University of Nevada, Reno, completed a comprehensive plan to control AIS already established in the waters of Lake Tahoe. This ecologically-based approach to prioritizing species and infestation sites identified two aquatic plants, Eurasian watermilfoil and curlyleaf pondweed, and warm water fish, as the primary targets for control work in the immediate future. Emphasis also remains on early detection and rapid response to any new satellite infestations of aquatic invasive plants and Asian clams.

Coupled with other factors such as feasibility, permitting and project cost, a five year action list was developed to aid in the search for funding needed to complete the job.

A Eurasian watermilfoil infestation in one of three Crystal Shores marinas. Photo on left taken July 2015 prior to the placement of bottom barriers. Photo on right taken 2016 after control treatment was complete. Photos: Tahoe Resource Conservation District



Tahoe Taking Action - 2017

Control of AIS is a multi-year endeavor that seeks to reduce the impacts from aquatic invaders to a point of insignificance. An integrated approach using numerous techniques is essential to success. Work taking place in 2017 is fueled by public/ private partnerships and funding sources including California Tahoe Conservancy (SB630 and Prop 1), League to Save Lake Tahoe, Nevada Division of State Lands, Proposition 84, Tahoe Fund, Tahoe Regional Planning Agency, Truckee River Fund, and numerous private contributions. Below are some projects underway in Lake Tahoe today.



Tahoe Using New Innovative Technology

Lead: Tahoe Resource Conservation District

Tahoe RCD and Inventive Resources, Inc. are embarking on a project using ultraviolet light to treat aquatic invasive plants in Lake Tahoe. Ultraviolet-C light works by damaging the DNA and cellular structure of invasive plant life that currently threatens the health of the lake. While this technology needs further field testing to determine its full potential, ultraviolet light could augment Tahoe RCD's methods, especially in low-water years, in tight spaces within marinas, or in river systems.



Success at Crystal Shores

Lead: Tahoe Resource Conservation District

Crystal Shores marinas are now weed-free. After three years of treatment using bottom barriers and diver-assisted suction removal, surveys show no new plants sprouting this season. Moving forward, this site will receive annual surveys to maintain the success and catch any new potential infestations early. Early detection of the infestation and the rapid response by public and private partners to begin treatment was critical for the success of this project.



Asian Clams at Sand Harbor State Park

Lead: Tahoe Regional Planning Agency/Nevada Division of State Lands

A control project began in mid-June at Lake Tahoe Nevada State Park, Sand Harbor, to treat a small, isolated population of Asian clams before it spread to an unmanageable level. The project consists of covering approximately 4 acres of the lake bottom near the boat ramp with thin rubber barriers which is intented to suffocate the clams. While boating in the area, please do not anchor within the project to avoid ripping or tearing the barriers.



Tahoe Keys Passes Special Assessment to Combat Weeds

Lead: Tahoe Keys Property Owners Association

The Tahoe Keys Property Owners Association (TKPOA) is proud to announce a nearly 2/3 "FOR" vote was achieved in April 2017authorizing up to $2.4 million over 4 years to test various ways to control the invasive weeds in the Tahoe Keys lagoons, including bottom barriers, plant fragment control methods, laminar flow aeration and other innovative approaches. The "FOR" vote also authorizes the TKPOA to propose a small-scale, pilot test to assess the effectiveness of aquatic herbicides on the invasive plants, if permitted.



Eyes on the Lake Volunteers Take Action

Lead: League to Save Lake Tahoe

Tahoe's citizen science monitoring program, Eyes on the Lake, is comprised of volunteers reporting presence and absence of aquatic invasive plants. In 2016, volunteers identified two new invasive weed infestations and reported them to resource managers. Both locations are receiving control work this season because of these dedicated volunteers.

INVASIVE SPECIES PROGRAM
LAKE TAHOE EIP



The AIS Challenge at Lake Tahoe

Aquatic Invasive Species Are Well Established in the Lake. Which Lake Do You Prefer?

August 2015

A Brief History of Aquatic Invasive Species at Lake Tahoe: The Tipping Point?

In 2008, with the threat of invasion from some of the most destructive aquatic invasive species (AIS) known (quagga and zebra mussels) approaching Lake Tahoe's doorstep, Basin partners jumped into action to launch the nation's most comprehensive boat inspection program. Now seven years later and with not one new invasion, the Lake Tahoe AIS Program is widely considered a national model for how to effectively keep new AIS from entering a water body. This $1.5 million per year program (funded by user fees and public dollars) has inspected 43,000 boats and decontaminated 21,000 boats while finding hundreds of potential invaders threatening Lake Tahoe, including mussels on twelve boats in 2014.

However, prior to shutting the door on new AIS in 2008, nearly 30 non-native species had already made their way into the Lake. Documentation of these species and their locations around the Lake began in earnest in the mid-1990s even though many were introduced (both intentionally and accidentally) many decades prior. Since their introduction, they have established into prolific infestations and are spreading rapidly, altering the environment in ways that could change the Lake Tahoe we know forever.

Aquatic invasive plants, warm water fish and invertebrates have the adaptive ability to make their surroundings more hospitable for themselves and other invasives, while simultaneously threatening the wellbeing of Tahoe's native species. These AIS are thriving in the Lake right now. By cycling nutrients, altering food webs, preying on native species and covering pristine beaches with clam shells and mats of weeds, they threaten a $5 billion economy while destroying the unique clarity that makes Lake Tahoe an annual destination for over three million visitors. The good news is that Tahoe now has a plan in place to systematically control these species and take back the Lake.[1]

Key Invasive Species of Concern (year introduced)[2]

Signal Crayfish (invertebrate)	late 1800s
Mysid Shrimp (invertebrate)	1960s
Eurasian Watermilfoil (plant)	1970s
Bass, Bluegill, Goldfish (warm water fish)	1970s
Asian Clams (invertebrate)	2002
Curlyleaf Pondweed (plant)	2003
American Bullfrog (amphibian)	2004

Photos (clockwise from top left):
Tahoe Resource Conservation District (TRCD), peterspain.com, TRCD



Implementation Plan for the Control of AIS within Lake Tahoe

Researchers at the University of Nevada, Reno developed the Implementation Plan in collaboration with the Lake Tahoe AIS Coordination Committee and with review by an AIS expert panel of individuals from academic, management and regulatory backgrounds. They designed the Implementation Plan to serve as an ecologically-based approach to prioritizing species, locations and strategies for removal and control of AIS at Lake Tahoe for the next three to five years. Seven of the most damaging species were categorized into **three categories** of management recommendations.

Category 1 Species | Feasible Control Action

- **Eurasian Watermilfoil (plant)**
- **Curlyleaf Pondweed (plant)**
- **Warm Water Fish**

Resources should be focused on these species first because there are existing control methods that have been used successfully at Lake Tahoe and removal of these species may lead to the reduction of other AIS in the Lake.

Eurasian watermilfoil and curlyleaf pondweed grow rapidly and spread easily, forming dense mats of vegetation. These infestations inhibit recreation, cycle nutrients into the water column leading to increases in algal growth, decrease water clarity and provide habitat for invasive warm water fish. Warm water fish in turn alter the food web through predation, decreasing the biodiversity of native fish species.

Originating on the south shore of Lake Tahoe, Eurasian watermilfoil was identified at 13 sites around the Lake in 1995, increasing to 18 sites in 2012. Curlyleaf pondweed was identified at two sites in 2003 and now occupies eight sites as of 2012.

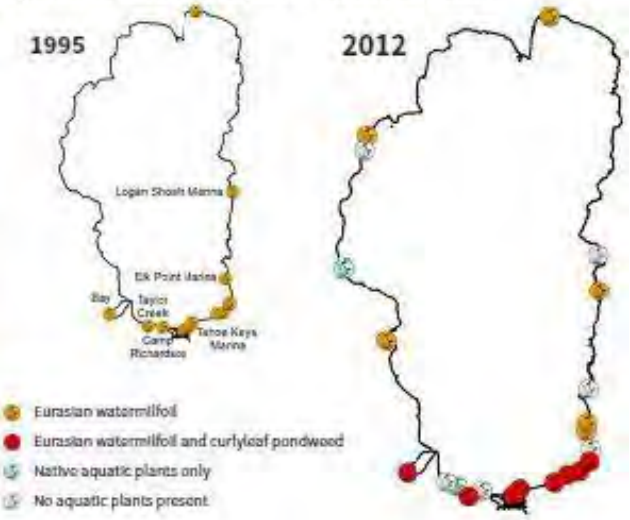
Both aquatic invasive plants spread through fragments transported by currents and boats as well as by root structures, seed and in the case of curlyleaf pondweed, by clone structures called turions. In 2006, invasive warm water fish species were found in 12 of 19 sites surveyed, but current distribution is unclear.

Recommended Action: Control
Efforts to remove a nearly 6 acre infestation of Eurasian watermilfoil in iconic Emerald Bay proved successful through a multi-year comprehensive strategy using bottom barriers to block out sunlight, followed by SCUBA diver-assisted suction and hand removal of plants. As of 2015 there are no longer aquatic invasive plants at this site. This methodology has been used effectively at other infestations in Lake Tahoe including lakeside of the Tahoe City Dam where a quarter acre infestation was removed in 2014. Mechanical removal of warm water fish using electro-shocking has decreased these fish populations in the short term. Multi-year treatments are recommended to occur in concert with aquatic invasive plant removal efforts. All control efforts need to include post-project monitoring to assess effectiveness.

Photos: Phil Caterino (left), California State Parks (right)



Spread of Invasive Aquatic Plants in Tahoe



Category 2 Species | Potential Control Action

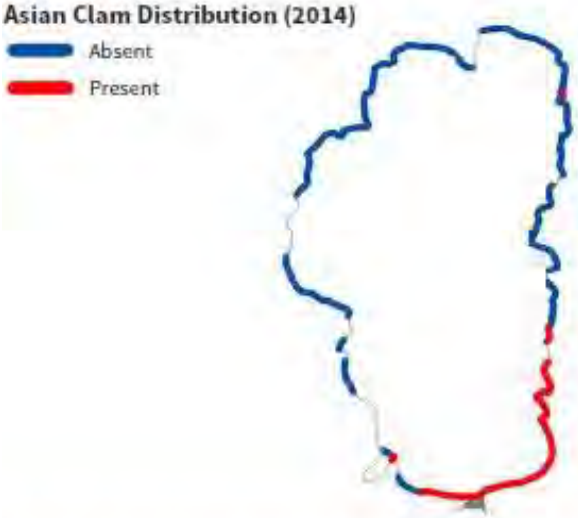
- **American Bullfrog (amphibian)**
- **Signal Crayfish (invertebrate)**

There are existing control methods that have proven to reduce populations of these species but the long-term feasibility of these methods for use at Lake Tahoe is still unknown.

American bullfrogs have been observed along the south shore since 2004, including several breeding populations. Signal crayfish populations dominate the nearshore zone around the entire Lake with the highest densities along the west and north shores. Both species are voracious predators that significantly alter the food web, while crayfish can also provide a food source for invasive warm water fish species.

Recommended Action: Increased Monitoring
Crayfish are currently being commercially harvested but it is unknown if this action is significantly reducing populations. It is unclear at this time if American bullfrog populations are increasing in Tahoe and what unwanted effects may be occurring. Increased monitoring of both species will assist in guiding future control actions. In areas where bullfrogs persist, proposed future projects should include monitoring and potential control actions. [2]

Asian Clam Distribution (2014)





Category 3 Species | No Feasible Control

- **Mysid Shrimp (invertebrate)**
- **Asian Clams (invertebrate)**

At this time, no control method that is allowed at Lake Tahoe has been proven to be successful in effectively reducing populations.

Mysid shrimp were intentionally introduced into Lake Tahoe in the 1960s as a food source for game fish (kokanee salmon and lake trout). They now persist in high densities (300 individuals per square meter) throughout the lake. They dramatically alter the native food web and have been proven responsible for fisheries collapse in other regions. There are no known control methods for mysid shrimp.

In 2002, researchers found low densities (two to 20 individuals per square meter) of Asian clams in a small section of the southeastern portion of the Lake, but by 2014, populations had spread along approximately 13 miles of shoreline from Cave Rock to Baldwin Beach (including a six acre satellite population at the mouth of Emerald Bay), with densities reaching 5,000 individuals per square meter in some areas. Once established, Asian clams dominate the lake bed and have been associated with algal blooms. Their shells also wash up on beaches in large numbers, affecting aesthetics and usability.

Recommended Action: Research Control Methods
Small scale control actions in areas where Asian clams are causing negative impacts to water quality should still be implemented while continuing to research a combination of control methods for future use. [2]

Photos, from top: Carl D. Howe , licensed under CC BY-SA 2.5; Wikipedia user MdE, licensed under CC BY-SA 3.0

Site Prioritization for Control Actions | Category 1 Species

A decision support tool was developed, with factors including fish/plant interactions, infestation size, human visitation and satellite populations. **The goal is to reduce overall expansion of these species in Lake Tahoe**

1. Tahoe Keys Main Lagoon | 2. Tahoe Keys Marina | 3. Meeks Bay | 4. Ski Run Marina & Channel
5. Tahoe City Dam | 6. Lakeside Marina | 7. Regan Beach | 8. Taylor Creek | 9-11. Crystal Bay Marinas 1,2,3

These ecologically-driven priorities will be further refined in an action list based on factors such as cost and feasibility.







Tahoe Keys

The Tahoe Keys is a large private homeowners development and commercial marina completed in the 1960s within the Upper Truckee meadow. It consists of 1,529 homes covering 372 acres of land and 172 acres of interconnected waterways, with three outlets to Lake Tahoe. Several AIS were introduced beginning in the 1970s and 80s that have now become established populations and a potential source for spread to the rest of Lake Tahoe.

Two of these invasive aquatic plant species, Eurasian watermilfoil and curlyleaf pondweed, along with a nuisance native aquatic plant, coontail, now occupy nearly 100 percent of the waterways. The environment created within the Tahoe Keys provides the perfect habitat for invasive warm water fish and the potential introduction of other AIS. Any efforts for long-term control of these species in Lake Tahoe are contingent upon control within the Tahoe Keys.
The Tahoe Keys Property Owners Association (TKPOA) invests $400,000 per year to "harvest" these plants in order to maintain use of the channels. A better solution is needed and the TKPOA has recently completed an Integrated Weed Management Plan (IWMP) to address this problem.

Recommended Action
The IWMP recommends a suite of control actions including the placement of bottom barriers, shifts in landscape practices to reduce nutrient inputs and targeted herbicide application (among others). The implementation of this plan still requires regulatory agency approvals and extensive environmental review with a target date for action no sooner than 2017. [3]

We Must Continue the Fight

The Lake Tahoe AIS Program, a partnership composed of 40 agencies and organizations, has successfully prevented new introductions of AIS into Lake Tahoe since 2008 and provides the framework for successful implementation of AIS control actions moving forward.

The recent development of two science-based control plans for Lake Tahoe and the Tahoe Keys offers the guidance needed to systematically and comprehensively stop the assault of AIS on Lake Tahoe. Additionally, the recent passing of California Senate Bill 630 (SB630) provides funding from private pier and buoy leases, a portion of which is directed to AIS control efforts at Lake Tahoe. With the combination of best available science, extensive public education, agency collaboration and private sector participation solving the AIS Challenge is within reach.

We must continue to make progress. The next step is to secure the additional funding needed to expand and improve the control efforts to protect the Lake.

Information in this overview is drawn from the following management plans.

1. TRPA (Tahoe Regional Planning Agency). 2014. Lake Tahoe Region Aquatic Invasive Species Management Plan, California - Nevada. 25 pp. + Appendices.

2. Wittmann, M.E. and Chandra, S. 2015. Implementation Plan for the Control of Aquatic Invasive Species within Lake Tahoe. Lake Tahoe AIS Coordination Committee, July 31, 2015. Reno, NV. 52 pp.

3. August 2015. Draft Integrated Weed Management Plan for the Tahoe Keys Lagoons. Prepared by Sierra Ecosystem Associates for the Tahoe Keys Property Owners Association.

You can make a difference.
Contact one of these organizations or agencies to get involved.

Photos (clockwise from top left): League to Save Lake Tahoe, League to Save Lake Tahoe, Map data ©2015 Google, Tahoe Resource Conservation District

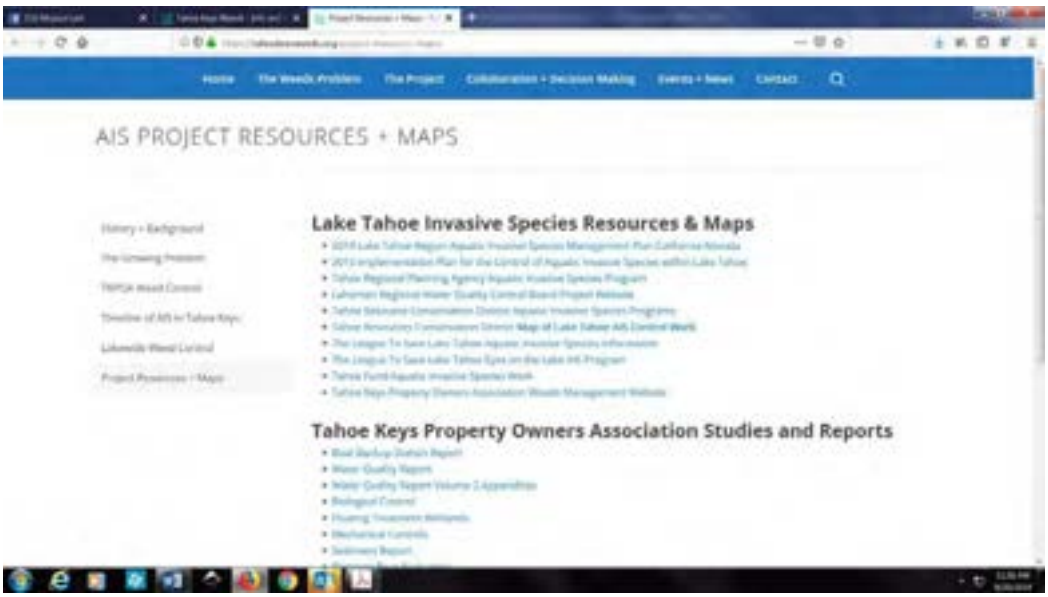
Tahoe Keys Weeds - Supporting Materials posted at: **www.tahoekeysweeds.org**

Tahoe Keys Property Owners Association (TKPOA) Application for Exemption

2021-22 Regulatory review pending

TKPOA Application for Exemption

Multiple documents are available. The application (2018) is undergoing more revisions (as of Oct.2019). Draft CEQA documents and draft environmental analysis documents, including anti- degredation analysis (pending), were released in 2020. All materials submitted for the current proposed application are posted on a public information page (and) on the Lahontan website. www.waterboards.ca.gov/lahontan / www. Tahoekeysweeds.org / www.keysweedsmanagement.org



(Editor Note 1: The Tahoe Water Suppliers Association Board of Directors' position on non- emergency AIS management is as follows: Lake Tahoe's' ONRW Tier 3 status warrants that permitted herbicide use should be considered only after the full vetting of all non-chemical control methods. In the case of the introduction of zebra or quagga mussels {which would be considered anemergency} chemical methods could be warranted.)

(Editor Note 2: In addition to weed problems, some of Tahoe Keys Lagoons were subject to localizedblue green algae growth and associated cyanobacteria blooms for several weeks in summer 2017, 2018, 2019. The situation was monitored and public health notices posted, but no control actions were taken. http://www.tahoedailytribune.com/news/toxic-algae-detected-in-some-tahoe-keys- waterways)

Background:

Aquatic invasive plants affect all the marinas around Lake Tahoe and continue to spread, constituting the immediate threat to Lake Tahoe, according to the University of Nevada, Reno's2015 Implementation Plan for the Control of Aquatic Invasive Species within Lake Tahoe.

The comparatively warm and shallow waters of the Tahoe Keys lagoons (located in South Lake Tahoe) make for the perfect habitat for the aquatic invasive plants (Eurasian watermilfoil and curly leaf pondweed). Ongoing harvesting programs pulled roughly 100 cubic yards of weeds in 1984 - around 10,000 cubic weeds were removed in 2016. They have now taken over more than 90 percentof the 172-acre lagoons.

In 2015, the TKPOA commissioned Sierra Ecosystem Associates (SEA) to prepare an Integrated Weeds Management Plan (IWMP). The IWMP in its May 2016 revision focused on non-chemicalcontrol methods. However, a one – time pilot test of herbicides was initially proposed for 2018,separate from the IWMP activities.

The main goal of the Tahoe Keys Integrated Management Plan is to gain control over aquatic invasive weeds and nuisance weeds in the Tahoe Keys lagoons, which are a major part of the greaterTahoe Keys development. The plan aims to reduce the biomass (overall volume) of these weeds – curly leaf pondweed, coontail and Eurasion watermilfoil – by about 90% (revised to 75% in 2018) from 2015 levels.

How to Request a Prohibition Exemption to use Aquatic Pesticides

(October 2016)

Purpose	Key Process Steps			Time to Approval
Vector Control	Submit required Vector-Pesticide information to Water Board for review	Water Board will review submitted information for completeness	If complete, aquatic pesticide use may commence immediately	Typically a few days to a week
Fisheries Management using Rotenone	Submit required Fisheries-Pesticide information to Water Board for review	Water Board will review submitted information for completeness	If complete, Water Board will inform you if proposal is either scheduled for next available public hearing or for Executive Officer action	One month to review for completeness plus at least 3-4 months for Board hearing
EMERGENCY	**IMMEDIATELY** contact the Water Board to notify about the situation	Submit required Emergency-Pesticide information to Water Board for review	If complete, aquatic pesticide use may commence immediately	Can be the same day as notification
Time Sensitive Project	Contact the Water Board to notify about the time sensitive situation	Submit required Time Sensitive-Pesticide information for Water Board to review and respond within ten days	If complete, the Water Board will inform you if proposal is either scheduled for next available public hearing or for Executive Officer action	From ten days to a few months. Additional time may be needed to develop environmental documentation
Not Time Sensitive	Submit required Normal-Pesticide information to Water Board for review	Water Board will review submitted information for completeness	If complete, Water Board will inform you if proposal is either scheduled for next available public hearing or for Executive Officer action	One month to review for completeness plus at least 3-4 months for Board hearing. Additional time may be needed for CEQA documents

The goals of the Nonpoint Source Water Quality Management Plan are to reduce runoff and the sediment, nutrients and other pollutants that runoff can carry into the keys lagoons and into LakeTahoe.

In 2018, the Project Title was changed from Tahoe Keys Lagoons Restoration Project to **Tahoe KeysAquatic Weed Control Methods Test (CMT).** In summer 2019, Public Scoping was conducted by the lead agencies. Multiple meetings and workshops were offered for public engagement. Extensive comments were submitted, and the project was modified form those comments. In June 2020, the DRAFT Environmental Impact Report / Environmental Impact Statement (DEIR/DEIS) was released. Multiple virtual workshops were heldfor public education on the project during summer 2020-21.
https://www.trpa.org/wp-content/uploads/Tahoe-Keys_DRAFT-EIR-EIS.pdf

2021: A TWSA staff summary is available at: https://www.yourtahoeplace.com/uploads/pdf-public-works/TKPOA_CMT_TWSA_Staff_Summary_01292021.pdf

In August 2020, TWSA and the consultant firm, Water Quality and Treatment Solutions (WQTS),provided extensive comment on the environmental documents. Link to the comment letters:
https://www.yourtahoeplace.com/uploads/pdf-public- works/TWSA_COMMENTS_TKPOA_DEIR_2020_-_FINAL_with_WQTS_attachment_SUBMITTED_8_27_2020_(1).pdf

Excerpts from the Current Project Description:

Test and Monitoring Period

A three-year test program is proposed:

- During the first year Group A methods would be used to reduce the population of the target aquatic weeds, with a target reduction of at least 75% in the treatment areas.
- First-year treatment would be followed by monitoring and two years of treatments applying Group B aquatic weed management methods to eliminate or manage residual aquatic weed populations.
- No mechanical harvesting would be performed in treatment areas during the methods test. Harvesting in control areas would only be conducted if necessary for navigation.

(source page 9 – Project Description 10/29/19)

2019 scoping process

https://tahoekeysweeds.org/environmental_analysis

Table 1. Number and source of comments received during the scoping period.

Source	Number of Commenters	Number of Comments	
		Individual	Flipchart Group
Email	40	204	
June Public Workshop	3	4	44
July Public Workshop	1	1	57
SCC Meeting			26
Governors Board Meetings	2	2	
Total	44	211	107
		318	

In the NOP, the following potential environmental issue areas were identified to be addressed in the EIS/EIR.

Hydrology and Water Quality	Geology and Soils
Biological Resources	Land Use and Planning
Human Health	Public Services
Hazards and Hazardous Materials	Greenhouse Gas Emissions
Recreation	Global Climate Change

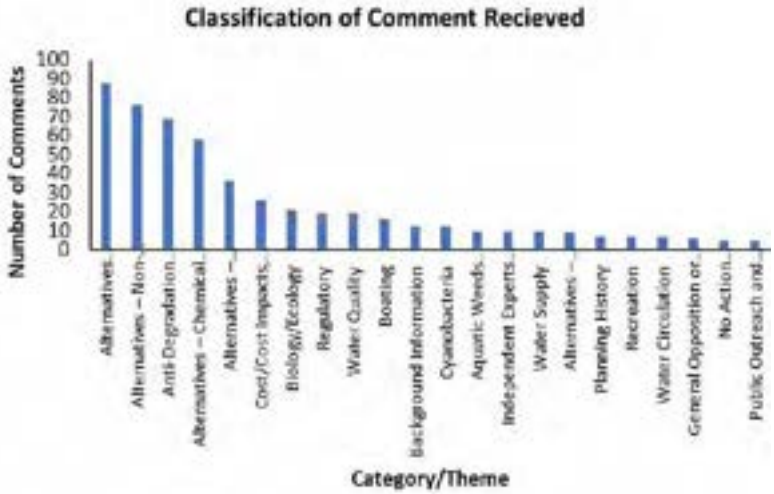


Figure 1. Comment classifications by number of comments received during the scoping period. Note: only classifications with five (5) or more comment are displayed. The following classifications received fewer than 5 comments: history, protection, jurisdiction, mitigation, risk assessment, cumulative & longterm effects, hydrology, indirect effect, project goals & objectives, and trash. More information about the comments within these categories can be found in the comment spreadsheet (Attachment E).

2.0 Project Description and Alternatives

This chapter presents the Proposed Project, Action Alternatives, and No Action Alternative considered in this EIR/EIS to control aquatic weeds. The history and status of aquatic weed infestation in Tahoe Keys lagoons is described in Section 1.3. This chapter explains the process used for alternatives development and selection, and summarizes alternatives that were considered and eliminated. Elements common to all alternatives are described, followed by a detailed description of the Proposed Project and Alternatives.

2.1 Summary of Proposed Project and Alternatives

This EIR/EIS considers the Proposed Project and two Action Alternatives for aquatic weed control methods testing (CMT), as well as the required No Action Alternative (Figure 2).

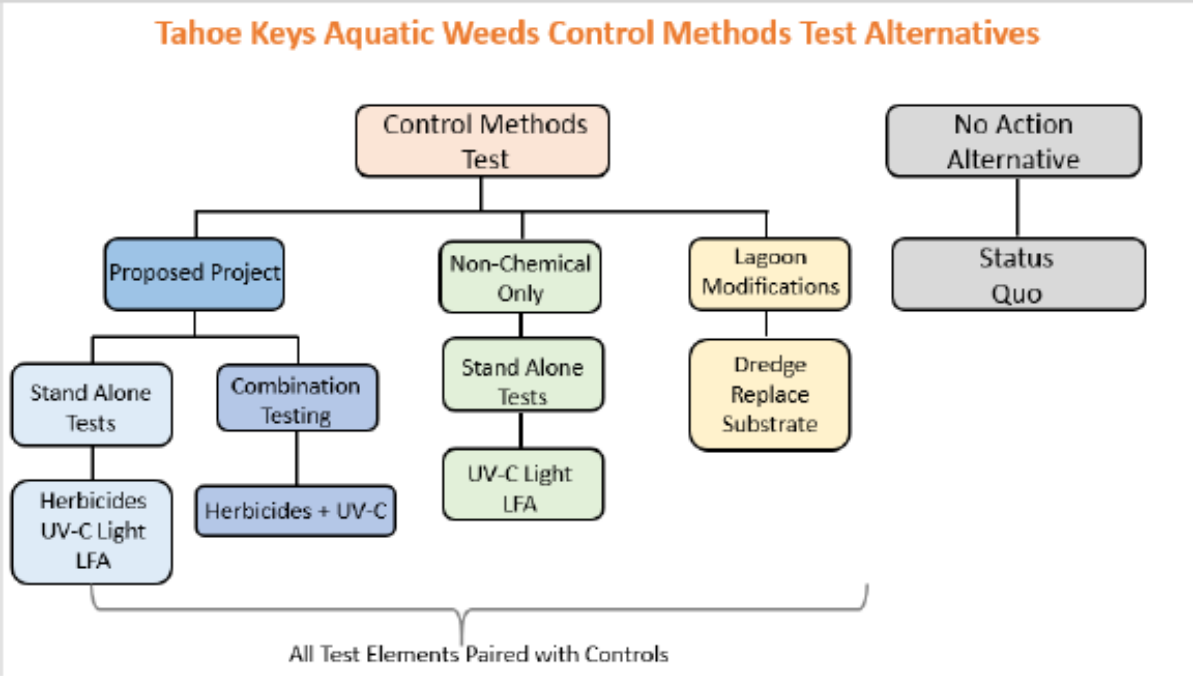


Figure 2: Components of the Proposed Project and Alternatives.

1. **Proposed Project**: The Proposed Project consists of a program to test alternative aquatic weed control methods, both as stand-alone treatments and in combination. Some methods were considered as full alternatives, and others were applied in support of these alternatives. Control methods were grouped as follows:

    a. **Group A** methods are full alternatives. They use herbicidal and non-herbicidal treatments at a large scale to achieve extensive reduction in target aquatic weeds (targeting at least 75% reduction). The Proposed Project tests stand-alone treatments using aquatic herbicides, UV light, and LFA, as well as combined herbicide and UV light treatments.

b. **Group B** methods are proven non-herbicidal maintenance treatments that are applied locally to follow up Group A treatments and control residual target aquatic weeds. Group B methods may include such actions as spot treatments with UV light, bottom barriers, diver-assisted suction and diver hand pulling techniques.

c. In addition to Group A and B methods, a variety of protective measures have been considered and could be applied during tests, as described below (2.3.3). Protective measures will be prescribed to reduce potential impacts of treatments identified through the environmental evaluation. Additional mitigation measures may be implemented as needed, based on monitoring results.

TWSA Board supports these options >

2. **Action Alternative 1- Non-Herbicidal Treatments**: A key action alternative is to proceed only with tests of non-Herbicidal methods of aquatic weed control. Under this alternative, no treatments with herbicides would be considered, but all other elements of the test program would be as described above for the Proposed Project.

3. **Action Alternative 2- Lagoon Modifications/Bottom Substrate Removal and Replacement in the Tahoe Keys Lagoons**: This action alternative responds to comments received during this scoping and would consist of direct reclamation at selected test locations in the Tahoe Keys lagoons through suction dredging (i.e., wet excavation) of the bottom layers of organic material and underlying sediment to remove the roots and turions of aquatic weeds, followed by placement of a new layer of bottom sediment (e.g., coarse sand).

4. **No Action Alternative**: This required alternative would consider the long-term consequences to the Tahoe Keys lagoons and the entirety of Lake Tahoe, of undertaking no new weed control activities in the Tahoe Keys lagoons. Under this alternative only existing control methods would be employed by TKPOA and individual property owners (e.g., voluntary use of bottom barriers, the existing LFA project, mechanical harvesting, and weed fragment control). Because herbicide and UV light applications would not be tested under this alternative, it is assumed that these methods for aquatic weed control would not be used in the foreseeable future under a No Action Alternative.

2.2 Alternatives Development and Selection

2.2.1 Alternatives Development

As described in Chapter 1, the lead agencies worked with a Stakeholder Committee to provide broad guidance and input to the development of alternatives. Building on initial work by the Stakeholder Committee, the Lead Agencies defined, screened, selected and characterized the proposed project and alternatives. This work included:

- Developing criteria for alternatives review and selection
- Reviewing a wide range of potential alternatives against the criteria
- Assigning alternatives to various parts of the test program (i.e., determining which methods for controlling aquatic weeds should be considered "Group A methods", which are "Group B" methods, and which should be incorporated as design mitigation in the test program)

Tahoe Keys Lagoons Aquatic Weed Control Methods Test (CMT)Environmental Certification

TWSA Staff Summary (Feb. 2021)

https://www.yourtahoeplace.com/uploads/pdf-public-works/TKPOA_CMT_TWSA_Staff_Summary_01292021.pdf

Tahoe Keys Lagoons Aquatic Weed Control Methods Test (CMT)Environmental Certification Process for the Lahontan RWQCB Board:

Certify-Final EIR/EIR
Grant-Basin Plan Prohibition Exemption
Adopt-NPDES Permit

Full Documents: https://tahoekeysweeds.org/environmental_analysis/

Due to NPDES permit data gaps the certification process was delayed untilwinter 2022, with scheduled implementation (if approved) in 2022. The Tahoe Keys Property Owners Association (TKPOA) is seeking approval for their exemption to the Lahontan Basin Plan Amendment on the prohibition of herbicide use in Lake Tahoe, as represented in the 2018 Aquatic Pesticide Application Plan (APAP), the goal of the project is to reduce aquatic weed biomass by 75% to improve water quality and recreation for beneficial use.

The Lead Agency (Lahontan) is requiring full environmental review of the proposed project, due to the proposed discharge of aquatic herbicides into receiving waters of the Tahoe Keys Lagoons, a Tier III Outstanding NationalResource Water (ONRW Tier III) for ecological and recreational value. After designation of the Tahoe Keys Lagoons as thegreatest threat to the environmental heath of Lake Tahoe, the TRPA has secured federal funding though the Lake Tahoe Restoration Act ($3M) to facilitate a solution to the aquatic weed problem at the Tahoe Keys Lagoons. As part of the California Environmental Quality Act (CEQA) process, the TKPOA has worked with regulators and stakeholders to produce a proposed project for herbicide use, and after an initial public scoping process, three additional project alternatives.

The proposed project, and three alternatives underwent review by an independent third party consultants chosen by the lead agencies, and produced the DEIR/EIS. As required by the (CEQA) Process, the DEIR/EIS is not recommending a project action to the lead agencies; it is providing the necessary information for informed decision making, with the required designation of an Environmentally Superior Alterative.

The DEIR/EIS has chosen a project alternative as the **Environmentally Superior Alternative, Action Alternative 1 (Testing of Non-Herbicide Methods Only)**. The proposed Project, Action Alternative 2 (Tahoe Keys Dredge and Replace Substrate), and the No-Action Alternative would have unavoidable impacts on recreational boating that would not occur under Action Alternative 1 (Testing of Non-Herbicide Methods Only). Additionally, the permitting process for the proposed project requires an Antidegradation Analysis, to be released in the fall of 2020, as part of the Draft National Pollutant Discharge Elimination System (NPDES) permit.

The DEIR/EIS has found that the proposed project and the alternative actions will have **no significant impact** to Environmental Health, Aquatic Biology, Utilities, and all reviewed objectives, that cannot be avoided with mitigation measures including early treatment, real time monitoring, pretreatment surveys, and containment. The non-action alternative has been found to have **potentially significant unavoidable impact** due to the increase infestation of aquaticweeds from the Tahoe Keys Lagoons throughout greater Lake Tahoe.

Project Details (Proposed Project)

The proposed project is a 2 phase, 3 year Control Methods Test (CMT) with a goal of 75% plant biomass reduction. Year 1 includes the testing of Group A Methods: two herbicides, in standalone test sites plus combination UV-C & Herbicide test sites. Additionally, the proposed project will include testing of UV-C Light, LFA, and no action. Years 2/3 will include testing of mechanical methods (Group B) with no herbicide use.

Year One – 2021
Group A West Lagoon- 21 Test Sites total. Triplicate use of methods (selection condition dependent).

6 herbicide-only (3 sites for 2 herbicides)
3 UV-C Light only
6 combination Herbicide and UV-C Light
3 LFA-only
3 Control
3 (herbicides only) Lake Tallac

Herbicide Only (10.4 acres in Lagoons, 2.9 acres in Lake Tallac)

The DEIR/EIS reviewed the environmental impacts of three aquatic herbicide, if the proposed project is executed onlytwo herbicides will be used, Endothall and Florpyrauxifen-benzyl or Triclopyr.
Containment- Double Turbidity Curtains, Applicator Control, Monitoring and Reporting Program described in the 2018Aquatic Pesticide Application Plan (APAP).

Ultraviolet Light C (UV-C) Stand Alone (4.9 acres)

"The current proposed methodology includes initial ultraviolet light treatments in May and June with the array two to three feet off the lagoon bottom, to stunt growth when the plants are small. A second treatment would occur in July andAugust, and in the case of curlyleaf pondweed, would target irradiating the crowns of the plants causing mortality before they drop turions. A final round of treatments could occur in September and October, as needed." (TKPOA CMT, page 2-19)

"The total area proposed for stand-alone tests of ultraviolet light in the CMT is 4.9 acres, which represents less than three percent of the total surface area of the 172-acre lagoon system. Based on the Lakeside Marina and Beach testing and using an average time of 15 minutes for treatment and repositioning of the light array, approximately 640 square feet could be treated per hour and one acre could be treated in 68 hours, using the existing eight-foot by 20-foot array.This information was used to project how long UV light treatment might take for the proposed testing:

Coverage using the existing ultraviolet light boat would require four to five days of operation at ultraviolet light-only test site. Continuous operations for seven days per week could accomplish a single round of treatment at all three testsites in approximately three weeks using the existing ultraviolet light boat, assuming no down time for cleaning, maintenance, and other activities.

To complete two rounds of ultraviolet light treatment during the active growing season for target aquatic weeds at all ultraviolet light test sites, including the six ultraviolet light/herbicide test sites described in Section 2.3.5, it is assumed that a mid-sized ultraviolet boat with a 320 square-foot light array would need to be deployed in addition to the existingsmall ultraviolet boat.

Working together the two boats could complete one round of treatment in approximately 270 operating hours, orabout seven weeks using a normal work schedule.

Given the plan for two or three rounds of ultraviolet light treatment, it is likely that the two boats could need to workcontinuously from late May until October if a third round is necessary based on results from the first two rounds." (TKPOA CMT, Page 2-21)



SOURCE: DigitalGlobe, 2018

Tahoe Keys Lagoons Restoration Program EIR/EIS, D180990



Laminar Flow Aeration (LFA) – Stand Alone (12.8 acres)

"Three test sites would be treated with LFA. LFA treatment would involve the temporary installation of five to 10 ceramic air diffusers on the bottom of the channel at each treatment site, together with weighted airlines. The diffusers and airlines would be connected to a land-based electrically powered air compressor, which would be placed in a sound-reducing cabinet. TKPOA was issued permits by TRPA, the Army Corps of Engineers (USACE) and Lahontan Water Board to install a six-acre LFA project at Site 26 in the south-central part of the West Lagoon (Figure 2-4) in April 2019. Two additional smaller test sites are planned to begin operation in the spring of 2021, for a total of 12.8 acres of LFA operation during the CMT.

The LFA test would not disrupt existing recreation uses in the Tahoe Keys since all equipment would be located on the bottom of the channel (except for air compressors that would be located within utility enclosures). No modifications toexisting uses or structures are proposed, and no barriers would be used to isolate the LFA treatment areas." (TKPOA CMT, page 2-22)

Herbicide & UV-C Light combined (10.4 acres)

TKPOA will test three combined Herbicide and UV-C light sites. The combination of the two group a methods "sites would be used to study the efficacy of combining ultraviolet light treatments applied in linear, unobstructed reaches, with herbicide treatments applied in the relatively narrow zone between the dock footprints and the shorelines. The objective of this combination is to optimize ultraviolet light exposure efficiency by combining it with the application ofherbicides in generally "obstructed" areas." (TKPOA CMT, Page 2-22)

Year 2 & 3 (2022-2023)

Group B West Lagoon – methods to be used; Diver-Assisted suction/Hand Pulling, Bottom Barriers (with our without hotwater, steam or acetic acid injections), Localized spot treatment with ultraviolet light, localized suction dredging. The Group B method to be used will be dependent on the results of the Group A treatment, the size of the infestation and limitations and constraints to the method type based on lagoon morphology or physical obstructions. "Group B methods would be implemented following the testing of Group A methods, depending on the target aquatic weeds present, size of infestation, and location of infestation. Where the target plant biovolume reduction does not achieve the 75% reduction goal for Group A methods, that site would be considered a failed test and Group B follow-upmaintenance would not be performed. Group B methods are included in the CMT to evaluate their ability to provide sustainable, long-term maintenance options that preclude the need for repeated use of herbicides or other Group A methods. During the Spring of the year following Group A testing at each site, hydroacoustic and macroinvertebrate surveys would be performed to determine the size of the remaining infestation. Group B methods would be implemented during the years following Group A tests." (TKPOA CMT, page 2- 23/24)

Alternative 1 (Testing of non-herbicide methods only):

Action Alternative 1 would proceed only with tests of non-herbicide methods of aquatic weed control. Under this alternative, no treatments with herbicides would be conducted, and other elements of the test program (i.e., ultravioletlight, LFA, and Group B methods) would be as described above for the Proposed Project. This alternative was identified as the environmentally superior alternative (Section 5.7).

Year One – (2021)

- UV-C Light – Stand Alone Test as described in the proposed project
- LFT – Stand Alone test as described in the proposed project

Year 2 & 3 (2022-2023)

- Group B maintenance as described in the proposed project

Alternative 2 (Tahoe keys dredge and replace substrate)

Action Alternative 2 responds to comments received during public scoping and would consist of hydraulic dredging (i.e.,wet excavation or suction dredging) of the bottom layers of organic material and sediment to remove the roots and turions of aquatic weeds at three test sites in the Tahoe Keys lagoons, followed by placement of a new layer of bottom sediment (e.g., coarse sand or gravel). (TKPOA CMT, Page ES-7)

No Action Alternative

The No Action Alternative considers the long-term consequences to the Tahoe Keys lagoons and Lake Tahoe of undertaking no new weed control activities in the Tahoe Keys lagoons. Under this alternative only current control methods would be employed by TKPOA and individual property owners (e.g., voluntary use of bottom barriers, theexisting LFA project, mechanical harvesting, and weed fragment control). Because herbicide and ultraviolet light applications would not be tested under this alternative, it is assumed that these methods for target aquatic weed control would not be used in the foreseeable future under a No Action Alternative. (TKPOA CMT, Page ES-7).

TWSA Staff Draft EIR/EIS Highlights for Purveyors

- **No Finding of significant impact to all objectives from proposed project, alt. 1, Alt. 2.**

Filtration Exemption References

Issue UT-1: Effects on Water Supply. A primary concern raised by water purveyors sourcing Lake Tahoe has been the potential to affect the quality of water taken at their drinking water intakes, such that they would no longer qualify for the filtration exemption. Of the six treatment requirements listed in Table 3.4.2-1, the only one that could be affected by the Proposed Project would be turbidity. The Proposed Project has no potential toinfluence microbial contamination or trihalomethanes in Lake Tahoe. This analysis of potential impacts also considers the potential for herbicides or degradates to reach water intakes in detectible concentrations, such that drinking water sourced at these intakes would be rendered contaminated or unsuitable for human use.

No mitigation would be required beyond that proposed for water quality (Section 3.3.4) and designed as part ofthe Proposed Project, as no impacts to utilities would occur. TKPOA has proposed contingency plans, including monitoring and alert systems (TKPOA 2018e; see also the IEC/IS), that would be implemented if necessary, to remove herbicides and other chemicals to treat the potable water before distribution. The negligible potential for impact forestalls the need for other mitigation. **No significant unavoidable impacts** to utilities would occur.

Detectable Concentrations of Herbicides and Degradates in Receiving Waters. The potential impact of detectable concentrations of herbicides and degradates in receiving waters will be **less than significant** for the Proposed Project, given the timing and limited extent of application. A spill response plan would also be employed, and double turbidity curtains would be used to prevent movement of herbicides toward the West Lagoon connecting channel. LFA or other aeration technology will be used at test sites to accelerate the degradation of herbicide active ingredients and degradates.

Protection of Drinking Water Supplies. This issue would have **less than significant** effects for the Proposed Project, given measures to contain the herbicide applications with double turbidity curtains to prevent movement of active ingredients toward the West Lagoon connecting channel and Lake Tahoe. Dye tracing

andwell monitoring will document herbicide movement, and existing or mobile carbon filtration systems would beactivated to remove herbicide residues if they reach wells.

Effects on Water Supply (Utilities). No impact to this issue would occur under the Proposed Project or any ofthe alternatives. **No significant unavoidable environmental effects would occur** for this issue under the Proposed Project and Action Alternatives. Though the degree of potential significance is speculative, the No Action Alternative could result in a potentially significant turbidity-related impact if intakes are located in shallow waters where habitat could support uncontrolled growth of aquatic weeds.

Significant impact of non-action alternative

Environmental Health as aquatic weed infestations persist and grow in the Tahoe Keys lagoons, conditions maybecome increasingly favorable for HABs. Past detections of cyanotoxins have reached caution levels at Tahoe Keys, and continuation of the existing programs to monitor and warn people at Tahoe Keys when cyanotoxins are present may continue to be effective in protecting against any additional risks of exposure to cyanotoxins. However, the conditions that cause cyanobacteria to produce cyanotoxins are not well understood, and it is uncertain whether concentrations of these toxins would increase in the future. Given this uncertainty, the impact of HABs may present a **potentially significant unavoidable impact** of the No Action Alternative.

Aquatic Biology: The No Action Alternative is expected to lead to expansion of aquatic weed growth in the lagoons and in other nearshore areas of Lake Tahoe, particularly with continued spread of curlyleaf pondweedinfestations. Therefore, significant and unavoidable impacts would be expected (1) in aquatic macrophyte community composition, (2) in the expansion of curlyleaf pondweed, (3) to further degrade habitat conditionsfor the larger aquatic BMI community, similar to that for the Tahoe Keys lagoons, and (4) to further degrade habitat conditions for special status fish species and native or recreationally important game fish species, potentially blocking access to spawning habitat.

Built/Human Environment: Long-term **significant unavoidable impacts** to recreational boating could accumulatefor this issue under the No Action Alternative, if the continued harvesting of aquatic weeds as currently practiced by the TKPOA is ineffective in preventing the spread of the weeds to Lake Tahoe.

Mitigation Measures (Feasible, measureable and specific)

Mitigation measures for the proposed project are provided in the 2018 Aquatic Pesticide Application Plan(APAP), the draft EIR provides the following mitigation measures:

- Applicator qualifications
- Spill response plan
- Dye tracing
- Well monitoring and contingencies
- West Channel monitoring and contingencies
- Public outreach
- Carbon filtration contingency (wells only)
- Double turbidity curtain barriers
- Best management practices
- Timing and size of treatment
- Aeration

Environmentally Superior Alternative (requirement & how chosen)

CEQA Guidelines 15126.6 address Alternatives to the Proposed Project, stating that "an EIR shall describe a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain mostof the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives," and further, "The range of potential alternatives to the proposed project shall include those that could feasibly accomplish most of the basic objectives of the project and could avoid or substantially lessen one or more of the significant effects."

Sections 15126.6(a) and 15126.6e(2)) require that an EIR's analysis of alternatives identify the "environmentally superior" alternative among all of those considered. In addition, if the No-Project Alternative is identified as the environmentally superior alternative, then the EIR must also identify the environmentally superior alternative among the other alternatives. Under CEQA, the goal of identifying the environmentally superior alternative is to assist decision makers in considering project approval. CEQA does not require an agency to select the environmentally superior alternative (State CEQA Guidelines Section 15042–15043).

In this case, the No Action Alternative is not the environmental superior alternative; in fact, as shown in Table 5-1, it would have the greatest potentially significant unavoidable impacts of the four alternatives considered.

Action Alternative 1 (Testing of Non-Herbicide Methods Only) was selected as an alternative that might reduce the potentially significant effects of the Proposed Project by avoiding the application of herbicides.

Action Alternative 2 (Tahoe Key Dredge and Replace Substrate) was selected after scoping as an alternative suggested by stakeholders that also might reduce impacts by avoiding the application ofherbicides.

As shown in Table 5-1, both the Proposed Project and Action Alternative 2 would have potentially significant unavoidable impacts on recreational boating. In addition, although the Proposed Project and both Action Alternatives mitigate all other identified environmental issues to less than significant, both the Proposed Projectand Action Alternative 2 entail activities (application of herbicides and the dredging, dewatering and disposal of sediment) that would not occur under Action Alternative 1. Although mitigated, these additional activities entailsome measure of potential risk and reduced impact.

For all these reasons, Action Alternative 1 is the environmentally superior alternative.

Figure 8: Contingency Herbicide Monitoring Sites and Tracks for Herbicide Validation Study



NOTE: These sites will only be monitored if herbicide residues are detected in the West Channel.

TWSA Public Comments

In 2020-21, significant comments were submitted by the TWSA Board, and multiple independent reviews were commissioned, of the CEQA draft environmental review (DEIR/DEIS). This correspondence is posted at: https://www.yourtahoeplace.com/uploads/pdf-public- works/TWSA_COMMENTS_TKPOA_DEIR_2020_-_FINAL_with_WQTS_attachment_SUBMITTED_8_27_2020_(1).pdf

https://www.yourtahoeplace.com/uploads/pdf-public-works/TKPOA_CMT_TWSA_Staff_Summary_01292021.pdf

https://www.yourtahoeplace.com/uploads/pdf-public-works/TWSA_FINAL_comments__on_Lahontan_Permit_(submitted_10_28_2021).pdf

The following letter is a sample of TWSA correspondence submitted as part of the public comment and technical review processes. Extensive correspondence by TWSA is archived in earlier TWSA Annual Reports.



Tahoe Water Suppliers Association
Protect the Source

1220 Sweetwater Road
Incline Village, Nevada 89451
775-832-1212

TWSA Members:
Cave Rock Water System
Edgewood Water Company
Glenbrook Water Cooperative
Incline Village GID
Kingsbury GID
Lakeside Park Association
North Tahoe PUD
Round Hill GID
Skyland Water Company
South Tahoe PUD
Tahoe City PUD
Zephyr Water Utility

July 16, 2019

To:
Mr. Russell Norman, Lahontan Water Board
Mr. Dennis Zabaglo, Tahoe Regional Planning Agency

RE: CEQA Scoping Comments – Tahoe Keys Lagoons Aquatic Weeds Control Methods Test

The Tahoe Water Suppliers Association (TWSA) remains in support of the exploration of non-chemical AIS controls at Lake Tahoe such as: diver suction, hand-pulling, weed dock rollers and UVC light methodology for aquatic weed controls.

"TWSA cannot support the application of aquatic herbicides until all non-chemical methods have been fully vetted." - TWSA Board Decision recorded at TWSA Board Meeting of Thursday, June 8, 2017

- **In this scoping process, we would ask that one of the alternatives be a 'non-chemical methods only' alternative.**

TWSA members share concerns about the potential impact of herbicides on our water intake systems and quality of the water we provide to our customers. Tahoe's municipal water treatments systems are not specifically designed to remove chemical contaminants. Six TWSA members hold "filtration exemption" status from the U.S. Environmental Protection Agency (US EPA). This is a rare status, usually granted only to a "non-contact" watershed. The treatment processes (ultra-violet/ozone/chlorine) used by members with "filtration exemption" status is designed for the deactivation of potential biological contaminants, not chemicals. Their effectiveness and efficiency at removing chemical compounds is unknown.

- **TWSA requests a detailed analysis of the potential impacts of herbicides on drinking water supply.**
- **We also ask for some analysis of the question "What are the potential impacts to customer confidence in the DRINK TAHOE TAP ® brand, from the various control methods?"**

The inflatable bladder dam was removed as a mitigation.

- **An explanation of the reasoning behind the removal of the bladder dam mitigation is requested.**

There are several other general topics that should be addressed in analysis:

- **Options for biomass removal after treatment of matured plants.**
- **Discussion on general issue of chemical adaptation/herbicide resistance and repeat application protocol as the norm.**
- **Fiscal analysis of various control methods including consultant fees, regulatory fees and mitigation measure expenditures.**
- **Discussion on algae bloom potential / cyanobacteria and control options.**

If you have questions, please contact us directly. Thank you for the opportunity to comment.

Madonna Dunbar, TWSA Executive Director & Suzi Gibbons, TWSA Board Chairperson

Non-Chemical Control Methods currently used at Lake Tahoe that can provide long-term invasive plant control.

Diver-assisted hand removal is labor intensive, and can require a greater investment of time and money. Using this method in combination with bottom barriers is an effective way of maximizing this technology while reducing the cost.



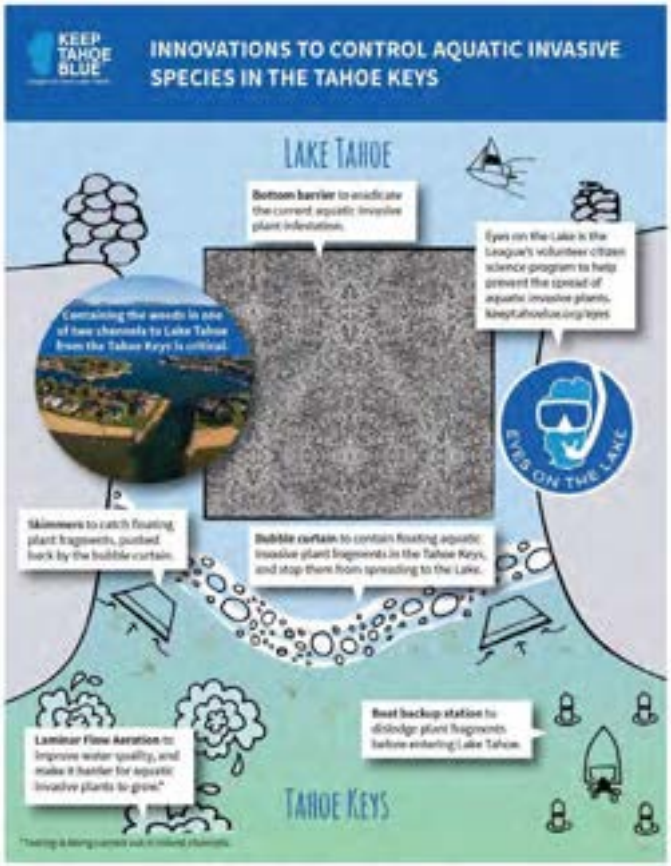
Bottom Barriers can be used effectively in large areas with smooth substrate and no structures. They have been used successfully at Emerald Bay, Crystal Shores HOA and other locations.



Testing and analysis on the effects of deep penetrating **UltraViolet Light** on aquatic invasive weeds began in 2017. This technology showed significant plant control during the initial trials.



Other mechanical methods considered: Water Drawdowns, Dredging, Rotovating, Circulation and Aeration



Tahoe Keys (TKPOA) Circulation System Operating Permit -Waste Discharge Requirements (WDR)
http://www.waterboards.ca.gov/lahontan/board_info/agenda/2014/july/item_12.pdf

2014 Reissuance of WDR Permit:
In 1975, the Lahontan Regional Water Board issued a permit to TKPOA which allowed operation of a water treatment facility and a circulation system for the lagoons. These systems were state-of-the-art atthat time and their purpose was to keep the waterways clear. By the late 1970s, a few residential homeshad been constructed on the private lots, and construction of the homes significantly increased after thebuilding moratorium was lifted in 1985. Most homes at the Keys were built in the late 1980s through the1990s. Throughout this time, TKPOA operated the circulation and treatment facilities intermittently as needed to reduce turbidity and prevent stagnation and the Water Board updated the permit periodically. Though the treatment and circulation systems were being operated, the lagoons were experiencing exponential growth of aquatic weeds.

The treatment system has not been operated following an incident in August 1998 where TKPOA allegedly discharged alum flocculent from to the waterways. To resolve the alleged violation, theWater Board and TKPOA entered into a settlement agreement whereby TKPOA agreed to spend $198,000 performing water quality improvement projects. These projects included a bioassessment study, installation of filters in storm drain inlets, and increased harvesting removal of aquatic weeds.By 2005, TKPOA completed all terms of the settlement agreement, yet the lagoon aquatic weeds had not been controlled. Since then, TKPOA has been exploring options for controlling the invasive aquatic weeds and has

been consulting with Water Board staff on understanding the viable options. The proposed Waste Discharge Requirements (WDR) are a result of intensive collaboration over many months between TKPOA and Water Board staff. The purpose of this new WDR is to require TKPOA to develop and implement management control measures to prevent the discharge of pollutants from non-point source activities.

The WDR allows TKPOA to operate its water circulation system and place bottom barriers in the lagoons to suffocate invasive aquatic weeds. Specific orders in the WDR require TKPOA to developand implement a Non-Point Source Management Plan for land-based activities, and an Integrated Management Plan for Aquatic Invasive Species for all water-based activities. Under a Municipal NPDES Stormwater Permit, the City of South Lake Tahoe (CSLT) is responsible for all stormwater within its jurisdiction, which includes TKPOA. The CSLT and TKPOA have agreed to coordinate operation and maintenance of shared stormwater facilities.

To strengthen TKPOA's involvement in stormwater management and to comply with the Lahontan Basin Plan, the WDR requires TKPOA to either document coordination with the CSLT to demonstrate that shared stormwater treatment facilities treating private property discharges and public right of-way stormwater are sufficient to meet the CSLT's average annual fine sediment and nutrient load reduction requirements, or meet the surface water numeric effluent limits.

The TWSA supported the required Non-Point Source Plan's strong emphasis in fertilizer and nutrient management with mandatory public education, water quality monitoring and specific goals and deadlines for a management plan for nutrient reduction. TWSA also supported the provisions of theIntegrated Weed Management Plan and the nonchemical control of aquatic weeds.

Lahontan Regional Water Board Water Quality Control Plan (Basin Plan) Changes to the Water Quality Objective for Pesticide Application to Water
http://www.waterboards.ca.gov/lahontan/water_issues/programs/basin_plan/pesticidebpa.shtml

Since 2010, TWSA has been active in drinking water quality advocacy. The potential use of herbicides remains one of chief concern and activity in the previous reporting years for TWSAmember agencies.

In 2014, Basin Plan Cleanup Amendments were passed by the LRWQCB. These revisions removed the previous blanket prohibition on direct water applications of herbicides/pesticides at Lake Tahoe.

Previously, addition of pesticides to water for any purpose was in conflict with the water quality objective. The proposed BPA amends the water quality objective to provide the Water Board with the discretion to approve specific aquatic pesticide applications and regulate the project under theNational Pollution Discharge Elimination System program.

Staff of the Lahontan Water Board proposed amendments to the Basin Plan that:
(1) change reference to Nondegradation Objective from a water quality objective to a policy statement and implementation measure, (2) add mixing zone provisions,
(3) revise certain existing waste discharge prohibitions and/or exemptions to those prohibitions, delete certain existing waste discharge prohibitions and applicable exemptions, and add certain waste discharge prohibitions and exemptions, (4) amend Chapter 5 for consistency with the updatedClean Water Act Section 208 Water Quality Management Plan (208 Plan), and 5) correct grammatical and punctuation errors, and address outdated policy references.

Description of the Revised Amendment

The Lahontan Regional Water Quality Control Board (Water Board/LRWQCB) amended the Water Quality Control Plan for the Lahontan Region (Basin Plan) by replacing the existing region-wide pesticide water quality objective - which essentially prohibits pesticide application to water - with a region-wide waste discharge prohibition on pesticides in water with exemption criteria for application of aquatic pesticides to water. Circumstances eligible for a prohibition exemption involvethe use of aquatic pesticides for purposes of protecting public health and safety (e.g., vector control,drinking water protection) and ecological integrity (e.g., fisheries management, aquatic invasive species control).

The project, under the California Environmental Quality Act, is the amending of a water quality objective. The proposed BPA is a region wide amendment. The project area is the Lahontan Region.The Lahontan Region is defined in terms of drainage basins by Section 13200(h) of the Porter- Cologne Act. For planning purposes, the Lahontan Region has historically been divided into North and South Lahontan Basins at the boundary between the Mono Lake and East Walker River watersheds. The entire Lahontan Region is about 570 miles long and has a total area of 33,131 square miles. Specifically, the language in Chapter 4 of the Basin Plan that discusses the proposed waste discharge prohibition and the exemption criteria required modification to allow for the potential use of other lower toxicity slow-release systemic aquatic pesticides in addition to allowingslow release larvicides.

For pesticides other than larvicides, the previously proposed language limited the duration of the treatment event to one-week. A one-week time limitation may have precluded the potential use of slow-release pesticides, which may require presence at effective concentrations in the water column beyond a one-week duration to achieve desired project goals. The modified language allows for the potential use of these slow-release compounds, but requires that the treatment event be limited to the shortest possible time and confined to the smallest area necessary for project success.

Lahontan Regional Water Quality Control Board's (LRWQCB) Basin Plan Amendment was adopted by the Regional Water Board and the CA State Water Board. The CA Office of Administrative Law (OAL) has reviewed and approved the amendment. It became effective after final USEPA approval (which took 3 years). Throughout this process, TWSA was heavily involved in public opposition to the LRWQCB revisions of the Basin Plan Amendment. Thenew regulations allow for LRWQCB review of proposed herbicide/pesticide application projects inLake Tahoe for aquatic invasive species management. Prior regulations upheld a prohibition on chemical use. TWSA staff and members attended multiple LRWQCB meetings, special planning workshops and CA Water Board meetings, providing both written and public comment. TWSA supported an unsuccessful 5-year moratorium on these projects at Tahoe.

TWSA involvement did yield enhanced public notification measures: any proposed chemical useproject now requires notification and solicitation of comments from potentially affected water providers, regardless of the distance of the provider's service area from the proposed projects.

Another result of the public comment process has been TWSA maintaining presence on the Nearshore Aquatic Invasive Weeds Working Group (NAIWWG) and the Tahoe Keys Water QualityWorking Group.

Initially, Lahontan staff began rewriting the amendment in early 2010, without input from the water providers, or the Nevada drinking water and water quality regulators (Nevada Department ofEnvironmental Protection {NDEP} and California Department of Public Health {CDPH}). By providingwritten and public comment, TWSA staff was successful in bringing the issue of the Tahoe drinking water purveyors' filtration exempt status and their concerns to the LRWQCB. LRWQCB staff was then given direction to work with TWSA, NDEP and CDPH on the regulatory language and review process.

In July 2009, the Lahontan Region Water Quality Control Board began the scoping process for revisions to

regulatory language in the Lahontan Basin Plan regarding aquatic herbicides, pesticides and other chemical controls. The revised Basin Plan was approved on Dec. 7, 2011, and received CAState Water Board approval on May 15, 2012.

This project was an amendment to the Water Quality Control Plan for the Lahontan Region regulating aquatic pesticide/herbicide use in Chapter 4 of the Basin Plan. The amendment replacedexisting region wide water quality objectives for pesticides. The amendment will give the Lahontan Water Board discretion to allow exemptions to the pesticide prohibition for aquatic pesticide treatments proposed for purposes of protecting public health or safety or ecological integrity and only if such projects satisfy specific exemption criteria.

TWSA staff and members presented public and written comments opposing the revisions throughout 2011, 2012, 2013 and 2014, presenting comments to the Lahontan Regional Water Quality Control Board and the CA State Water Board on multiple occasions.

The TWSA presented argument that Lake Tahoe's Tier 3 Outstanding National Resource Water (ONRW) status warranted a prohibition. TWSA staff attended meetings and voiced the concerns ofthe water purveyors over chemical use in Lake Tahoe; supporting a preference for maintaining the ban on such use at Lake Tahoe.

Based on public comment; meetings between TWSA staff and member agencies and LRWQCB staffwere held in April & May 2011. Both the CA and NV drinking water regulatory agencies submitted mitigation language to LRWQCB in May 2011.

Final approval of the Basin Plan Amendment revisions was given on Sept. 10, 2015 by USEPA.

An herbicide test pilot was proposed for AIS weed management in the Tahoe Keys area in 2018, it has been revised and deferred to 2022, if approved.

Excerpt of Exemption Criteria and Mitigation Language relevant to drinking water intakes:
http://www.waterboards.ca.gov/lahontan/water_issues/programs/basin_plan/comments111411/attachment2_revised093011.pdf

(Note: Footnote 7: page 8: The Regional Board will consult with the Nevada Division of Environmental Protection (NDEP) when a project affects interstate waters that exist within, or flowto, the State of Nevada. The Regional Board will consult with the California Department of Public Health (CDPH) when reviewing exemption requests that may affect surface drinking water intakes.)

(Page 8):
An exemption request must be submitted to the Water Board and contain the following information acceptable to the Regional Board.

Project Information to include:
Project description including, but not limited to, proposed schedule, duration, nameof pesticide, method and rate of application, spatial extent, water body, control/mitigation measures to be used, contact information. Purpose and need for project. The chemical composition of the pesticide to be used, including inert ingredients. Communication and notification plan to be implemented before, during and after the project. The plan will include documented measures to notify potentially affected parties who may use the water (ground or surface) downstream for any beneficial use. The notification plan must include any associated water use restrictions or precautions. Project proponents will provide potable drinking water where necessary and shall obtain any necessary permits from CDPH and NDEP for supply of potable

drinking water.

For projects conducted in an ONRW (e.g. Lake Tahoe) that may impact surface water intakesused for drinking water located within one-half mile of the point of application, the following additional requirements apply:

i. Proponents will provide written response from the water purveyor(s) indicating (1)request for project modification (e.g., project design, monitoring, and/or mitigation measures) or (2) consent with the project with no continued involvement.

ii. An estimate of the maximum foreseeable concentrations of pesticide components inany surface water intake used for drinking water supplies.

Public notification requirements may be waived where project proponent is an agencysignatory to Cooperative Agreement with DPH and evidence is provided of notificationexemption.

iii. Spill contingency plan to address proper transport, storage, spill prevention and cleanup.

Public comment offered to the CA State Water Board by TWSA staff in 2014 is archived in earlier annual reports. The following links directly reference 2011 TWSA, NDEP and CDPH comments regarding the Basin Plan:
http://www.waterboards.ca.gov/lahontan/water_issues/programs/basin_plan/comments051311/re sponses/twsa_wbresponse093011.pdf

http://www.waterboards.ca.gov/lahontan/water_issues/programs/basin_plan/comments051311/responses/ndep_wbresponse093011.pdf

http://www.waterboards.ca.gov/lahontan/water_issues/programs/basin_plan/comments051311/responses/cdph_dw_wbresponse093011.pdf

Tahoe Keys 2016
Aquatic Macrophyte Survey Report
http://www.keysweedsmanagement.org/#methods

Tahoe Resource Conservation District / Tahoe Keys Aquatic Plant Management Research Projects
http://tahoercd.org/aquatic-invasive-species-control-projects/

More on information on these type of non-chemical control projects is provided in the "Controls" and 'Watershed Activities" chapters.

The Tahoe RCD is the lead implementation agency for aquatic weeds control in the Tahoe Basin. They have been the agency staffing the boat inspection program, conducting underwater surveys,monitoring, installing bottom barriers and preparing reports on projects.

Perhaps the most promising thing to occur in recent years was the demonstration of a UV Light Project to kill aquatic weeds, conducted by Inventive Resources Inc. with technical support from Tahoe RCD.
Initial results show plant control is possible using UV light. A full report was published, December 2018.

http://www.tahoefund.org/our-projects/active-projects/uv-light-pilot-project/
Partners: Tahoe Resource Conservation District, Inventive Resources Inc., California Tahoe Conservancy **Total Project Cost:** $270,000 / **Tahoe Fund Grant:** $10,000

UV-C Light Test Final Report 2018
https://tahoercd.org/tahoe-aquatic-invasive-species-resources

Executive Summary

This Final Monitoring Report is submitted to fulfill Contract Number CTA 16031L between the California Tahoe Conservancy (Conservancy) and Tahoe Resource Conservation District (Tahoe RCD) for the Aquatic Invasive Plant Control Pilot Project (Project). This Project tested the effectiveness of ultraviolet light, C wavelength (UV-C) on aquatic invasive plant (AIP) infestations in Lake Tahoe in two lake environments: open water and enclosed water. An interim progress report was submitted to the Conservancy in December 2017 and is available for download on Tahoe RCD's website (https://tahoercd.org/tahoe-aquatic-invasive-species-resources/). The 2017 progress report included:

- A summary of work completed during the 2017 treatment period;
- Draft products, reports and interim findings, including a statement of tasks and milestones and a report of the status on each, including public and agency meetings' outcomes;
- A discussion of any challenges or opportunities encountered in accomplishing the scope of work;
- An assessment of the progress compared to the timeline in the Project Schedule;
- A narrative financial report comparing costs to date and the approved scope of work and budget, and
- Copies of relevant materials produced during the 2017 reporting period under the terms of the agreement.

This Final Monitoring Report builds upon the data and preliminary findings provided in the 2017 Progress Report by considering long term post-treatment results that were measured during the 2018 growing season between June and September 2018. This report includes:

- A summary of the objectives of the project and how these objectives were accomplished (**Section 3 and Section 7**);
- Summary of public and agency meeting outcomes and work completed for this project (**Table 1 and Appendix B**);
- Findings, conclusions or recommendations for follow-up or ongoing activities that could result from the successful completion of this project (**Sections 9 and 10**);
- Comparison of pre-treatment and post-treatment results for macrophytes, benthic macroinvertebrates (BMI), periphyton, phytoplankton, zooplankton and water quality parameters (**Section 8**);
- Compilation of 2017 and 2018 field photo documentation (**Appendix D**);
- Copies of news articles and educational materials produced as a result of the grant agreement (**Appendix F**); and
- An economic assessment of AIP treatment methods used in Lake Tahoe (**Section 11**).

The results from the Project support initial laboratory findings that the application of UV-C light results in observed mortality of submerged aquatic plants, both in an enclosed waterbody (i.e., marinas) and open waterbody (i.e., beach littoral) systems. Most submerged aquatic plants (i.e., macrophytes) treated with UV-C light exhibited signs of deterioration within 7 to 10 days following treatment. Complete eradication of AIP may not be achieved with only one treatment, but a decrease in plant percent cover, mean plant height, and thus plant density, was observed. For future treatment, macrophytes should be treated with UV-C light early in the growing season (e.g., typically May and June) and treatment conducted several times throughout a season or multiple seasons. This monitoring report provides quantitative information on the physical, chemical, and biological characteristics of lake waters and substrate in the treatment area and comparisons to control sites, which represent comparable AIP infestation sites that were not treated with UV-C light.

The data collected from this Project serves two purposes: 1) to determine the success of the UV-C light treatment method and the efficacy of this method as a useful tool at a lake-wide scale; and 2) to provide information to support future environmental document analysis and permitting needs. Based on observations of UV-C light treatment at Lakeside Marina and Lakeside Beach, UV-C light is a good first line of defense when tackling large, dense areas of aquatic plants, ideally treating in the beginning of the growing season. This technology provides a marked cost advantage and was the least costly method reviewed however, cost should not be the main factor considered when choosing a control method. There is significant interest and support from public and private sectors to further develop this pilot Project and the utility of UV-C light as a technique to treat AIP in Lake Tahoe. It is our recommendation that UV-C light prescription treatments consider the following: project area, treatment frequency, project duration, size of light array, plant species present, desired outcomes, and cost. UV-C technology should be used along with other techniques and technologies in an appropriate and comprehensive manner to be most effective. Additional UV-C light treatment applications and projects should be implemented and monitored for a period of 2-3 years to investigate the full potential of this tool.

Possible constraints:

- Plant height and density is an initial constraint, that may predicate additional rounds of treatment
- Visibility in the water column can obstruct the precision of application to the plant crown
- Site configuration and use need to be addressed through adaptation of the treatment apparatus and treatment timing

Truckee River Eurasian Water Milfoil Removal Project

The Tahoe RCD is pioneering a project on the Truckee River to control the aquatic invasive plant, Eurasian Watermilfoil, which has been growing prolifically there since the late 1990s. Made possibleby strong partnerships, this project follows other successful removal projects that have targeted aquatic invasive plants in Lake Tahoe, particularly in Emerald Bay. Eurasian watermilfoil likely entered the Truckee River during the overflow of the dam in 1997 and has established a thriving population over the last 5-7 years. The goals of this project are to, create a baseline map of the infestation from the outlet at Lake Tahoe downstream to River Ranch at Alpine Meadows Rd, and systematically implement control efforts to remove this aquatic invasive plant within this reachof the Truckee River.

Asian Clam Control and Removal
Asian clam control in Lake Tahoe is a multi-agency, collaborative effort. Starting with a pilot project in Marla Bay and off shore of Lakeside Beach, researchers and managers looked at two different methods of control; rubber bottom barriers and diver assisted suction removal. Initial tests in the southeast portion of the Lake showed that covering clam populations with rubber barriers was effective in starving clams of dissolved oxygen, thus killing them. Expanding on these initial tests, inthe Autumn of 2012, approximately five acres of rubber barrier material was deployed on a relatively low density clam population in the mouth of Emerald Bay.

Early Detection Monitoring (Veliger monitoring)
Since 2010, the Tahoe Regional Planning Agency, with assistance from the Tahoe RCD conducts veliger monitoring in Lake Tahoe, Echo Lake and Fallen Leaf Lake. Veligers are the larval stage of bivalve mollusks which includes quagga and zebra mussels, two potential invaders of Lake Tahoe. Monitoring is an essential element to ensure that the Watercraft Inspection Program has been effective in preventing quagga and zebra mussels from establishing populations in Lake Tahoe.Ten locations are surveyed monthly from late June until the end of September; eight locations in Lake Tahoe include Elks Point, Tahoe Keys, Emerald Bay, Meeks Bay, North Tahoe Marina, Sand Harbor, Obexers Marina, and Cave Rock along with Fallen Leaf Lake and Echo Lake. Sampling consists of eight vertical plankton tows at each site. The samples are then sent to a laboratory to beanalyzed. All of the samples to date have returned with no zebra or quagga mussel veligers present.

An overview of Tahoe agency programs was offered in 2014. The link to the presentation is:
http://tahoercd.org/wp-content/uploads/2014/05/AllPresentations_May2014AIS-public-forum.pdf

2016 Dye Tracer Study in Tahoe Keys
In 2016, the earlier Rhotamine Dye study test was replicated in the Tahoe Keys.
A Final Report was published in 2017. See www.TahoeKeysweeds.org for information.

Chemical Risks: Perchlorate (SLT Plume and Fireworks)
Perclorate is of concern due to a historic groundwater plume in the City of South Lake Tahoe whichis mighrating and contaminating several wells. There are also potential lake impacts from community fireworks displays. South Tahoe PUD has taken a leading role in management of the investigatory process of the PCE plume. http://stpud.us. Details provided in other sections of this report.

Fireworks
Several communities around the lake, including Incline Village, Kings Beach, Glenbrook and the City of South Lake Tahoe provide community fireworks shows annually at the 4th of July holiday and at other large events. These shows are conducted by professional fireworks providers and are staged from barges anchored several hundred yards off shore. Event organizers require the next day cleanup of any firework debris, several include underwater dive cleanups. Perchlorate as a potentialdrinking water contaminant has entered the discussion surrounding these events. TWSA staff has conducted research and continues to monitor the situation surrounding fireworks use. Personal useof fireworks is banned in the Tahoe Basin.

In 2014, several citizens filed a lawsuit regarding debris from the displays. The parties reached an agreement to allow the fireworks displays to continue.
http://www.rgj.com/story/news/2014/04/01/south-tahoe-fireworks-will-continue/7162969/

Under the settlement, the authority will ratchet up post-show cleanup activities and make a hotline available for residents to report fireworks debris. Taking the lead role in permitting the show will be the Tahoe-Douglas Fire Protection District, whose chief Ben Sharit described required clean-up as animportant component.

Wildlife and Domestic Animals

The Tahoe Basin is home to many species of native, introduced, adapted and domestic animals. The significance to drinking water includes the potential of bacterial contamination from animal defecation/feces. Due to large population sizes, the main threats include: 1) domestic dogs and 2)colonies of Canadian Geese, which inhabit local beaches and defecate at the shoreline.

TWSA Dog Waste Education Campaign

TWSA staff's ongoing beach and stream monitoring points to no significant impact on drinking waterquality from wildlife. Dr. Marc Walker, University of Nevada Reno faculty, conducted extensive studies on dog feces and water quality, between 2004 and 2007 at Burke Creek. His study revealed that once feces have desiccated, there is no ongoing bacteriological impact on water quality. This report is available on request.

TWSA efforts on the 'They Drop It,You Drink It' dog waste awareness campaign now includes a custom dog waste dispenser with biodegradable bags. These units are given to dog owners after theysign a pledge to pick up more dog waste. TWSA provides funding for bulk waste dispensers, bags and customsignage for high use public dog areas.

As of October, 2021 there were 100 waste bag units installed on the east, south and north shores of Lake Tahoe including Nevada State Park, Johnson Meadows, Burke Creek, Third Creek, Bijou Meadows,Van Sickle Bi-State Park and the new Tahoe City and Tahoe Vista Dog Parks. TWSA commits funds for refill bags annually. This program seems to have a positive effect on watershed conditions but this has not been scientifically proven.



Pickup bag rolls, leash dispensers signage are provided to individuals at the IVGID Public Works offices, at events and upon request.

TWSA and Take Care Tahoe offer dedicated educational resources on this topic:
https://takecaretahoe.org/take-action/dog-doody/
https://www.yourtahoeplace.com/news/the-scoop-on-dog-poop
https://www.moonshineink.com/tahoe-news/clash-of-the-leashes/

Excerpt from **Burke Creek Final Report 2011**
http://ntcd.org/nv_ourtahoewatershed/documents/Burke%20Creek%20Final%20Report.pdf

Dog Waste and Water Quality

Dog waste was ranked as the 5th most important concern in the community survey for the Oliver Park GID. Community residents complained of dog waste littering the trails along Burke creek and around their neighborhood. Dog waste is also a concern from a water quality perspective. Fecal Coliform bacteria which are found in the feces of warm-blooded animals, including humans, pets, livestock, beavers, and birds, can be a human health hazard. This is especially valid in the case of Burke creek which enters Lake Tahoe at Nevada Beach, one of the most popular recreation sites in the Basin.

Fecal Coliform is measured in colony forming units (CFU)counted per 100 milliliters of water (CFU/100ml). CFU are roughly equivalent to the number of bacteria cells. The Lahontan Regional

Water Quality Control Board standard for fecal coliform is 20 counts per 100 ml for a single occurrence. In 2010, the fecal coliform at the mouth of Burke creek were measured at 49 CFU's, more than double the water quality standard and the highest level measured in any creek in the Basin. Figure 11 shows the fecal coliform measurements for 15 south shore monitoring sites from 2010. The other highly contaminated site, South Zephyr Creek, is located near a horse-back riding stable and has had numerous violations in the past.

While the fecal coliform numbers from 2010 are impressive, they are an improvement from 2009 when over 60 CFU were detected. Prior to the 2010 measurements, a dog waste station was installed near the parking lot as an Eagle Scout project. Water quality improvement for Burke Creek over the past year could be attributed to the dog waste station.

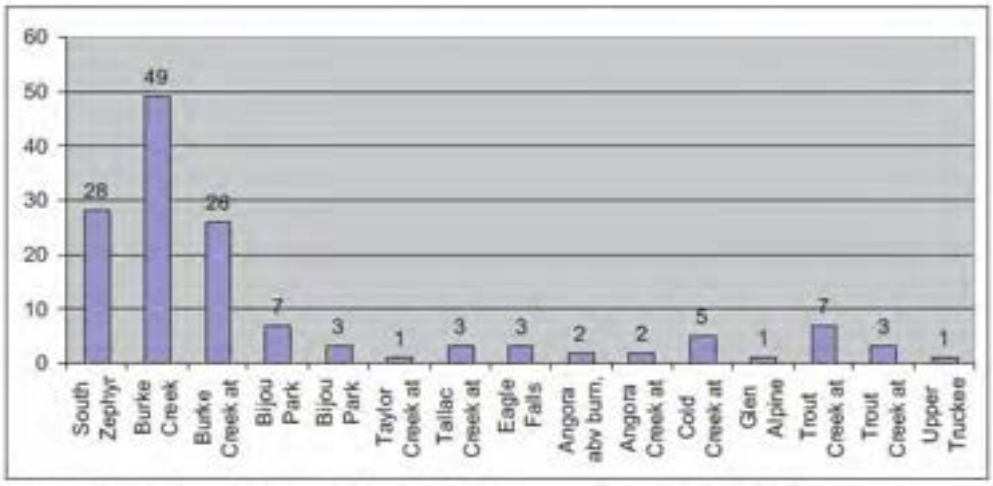


Figure 11. Fecal Coliform CFU's for 15 Monitoring Sites. Source: "Snapshot Day" 2010.*
**This figure contains incomplete labels but is un-editable.*

During the CWP survey, residents of the Oliver Park GID asked for improvements in signage directing dog walkers on how to dispose of dog waste properly and greater access to waste containers. Many dog owners use the clean-up bags supplied by the dog waste station, but then leave these bags along the trail rather than disposing of them properly.

IVGID Goose Patrol Team
http://inclinerecreation.com/outdoor_recreation/beaches/geese_patrol

IVGID uses a volunteer Goose Patrol team of approximately 40 dogs and human volunteers to hazeand chase geese from District property. Dogs on the Geese Patrol wear red vests and owners have special identification authorizing them to be at the beaches. Arriving at a variety of times throughout the day, the dogs chase the geese back into the water. Because of their efforts, fewergeese come to the beaches or stay at the beaches. Cleanup from the geese droppings has been greatly reduced, hence saving labor and staff resources.

Grazing – Historical Impacts http://water.epa.gov/polwaste/nps/success319/ca_bigmeadow.cfm

Under the Porter-Cologne Act, the USFS manages grazing allotments in accordance with a State Water Resources Control Board-certified water quality management plan. The plan sets forth an iterative process that governs the implementation, monitoring and revision (as appropriate) of BMPs used to control nonpoint source pollution. If BMPs are not effective—even after revision—theUSFS can choose to mitigate the water quality impact, refine water quality standards and/or cease the activity. All resource activities are managed under the limitations provided in a USFS site-specificenvironmental assessment developed by an interdisciplinary team of experts. The USFS-LTBMU develops allotment-specific management plans in cooperation with its grazing permittees.

In the decade prior to the grazing ban (1999), USFS-LTBMU tried to mitigate the impacts on waterquality from cattle grazing by installing BMPs such as cattle stream crossings and cattle exclusion fencing upstream of the crossings. Within the protected stream areas, the USFS-LTBMU planted vegetation and stabilized streambanks using cobbles and erosion control cloth. The USFS-LTBMU conducted its own water quality monitoring to assess the effectiveness of the various BMPs.

In the areas where cattle weren't excluded, the USFS implemented the following BMPs: off-stream water sources, rest rotation, reduced herd size and shortened grazing season. Despite these efforts,water quality continued to violate the FC bacteria objective. In 1999, the USFS-LTBMU informed thepermittees who grazed the Meiss Meadows area that "a viable grazing strategy cannot be developed that would likely meet the state-mandated water quality standards..." As a result, the USFS permanently ceased all grazing on the Meiss Meadows area, which includes the Big Meadow Creek and Upper Truckee River basins.

Results
Removing livestock from the area allowed the waterbodies to recover. The USFS collected and analyzed approximately 43 samples at three separate locations in Big Meadow Creek during 2000, 2001, 2002 and 2008. FC levels have declined and now meet the water quality objective of less thana log mean of 20 units/100 mL (Figure 2). Similarly, the USFS collected and analyzed approximately 103 surface water samples from the Upper Truckee River (above Christmas Valley) during the years 2000, 2001, 2002, 2003, 2004 and 2008. Like Big Meadow Creek, FC levels in the Upper Truckee River have declined steadily since 1999 and now meet the water quality objective.

These significant reductions in FC bacteria counts restored the water contact recreation use, prompting the Lahontan Water Board to remove 4.5 river miles of Upper Truckee River and 1.4 rivermiles of Big Meadow Creek from California's CWA section 303(d) list of impaired waters in 2010.

Grazing - 2013 U.C. Davis Study

http://news.ucdavis.edu/search/news_detail.lasso?id=10636

http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0068127

Limited livestock grazing is available seasonally in the Tahoe Basin. A new study released in 2013 by U.C Davis states cattle grazing and clean water can coexist on national forest lands, according to research by the University of California, Davis. The study, published today in the journal PLOS ONE,is the most comprehensive examination of water quality on National Forest public grazing lands todate. "There's been a lot of concern about public lands and water quality, especially with cattle grazing," said lead author Leslie Roche, a postdoctoral scholar in the UC Davis Department of Plant Sciences. "We're able to show that livestock grazing, public recreation and the provisioning of cleanwater can be compatible goals."

Grazing Animals: Baldwin Grazing Allotment - Site Closed to Grazing

http://www.fs.fed.us/r5/ltbmu/documents/projects/BGAMP/FINAL_Baldwin_Allotment_EA_200907 23.pdf

The Lake Tahoe Basin Management Unit (LTBMU) permanently ended authorized livestock grazing on the Baldwin Allotment in order to meet state and federal resource standards and achieve desiredconditions. The proposal included an amendment to the 1988 LTBMU Land and Resource Management Plan to close the Baldwin Grazing Allotment to eliminate grazing in the future.

The Baldwin Grazing Allotment was located in El Dorado County on the south shore of Lake Tahoe inthe Fallen Leaf Management Area. The U. S. Forest Service Lake Tahoe Basin Management Unit (LTBMU) managed the Baldwin Grazing Allotment in the Tallac Creek watershed. The allotment was approximately 200 acres and the only grazing allotment on the lakeshore of Lake Tahoe. The allotment is dissected by Tallac Creek, which provides inflow to Lake Tahoe and supports native and introduced fish species. Wetland and riparian areas provide habitat for wildlife species, such as willow flycatcher and sensitive plant taxa, including Botricium spp. and Epilobium spp. The beach pasture was also adjacent to a known Tahoe yellow cress population, which is identified in the conservation plan as a medium priority restoration site, and a population recreational beach facility.

Logging

There are no commercial logging operations in the Tahoe Basin. Tree removal is restricted (permit required) by TRPA for trees greater than 12" in diameter. Most logging is conducted by one of the designated Fire Districts, in relation to forest fuels reduction projects. These operations are mitigated through measures such as special operational and equipment requirements for work onsteep slopes and in Stream Environment Zones (SEZs). Most work is conducted in late fall, early winter and early spring. On-site prescribed burns are currently the main method for removal of forest biomass.

Cabin Creek Biomass Facility Project

https://www.placer.ca.gov/2900/Cabin-Creek-Biomass-Energy-Facility

A hi-tech biomass burning facility is under consideration by Placer County, CA, but the preferred location of Kings Beach, CA was rejected in July 2011 due to community opposition. The Biomass Plant Facility is slated for placement next to Placer County's Cabin Creek MRF Facility, between Tahoe City and Truckee, CA. This would allow both the processing/grinding of forest debris at close proximity to the facility using the material for energy production.

Early on in implementation of the Biomass Utilization Program, it was recognized that having a market for woody biomass would provide economic assistance and incentive for completing the kinds of forest management and fuels reduction projects that are needed toreduce the threat and impacts of high intensity wildfire. Further, it was recognized that biomass energy facilities represent a viable and proven option for

providing such a market for biomass. That led to the planning for a biomass energy facility that would create a market for woody biomass being created in the Lake Tahoe Basin.

Planning is now complete, and the County is developing an approach to finance and install a new small-scale combined heat and power facility at the "Cabin Creek" site on land owned by Placer County near the Town of Truckee in eastern Placer County. This facility will utilize technology that is powered entirely by woody biomass - a green renewable fuel generated as a byproduct of forest management and hazardous forest fuels reduction activities-to generate electricity 24/7 for distribution in eastern Placer County. The facility will also provide an opportunity to demonstrate the use of excess heat in the facility building and to melt snow on the roof, road, and sidewalks of the site.

59,000-acre Lake Tahoe West Restoration Project (StoryMap Here)

http://southtahoenow.com/story/08/23/2020/interactive-story-book-released-highlight-59000- acre-lake-tahoe-west-restoration-pr

Lake Tahoe West partners have released an interactive “story map” to explain ongoing and proposed actions to restore forests and watersheds across 59,000 acres of Lake Tahoe’s west shore.

Community members and visitors can use the story map to learn more about the threats to the west shore landscape, and how science is informing a landscape-scale restoration approach to addressing those threats. Through the Lake Tahoe West Restoration Partnership, land management agencies, local partners, and other stakeholders are working together to increase resilience to high-severity wildfire, drought, climate change, and insect and disease outbreaks. Multiple restoration efforts are already underway. The story map highlights current projects on the west shore to reduce fire hazards near communities, restore meadows, and create healthier, more resilient forests. The Lake Tahoe West Restoration Partnership is a collaborative, multiple-stakeholder effort led by the USDA Forest Service Lake Tahoe Basin Management Unit, California Tahoe Conservancy, Tahoe Regional Planning Agency, California State Parks, Tahoe Fire and Fuels Team, and National Forest Foundation.



VII. ANNUAL WATERSHED ACTIVITIES SUMMARY

This chapter provides a summary of the major findings or changes within the watershed related to: lake biology, invasive species, recreation, landownership or zoning changes, water quality monitoring programs, research and wildfires.

About Lake Tahoe and the Tahoe Basin

http://www.trpa.org/tahoe-facts (and) https://tahoe.ucdavis.edu/stateofthelake

Lake Tahoe Fast Facts

- Lake Tahoe is 2 million years old
- Holds 39 trillion gallons of water
- Size of watershed: 501 sq. miles
- Lake surface area: 192 sq. miles
- 12 miles wide
- 22 miles long
- 72 miles of shoreline
- 2nd deepest lake in the United States
- Average depth: 1,000 feet (305 meters)
- Lake surface area: 191 square miles (495 square kilometers)
- Watershed area: 312 square miles (800 square kilometers)
- 1,645 ft. deep, one of the deepest lakes in the world
- 6,223 ft. elevation (natural rim)
- Trees in the basin: 17 million
- 2 states: CA, NV
- 5 counties, 1 city
- 55,000 Tahoe Basin year-round residents
- Tourist population: 15 + million
- Majority of private property owners are part-time residents
- U.S. Forest Service and state agencies manage almost 90% of land area
- 43,470 developed parcels in the basin
- Assessed property values in the basin total = $15.5 billion
- Average surface water temperatures are 68˚ Fahrenheit in the summer and 41˚ in the winter
- 63 streams feed into Lake Tahoe but only one, the Truckee River, flows out
- Approximately 15 million people visit Lake Tahoe every year
- Nearly 10 million vehicles drive into the basin annually
- Outstanding National Resource Water (Tier 3) under the Clean Water Act
- Lake Tahoe is the second deepest lake in the United States
- A single drop of water entering the Lake today will take 650 years to find its way out.
- Length of time it would take to refill the lake: about 600 years
- Number of large lakes worldwide with annual clarity exceeding Tahoe's: 0
- Highest peaks in the Tahoe Basin: Freel Peak at 10,891 ft.; Mt. Rose at 10,776 ft.
- The daily evaporation from Lake Tahoe (half a billion gallons) would meet the daily water needsof 5 million Americans. Evaporation from the lake surface during the year equals approximately52 inches of water, with August being the month of maximum evaporation. One inch of evaporation is equivalent to 3.5 billion gallons.
- The number of algal cells in Lake Tahoe is approximately 30 million trillion

- Outflow from Lake Tahoe into the Truckee River stopped for 364 days in 2015.
- Latitude: 39 degrees North
- Longitude: 120 degrees West
- Highest peaks in the Tahoe Basin: Freel Peak at 10,891 ft.; Mt. Rose at 10,776 ft.

Tahoe Regional Precipitation. Most of Tahoe's annual precipitation falls in the winter months.

https://www.sierraattahoe.com/season-snow-totals

A year by year summary of precipitation is included in the Description of the Watershed section.

Some emergency measures have remained in place to address long-term conservation and efficiency. The California Water Board maintains a Water Conservation Portal: *https://www.waterboards.ca.gov/water_issues/programs/conservation_portal*

University of California-Davis' "State of the Lake Report (SOTL) 2021"

https://tahoe.ucdavis.edu/stateofthelake

The ***UC Davis Tahoe: State of the Lake Report*** informs non-scientists about the most important factors affecting lake health and helps influence decisions about ecosystem restoration and management within the Lake Tahoe Basin. The report was funded by the California Tahoe Conservancy, the Lahontan Regional Water Quality Control Board, the Tahoe Fund, the Tahoe Lakefront Owners Association, the Tahoe Regional Planning Agency, the Nevada Division of Environmental Protection, the Tahoe Water Suppliers Association, the League to Save Lake Tahoe and the Incline Village Waste Not Program, and individual donations.

Annually in August, the University of California–Davis (UC Davis) issues the "*Tahoe: State of the Lake Report"*. The University of California, Davis, has conducted continuous monitoring of Lake Tahoe since 1968, amassing a unique record of change for one of the world's most beautiful and vulnerable lakes. The *State of the Lake Report* summarizes how natural variability, long term change and human activity have affected the lake's clarity, physics, chemistry and biology over that period. The data reveals a unique record of trends and patterns – the result of natural forces and human actions that operate at time scales ranging from days to decades. These patterns tell us that LakeTahoe is a complex ecosystem, behaving in ways we don't always expect.

The long-term data set collected on the Lake Tahoe ecosystem by U-C Davis and its research collaborators is a valuable tool for understanding ecosystem function and change. *Tahoe: State of the Lake Report* presents the most recent year's data in the context of the long-term record.

Lake Tahoe, with its iconic blue waters straddling the borders of Nevada and California, continues to face a litany of threats related to climate change. But a promising new project to remove tiny invasive shrimp could be a big step toward climate-proofing its famed lake clarity.

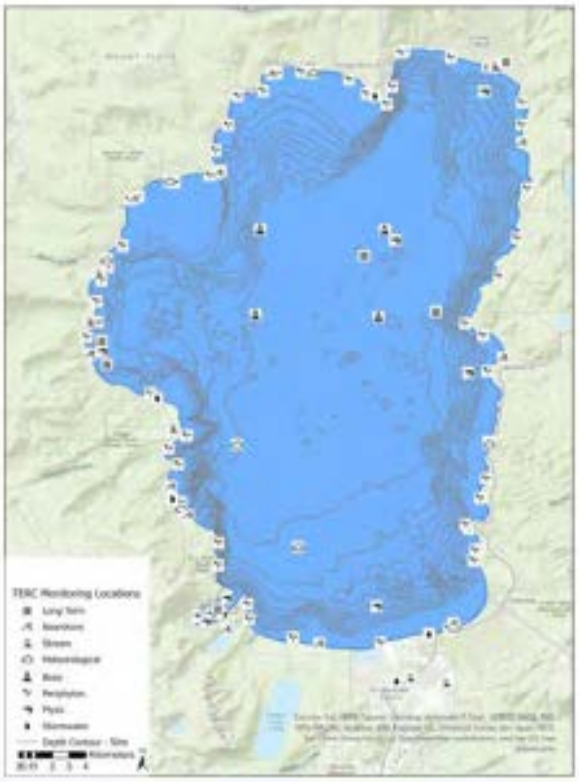
Archived SOTL Reports are available on the TERC website**: *(http://tahoe.ucdavis. edu/stateofthelake).***

UCDAVIS
Tahoe Environmental
Research Center

TAHOE: STATE OF THE LAKE REPORT 2021

TAHOE BASIN DATA COLLECTION SITES





TAHOE.UCDAVIS.EDU 5

EXECUTIVE SUMMARY

The long-term data set collected on the Lake Tahoe ecosystem by the University of California, Davis and its research collaborators provides a unique tool for understanding ecosystem function and change. It has become essential for decision-making by elected officials and public agencies tasked with restoring and managing the Tahoe ecosystem. This is in part because it provides an independent basis for assessing the progress toward attaining Tahoe's restoration goals and desired conditions, while at the same time building our understanding of the natural processes that drive the ecosystem.

The UC Davis Tahoe Environmental Research Center (TERC) is innovating with new approaches to enrich the long-term data record for Lake Tahoe and to address emerging questions. These approaches include real-time measurements at over 25 stations around the basin, remote sensing from autonomous underwater vehicles, satellites, aerial drones, helicopters, and computer modeling tools. These efforts are all focused on quantifying the changes that are happening and, at the same time, understanding what actions and measures will be most effective for control, mitigation, and management in the future.

This annual *Tahoe: State of the Lake Report 2021* presents data from 2020 in the context of the long-term record. While we report on the data collected as part of our ongoing measurement programs, we also include sections summarizing some of the current research that is being driven by the important questions of the day and concerns for the future. These include: the future consequences of climate change on the physical environment at Lake Tahoe; the accelerating rate of ecological change in the nearshore, made all the more clear through the use of new approaches and advanced sensing and analysis tools; the emerging and growing prevalence of microplastic pollution in both the watershed and the lake; the impacts of smoke from distant wildfires on Lake Tahoe; the varied impacts of extreme heat and temperature stress on forest health; and finally an introduction to some of the work being done by graduate students and researchers affiliated with TERC.

The future climate change impacts for the Lake Tahoe Basin are substantial. While the projected air temperature increases of 8 °F and the 50 percent reduction of snow by the latter part of the century seem dramatic, what may be more important are the changes that arise on account of this increasing temperature. For example, drought intensity due to both the warming and loss of soil moisture place the Tahoe forests at far higher risk of mortality, insect attack, and wildfire than they are presently. The loss of snow and its replacement by rain will increase peak stream flows by 2–3

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times their current peaks, placing infrastructure at heightened risk. The rapidly rising lake levels during such events has the potential to exceed the capacity of the dam at the outlet and is likely to result in uncontrolled releases downstream. Lake Tahoe itself will be increasingly prone to stagnation during ever longer, warmer summers with the potential for a loss of oxygen at depth.

The nearshore regions of the lake, where millions of people recreate every year, are also at a growing risk. The largest threat here is the increasing presence of filamentous algae (metaphyton) that wash up on the beaches and decompose. The metaphyton grow, in part, due to the concentration of lake nutrients by the invasive Asian clam, which has been present in Lake Tahoe since 2000. Warmer water and higher nutrient loads expected with future climate change will further exacerbate this growth. Microplastic pollution is also an increasing issue, with much of it being introduced at the shoreline.

Wildfires are an increasing presence, even when they are not burning within the basin. Fine particles which reduce visibility and cause the air quality to reach dangerous levels impact public health and the lake in many ways. The reduction in sunlight during these events changes algal growth and heat transfer within the lake. More importantly, the large reduction in UV radiation is changing grazing patterns by zooplankton within the lake. The impacts of this change are currently being explored through ecological modeling of the lake. Other impacts from wildfires, such as the addition of particles and nutrients to the lake are also the subject of ongoing research.

Meteorologically, the long-term trends that have been prevalent do not change year-to-year, however a changing climate is evident in almost all the long-term meteorological trends including rising air temperature and the declining fraction of precipitation as snow. The weather experienced in a given year can be far more variable, and 2020 was a relatively warm year. The annual average maximum temperature was 58.2 °F, an increase of 3.2 °F from 2019. The 2020 annual average minimum was 32.4 °F, which was 0.9 °F warmer than the previous year. At 20.1 inches, 2020 precipitation was below the long-term average measured at Tahoe City. The low values of 2020 came after just four years of average or above average precipitation. Snow represented 45.1 percent of the 2020 total precipitation.

The water level in Lake Tahoe varies throughout the year due to inflows, outflows, precipitation, and evaporation. In 2020, on account of the dry winter, the annual rise in lake level was very muted. From January through December 2020, overall lake level fell 1.9 feet. Based on historical water level data, it is likely that

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Lake Tahoe will fall below its natural rim in October 2021.

Despite year-to-year variability, the annual average surface water temperatures show an increasing trend. The average temperature in 1960 was 50.4 °F. For 2020, the average surface water temperature was 52.8 °F, warmer than in 2019. The overall rate of warming of the lake surface is 0.38 °F per decade. Lake Tahoe mixes vertically each winter as surface waters cool and sink downward. Mixing depth has profound impacts on lake ecology and water quality. Deep mixing brings nutrients to the surface, where they promote algal growth. It also carries oxygen downward to deep waters, promoting aquatic life throughout the water column. On February 6, 2020, Lake Tahoe's maximum mixing depth was observed to be 476 feet (145 m). This relatively shallow mixing likely contributed to the warmer surface temperatures experienced during winter, and the low winter clarity.

The stability of the lake is an important concept that expresses its resistance to vertical mixing and determines whether it is stratified. High stability can mean that oxygen is not transferred to deep portions of the lake, that pollutant bearing inflows enter the lake closer to the surface, and that the types and vertical distribution of phytoplankton changes. In 2020, the stability index was the third highest ever recorded. The length of time that Lake Tahoe is stratified has been increasing each year, another consequence of climate change. Since 1968, the stratification season length has, on average, increased by one month, effectively increasing the length of summer and decreasing the length of winter. In 2020, the length of the stratified season was 200 days.

The reduction of nutrient and fine particle loads to the lake is a fundamental part of the restoration efforts at Lake Tahoe, driven largely by the Total Maximum Daily Load (TMDL) program. The stream-borne nitrogen and phosphorus loads from the Upper Truckee River were generally lower in 2020, in line with the below average precipitation for the year. In-lake nitrate and total hydrolyzable phosphorus concentrations increased slightly, a result of the absence of deep mixing in 2020. The concentration of fine particles in the surface of the lake has been elevated since the record inflows of 2017. The reasons for the persistence of these particles are an area of current research.

Biologically, the primary productivity of the lake has increased dramatically since 1959. By contrast, the biomass (concentration) of algae as measured by chlorophyll concentration in the lake has remained relatively steady. For the period of 1984–2020, the average annual chlorophyll-a concentration in Lake Tahoe was 0.70 micrograms per liter. Most of the chlorophyll is concentrated in a band at a depth of approximately 150–200 feet, known as the "deep chlorophyll maximum." The peak in the chlorophyll

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occurred relatively late in the summer of 2020. Diatoms were the most common algal group (60 percent of the cells) in terms of the abundance of individual cells. Of these, *Synedra* formed the largest percentage of the biomass, accounting for over 80 percent of the diatoms during spring, summer, and fall. Although *Cyclotella* was a relatively low fraction of the percentage of the biovolume of diatoms in 2020, it was the second most dominant species in June and July and still had a large impact on clarity due to its tiny size. The attached algae (periphyton) on the rocks around the lake were near average values in 2020, based on a synoptic survey of 53 observations. As usual, the California side of the lake continued to display higher concentrations of periphyton.

In 2020, the annual average Secchi depth was 63.0 feet (19.2 m), almost unchanged from the previous year and reflective of the near-constant values that have been attained over the last 20 years. The highest individual clarity value recorded in 2020 was 81.2 feet (24.8 m) on February 12. The lack of complete vertical mixing of the lake in 2020 is the main reason for this low maximum clarity value. The poorest clarity reading was 50.8 feet (15.5 m) on May 15. While the average annual clarity is now better than the preceding decades, it is still short of the clarity restoration target of 97.4 feet (29.7 m). The winter (December–March) clarity value of 64.0 feet was the lowest winter clarity on record and was 17 feet lower than the previous year. Winter precipitation was below the long-term average and such conditions would typically be expected to yield higher clarity values. The reasons for the low winter values are still not fully understood. Summer (June–September) clarity was 59.1 feet (18.0 m), a loss of over 6 feet from the previous year. This is significantly better the lowest summer value of 50.5 feet in 2006.

Sc

report describes how TERC researchers and staff revamped their process for conducting science, as well as moving much of their educational outreach online, during state stay-at-home directives to slow the spread of COVID-19.Findmore details about innovative research underway at Lake Tahoe — including sugar pine genetics and reforestation, ice physics, and microplastic pollution — at www.tahoe.ucdavis.edu.

The report's production was funded by the California Environmental Protection Agency, Lahontan Regional Water Quality Control Board, California Tahoe Conservancy, Tahoe Fund, Tahoe Regional Planning Agency, Tahoe Lakefront Owners' Association, Lake Tahoe Marina Association, Parasol Tahoe Community Foundation, League to Save Lake Tahoe, Tahoe Water Suppliers Association, TruePoint Solutions and Incline Village Waste Not program. In 2015, TWSA became a sponsor at the $2500 level for the production of this report.

University of California-Davis' "State of the Lake Report" (SOTL) historic archives are available at https://tahoe.ucdavis.edu/stateofthelake .

Tahoe Environmental Research Center (TERC) Education Programs

Micro-plastics reduction education campaign in 2020-2023.
See also Executive Summary of this report.
www.drinktahoetap.org
https://tahoe.ucdavis.edu/microplastics

2020 in-person activities at the Center were restricted in response to Covid-19. Multiple online resources were made available. In June 2021, the Center reopened featuring a large scale micro-plastics education display.

This project is a collaborative effort from TERC's researchers and educators, with grant sponsorship from NDEP/US EPA.



Tahoe Environmental Research Center (TERC) Micro-plastics Research
Extensive microplastics research has been conducted in marine research, however the research of its impacts on freshwater ecosystems is limited. TERC is working with the Desert Research Institute (DRI), Clean Up the Lake, the League to Save Lake Tahoe, Raley's stores, Sierra Watershed Education Partnerships, and Tahoe Water Suppliers Association, to lead the research and education efforts at Lake Tahoe in this emerging field. For more information contact Heather Segale or Katie Senft**.**

Scientists from TERC and DRI are collaborating to study the threat microplastics pose to the health of Lake Tahoe. The teams are studying different aspects of the problem.

Microplastics are defined as any type of plastic fragment that is less than 5 mm in length. Plastics enter the natural environment from a variety of sources including cosmetics, clothing, and industrial processes. They break into smaller and smaller fragments by sunlight and physical abrasion from wind and waves, but never disappear. Research has shown microplastics entering the food chain, leaching chemicals, and showing up in soil and drinking water.



Katie Senft of TERC, flushes the Manta trawl net of any remnants of microplastics. Purchase of the net was sponsored by TWSA.

While TERC is researching the fate of microplastics to determine where they end up in the lake, DRI is studying the inputs—inflowing streams, accumulation on snow, storm drains, and even dryer vents.

In summer 2018 and 2019, field researcher Katie Senft led a pilot project through a summer internship program with TERC and found microplastics in many of the samples of beach sand collected. Building on that pilot project with funding from the Nevada Division of Environmental Protection (NDEP) and the U.S. Environmental Protection Agency (EPA), Senft's team continues to investigate the fate of microplastics in Lake Tahoe.

The team began sampling for microplastics in summer 2020, performing regular trawls at various depths throughout the lake, and collecting deep-water sediment samples to capture heavier plastics. Researchers also sample municipal water treatment facilities and Kokanee salmon and Asian clam tissues to assess the impacts on filter-feeding biota. Sampling protocols build on previous studies to measure microplastics in the waters at every depth of the lake and other areas of the surrounding watershed.

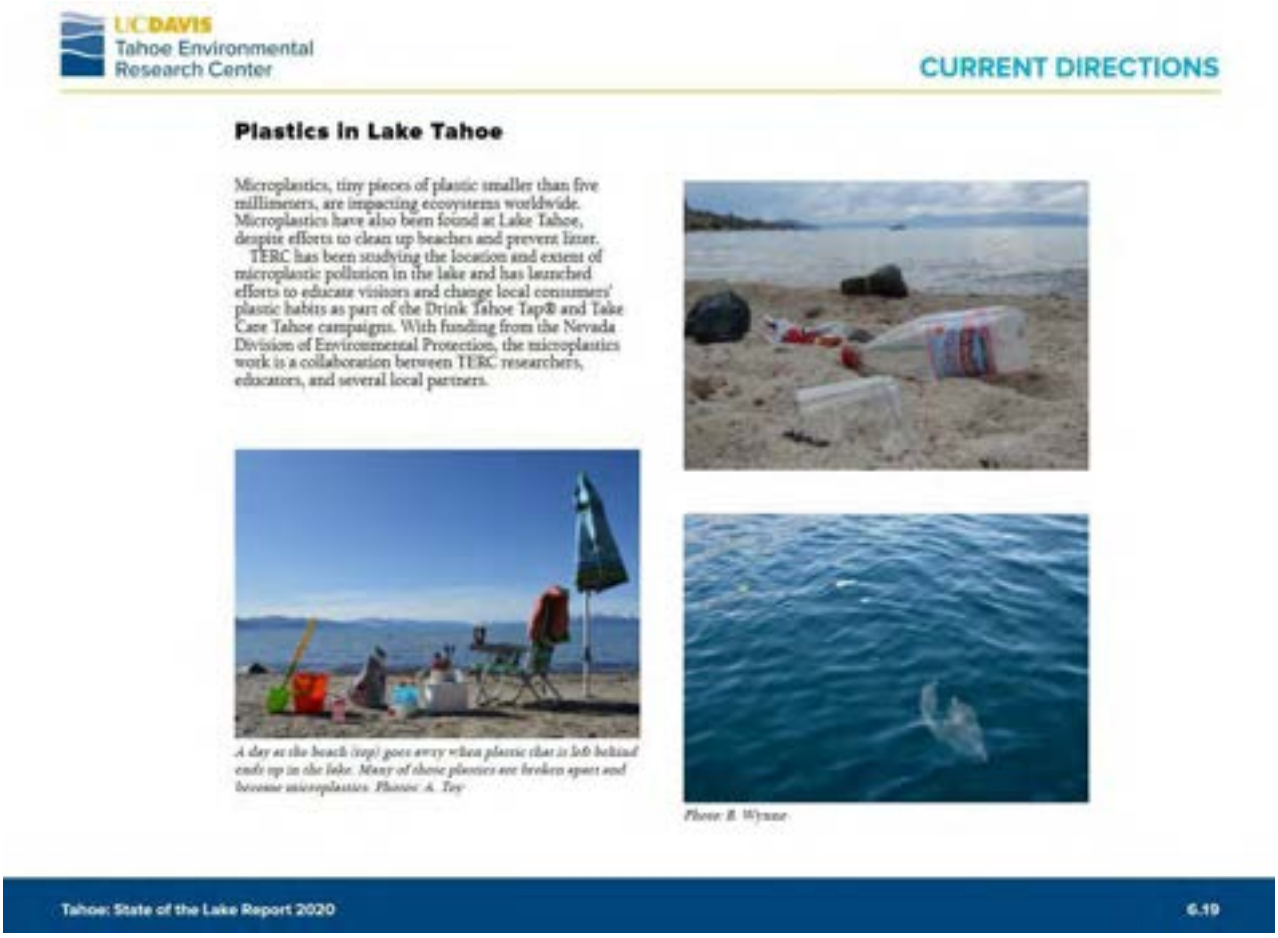
Samples aimed to confirm microscopic particles will be subject to Raman microspectroscopy by Dr. Jenessa Gjeltema, associate professor in zoological medicine at UC Davis. Gjeltema uses the technology to determine the types of microplastics found in very tiny pieces.

TERC's science team takes a multidisciplinary approach. Only by looking at the watershed as a whole—with its trees, animals, roadways, and people—can we truly understand what's happening to the lake. The plastic problem is similar. We cannot understand the ecological harms without exploring the human industries and big corporations that created the plastic problem in the first place

TERC Center Programs

Through TERC's education and outreach programs, the goal is to provide science-based information about the Lake Tahoe region in order to foster responsible action and stewardship. We provide engagingexhibits, interactive hands-on education activities, and conduct effective outreach to draw student groups, residents, and visitors to our facilities. Our education programs inspire an interest in environmental science, stimulate curiosity, and motivate active conservation and preservation of freshwater resources.

Tahoe Science Center and Green Building Tours are offered by appointment only.
The UC Davis Tahoe Environmental Research Center (TERC) **Monthly Lecture Series** provides a forum for community members to hear from scientific experts. Speakers include authorities on various environmental issues, scientific research, regional subjects, and topics of general interest.



UC DAVIS Tahoe Environmental Research Center

CURRENT DIRECTIONS

Plastics in Lake Tahoe

Microplastics, tiny pieces of plastic smaller than five millimeters, are impacting ecosystems worldwide. Microplastics have also been found at Lake Tahoe, despite efforts to clean up beaches and prevent litter.

TERC has been studying the location and extent of microplastic pollution in the lake and has launched efforts to educate visitors and change local consumers' plastic habits as part of the Drink Tahoe Tap® and Take Care Tahoe campaigns. With funding from the Nevada Division of Environmental Protection, the microplastics work is a collaboration between TERC researchers, educators, and several local partners.

A day at the beach (top) goes away when plastic that is left behind ends up in the lake. Many of these plastics are broken apart and become microplastics. Photos: A. Toy

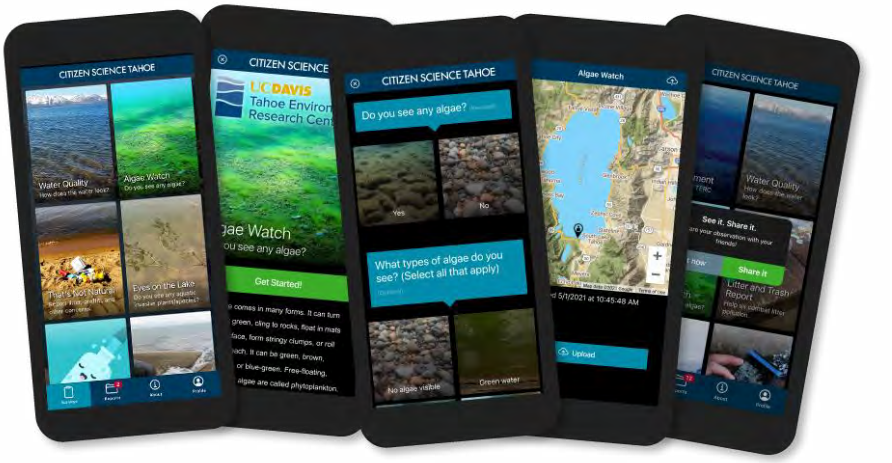
Photo: B. Wynne

Tahoe: State of the Lake Report 2020 6.19

Citizen Science

(http://CitizenScienceTahoe.com)

It is something anyone can do at any beach in Tahoe. Just download the free Citizen Science Tahoe app.



What you can report with the app:

- **Water Quality**: How does the water look? When the water is not clear, it can point to localized erosion or other problems that may require more investigation.

- **Algae Watch**: Do you see any algae? Understanding the location and timing of algae growth can help us better control it.
- **That's Not Natural**: Do you see litter, graffiti, or other human impacts where they shouldn't be? Did you pick up litter? Your reports will drive solutions for these "hot spots," including community cleanup events.
- **Eyes on the Lake**: Have you spotted aquatic invasive weeds? Report your sightings of these aquatic invaders to help prevent Tahoe's blue waters from turning a murky green.
- **Pipe Keepers**: Lake Tahoe is losing water clarity to stormwater pollution that runs off roads and urban areas. Protect Lake Tahoe by reporting polluted runoff.
- **Tahoe. Rain or Snow?**: Send us updates in real-time to share whether it is raining, snowing, or a wintry-mix.
- **Stories in the Snow**: Share your snow crystal images.
- **Drink Tahoe Tap - Where?**: Find or report a water fill station.

See it – share it – make a difference: With online platforms, citizen scientist volunteers can collect and share important data about their surrounding environment. You can help researchers by taking a few minutes to report what you see around the lake – whether it's an algal bloom, cloudy water, invasive species, or litter on the beach. Science needs both sides of the story, so users are encouraged to report both the positive and negative things they see.

How it works: Using the Citizen Science Tahoe app, you can submit observations along with your photos and comments. Each report automatically captures where and when the observation was submitted, with options to submit anonymously. The Citizen Science Tahoe App is available for Apple and Android phones. Users do not need to utilize their cellular data and can wait to upload images when connected to Wi-Fi. This makes the app easy to use in even the most remote locations!

Instructions available here. Support available here.

Why it helps: Data from various locations around the lake (spatial data) and from multiple dates throughout the year (temporal data) helps scientists to better understand the nearshore environment – the location where most visitors see the lake. The observational data collected by citizen scientists will be used by researchers to better understand conditions around the lake and to compare observations with sensor readings.

Core partners: UC Davis Tahoe Environmental Research Center (TERC) developed the first version of the Citizen Science Tahoe app in 2015 to compare the results of citizen science observations of the Lake's nearshore with the real-time nearshore monitoring network. This early version of the app was developed using grant funding from the Institute of Museum and Library Services. The League to Save Lake Tahoe (Keep Tahoe Blue) joined UC Davis TERC shortly after, and Desert Research Institute (DRI) joined in 2017 to expand the project and provide a fun and easy way for Tahoe-lovers to share observations about the natural environment at Tahoe to inform research and advocacy. These core partners create engaging surveys on important environmental issues facing Lake Tahoe and collaborate regularly to update and improve features on the app, compare data, and share interesting outcomes from the observations.

Participating members: Citizen Science Tahoe participating members bring a unique set of skills and perspectives to the team that improve the app for everyone. They contribute their expertise and passion for the Tahoe environment as well as expanded outreach to get more people involved and more data and observations in the hands of researchers and environmental advocates. Learn more about our participating members below. Together our community grows. The latest participating members to join in the Citizen Science Tahoe project include Clean Up the Lake, Tahoe Fund, and Tahoe Water Suppliers Association.

Demo Gardens: UC Davis TERC partners with Lake Tahoe Master Gardeners, the Truckee Community Garden, and the North Tahoe Demonstration Garden to bring family-friendly garden workshops that will encourage people to build beautiful and sustainable gardens that enhance the environment and foster an interest in citizen science.

K-12 Programs: UC Davis provides students with an opportunity to learn about science at Lake Tahoe with the following thematic programs: Water on Earth, Ecology, Tahoe Food Web, Landforms, Earthquakes and Plate Tectonics, and Lakes of the World. Activities align with state science curriculum.

UC Davis TERC offers a 15-week (January through May) Youth Science Institute afterschool program for high school students. They offer the Trout in the Classroom program each year. Along with partner organizations, UC Davis provides training and support for participating teachers.

The annual **Science Expo** event is designed to increase student excitement and interest in science through interactive, hands-on activities, games, and demonstrations. Science Expo is hosted by UC Davis TERC, with support from the Rotary Club. Science Expo includes five days of hands-on science activities in North Lake Tahoe and four days in South Lake Tahoe for third-, fourth-, and fifth-grade students from the greater Lake Tahoe and Truckee Region. There is also a evening public event for all families and lovers of science at both locations.

Teacher Programs: Project WET, Project Learning Tree, Project WILD Workshops are held each year for teachers and informal educators in the region. Hosted in collaboration with other partners such as the US Forest Service and Sierra Watershed Education Partnerships. **Summer "Tahoe Teacher Institute" -** We partner with various school districts to host a summer TahoeTeacher Institute focused on science, technology, engineering, and math (STEM) education.

Volunteer Docent Program: The volunteer docent training program is currently offered once a year in the spring. The training program consists of three to four sessions. Docents can also join the program by meeting with our staff, reading the Docent Manual, and shadowing tours until they are comfortable hosting tours.

The Thomas J. Long Foundation Education Center (TERC) at Incline Village, averages 12,000+ contacts annually. In addition, TERC hosts monthly public lectures and workshops, makes presentations to local organizations and takes a limited number of visitors out on research vessels. TERC organizes and hosts annual events and programs including Children's Environmental Science Day, Science Expo, Youth Science Institute, Trout in the Classroom program, Project WET workshops, Summer Tahoe Teacher Institute and a volunteer docent training program. Several new exhibits were developed including upgrades to the interpretive signage located in the Native Plant Demonstration Garden outside the Tahoe City Field Station; addition of two aquariums at the Eriksson Education Center in Tahoe City; the Microplastics Display, Virtual Watershed Sandbox and Clarity Model Interactive exhibit in Incline Village; and the 3D movie "Lake Tahoe in Depth" for viewing in the Otellini 3D Visualization Lab in Incline Village.

Desert Research Institute (DRI) Microplastics Research
https://www.dri.edu/labs/microplastics
https://ucscsciencenotes.com/feature/lake-tahoes-pristine-legacy-threatened-by-microplastics/

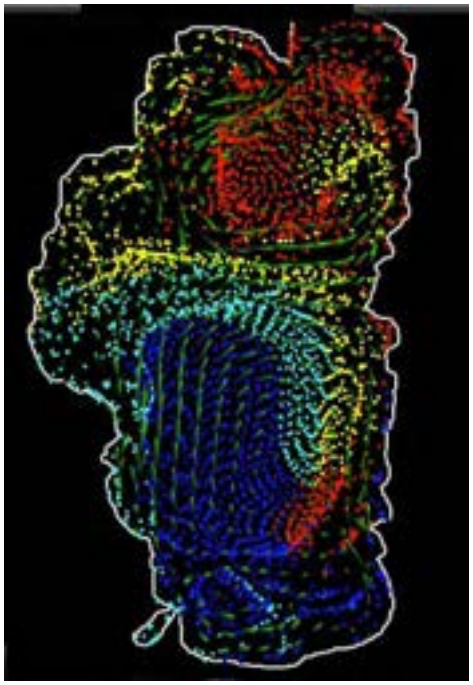
DRI's Monica Arienzo, Zoe Harrold, Meghan Collins, Xuelian Bai, and University of Nevada, Reno undergraduate Julia Davidson are exploring these questions in two bodies of freshwater in Nevada: Lake Tahoe and the Las Vegas Wash. There have been far fewer studies in freshwater, and far fewer even in

alpine lakes," explained Collins, Education Program Manager at DRI. "This study is really well placed to identify what microplastics may be in the water, their sources, and their characteristics."

The research team is collecting samples from four different sites in Las Vegas—one in Lake Mead and three in the Las Vegas Wash—and six sites in Lake Tahoe. Sites were selected to include areas both high and low human activity, like the Tahoe Keys with significant boat traffic and Emerald Bay State Park where human impact is low. Additional sampling was also conducted at three stormwater outfalls into Lake Tahoe in collaboration with the League to Save Lake Tahoe's Pipe Keepers citizen science program.

"The sampling methods we're using are unique," said Arienzo, assistant research professor and project lead. "Past studies collected samples by trailing a large net from a boat or standing with it in a moving stream. Our approach is to sample and filter water in the field for microplastics using a pump, which allows us to filter upwards of 15 gallons of water in locations with still water and in places where boat access is limited." Using a backpack, makes sampling in remote and hard to access locations more feasible," Arienzo added. To make this novel method work, researchers place a stake with a funnel clipped to it about 20 feet from the water's edge. The funnel, positioned on the surface of the water, is connected to tubing that runs back to the pump on shore, which draws water through the tubing and over a series of filters which can capture particles of different sizes.

TERC Studying Circulation Patterns / Water Current Drifters
http://terc.ucdavis.edu/research/lake-tahoe/drifters.html



Measuring the water current at a single point provides valuable data – but only at that point. What is often important to know is how water moves all around the lake, and where it would carry pollutants orinvasive species once they were in the lake. Water current drifters do that. TERC has used surface drifters attached to underwater sails (or drogues) to measure the paths that they take when carried by currents. A GPS unit in the drifter keeps track of the ever changing pos ition, and in recent versions that data is sent to us in real-time via satellite.The drifter studies to date have revealed a lot of new information about Lake Tahoe. We know that thecirculation is dominated by two main eddies or gyres. The one in north travels counterclockwise, while the one in the south moves clockwise. Smaller gyres occur at the edges of these major gyres, and they disappear and reappear depending on the winds. The first hint that Asian clams could travel across thelake from east to west in less than a day was revealed by a drogue study. Our interest is now on understanding the small gyres that run along the nearshore regions of the lake.

Funding for this research has spanned many years, with numerous sources. Funders include the US EPA, East Bay Municipal Utility District (EBMUD), SNPLMA, the UC CITRIS Program and private donors. Our newest collaboration is with the students of the Tahoe Expedition Academy in King's Beach. Together we will be monitoring the currents off the north shore of Lake Tahoe and developing a web application to show the current movements.

RECREATION ACTIVITIES IN THE WATERSHED

*(*Editor Note: There is an active proposal under consideration by LRWQCB for a pilot test of herbicides at the Tahoe Keys. A decision is anticipated early 2022.)*

Aquatic Invasive Species (AIS) Management and Prevention:

"A non-indigenous species that threatens the diversity or abundance of native species or the ecological stability of infested waters, or commercial, agricultural, aquacultural or recreational activities dependent on such waters." (NANPCA 1990).

- **If any single factor had to be identified as the most important change in the state of Lake Tahoe since 2008 - it would be the dramatic increase of Asian clams and other Aquatic Invasive Species.**

Tahoe AIS prevention efforts are working. 2021 marked the 13-year anniversary of the Tahoe Boat Inspection Program, and 13+ years of front-line defense against new invasive species.
https://tahoeboatinspections.com/

Lake Tahoe continues to test negative for the presence of Quagga or Zebra mussels.

13 years of Inspections continue to provide a line of defense.
https://tahoeboatinspections.com/tahoe-keepers/about-ais/

This topic is a major part of TWSA's work over the past years. Staff maintain presence on multiple working groups and provides comment during regulatory process.

The Tahoe Regional Planning Agency (TRPA) and Tahoe Resource Conservation District (Tahoe RCD) have the lead roles in a region-wide management plan for the prevention of the introduction of Aquatic Invasive Species (AIS) to the Lake Tahoe Basin.

In 2008, TRPA and Tahoe RCD began a large-scale, mandatory, lake-wide campaign to educate and boaters on the AIS threat to Lake Tahoe and provide mandatory inspection of boats by trained inspectors before launching at public and private ramps.

Boat inspections are conducted at off-site locations in the summer at key entrance points to the Tahoe Basin. It is mandatory to undergo inspection off-site, then proceed with an intact seal from the inspection site before launching from a ramp at Lake Tahoe. Ramps are gated and locked when inspectors are not present. Boaters pay a sliding scale fee annually, based on boat size and type, to defray costs on the inspection program. Decontamination is provided off-site if the inspector determines a high level of risk. Boats are cleaned with 140 degree F water and chlorine solution. Significant federal and state grant funding has supportedthe inspection program to date.

Fallen Leaf Lake, located adjacent to Lake Tahoe, maintains its own inspection program.
Any trailered boat wanting to launch at the Fallen Leaf Lake Marina must have a green Fallen Leaf Lake inspection seal in order to launch. Boats without an inspection seal or those with a Lake Tahoe inspection seal will be required to get an inspection and decontamination

In 2011, voluntary inspections were more stringently implemented in California areas just outside the Tahoe Basin, at Donner Lake and Boca/Stampede Reservoirs. This program is coordinated and staffedby Tahoe RCD.

Invasive species found on 14 boats heading to Lake Tahoe so far in 2021

http://southtahoenow.com/story/05/21/2021/invasive-species-found-14-boats-heading-lake-tahoe-so-far-2021

Boats entering Lake Tahoe can carry unwanted stowaway passengers - aquatic weeds, Asian Clams, zebra and quagga mussels, and other invasive species. The invaders find propellers, cockpits, hatches, outer hulls, rudders, and paddles to hide in, even a boater's gear.

Aquatic invasive species (AIS) pose a serious threat to the recreational and natural resources of the Lake Tahoe watershed and other lakes and waterways around the country. In order to prevent them from getting into Lake Tahoe a robust boat inspection system has been in place around the lake since 2008.

The inspection stations Tahoe have had a busy start to 2021 with 1,089 boats inspected to date. They have also been proving their value with 14 boats already found to be contaminated, and the boating season is still young. In all of 2020, there were 20 contaminated boats found at the inspection stations out of the 5,599 boats that went through.

Of the new contaminations found, seven were mussels and the other seven were other invasive species such as mud snails and invasive weeds like hydrilla. Aquatic invasive species making their way into Lake Tahoe would devastate Lake Tahoe's ecosystem and recreational experience and could cost the region $20 million a year. Even with over 1,000 boats inspected and on the water, there are another 15,000 boats with "Tahoe Only" AIS stickers that do not venture into other waterways.

Inspections are also done on boats headed to Fallen Leaf and Echo lakes.

Kayaks are subject to inspection and can go to the station for a free inspection if they are coming from outside the region. The Aquatic Invasive Species Program managers just ask that all non-motorized watercraft are "Clean, Drain, Dry" before they launch. Paddlecraft owners need to be aware that Fallen Leaf and Echo lakes don't have some of the invasive species that are already in Tahoe, so learning how to self-inspect and be a Tahoe Keeper is essential to protecting more than just Lake Tahoe.

The Tahoe Keepers free self-inspection and decontamination training program provides paddlers and hand-launched watercraft users with the information needed to help stop the spread of AIS. A training video can be found HERE.

For more information on the AIS program and to book an inspection, visit https://tahoeboatinspections.com/.

The AIS boat program is a joint operation by the Tahoe Regional Planning Agency and the Tahoe Resource Conservation District.

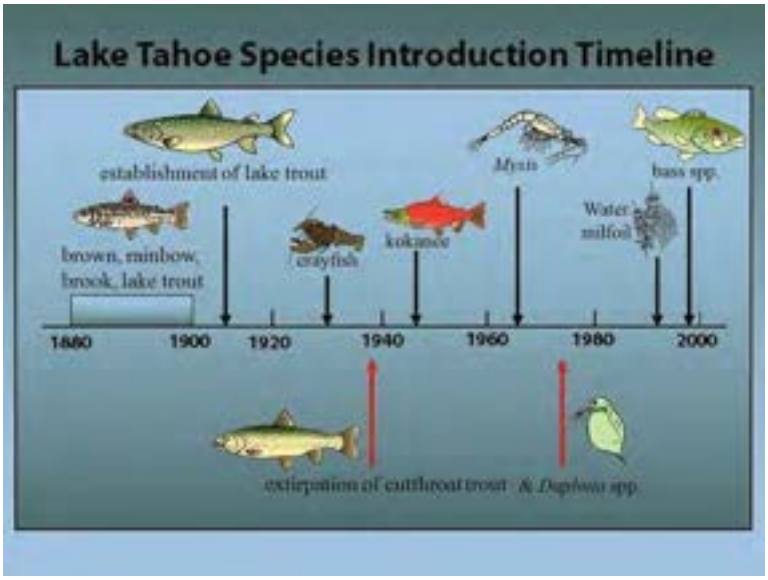
A new invasive species introduction in Lake Tahoe could have devastating impacts. Without natural predators, invasive species multiply quickly and can colonize the lake, as well as docks, water pipes, filtration systems, piers, ramps, and boats. They destroy fish habitat, impair boat engines, and negatively impact water quality and recreation, thus posing serious threats to the ecology, recreation, infrastructure, and economy of the Lake Tahoe Basin.
To learn how to clean, drain, and dry your vessel and prepare for a watercraft inspection, please visit www.TahoeBoatInspections.com. For non-motorized watercraft preparing to boat in the Lake Tahoe Region, please visit www.TahoeKeepers.org to learn more.

2013 Detection of New Zealand Mud Snails in lower Truckee River
New Zealand mud snails (NZMS) were detected near Reno in the lower Truckee River in spring 2013. *http://www.ktvn.com/story/22410534/new-zealand-mud-snails-invading-truckee-river*

After the initial detection in 2013 of New Zealand Mudsnails in the Truckee River, Nevada Department of Wildlife (Chris Crookshanks) conducted a survey of the river from the CA/NV state line to some point east of Reno. Unfortunately, they found quite a few of the invasive mudsnails. In some locations, the densities were relatively high; however, it should be noted that they were not doing formal counts, just noting presence or absence. *(Source: Pers. comm. T. Crimmens, TAHOE RCD)* . In Nevada, NZMS occur in the Salmon Falls Creek drainage, Beaver Dam State Park, Lake Mead NationalRecreation Area and the Lower Colorado River, Maggie Creek and a small portion of the Humboldt River near Carlin, NV.

2015 - Lake Tahoe Aquatic Invasive Species Implementation Plan
http://tahoercd.org/wp-content/uploads/2015/08/Implementation-Plan-AIS-Final-7_31_2015.pdf

Additional AIS Resources at*:* http://tahoercd.org/tahoe-aquatic-invasive-species-resources/



In July 2015, the *Implementation Plan for the Control of Aquatic Invasive Species within Lake Tahoe* by Marion E. Wittmann, Ph.D. & Sudeep Chandra, Ph.D. (University of Nevada Reno), written in collaboration with the Lake Tahoe Aquatic Invasive Species Coordination Committee, was released.

Excerpts from the Summary are below:

Substantial changes to the economy, water quality, aesthetic value, and recreational pursuitsare currently occurring in part due to the unwanted impacts of aquatic invasive species (AIS).

In 2009 and again in 2014, the Aquatic Nuisance Species Task Force (ANS Task Force), an intergovernmental organization dedicated to preventing and controlling aquatic nuisance species, approved a Lake Tahoe Region Aquatic Invasive Species Interstate Management Plan (LTAIS Management Plan). The LTAIS Management Plan identifies threats and quantifies economic damages posed by AIS, develops management strategies for AIS in the Tahoe Basin, and supports one of the nation's most rigorous recreational boat inspection programs.

Through the development of this implementation plan, seven aquatic invasive species groups were determined under guidance from the LTAIS Management Plan and the AISCC. These groups include: warm water fishes (various species), plants (Eurasian watermilfoil, curlyleaf pondweed), invertebrates (Asian clam, mysid shrimp, signal crayfish), and an amphibian (American Bullfrog).

A comprehensive history of the invasion of each of these species and the control actions taken to date

within the Tahoe Basin and elsewhere was provided. Using this information, as well as information from the peer-reviewed published literature, an assessment of the feasibility of management actions for each of species group was provided. Feasible management actions were qualified into three classifications:

Feasible control actions

- Eurasian watermilfoil
- Curlyleaf pondweed
- Warm water fish

Potential control actions

- Signal crayfish
- American bullfrog

No feasible control options at this time

- Mysid shrimp
- Asian clam

An ecologically-based framework was used to determine a site prioritization for aquatic invasive plants and warm water fish in the Tahoe Basin.

Other factors of major significance concerning the control of AIS such as suitability of the receiving habitat, proximity to sensitive native species, or potential impact of control actions on the surrounding environment are vital components of site selection, but are not included in this model due to lack of available data. Sites with the highest prioritization included the Tahoe Keys (East and West). These sites received the highest priority largely as a result of the immensity of nuisance aquatic plant infestations, as well as the intensity or recreational boater visitation. Other highly prioritized sites included Meeks Bay, Ski Run Marina and Channel, and Lakeside Marina and swim area.

Emerald Bay was not highly prioritized for immediate control action because of recent successful efforts to remove all Eurasian watermilfoil biomass. This site is indicated as a priority for post-treatment surveillance monitoring. At present, only non-chemical methods are allowed for the control of all AIS in Lake Tahoe. This is due to the special status designation for Lake Tahoe and States of California and Nevada with rules* prohibiting the use of chemical additions to the watershed.

Suggestions are provided for all AIS considered in this document for immediate implementation actions, the development of future control strategies or technologies, and the consi deration of chemical control methods, where appropriate.

Major knowledge gaps identified include the need for:

- A consistent lake-wide surveillance program with central data storage,
- Efficacy monitoring associated with each management action taken,
- Development of specific metrics to quantify the success of the overall AISmanagement/implementation program at Tahoe, and
- As a majority of the AIS considered here are nearshore species, an integration of the Tahoe AIS management program with the Lake Tahoe Nearshore Management plan.

Recommendations for "next steps" include a call for the development of: a nearshore surveillance and monitoring program, metrics to evaluate the progress of AIS control actions

carried out in the lake, a research plan to address data gaps, the exploration or development of new strategies or technologies for the control of AIS in Lake Tahoe, and an alignment of available resources with the priorities recommended in this implementation plan.

2020 Update:

https://tahoercd.org/wp-content/uploads/2020/02/TahoeAISActionAgenda_v5.0_2September2019_reducedsize.pdf

Details follow in later in this section.

Summary: The Lake Tahoe Region Aquatic Invasive Species (AIS) Management Plan (2014) and Implementation Plan for the Control of Aquatic Invasive Species within Lake Tahoe (2015) document the substantial negative changes occurring to Lake Tahoe as a result of the introduction and expansion of aquatic invasive species (AIS).

To address this issue, the California Tahoe Conservancy initiated an effort in 2018 to support the development of short- and long-term management targets and a set of specific actions to control AIS in the Lake Tahoe Region. The Conservancy contracted with Creative Resource Strategies, LLC to conduct a regional stakeholder survey and interviews, and then work with the Lake Tahoe AIS Coordinating Committee to develop a 10-year Action Agenda and complementary Investment Strategy.

Results of the Lake Tahoe Region stakeholder survey and interviews validated support for a comprehensive and aggressive AIS program, the projection that it will take 5–10 years to achieve AIS goals in the Region, the reality that a full complement of control methods will likely be needed to achieve AIS goals, and recognition that everyone has a role to play in monitoring, detecting, controlling, and funding AIS efforts. This Action Agenda proposes to implement a well-funded, comprehensive, robust, simultaneous, science-based, and aggressive suite of aquatic invasive species (AIS) actions through the next decade to reduce the economic, environmental, and social effects of AIS in the Lake Tahoe Region.

The Agenda describes a 10-year (2021–2030) two-phased effort. Phase 1 (2021–2025) aggressively treats and controls AIS throughout the Region for five consecutive years while containing AIS and completing environmental documents and AIS control testing specific to the Tahoe Keys. Phase II (2026–2030) focuses efforts on reducing aquatic invasive plants and invasive fish in the Tahoe Keys (implementing the outcomes of the environ-mental assessment and testing processes occurring through 2025), while continuing to maintain, reduce, or when possible, eradicate AIS in other parts of the Lake Tahoe Region such that they minimize detrimental effects to ecosystem function.

What causes weed growth in the Tahoe Keys?



Aquatic invasive weeds cover over 90% of the 172 acres of the Tahoe Keys

Over

90%

of nutrients

that feed weed and algal growth in the Tahoe Keys come from the existing weeds and sediment layer.



Invasive weeds were first spotted in the Tahoe Keys decades ago. These weeds were not native to Tahoe, and they had no natural competition. They quickly grew and spread, generating a vicious cycle of growth and die back that feeds further expanding growth with each year.

Why are weeds choking the Tahoe Keys?

The shallow, warm water in the Tahoe Keys create favorable conditions for the growth of aquatic weeds. Scientists collected over a million data points in 2019 to learn more about weed growth in the Tahoe Keys. The results show that the majority of nutrients that spur weed growth come from the weeds themselves.

- The weeds get nutrients from the deep bottom layer of muck that has accumulated from decades of weed decomposition.
- This weed dieback happens annually and continues to accumulate vast amounts of decomposing weed substrate.
- Some of the nutrients from decaying plants are also released into the water where they can stimulate harmful algal blooms (HABs).

What else affects weed growth in the Tahoe Keys?

- Studies show that stormwater runoff contributes approximately 10% of the nutrients that drive weed growth.
- The Tahoe Keys Property Owner Association (TKPOA) and partners are implementing measures to reduce stormwater runoff and improve water quality including:
  - Ban on fertilizers containing phosphorus.
  - Installation of best management practices (BMPs) that capture and treat stormwater.
  - Homeowner, property manager, and landscape contractor education.
  - Water quality monitoring.
  - Enforcement.

Eliminating all nutrients from stormwater runoff could not address the far more significant source of nutrients coming from the weeds themselves and the decomposing muck layer.

What is being done to control weeds in the Tahoe Keys?

- TKPOA uses harvesters to remove weeds, but it cannot keep up with rapid weed growth.
- Innovative weed control methods such as Laminar flow aeration, and Ultraviolet light, bubble curtains, and bottom barriers are also being tested.
- The Tahoe Keys Control Methods Test focuses on finding what combination of control methods will make the biggest impact on controlling the weeds.

Learn more at Tahoekeysweeds.org

Published by the Tahoe Regional Planning Agency – Oct. 2021

Boating: Aquatic Invasive Species - Potential Importation of Quagga/Zebra Mussels& Spread of Existing AIS
Watercraft are the largest source for spreading Aquatic Invasive Species (AIS) into new waterways. Inspections are an essential part of preventing this inadvertent transport of alien species into the pristine waters of Lake Tahoe. Invasive species have devastating environmental and economic impacts on industries, communities and native species populations. Most invasive species do not have predators to keep their populations in balance and, once introduced, are difficult, if not impossible, to eradicate.

Mandatory watercraft inspections can stop aquatic invasive species, such as Quagga mussels, BEFORE they enter the water. Inspectors are looking for any plant or animal, dead or alive, that may pose a risk to Lake Tahoe and the surrounding waters. Tahoe has one of the strictest programs in the nation.

Primary species of concern include:

- Zebra and Quagga mussels
- New Zealand mudsnails
- Spiny waterflea
- Hydrilla and other highly invasive plants, some of which are already present in California and/or Nevada waters

Boat transport is one method of transport for aquatic invasive weeds within Tahoe. The Tahoe Keys is attempting education and control of fragment transport with a boat backup station installed onsite. Compliance is sporadic however.

There is new information that the spread of Asian Clams is affected by ballast water draw and release at Tahoe. A very small, new population at Sand Harbor receive bottom barrier treatment in summer 2017. There is new outreach to boaters to fill up ballast water at least a mile from shore, to mitigate the transport of Asian Clam veligers in the ballast water.

From the State of the Lake Report 2017 (pg.6.17):
The Nevada Division of State Lands has commenced a project to control the emergence of a satellite population of Asian clams adjacent to the boat ramp at Sand Harbor State Park, Nevada. While Asian clams are now widespread along the southern shore of Lake Tahoe, their recent appearance at one of the
most scenic locations on the north shore would seem puzzling. A multi-agency boat inspection program prevents new invasive species from entering the lake from outside. The currents in the lake are such that the rapid transport from south to north is inconceivable.

The most likely scenario is that Asian clams are now being transported within Lake Tahoe by boats. The boating activity that seems to have the greatest potential for this is wakeboarding. A boat outfitted for wakeboarding would typically fill its ballast tanks with up to 600 gallons of water. If this water happened to be drawn from a clam infested area in summer, it is very possible that veligers (the larval offspring) would also be drawn in. At the end of a fun day, if the ballast tanks were emptied at a different, clam-free area, then in-lake transport would have occurred.

Two obvious actions can prevent this accelerated spread from occurring. First, all filling and emptying of ballast tanks should take place at least one mile from shore. The deep waters there are less likely to contain veligers, and any would invariably sink to the cold depths where they cannot reproduce. Secondly, it would be extremely prudent to require that all ballast tanks be equipped with filters that can effectively remove all particulate material.

What are Quagga and Zebra mussels & how many waterbodies are known to be infested with them?
Quagga (Dreissena bugensis) and Zebra (Dreissena polymorpha) mussels are destructive aquatic invasivespecies that grow to about 1 inch in diameter. They can be larger than 1 inch or they can even be microscopic. They reproduce quickly and in large numbers. Once established, eradication is often difficult or impossible. The small, freshwater bivalve mollusks are triangular with a ridge between the side and bottom. It has black, cream or white bands, and often features dark rings on its shell almost like stripes. Quagga and Zebra mussels are native to the Ukraine and Russia. Zebra mussels were first discovered in the GreatLakes in 1988, and a year later, Quagga mussels were discovered in the same area. It is believed they arrived in America via ballast water discharge that contained their free swimming larva called veligers. Since 2007, these species have been found in Lake Mead, Lake Havasu, the Colorado River drainage andother significant and also small western U.S. water bodies.

What is the environmental impact of the Quagga and Zebra mussel?
Quagga and Zebra mussels will upset the food chain by consuming phytoplankton that other species need to survive. They are filter feeders that consume large portions of the microscopic plants and animals that form the base of the food web. One adult mussel can filter up to 1 liter of water per day. Their consumption of significant amounts of phytoplankton from the water decreases zooplankton and can cause a shift in native species and a disruption of the ecological balance of entire bodies of water. In addition, they can displace native species, further upsetting the natural food web. Quagga and Zebra mussels have few natural predators in North America. It has been documented that several species of fish and diving ducks have been known to eat them, but these species are not an effective control. In some cases, the mussels concentrate botulism toxin causing bird die offs.

What is the economic impact of the Quagga and Zebra mussel?
A recent study by the U.S. Army Corps of Engineers estimates a mussel invasion could cost Tahoe's tourism economy more than $22 million per year. Quagga and Zebra mussels can colonize on hulls, engines and steering components of boats and other recreational equipment. If left unchecked, the mussels can damage boat motors and restrict cooling. They also attach to aquatic plants and submerged sediment and surfaces such as piers, pilings, water intakes and fish screens. In doing this they can clog water intake structures hampering the flow of water. They frequently settle in massive colonies that can block water intake and threaten municipal water supply, agricultural irrigation and power plant operations. U.S. Congressional researchers estimated that an infestation of the Zebra mussel in the Great Lakes area cost the power industry $3.1 billion in the (1990s) period, with an economic impact to industries, businesses and communities of more than $5 billion. California could spend hundreds of millions of dollars protecting the state's water system from a Quagga/Zebra infestation.

Quagga Mussel and AIS Impacts to Nevada's Waters
http://www.ndow.org/uploadedFiles/ndoworg/Content/Boat/Aquatic_Invasive_Species/AIS-Threats-Nevada-Waters.pdf

Nevada currently has a variety of AIS inhabiting waterways. Other species of concern are purple loosestrife, tamarisk, Eurasian milfoil, curlyleaf pond weed, didymo (alga), Asian clams, Asian carp, common carp, New Zealand mud snail, tilapia, and various aquarium fish.

Some economic impacts for Nevada AIS include:

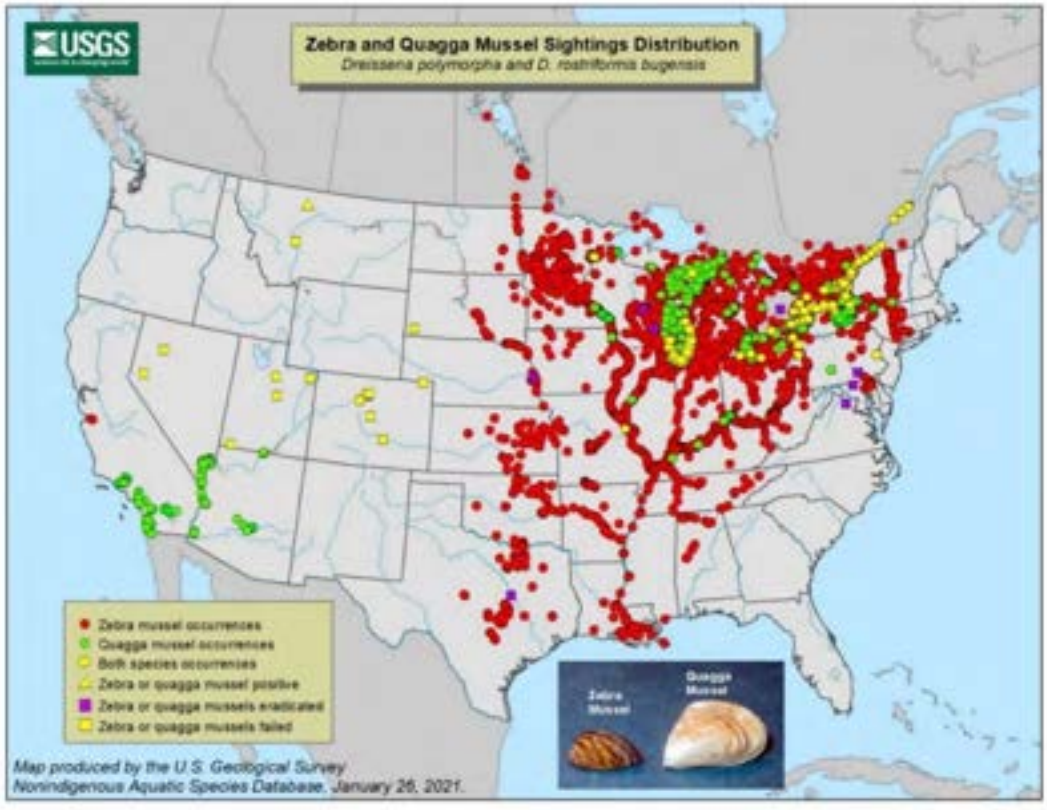
- $1 million year Hoover Dam annual budget for Quagga mussel control (BOR Per. Comm. 2011)
- $172,600 annually for chlorination additions at Southern Nevada Water Authority: removal of Quagga's from one drinking water intake tunnel $340,000:

routine maintenance and removal
$6,000: proposed chemical control $560,000: research on the invasion $300,000 (SNWA Per. Comm.2011).

- $3-5 million to retrofit the water filtration system at NDOW's Lake Mead Fish Hatchery due toQuagga infestation.

The discovery of Quagga mussel contamination in Lake Havasu, Lake Mead, and the Colorado River Basin created an emergency need in 2008 for the Tahoe area to address prevention. Recent studies (by researchers at TERC/UC Davis/UNR) indicate the survivability potential is real for these species if introduced to Lake Tahoe. If established at Lake Tahoe; Quagga mussels or Zebra mussels could cause profound changes to the alpine lake's sensitive ecosystem. The mussels could clog water intakes, cover boats and piers, and litter pristine beaches with sharp shells and decaying, reeking biomass.

A map of mussel detections is available at:
http://nas.er.usgs.gov/taxgroup/mollusks/Zebramussel/maps/southwest_Quagga.pdf



Nevada Boat Inspections
http://www.ndow.org/Boat/Aquatic_Invasive_Species
Under the direction provided in Assembly Bill 167 by the Nevada State Legislature in 2011, NDOW was provided authority to implement an Aquatic Invasive Species (AIS) Prevention Program.

The goals of the program are to prevent the spread of AIS threatening Nevada's waterways and to prevent new introductions of AIS. Implementation of the program includes the development and approval of AIS regulations, seasonal inspection and decontamination stations, monitoring, coordination with stakeholders and government entities, and AIS prevention education and outreach for the public.

The program is funded through collection of an AIS watercraft decal and federal assistance grants. In 2014, NDOW began watercraft inspection stations seasonally at Lahontan Reservoir, Rye Patch Reservoir, and Wildhorse Reservoir.

In Nevada, Zebra mussels are not currently present; however, Lake Mead National Recreation Area discovered Quagga mussels in Boulder Basin in 2007. Since that time, the mussels have spread throughout the lower Colorado River system. With the exception of Lake Mead National Recreation Area and the lower Colorado River, adult mussels have not been found in Nevada, however, in April 2011, Lahontan and Rye Patch Reservoirs in Northern Nevada tested positive for the presence of Quagga mussel veligers (larvae). Subsequent sampling since that time has not found any veligers or adult mussels. These water-bodies are within a few hours' drive of Lake Tahoe.

TWSA Involvement
TWSA has been involved in the Aquatic Invasive Species and Boat Inspection process/working group since the threat of AIS emerged in the region as a major concern in 2007. TWSA staff provides ongoing education and outreach to the public at local events, on the threat these species pose to drinking water quality. In summer 2009, 25 large format aluminum signs with Quagga mussel information were sponsored by TWSA for installation at public access points. These signs are still on location.

The **Lake Tahoe Aquatic Invasive Species Working Group (LTAISWG)** is a diverse group of agencies, community members and scientists dedicated to early detection and rapid response, prevention and control of aquatic invasive species in the Tahoe Basin. TWSA staff became actively involved in working with TRPA and Tahoe RCD as a member of the working group, focusing on the AIS inspection program protocols, public education and outreach.

This group conducts research in the Tahoe Keys, Emerald Bay and Lake Tahoe.
More information about these projects is included later in this report.

TRPA Ordinances Regarding Invasive Species
In October 2008, the TRPA Governing Board revised the TRPA Code of Ordinances to prohibit the transportation of invasive species. TRPA Code of Ordinances, Chapter 79.3 contains regulations relating to the prevention of invasion by aquatic invasive species.
Invasive species are defined in the TRPA Code as:
…species, both aquatic and terrestrial, that establish and reproduce rapidly outside of their native range and may threaten the diversity or abundance of native species through competition for resources, predation, parasitism, hybridization with native populations, introduction of pathogens, or physical or chemical alteration of the invaded habitat. Through their impacts on natural ecosystems, agricultural and other developed lands, water delivery and flood protection systems, invasive species may also negatively affect human health and/or the economy. Aquatic invasive species shall include but not be limited to: Zebra mussel (Dreissena polymorpha), Quagga mussel (Dreissena bugensis), Eurasian water milfoil (Myriophyllum spicatum L.), curlyleaf pond weed (Potamogeton crispus L.), and large mouth bass (Micropterus salmoides).

TRPA Code of Ordinances, Chapter 79.3 A - Relates to the transport, introduction and launching of watercraft that is contaminated with aquatic invasive species: *Prohibition: The transport or introductionof aquatic Invasive Species into the Lake Tahoe Region is prohibited. Further, the launching of any watercraft contaminated with Aquatic Invasive Species into the waters of the Tahoe Region is prohibited.*

TRPA Code of Ordinances, Chapter 79.3. B - Makes it mandatory to submit to the inspection of watercraft prior to launching when an inspector is present, makes decontamination mandatory when the watercraft is judged by an inspector to be contaminated, and closes boat launching facilities when an AIS inspector is not present:

(1) An owner operator of a Boat Ramp or other Boat Launch Facility (exclusive of single family residences) shall close the ramp or facility to launching of watercraft at all times when the provisions ofsubsection (2) have not been or cannot otherwise be provided or met.

(2) All watercraft, motorized and non-motorized, including but not limited to boats, personal watercraft,kayaks, canoes and rafts, shall be subject to an inspection prior to launching into the waters of the Lake Tahoe Region to detect the presence, and prevent the introduction, of Aquatic Invasive Species. An inspection under this section is valid only if performed by a trained inspector pursuant to Tahoe RegionalPlanning Agency standards and requirements for Aquatic Invasive Species inspections.

(3) All watercraft inspected in subsection (2) shall be subject to decontamination if determined necessaryby an inspection under 79.3 B (2). A watercraft shall launch only if the required decontamination is performed and completed by a trained individual pursuant to TRPA standards and requirements for Aquatic Invasive Species decontamination and launch is authorized by a trained inspector pursuant to
TRPA's standards and requirements for Aquatic Invasive Species Inspections.

(4) All watercraft inspected in compliance with subsection (2) and decontaminated in compliance with subsection (3) are subject to a fee to pay for the inspection and/or decontamination and other programcosts.

Tahoe Resource Conservation District (Tahoe RCD) Invasive Species Program

The Invasive Species Program at the Tahoe Resource Conservation District is divided into the Terrestrial Invasive Weed and Aquatic Invasive Species sub-programs, which focus on the removal and abatement of terrestrial and aquatic invasive species. The Tahoe RCD is the coordinator for the Lake Tahoe Basin Weed Coordinating Group and the Lake Tahoe Aquatic Invasive Species Working Group. These working groups are comprised of diverse agencies and community members dedicated to protecting the Lake Tahoe Basin from invasive species through education, research, prevention, early detection, rapid response, and control.

Aquatic Invasive Species Sub-Program

The Tahoe RCD Aquatic Invasive Species (AIS) Program was formed after the January 2007 discovery of Quagga mussels in Lake Mead, Lake Havasu, and the Colorado River Basin. The AIS Program serves as chair for the Lake Tahoe Aquatic Invasive Species Working Group (LTAISWG). Funding received from the Bureau of Reclamation for the removal and monitoring of aquatic weeds in Emerald Bay and Ski Run Marina supported some of the program's first efforts.

The AIS Program has grown extensively since 2007, following the Lake Tahoe Aquatic Invasive Species Working Group mission. The group is working to prevent new introductions into Lake Tahoe such as Quagga and Zebra mussels, and performs monitoring, research, control, and removal of existing invasive species. This requirement has put the Tahoe RCD in the spotlight for coordination of the Watercraft Inspection Program at Lake Tahoe. LTAISWG partners are continuing research of aquatic invasive species in Lake Tahoe to better support resource management decisions in the Tahoe Basin.

Lake Tahoe's Boater APP
https://tahoeboatinspections.com/trpa-releases-app-designed-to-help-boaters-paddlers-navigate-lake-tahoe/ https://tahoeboatinspections.com/news-updates



Boaters and paddlers trying to navigate Lake Tahoe's expansive blue waters have a new tool to help in their travels. The Tahoe Regional Planning Agency recently announced the release of the new Tahoe Boating app designed to inform boaters and paddlers about Lake Tahoe, no-wake zone boundaries, area attractions, and responsible recreation. The app, according to TRPA, includes interactive mapping, giving boaters real-time location and direction of travel on the lake. Location information allows boaters to see their position in proximity to Lake Tahoe's no-wake zones which requires boaters to stay under 5 mph within Emerald Bay, 600 feet of shore, 100 feet of swimmers and paddlers, and 200 feet of structures.

Boaters and paddlers can download the free Tahoe Boating app from either the Apple or Android stores or at tahoeboating.org. The app includes:

An interactive map that shows a boat's location relative to no-wake zones.
Information about boating safety, aquatic invasive species, and emergency contacts.
Locations of fuel stations and bathrooms.
Lake Tahoe points of interest including detailed information and photos.

Tahoe RCD coordinates Lake Tahoe's Watercraft Inspection Program by providing qualified inspectors at designated inspection stations, offering technical support for private launches, trainings, and decontamination of watercraft. The Watercraft Inspection Program was implemented in 2008.

In 2014, **Tahoe RCD finalized the CEQA lakewide permit** for invasive species projects.
http://tahoercd.org/wp-content/uploads/2014/07/CEQA_Final_Env_Doc_Lakewide_AIS_Project_SIGNED.wAttachments.pdf

In 2020, this was updated. TWSA had no significant comments on the plan.
https://tahoercd.org/wp-content/uploads/2020/08/TRCD_AIP_NOI_Availability.pdf

TAHOE REGIONAL PLANNING AGENCY

TAHOE

Tahoe Regional Planning Agency
(28 Market Street)
P.O. Box 5310
Stateline, NV 89449-5310
Phone: (775) 588-4547
www.trpa.org

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Lake Tahoe Basin Management Unit
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South Lake Tahoe, CA 96150
Phone: (530) 543-2600
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Tahoe Resource Conservation District
870 Emerald Bay Road, #108
South Lake Tahoe, CA 96150
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NOTICE OF INTENT TO ADOPT A MITIGATED NEGATIVE DECLARATION/OPPORTUNITY TO COMMENT ON DRAFT ENVIRONMENTAL ASSESSMENT

August 14, 2020

To: California State Clearinghouse
California Responsible and Trustee Agencies
Interested Parties and Organizations

Nevada State Clearinghouse
Cooperating Agencies

Action: **Tahoe Resource Conservation District Lake-Wide Control of Aquatic Invasive Plants Project – Lake Tahoe, California and Nevada**

Project Summary: The Tahoe Resource Conservation District (Tahoe RCD), Tahoe Regional Planning Agency (TRPA), and USDA Forest Service Lake Tahoe Basin Management Unit (LTBMU) have directed the preparation of a joint environmental document for the Lake-Wide Control of Aquatic Invasive Plants (AIP) Project. The document is an Initial Study (IS) for Tahoe RCD pursuant to the California Environmental Quality Act (CEQA); an Initial Environmental Checklist (IEC) for TRPA pursuant to the Tahoe Regional Planning Compact, Code of Ordinances, and Rules of Procedure; and an Environmental Assessment (EA) for the LTBMU prepared pursuant to the National Environmental Policy Act (NEPA).

Tahoe RCD, on behalf of the Tahoe Aquatic Invasive Species Coordination Committee (AISCC), and in coordination with the TRPA, is proposing to conduct aquatic plant control and management throughout suitable habitat areas within the Lake Tahoe Region including the Lake itself, tributaries, and adjacent marshes of Lake Tahoe and the Upper Truckee River and Truckee River as they flow into and out of Lake Tahoe. The Project intends to continue aquatic invasive plant control efforts in locations where previous efforts have been successful, expand control efforts to include known infestation areas, expand available methods/techniques, and to allow for rapid response to detections of new aquatic invasive plant (AIP) infestations.

Suitable habitat is present in Lake Tahoe within the City of South Lake Tahoe and El Dorado and Placer counties in California and Carson City, Washoe, and Douglas counties in Nevada. Within this large project area, several control sites have been identified for potential control methods based on existing knowledge of AIP presence.

LAKE-WIDE CONTROL OF AQUATIC INVASIVE PLANTS PROJECT
LAKE TAHOE, CALIFORNIA AND NEVADA

CEQA Initial Study / Mitigated Negative Declaration

TRPA Initial Environmental Checklist / Mitigated Finding of No Significant Effect

NEPA Environmental Assessment / Finding of No Significant Impact







Prepared for:
Tahoe Resource Conservation District
Tahoe Regional Planning Agency
USDA Forest Service -
Lake Tahoe Basin Management Unit

Prepared by:
Hauge Brueck Associates, LLC

August 2020

Public Review and Comment: The Draft IS/IEC/EA is available for public review and comment until September 16, 2020. The document is available for review at the following agency websites:

https://www.trpa.org/document/projects-plans/
https://go.usa.gov/xmgxT
https://tahoercd.org/tahoe-aquatic-invasive-species-resources/

Tahoe RCD will maintain and be responsible for the handling of public comments submitted in connection with this notice. Written comments may be mailed to Tahoe RCD, Attn: Mollie Hunt, 870 Emerald Bay Road, #108, South Lake Tahoe, CA 96150 or emailed to mhunt@tahoercd.org. Personal contact information is optional. However, only individuals or entities who have submitted their name, address, email and phone number (if available) with their substantive comments will be eligible to file an objection later regarding this project with the USDA Forest Service LTBMU (36 CFR 218.5). Please also note your comments and contact information will be considered part of the USDA Forest Service's public record and may be available for public inspection.

NEPA Comment Process: This project will be subject to 36 CFR 218 Project-level Pre-decisional Administrative Review Process (Parts A and B). Pursuant to 36 CFR 218.25, comments on the Lake-Wide Control of Aquatic Invasive Plants Project will be accepted for 30 days beginning on the first day after the date of publication of the legal notice in the Tahoe Daily Tribune newspaper.

Only individuals or entities (as defined by 36 CFR 218.2) who submit timely and specific written comments about this proposed project during this or another public comment period established by the Responsible Official will be eligible to file an objection later in the process. It is the commenter's responsibility to ensure timely receipt of comments (36 CFR 218.25). Other eligibility requirements are defined by 36 CFR 218.25.



Veliger Monitoring Program

In 2010, a veliger monitoring program was initiated by the Tahoe Regional Planning Agency, with assistance from the Tahoe RCD. Veligers are the larval stage of bivalve mollusks which includes Quagga and Zebra mussels, two potential invaders of Lake Tahoe. Monitoring is an essential element to ensure that the Watercraft Inspection Program has been effective in preventing Quagga and Zebra mussels from establishing populations in Lake Tahoe. Ten locations are surveyed biweekly from late June until the end of September; the eight locations in Lake Tahoe include Elks Point, Tahoe Keys, Emerald Bay, Meeks Bay, North Tahoe Marina, Sand Harbor, Obexers Marina, and Cave Rock along with Fallen Leaf Lake and Echo Lake. Sampling consists of eight vertical plankton tows at each site. The samples are then sent to a laboratory to be analyzed. All of the samples to date have returned with no Zebra or Quagga mussel veligers present**.**

Tahoe RCD Boat Inspection Program – other lakes, other programs

The Tahoe RCD's Lake Tahoe Watercraft Inspection Program had another successful season of protecting Lake Tahoe, Fallen Leaf and Echo Lake from the introduction of new aquatic invasive species. Inspections were performed at our five inspections locations. Approximately 15,000 boats are inspected annually. Since the addition of convenient off-highway locations enabled boaters to receive their watercraft inspections and decontaminations when entering the Lake Tahoe Basin, marinas and boat launches were freed up from being the busiest locations for inspections. This prevention effort also includes a more rigorous non-motorized watercraft inspection and education (The Tahoe Keepers Program) process at ramp facilities, US Forest Service kiosks and Fallen Leaf Lake. Paddlers were also educated about self-inspecting and decontaminating canoes, kayaks and paddleboards.

Tahoe RCD Aquatic Invasive Weeds Control Program

http://tahoercd.org/aquatic-invasive-species-control-projects/

Beginning in 2005, the Tahoe RCD has been directly involved with over 30 non-chemical, aquatic invasive weed control projects. These projects represent treatment of almost 30 acres of invasive weeds.

Year	Location	Biomass (gallons)	Biomass (Cubic Yards)	Suction Removal Area (sf)	Barrier Area (sf)	Total Treatment (sf)	Total Treatment (acres)	Treatment Density Class
2005	Emerald Bay - Avalanche Beach	236	1.18	7,000		7,000	0.05	high
2006	Emerald Bay - Avalanche Beach	1250	6.23	12,000		12,000	0.28	high
2007	No Weed Removal	0	0.00	0	0	0	0.00	very low
2008	Emerald Bay - Parson's Rock		0.00		500	500	0.01	high
2008	Emerald Bay - Avalanche Beach		0.00		400	400	0.01	high
2009	Emerald Bay - Parson's Rock		0.00		10,000	10,000	0.23	high
2009	Emerald Bay - Vikingsholm Swim Beach	160	1.78	3,600	0	3,600	0.08	high
2010	Elk Point Marina	60	0.30	14,000	0	14,000	0.32	high
2010	Emerald Bay - Vikingsholm Swim Beach	301	1.50	4,000	8,500	12,500	0.29	moderate
2010	Emerald Bay - Parson's Rock	101	0.50	2,000	0	2,000	0.05	high
2010	Lakeside Marina	2020	10.00	40,000	0	40,000	0.92	high
2011	Emerald Bay - Avalanche Beach	217.5	1.08	132,000	13,200	145,200	3.33	moderate
2011	Emerald Bay - Parson's Rock	262.5	1.30	34,000	7,000	41,000	0.94	high
2011	Emerald Bay - Vikingsholm Swim Beach	150	0.74	96,250	1,200	97,450	2.24	low
2011	Tahoe Keys	0	0.00	0	17,200	17,200	0.39	high
2012	Emerald Bay - Avalanche Beach	560	2.77	82,000	44,000	126,000	2.89	moderate
2012	Emerald Bay - Parson's Rock	30	0.15	8,700	0	8,700	0.20	low
2012	Emerald Bay - Vikingsholm Swim Beach	3	0.01	1,750	0	1,750	0.04	very low
2012	Tahoe Keys	0	0.00	0	14,075	14,075	0.32	high
2012	Lakeside Beach	377	1.87	17,200	68,400	80,800	1.85	high
2012	Lakeside Marina	2890	14.31	0	35,720	35,720	0.82	high
2012	Ski Run Channel	11527	57.07	71,840	65,360	137,200	3.15	high
2013	Emerald Bay - Avalanche Beach	146.25	0.72	20,075	28,800	48,875	1.12	moderate
2013	Emerald Bay - Mouth of Eagle Creek	26.25	0.13	14,000	0	14,000	0.32	moderate
2013	Emerald Bay - Parson's Rock	5	0.02	36,750	0	36,750	0.84	very low
2013	Emerald Bay - Parson's Rock North	1	0.03	1,000	0	1,000	0.02	moderate
2013	Emerald Bay - Vikingsholm Swim Beach	2.5	0.01	31,500	0	31,500	0.72	very low
2013	Lakeside Beach		0.00	29,550	43,700	73,250	1.67	moderate
2013	Ski Run Channel	6831	33.82	115,956	19,080	135,036	3.10	high
2013	Tahoe City Dam	0	0.00	0	0	0	0.00	high
2013	Truckee River	0	0.00	0	0	0	0.00	high
2013	Mouth of Taylor Creek	200	0.99	0	0	90,000	2.07	moderate
2013	Mouth of Tallac Creek	990	4.90	0	0	26,000	0.60	moderate
2014	Emerald Bay	15	0.07	450	0	450	0.01	low
2014	Truckee River	1200	15.84	6,425	0	6,425	0.15	high
2014	Dam - Truckee River	0	0.00	0	18,400	18,400	0.42	high
2014	Crystal Shores East	0	0.00	0	10,400	10,400	0.24	moderate
	Totals	31679.00	156.85	772,046	405,435	1,293,681	29.69	

Emerald Bay weed eradication

After several years of manual treatments, in 2013, weeds were completely eradicated from California State Parks' Emerald Bay. Intensive treatment always included use of all three control methods (barriers, suction removal, and hand removal) in combination to remove all visible plants in a discrete treatmentsite. Maintenance treatment involved follow-up removal of all recolonizing plants in a discrete treatment site after initial intensive treatment. Barriers were not necessary for maintenance removal. No maintenance removal was necessary in 2015; there were no NI plants detected in Emerald Bay.

Product of the University of Nevada, Reno, 2008

KEEP INVASIVE MOLLUSKS OUT OF LAKE TAHOE: CLEAN, DRAIN, AND DRY YOUR BOAT EVERY TIME

Invasive Aquatic Mollusks:



Asian Clam (*Corbicula fluminea*)
Size: 1 to 1 1/2 inches (25 to 40 mm)
Food: These clams filter particles suspended in water, including bacteria, algae, and detritus.
Preferred Habitat: silt, sand, and gravel in near-shore areas from approximately 10 to 30 feet (4 to 10 m)
Primary Means of Introduction: intentional release of aquarium clams, angler bait dumping, microscopic larvae transferred via un-drained boats

Already present in South Lake Tahoe

Photo Credit: U.S. Geological Survey, Florida Integrated Science Center



Zebra Mussels (*Dreissena polymorpha*) and Quagga Mussels (*Dreissena bugensis*)
Size: 1/4 to 1 1/2 inches (5 to 40 mm)
Food: These mussels filter particles suspended in water, including bacteria, algae, and detritus.
Preferred Habitat: hard substrate from 10 to 200 feet (4 to 60 m)
Primary Means of Introduction: Adults attach to watercraft and fishing gear, and microscopic larvae are transferred in water of un-drained boats.

Currently **not present in Lake Tahoe**; however, quagga mussels were recently discovered in Lake Mead. Please **clean, drain, and dry** your fishing gear and watercraft. **Both mussels have devastating impacts on aquatic ecosystems.**



New Zealand Mudsnails (*Potamopyrgus antipodarum*)
Size: Small! 1/10 to 1/5 inch (2 to 6 mm)
Food: periphyton (algae)
Preferred Habitat: silt, sand, cobble, and aquatic vegetation at depths from 13 to 130 feet (4 to 40 m)
Primary Means of Introduction: attached to watercraft and fishing gear, larvae in water of un-drained watercraft

Currently **not present in Lake Tahoe**, but have invaded many areas of the West. Please help to keep these invaders out of Lake Tahoe! More information on how to prevent the spread of New Zealand Mudsnails is available from the California Department of Fish and Game: http://www.dfg.ca.gov/invasives/mudsnail/

Photo Credits: R. Dedham, Portland State University Center for Lakes and Reservoirs

Invasive species cause serious economic and ecological damage to aquatic ecosystems.

The Lake Tahoe Aquatic Invasive Species Working Group (LTAISWG) is currently working to prevent invasions in Lake Tahoe. The public is invited to attend meetings and encouraged to volunteer!

For more information, please go to http://www.tahoercd.org/AquaticInvasives.php, or contact the Tahoe Resource Conservation District (TRCD) at 530-543-1501, ext. 113

Invasive Aquatic Plants of Lake Tahoe



Eurasian Water milfoil (*Myriophyllum spicatum L.*)
Characteristics: long underwater stems, feathery foliage, tolerant to shallow and deep waters, distinguished from native milfoil by threadlike leaflets usually found in pairs of more than 14
Primary Means of Introduction: native to Europe and Asia, present in much of the United States and Canada, spread from lake to lake by boat trailers and aquarium dumping, has been spreading around Lake Tahoe for 15-20 years
Problems: impedes water flow, disrupts navigation, inhibits recreational activities, decreases water quality, reduces plant diversity
Management: physical (hand pulling, harvesting, cutting) and mechanical control
Prevention: clean all vegetation off boats and equipment

Established communities present in Lake Tahoe. Current management techniques controlling populations; eradication is not achievable.

Photo credit: Robert Johnson, Cornell University, Rebecca Bowman, Cayuga Lake Watershed Network



Curly Leaf Pondweed (*Potamogeton crispus L.*)
Characteristics: submersed aquatic plant with oblong blue-green leaves that have very wavy margin, reproduces by turions (out asset)
Primary Means of Introduction: native to Eurasia, Africa, and Australia; has begun to expand rapidly in Lake Tahoe over the past three years; primarily has spread in warm, shallow waters (such as marinas)
Problems: impedes water flow, disrupts navigation, inhibits recreational activities, decreases water quality, reduces plant diversity
Management: physical (hand pulling, harvesting, cutting) and mechanical control
Prevention: clean all vegetation off boats and equipment

Established communities present in Lake Tahoe. Current management techniques controlling populations; eradication is not achievable.

Photo credit: Three Lakes Council, South Salina, New York
Photo credit (inset): Leslie J. Mehrhoff, University of Connecticut

Eurasian water milfoil and curly leaf pondweed populations are highly concentrated in the South Shore, near the Tahoe Keys area, with smaller populations throughout the lake. Both plants currently dominate the submersed aquatic plant community, causing increased nutrient pumping from sediment (a cause of decreased water clarity).

The Lake Tahoe Aquatic Invasive Species Working Group (LTAISWG) is currently working to prevent the spread of invasive species in Lake Tahoe. The public is invited to attend LTAISWG meetings and is encouraged to volunteer!

For more information about aquatic invasive species, please go to http://www.tahoercd.org/index.php?ID=aquatic

Native Aquatic Plants of Lake Tahoe



Andean Milfoil (*Myriophyllum quitense*)
Characteristics: feather-like submersed leaves in whorls of two to four, blue-green emergent leaves, tiny flowers (0.5mm-1.2mm long) with four petals located at base of emergent leaves, stay from multiple flower stalks, often flowers in August or September (later than most other milfoils)
Importance: provides habitat of aquatic animals and stabilizes sediment

Photo credit: Jennifer Parsons, Washington State Department of Ecology



Canadian Waterweed commonly known as Elodea (*Elodea canadensis*)
Characteristics: submersed leaves are bright green, translucent, oblong, 6-17 mm long and 1-4 mm broad; small white or pale purple flowers float at the surface
Importance: provides good habitat for many aquatic invertebrates and cover for young fish and amphibians

Photo credit: Christine Dudley



Coontail (*Ceratophyllum demersum*)
Characteristics: floats freely below the surface, no roots, 0.5-4 cm long leaves are forked into 2 flattened segments, leaves often somewhat stiff, leaves arranged in whorls of 5 to 12, tiny submersed green flowers present from June through September
Importance: provides habitat plant for young fish, small aquatic animals, and aquatic insects

Photo credit: Clayton Antram, Washington State Department of Ecology



Leafy Pondweed (*Potamogeton foliosus*)
Characteristics: linear leaves that are 2-10 cm long and 1-2.5 mm wide, fibrous roots emerging from threadlike rhizomes, flowers have 2-4 wheels on an unitially crowded spike (1 cm)
Importance: seeds and vegetation provide cover and food for aquatic animals

Photo credit: Clayton Antram, Washington State Department of Ecology

Lake Tahoe Region AIS Action Agenda 2021–2030

https://www.trpa.org/wp-content/uploads/TahoeAISActionAgenda_Final.pdf

Lake Tahoe is an Outstanding National Resource Water renowned for its extraordinary clarity and blue color. Climate change effects, the millions of people that visit the Lake Tahoe Region annually, and aquatic invasive species (AIS) amplify existing and predicted stressors on Lake Tahoe aquatic ecosystems. Enhancing resilience to these and other stressors is needed to mitigate detrimental effects to ecosystems, the local economy, and the public.

To address the introduction and expansion of AIS to Lake Tahoe, the California Tahoe Conservancy initiated an effort to develop short- and long-term management targets and a set of specific actions to control AIS in the Lake Tahoe Region.

This Action Agenda implements a well-funded, comprehensive, robust, simultaneous, science-based, and aggressive suite of AIS control actions through the next decade to reduce the economic, environmental, and social effects of AIS in the Lake Tahoe Region.

The Agenda describes a 10-year (2021–2030) two-phased effort.

Phase 1 (2021–2025) aggressively treats and controls AIS throughout the Region for five consecutive years while containing AIS and completing AIS control planning for the Tahoe Keys.

Phase II (2026–2030) focuses efforts on reducing aquatic invasive plants and invasive fish in the Tahoe Keys while continuing to maintain, reduce, or eradicate AIS in other parts of the Lake Tahoe Region.

The Action Agenda reflects a 272% increase in pace and scale relative to current efforts at a cost of $7.4 million annually for ten years.

Implementation will result in:

- 90% reduction to eradication of invasive plants in nearshore and upstream areas and the Tahoe Keys;
- 90% reduction in invasive fish biomass in priority areas;
- Reduction of aquatic invasive invertebrates and amphibians in regions of the lake and upstream areas;
- Effective Early Detection Rapid Response actions through the creation of an emergency invasive species fund;
- Strategic investment in new technologies and methodologies to monitor and control AIS; and
- Enhanced likelihood of recovering the Endangered Species Act-listed Lahontan Cutthroat Trout.



Figure 2. Programmatic and outcome-based metrics to evaluate progress of AIS control efforts in the Region.

2019-30 Summary of Tahoe AIS Sites and Associated Treatment
https://tahoercd.org/wp-content/uploads/2020/05/Final-ISND-IEC-TIF-_clean_with-App-A.pdf

Table 1A. Categories and priorities of AIS locations and species for control efforts, 2019-2030. Sites in Tiers 1 and 2 in which no active treatment is occurring are undergoing planning for future treatments as well as containment to avoid spread. The species listed were documented as present, not necessarily locations where controls/treatments are ongoing, or have occurred.
Habitat Categories: M = Marsh; MR = Marina; E = Embayment; O = Open Water; T = Tributary; U = Upland Ponds
Species Categories: EWM = Eurasian Watermilfoil, CLP = Curlyleaf Pondweed, IF = Invasive fishes, AC = Asian Clams

Table 1A. Aquatic Invasive Plants

Category	Location	Habitat	2015 IP Priority	2019 Action Agenda Category	Species	Status of Infestation	Estimated Acreage of Infestation	% Cover	Acreage of Infestation Prior to Treatment	Area Surveyed (Acres)
Tier 1	Meeks Creek	T	3	A	EWM, IF	Active treatment 2019	3		3	3.5
	Pope Marsh	M		A	EWM	Active treatment 2019	<1		<1	125
	Tahoe Keys Main Lagoon (CA)	MR, E	1,2	A	EWM, CLP, IF	Planning, testing, containment	172		172	172
	Tahoe Keys Channels Complex	O	1,2	A	EWM, CLP, IF	Planning, testing, containment	10		Unknown	175
	Taylor and Tallac Creeks (CA)	M	8	A	EWM, CLP, IF	Planning, containment	8		n/a	10
	Upper Truckee Marsh (CA)	M		A	EWM, IF	Planning, containment	3		3	5
	Upper Truckee River	T	18	A	EWM, CLP, IF	Planning, containment	1.25 (0.25 CLP, 1 EWM)		n/a	11
	Edgewood Creek and Pond Complex (NV)	U		B	EWM, CLP, IF	Planning, containment	10		n/a	20
	Lakeside Beach (CA)	O	12	B	IF	Active treatment 2019	1.5			2
	Lakeside Marina (CA)	MR	6	B	EWM, CLP, IF	Active treatment 2019	1		3	1
	Ski Run Marina (CA)	MR	4	B	EWM, CLP, IF	Planning, containment	0.5		n/a	0.5
	Ski Run Channel (CA)	O	4	B	EWM, CLP, IF	Planning, containment	3.5		n/a	5

Table 1A. Aquatic Invasive Plants (continued)

Category	Location	Habitat	2015 IP Priority	2019 Action Agenda Category	Species	Status of Infestation	Estimated Acreage of Infestation	% Cover	Acreage of Infestation Prior to Treatment	Area Surveyed (Acres)
Tier 1	Baldwin Beach (offshore)	O		C	EWM, CLP, IF	Active treatment 2019	0.25		0.25	20
	Camp Richardson Pier	O	18	C	EWM, IF	Active treatment 2019	0.25		0.25	6
	Elk Point Marina	MR	15	C	EWM, CLP, IF	Active treatment 2019	0.5		0.5	0.75
	Timber Cove Pier	O	14	C	EWM, CLP, IF	Active treatment 2019	0.25		0.25	1
Tier 2	Burke Creek (NV Beach)	T			EWM	Active treatment 2019	0.1		0.1	0.5
	Elk Point and Round Hill shoreline structures	E			EWM	Active treatment 2019	3		3	18
	General Creek	T			EWM	Active treatment 2019	0.1		.1	25
	Logan Shoals Marina	MR	17		EWM	Planning, containment	1.75		1.75	2
	Lower Truckee River below dam	T			EWM	Active treatment 2019	17		20	25
	Regan Beach	O	7			Not surveyed in 2018	0.1		0.1	10
	Sand Harbor	E			AC	Active treatment 2019	22		6	25
	Tahoe Beach Club (NV beach)	T			EWM	Active treatment 2019	0.3		0.3	0.5
	Waveka Estate Marina	MR			EWM	Active treatment 2019	0.1		0.1	0.25

Table 18 includes more detailed information about the AIS treatments that will be occurring in the two years prior to the launch of the Action Agenda. Note: Sites treated in 2019 either are treated again in 2020, or are designated as EDRR sites if they have received treatments the prior two years.

Table 18. 2019-2020 AIS Treatments.

Tier	Location	2019 Treatment Acreage	2020 Treatment Acreage	Species	Notes:
1	Pope Marsh	<1	<1	EWM	
	Lakeside Marina	1	1	EWM, CLP	
	Lakeside Beach		1	EWM, CLP	
	Meeks Marina and Creek	3	3	EWM	
	Baldwin Beach	0.25	EDRR	EWM, CLP	
	Camp Richardson Pier	0.25	EDRR	EWM, CLP	
	Elk Point Marina	0.5	0.5	EWM, CLP	
	Timber Cove Pier	0.25	EDRR	EWM, CLP	
	Ski Run Marina		Planning treatment	EWM, CLP, IF	
2	Elk Point and Round Hill rock cribs shoreline	3	EDRR	EWM	
	General Creek	0.1	EDRR	EWM	
	Lower Truckee River below dam	17	17	EWM	Funding to treat after 2020 currently does not exist.
	Sand Harbor			Treatment for Asian Clams	
	Tahoe Beach Club (NV beach)	0.3	EDRR	EWM	
	Burke Creek (NV beach)	0.1	EDRR	EWM	
	Wavoka Estate Marina	0.1	0.1	EWM	

3.21.1 Cumulative Setting

Table 3.20-1 provides a list of cumulative projects that could occur simultaneously with implementation of the proposed program.

Table 3.20-1 Cumulative Projects List

Project Name	Location	Description	Project Status
UV Light Pilot Control Project	Tahoe Keys, Lakeside Marina and Lakeside Beach	Involves use of ultraviolet-C light to damage the DNA and cellular structure of invasive plants.	2019-2020
2014 Lake Tahoe Aquatic Invasive Plant Control Implementation Project	Lake Tahoe, marinas, Truckee River	Uses various control methods to treat aquatic invasive plants.	Ongoing, funding dependent
Lake-wide Control of Aquatic Invasive Plant Project Lake Tahoe, California and Nevada with new methods proposed	Lake Tahoe, marinas, Truckee River	Uses various control methods to treat aquatic invasive plants.	Environmental review currently in progress
Truckee River Eurasian Watermilfoil Removal	Truckee River	Map and implement control efforts to remove Eurasian watermilfoil.	Ongoing, funding dependent
Asian Clam Control and Removal	Sand Harbor	Includes installation of rubber bottom barriers and use of diver assisted suction removal.	Ongoing, funding dependent
Veliger monitoring	Fallen Leaf Lake, Elks Point, Tahoe Keys, Emerald Bay, Meeks Bay, North Tahoe Marina, Sand Harbor, Obexers Marina, Cave Rock, and Echo Lake	Involves monitoring for larva of bivalve mollusks using plankton tows.	Ongoing, seasonal annual monitoring
Ski Run Marina Aquatic Invasive Plant Control Pilot Project	Ski Run Marina	Uses laminar flow aeration to determine efficacy of aquatic invasive plant control.	Ongoing

Tahoe Resource Conservation District/Tahoe Regional Planning Agency
Target Invasive Fish Control Program at Lake Tahoe IS/ND and IEC/FONSI

Tahoe Vista boat ramp

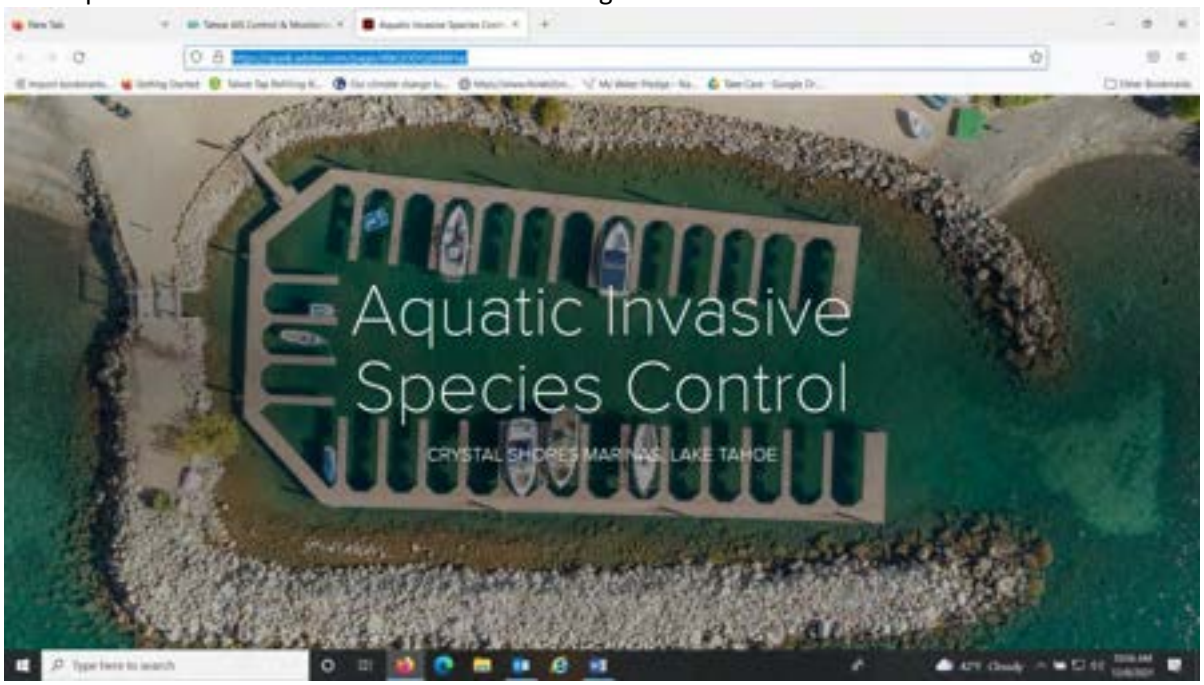
Environmental Checklist — Ascent Environmental

Project Name	Location	Description	Project Status
Tahoe Keys Aquatic Weed Control Methods Test	Tahoe Keys Lagoons and Marina	Would involve use of three different types of herbicide followed by a maintenance period using non-chemical control methods. It would also involve use of laminar flow aerators	Environmental review in progress
General Creek Aquatic Plant Control Project	General Creek	Surveillance monitoring and removal of Eurasian watermilfoil	Ongoing
Meeks Bay Aquatic Invasive Species Plant Control and Monitoring Project	Meeks Bay Marina	Removal of Eurasian watermilfoil and monitoring.	Ongoing
Taylor and Tallac Ecosystem Restoration Project Phase 3	Tallac and Taylor Creek	Restore ecological processes and functions by eradicating/controlling aquatic invasive species	No current activities
Baldwin Beach Eurasian Watermilfoil Removal Project	Offshore Baldwin Beach	Surveillance monitoring and removal of Eurasian watermilfoil.	Ongoing
Pope Marsh Eurasian Watermilfoil Removal Project	Pope Marsh	Surveillance monitoring and removal of Eurasian watermilfoil.	Ongoing
Camp Richardson Eurasian Watermilfoil Removal Project	Camp Richardson	Surveillance monitoring and removal of Eurasian watermilfoil.	Ongoing
Upper Truckee River and Marsh Restoration Project	Upper Truckee River and Marsh	Restore Upper Truckee Marsh and remove the valley levees. Invasive species control for Eurasian watermilfoil and curly-leaf pondweed will be implemented.	Ongoing
Timber Cove Eurasian Watermilfoil Removal Project	Timber Cove	Surveillance monitoring and removal of Eurasian watermilfoil.	Ongoing
Nevada Shoreline Aquatic Invasive Plant Control	Wavoka Estates rock crib	Removal of Eurasian watermilfoil followed by surveillance monitoring.	Ongoing
	Tahoe Beach Club	Removal of Eurasian watermilfoil followed by surveillance monitoring.	Ongoing
	Burke Creek	Removal of Eurasian watermilfoil followed by surveillance monitoring.	Ongoing
Elk Point Eurasian Watermilfoil Removal Project	Elk Point Rock Crib	Removal of Eurasian watermilfoil followed by surveillance monitoring.	Ongoing
Elk Point Marina Aquatic Invasive Plant Control Project	Elk Point Marina	Removal of Eurasian watermilfoil and curlyleaf pondweed populations in Elk Point Marina followed by surveillance monitoring.	Ongoing

Source: Compiled by Ascent Environmental 2019

2015 Truckee River Aquatic Plant Control Project
http://tahoeboatinspections.com/wp content/uploads/2015/08/2015_08_14_TruckeeRiverAISControl.pdf

Crystal Shores (Incline Village, NV) East Milfoil Barrier Project 2014-2017
https://spark.adobe.com/page/rRkQODQzhBBHa
2017 update: all weeds have been eradicated using bottom barriers and hand removal.



The homeowners association of Crystal Shores East in Incline Village stepped up in 2014, to remove invasive weeds from their marina by partnering with local experts. An infestation of approximately 10,000 square feet of Eurasian watermilfoil (Myriophyllum spicatum) was crowding out their marina. Eurasian watermilfoil is a submerged aquatic plant that grows in still or slow-moving water and reproduces mainly by fragmentation. It was first discovered in Lake Tahoe in the late 1990's on the South shore of Lake Tahoe. Over the years, small fragments of this plant have made their way across the 22 miles of famous blue waters and established new colonies.

The Tahoe RCD and Crystal Shores East Homeowners Association combined public and private dollars to treat this satellite population of aquatic invasive weeds, with financial support from the Nevada Division of State Lands.

Treatment for this location includes a combination of bottom barriers and diver assisted hand removal. "Bottom barriers," sheets of synthetic material, are used to block sunlight and inhibit the plants from photosynthesis, were placed on the infestation. Diver follow up included hand pulling.

Tahoe RCD Truckee Regional Aquatic Invasive Species Prevention Program 2012 Final Report
http://tahoercd.org/wp-content/uploads/2013/06/TRAISPP_Annual_Report_2012.pdf

Since 2010, the Tahoe Resource Conservation District (TAHOE RCD) has coordinated with local partners in the Middle Truckee River Watershed (outlet of Lake Tahoe to the California state line) to implement

the Truckee Regional Aquatic Invasive Species Prevention Program (TRAISPP). The principle objectives of this pilot program were to better understand invasive species issues in the region, provide outreach and education on invasive species, organize regional resource managers, evaluate usage patterns, and evaluate the feasibility of watercraft inspections and decontaminations. The geographical scope of coordination has extended through the entire Truckee River watershed, from Lake Tahoe to Pyramid Lake. The degree of coordination and cooperation among partner agencies underscores the importance and need for regional management efforts.

Program waterbodies: Donner Lake / Stampede Reservoir /Independence Lake / Boca Reservoir / Webber Lake Prosser Reservoir / Martis Creek Lake /Lake of the Woods.

Tahoe Keepers

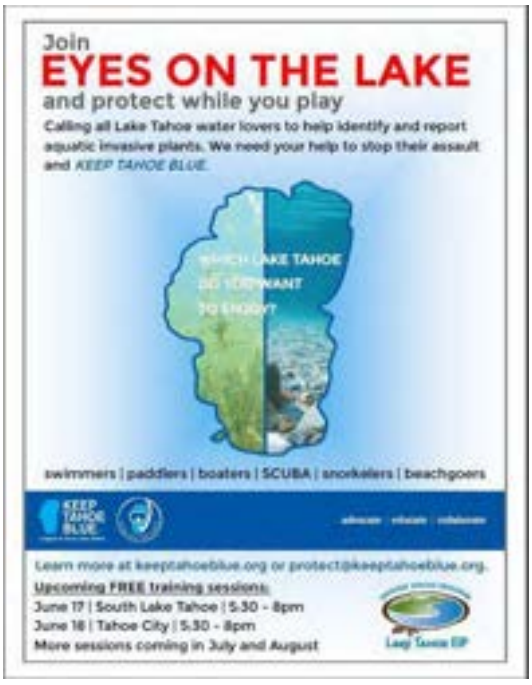
http://tahoekeepers.org
http://tahoeboatinspections.com/tahoe-keepers/



In 2011, this online, non-motorized boat education/inspection program was launched. Tahoe Keepers, the outreach initiative targeted at paddlers, has been able to raise awareness to approximately 1500 people annually.

The League to Save Lake Tahoe helped to plan and implement the outreach and education portions of the Tahoe Keepers stewardship program. Funds came from the Lake Tahoe Quagga Mussel Prevention Fund, which the League formed in conjunction with the Tahoe Lakefront Owners Association.

TahoeKeepers.org provides video training on how to properly clean, drain and dry watercraft and gear and dispose of any plants or debris away from lakes and streams. Preventing invasive species is an important part of protecting Lake Tahoe's shorelinebeauty.



Eyes on the Lake (EOL)

http://keeptahoeblue.org/our-work/eyes/

Eyes on the Lake is the League to Save Lake Tahoe's newest volunteer program helping to prevent the spread of aquatic invasive plants in Tahoe's waters. If you are a water lover at Tahoe (SCUBA diver, paddler, swimmer, beachgoer, or boater) and want to help ensure Tahoe's waters are pristine, then Eyes on the Lake is for you. Volunteers will learn how to identify plants in the classroom and in the field.

The two main targets of our Eyes on the Lake programare curlyleaf pondweed and Eurasian watermilfoil, which are already established in several locations throughout the lake and are difficult and expensive to control. These weeds clog recreation equipment, degrade shoreline beauty, and impede views of the lake's bottom. Milfoil is a common aquarium plant that was first introduced to the Tahoe Keys decades

ago. It has now spread to dozens of locations throughout Tahoe by hitching a ride on boats.

A certified Eyes on the Lake volunteer receives training to:

- Identify aquatic invasive plants;
- Complete simple surveys while you are enjoying Tahoe's waters, and report what you find;
- Provide information to the Lake Tahoe Aquatic Invasive Species Program that can result in earlydetection of new infestations and more effective treatment.
- If you see something suspicious while out on the water report what you find to the AquaticInvasive Species Hotline at (888) 824-6267.

Tahoe Pipe Keepers

http://keeptahoeblue.org/our-work/Pipekeepers

Tahoe Pipe Keepers is a volunteer based water quality monitoring program that examines the turbidity (clarity) of the water being released from storm drains into Lake Tahoe and tributaies. Since the program's launch in October 2012, a dedicated group of volunteers have braved the elements, during and after storm events to collect water samples, take photos and raise awareness about the impact of storm drains on lake and river waters.



To date, Pipe Keepers volunteers have collected over 2,000 water samples from 33 pipes around Lake Tahoe. There are over 170 stormwater outfalls that dump stormwater runoff directly into Lake Tahoe.

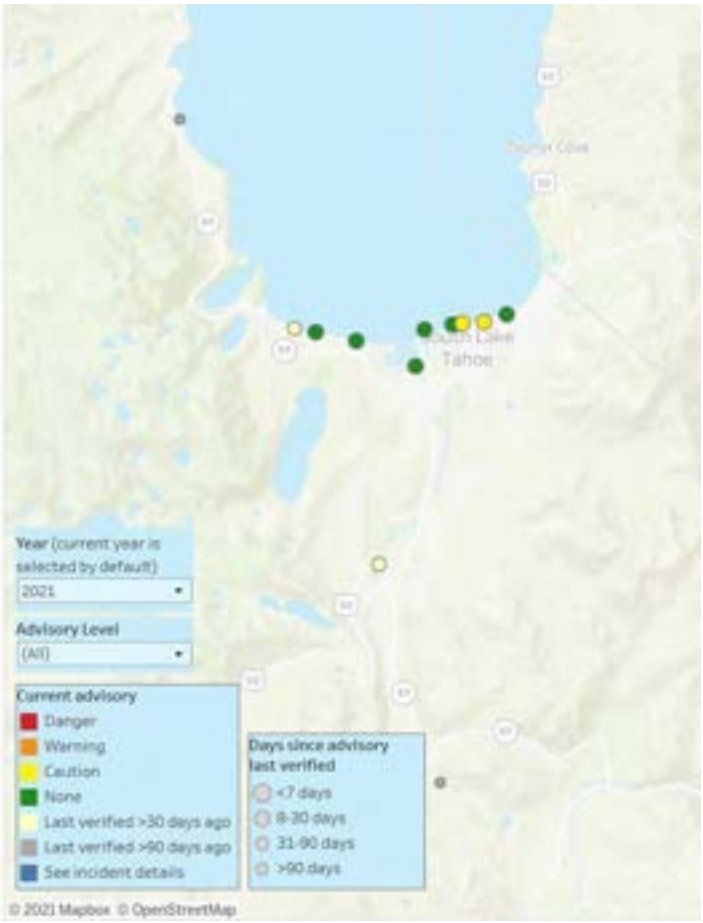
Fine sediment particles are smaller than the width of a human hair and can remain suspended in LakeTahoe for years, even decades, degrading its deepwater clarity. Sources of fine sediment include roadtraction abrasives (road sands) that are applied to our streets and highways in the winter; dirt and pollutants from streets, parking lots and neighborhoods; and even degradation of roads and other surfaces. All this material washes into storm drains during rain storms and snowmelt and pollutes the Lake.



Filamentous Algae Blooms (FABs)
Hazardous Algae Bloom (HABs)
https://www.unr.edu/nevada-today/news/2021/worldwide-lakes-decline

Many of the world's most iconic clear lakes are degrading at an alarming rate – shallow, nearshore lake bottoms are being carpeted by bright green fronds of slimy algae, especially during the summer. These filamentous algal blooms, known as FABs, need lots of light, so they occur at lake edges where people want to swim and play.

Scientists are unsure why FABs are suddenly showing up in remote mountain lakes, as well as in some large lakessuch as Lake Tahoe (USA), Lake Baikal (Russia) and Lake Wakatipu (New Zealand), but an international group of lake scientists is ready to tackle the problem. In a scientific article published in BioScience, "Blue waters, green bottoms: benthic filamentous algal blooms are an emerging threat to clear lakes worldwide," scientists from around the world explore how nutrient pollution, climate change, loss of aquatic animals that eat algae, and invasive species contribute to the increased occurrence of green bottoms.



Co-author and Professor Sudeep Chandra at the University of Nevada, Reno noted, "The interdisciplinary, international team of scientists that met together at Lake Tahoe impressed upon me the need to develop a science-based framework to guide our future understanding of FABs. The paper highlights the factors from local to global pressues that might contribute to this profusion of algae on lake bottoms."

Freshwater and estuarine HABs (FHABs) have occurred in California since at least 1925, when a dog fell ill after drinking water at Clear Lake -- the first report of a FHAB dog sickness in the state. Now almost one hundred years later, FHABs continue to occur in lakes, reservoirs, and rivers throughout the state and during all months of the year. Blooms occur in high elevation lakes in the Sierra Nevada mountains down to coastal estuaries, where cyanotoxins are exported into the marine environment. *https://mywaterquality.ca.gov/habs/where/freshwater_events.html*

They also occur in sensitive desert landscapes where water is already a scarce resource. In parts of the state, environmental conditions, particularly drought conditions, promote cyanobacterial blooms that persist through the winter, making FHABs a year-round issue in California. When cyanobacteria bloom and produce cyanotoxins they threaten drinking water supplies, wildlife, domestic animals, and human health. With greater than 3000 lakes, 190,000 river miles, rainfall spanning deserts to temperate rainforests, and over 40 million inhabitants, the diversity of environments in California forms a complex social and ecological context within which cyanobacteria bloom.

The Water Boards first began to address HAB prevalence in 2006 when it supported the formation of the Blue Green Algae Work Group with many other concerned entities, later the group was renamed the California Cyanobacteria Harmful Algal Bloom Network (CCHAB). An initial product of this group was the Voluntary Guidance Document that describes a standardized framework to HAB response in recreational waterbodies (original release 2010, updated 2016).

Link to California HAB data (historical and current):
https://www.waterboards.ca.gov/lahontan/water_issues/programs/swamp/harmful_algal_blooms.html

At Lake Tahoe, the most recent incidents have occurred primarily in the South Shore area, including the Tahoe Keys. Annual blooms have been investigated and monitored by Lahontan Regional WQCB.

In May 2019, TWSA, Lahontan Water Board and TERC staff co- hosted a ½ day instructional workshop on field identification of HABs. More than 20 area agency personnel attended.

The TKPOA Water Quality Committee and the Water Quality Staff monitor and report on HABs to the Lahontan Water Board. Water quality sampling, signage and monitoring has been ongoing.

2017: Toxic algae detected in some Tahoe Keys waterways

*https://www.tahoedailytribune.com/news/toxic-algae-detected-in-some-tahoe-keys-waterways*August 26,
http://www.laketahoenews.net/2017/08/toxic-algae-bloom-tahoe-keys-lagoons

Lake Tahoe Aquatic Invasive Species Working Group
The Lake Tahoe Aquatic Invasive Species Working Group (LTAISWG) is a diverse group of agencies, community members and scientists dedicated to early detection and rapid response, prevention and control of aquatic invasive species in the Tahoe Basin. TWSA staff became actively involved in working with TRPA and Tahoe RCD as a member of the working group, focusing on the AIS inspection program protocols, public education and outreach.

Asian Clams
In spring 2008, UC Davis researchers discovered extensive beds of an invasive bivalve, the Asian clam (*Corbicula fluminea*), in the nearshore of Lake Tahoe along the southeastern edge of Lake Tahoe. Clam densities reach over 6,000 per square meter and are among the highest anywhere in the world. In Lake Tahoe Asian clams can affect plankton levels and food webs, out-compete native species, and cause attached algae to form nuisance blooms. More information on TERC Asian Clam research is presented later in this chapter.

Asian Clam Removal Projects 2011-14
In 2011-13 the majority of work on AIS was located much farther away from TWSA member intakes; focused on the Emerald Bay, Tahoe Keys and Ski Run areas in South Lake Tahoe.
In 2011, the project expanded to Emerald Bay where a small population of Asian clams has colonized at the mouth of the bay. Tahoe RCD continued to manage and coordinate these efforts in collaboration with our partners and funders: UNR, UC Davis, U.S. Fish and Wildlife, Tahoe Regional Planning Agency, CA State Parks, Nevada Department of Environmental Protection, Lahontan WQCB, and Lake Tahoe Water Purveyors.

Asian Clam Population in Lake Tahoe – Experimental Controls 2009-2013



10-foot by 10-foot rubber bottom barriers were tested as a strategy for managing Asian clam populations



Researchers sampled Asian clam densities before and after rubber bottom barrier experiment



Autonomous Underwater Vehicle (AUV) is used to map clam beds around Lake Tahoe

In 2012, the AIS group began a larger scale Asian clam control project in the mouth of Emerald Bay. TWSA involvement in these projects was reduces since the barrier projects were not in proximity to drinking water intakes.

2012: UC Davis scientists assemble 5 acres of mats for Tahoe Asian Clam Project
http://www.news.ucdavis.edu/search/news_detail.lasso?id=10368
Oct. 16, 2012 - Rubber barriers bound for the lakebed of Lake Tahoe's EmeraldBay were assembled at the University of California, Davis's part of the biggest Asian clam control project in the lake's history.

The invasive clams threaten the lake's health and famed clarity. UC Davis scientists, staff and students are unfolding the long, black mats and enhancing them with rebar, brass grommets and valves that will hold the barriers inplace underwater and enable scientific analysis of the project. Scientists from UC Davis and the University of Nevada, Reno first devised and tested the concept of using rubber barriers to smother Asian clams in 2010, when they placed an acre of the barriers on the lake bottom. This first-of-its-kind method killed 100 percent of the clams. The success of those efforts and additional research led to this bigger project, which involves a team of interagency partners.

By treating the Emerald Bay infestation in the early stage, impacts can be minimized or avoided. The treatment will also help prevent the spread of these invasive clams to other areas of Lake Tahoe. The project cost is about $810,000 and is funded by the Lahontan Regional Water Quality Control Board, U.S. Fish and Wildlife Service, and U.S. Forest Service Pacific Southwest Research Station.

Marla Bay Asian Clam Removal Asian Clams: 2010 experiment
In the summer of 2010, two sets of half-acre barriers were installed to test whether large-scale application of this experimental method is a feasible option. The bottom barriers were installed in Marla Bay, NV, and Lakeside, CA, and consisted of 20 rolls of 10-foot-wide and 100 foot long high density polyethylene. Both of these larger scale project areas were again located within proximity to TWSA member agency water intakes. The project team worked closely with the water providers to plan the project to avoid potential impacts to drinking water quality. TWSA staff, Rebecca Williams, served as a member of the project team, conducting the water quality monitoring sampling and consulting with the team on mitigation requirements for the permits.

The Control of Asian clam (*Corbicula fluminea*) in Lake Tahoe with Benthic Barriers: The Influence of Water Temperature on Mortality
http://terc.ucdavis.edu/publications/documents/marlabayfinalreport.pdf
Final report for the Marla Bay Asian Clam Project published 2011.

Water Supplier Needs - Asian Clam Project Mitigation Measures
The Tahoe Water Suppliers Association (TWSA) has been in attendance for Working Group meetings since 2009 and was part of the development of this project and the monitoring plan and mitigations. TWSA staff have been actively conducting water quality sampling during experiments as needed.

Mitigation measures applied to all aspects of the project except the initial pre-installation background monitoring. The water purveyors were to be contacted within 72 hours of any work commencing.

Bacteria results were to be obtained within 24 hours of time sampled, reviewed and methodology willbe amended accordingly. If E. coli counts were detected or at the request of any TWSA member, a rawwater sample can be taken at all the 5 TWSA intakes in the vicinity to insure no migration of microbial waste associated with barrier removal. The ultimate mitigation for the water supplier is to rely on storage and turn off pumpage for some period of time. In addition, if at any time during project activities, a spill or release of fuel from boats or operations occurred spill procedures were to be instituted and a sample for total petroleum hydrocarbons taken and sent to the lab. Spill information,emergency contact list, procedures, and forms were on hand for any project activity.

Potential Effects of AIS on the Regional Economy
As the regional economy of Lake Tahoe developed, local concerns grew that the Tahoe Region could become overcrowded and lose its scenic appeal. In 1968, the Tahoe Regional Planning Agency was formed to achieve and maintain defined environmental threshold carrying capacities (thresholds). Significant resources have been channeled into the simultaneous regulation of development while moving toward achievement of thresholds (LTVA 2008). A challenge lies in minimizing adverse impacts of the recreation industry, including introduction of AIS, on the lake's natural environment, which in turnis the major draw for the recreational visitation. Sustainable recreation is vital to the local economy.

In 2011, the Lake Tahoe Region's natural and recreational amenities were estimated to draw between 3 and 5 million visitors annually. These estimates have shot to 15-20 million in 2019. The 1999 Lake Tahoe Watershed Assessment reported that visitors spend an average of around $114 dollars per visitor day (Nechodom *et al.* 1999). This spending translates to local employment and income. In addition to supporting local jobs and generating income, the natural beauty and recreational utility at Lake Tahoe is reflected in property values within the region. Shoreline properties, in particular, are especially valuable and sensitive to AIS impacts. The lake also provides drinking water for the residents and thousands of visitors in the region.

Potential Impacts to Water Supply
Some Nevada water suppliers have been granted filtration avoidance status from the NDEP Bureau of Safe Drinking Water (NDEP-BSDW); based on ongoing compliance: source water quality remains within specified required limits for turbidity and coliform and an annual Watershed Control program update (TWSA Annual Report) indicates the watershed is at low risk for pathogens.

Recent efforts to test aquatic herbicides for aquatic weed control are of concern to the water suppliers due to the filtration exemption status of six of the water purveyors in the TWSA. Tahoe's status as an ONRW Tier 3 waterbody warrants special consideration in regulatory review of a potential herbicide application. The Board supports using herbicide last, only after other non-chemical methods have been fully vetted on a larger scale than previous tests.Recent public comment is posted at: https://www.yourtahoeplace.com/public-works/water/source-water-protection/tahoe-keys-iwmp-to-control-weeds .

The main concern that with regard to water supply is the tendency of Quagga and Zebra mussels (if introduced) is that the mussels biofoul freshwater intake pipes. This invasion not only requires costly maintenance or periodic replacement of pipes, but it can result in the loss of filtration exemption due to the presence of mussels and plants in the water intake systems that raise human health concerns. Plants and invertebrates may colonize in large numbers near intakes, depositing organic contaminants into the water. If water suppliers cannot rely on the water drawn from the lake to be free of microbial contaminants, then further purification infrastructure might be necessary, raising unit costs for suppliers, and ultimately consumers.

The table below provides estimates of the necessary infrastructure spending to maintain current production levels without sacrificing drinking water quality in the event of a serious mussel and plant infestation near, on, or in the intake system. The redundant intake system would allow suppliers to take intakes offline in rotation for cleaning and maintenance without interrupting service. The presence of organic material in supply water can result in taste and odor problems that require another level of purification.

In 1990, $1 million, per million gallons per day (MGD) was estimated in capital costs for design and construction of tertiary treatment. The estimate includes a chlorine injection system to prevent mussels from colonizing the inside of intake pipes. (Source: Pers. Comm. Perri Standish Lee/Black and Veatch)

In total, a conservative infrastructure cost of approximately $25 million could be borne by the region's water suppliers if invasive mussels infest the lake. The low and median estimates are presented in the table below. Operation and maintenance costs will contribute to this total. For example, according to the recommended chlorine levels for injection systems by the U.S. Army Corps of Engineer's Zebra Mussel Chemical Control Guide, Lake Tahoe Region suppliers as a whole will need to use about 147 pounds of liquid chlorine per day, or 27 tons per year (Sprecher and Getsinger 2000). At a price of around $500 per ton (City of Lewisville 2008), water suppliers would need to spend more than $250,000 per year on chlorine alone.

Estimated Water Supply Infrastructure Costs (source: LTAISMP)

Cost Category	$ 2008 Low	$ 2008 Median	Justification
Redundant Intake System	3,100,685	4,429,549	Continued operation while performing maintenance
Taste & Odor Control System	20,326,710	29,038,157	Maintains clean taste and odor
Chlorine Intake Injection System	252,000	360,000	Prevents mussel colonization on inside of intakes
Annual Cleaning & Maintenance	1,219,603	1,742,289	Defoul intake on rotation; regular O&M

Annual Liquid Chlorine Supply	175,000	250,000	One year supply chemical cost
Total	$ 24,898,997	$ 35,819,996	

Lake Tahoe Basin Interagency Dreissenid Mussel Rapid Response Plan
http://tahoercd.org/wp-content/uploads/2014/11/01_Updated_Lake-Tahoe-AIS-Management-Plan_Final_July-2014.pdf
Updated 2014. Interagency Response Plan Practice Exercise conducted Sept. 12 & 13, 2012.

Prepared for the Lake Tahoe Aquatic Invasive Species Coordination Committee by:
U.S. Fish and Wildlife Service. For further information about this Interagency Dreissenid Mussel Rapid Response Plan for the Lake Tahoe Basin, please contact Steve Chilton, U.S. Fish and Wildlife Service (775-589-5265; steve_chilton@fws.gov).

The purpose of this plan is to provide a framework for an effective rapid response to the discovery of any Dreissenid mussel (mussel) aquatic invasive species (AIS) in Lake Tahoe. In this document, "rapid response" means that soon after a detection of a Dreissenid mussel (veliger or adult) in Lake Tahoe is discovered, 1) the responsible agency will make a determination of whether it is potentially significant and/or detrimental and 2) if that is the case, the responsible agency will develop and implement a course of action. This also would apply to mussels that are discovered in an adjacent waterway or lake.

CHANGES IN LANDOWNERSHIP, ZONING, OR LAND ACTIVITIES

Approximate land ownership in the Lake Tahoe Basin is:

National Forest 75%
States and Local Government 10%
Private 15%

Revised Land Management Plan for the Lake Tahoe Basin Management Unit
Forest Plan & Final Environmental Impact Statement (FEIS) - Revised Land and Resource Management Plan, August 2015 for Alpine, El Dorado, and Placer Counties, California and Douglas and Washoe Counties, and Carson City, Nevada
https://fs.usda.gov/Internet/FSE_DOCUMENTS/stelprd3844951.pdf
http://www.fs.usda.gov/detail/ltbmu/landmanagement/projects/?cid=fsm9_046482

Introduction to the Land Management Plan - Purpose
The purpose of this Land Management Plan (also known as the Forest Plan) is to provide strategic guidance to the Lake Tahoe Basin Management Unit (LTBMU) for forest management over approximately the next 15 years.

The Lake Tahoe Basin is situated on the eastern side of the Sierra Crest and extends across the state line between California and Nevada.The LTBMU was established in 1973, to facilitate consistent management of National Forest System (NFS) lands within the Lake Tahoe Basin watershed. These lands were previously managed by three separate national forests: Tahoe, Eldorado, and Toiyabe.

While the LTBMU is small in comparison to most National Forests, as the Tahoe Basin's largest land manager, its issues, resources and values are (in comparison) very large. The Forest Service manages 78% of all lands in the Lake Tahoe Basin; National Forest ownership in the Lake Tahoe Basin has grown

from 35,000 acres in the 1950s to 154,850 acres. NFS lands include 3,366 urban forest parcels on sensitive lands acquired through the Santini-Burton Act.

The LTBMU contributes to the tourist-based economy through provision of recreation opportunities including downhill skiing, cross-country/backcountry skiing, snowshoeing, hiking, beach access, camping, and sightseeing. Ongoing conservation education programsinform residents and visitors of all ages about the natural environment in which they live, work, and play. Partnerships continue to be important. Numerous groups provide their assistance in such activitiesas trail maintenance and construction, historic building maintenance, and interpretive programs. Many of the resorts, campgrounds, and the Tallac Historic Site are operated by private enterprises under special use permits –these partnerships support the local economy by providing jobs.

Over 75% of the area around Lake Tahoe is public land managed by the United States Department of Agriculture (USDA) Forest Service. Totaling over 150,000 acres, this land includes beaches, hiking and biking trails, wilderness areas, historic estates and developed recreation areas such as campgrounds and day use areas. The forest is managed to provide access for the public and to protect the natural resources of the area. The Forest Service manages the land in the Lake Tahoe Basin as a unique kind of National Forest, called the Lake Tahoe Basin Management Unit, or LTBMU for short.

The LTBMU is managed in many ways like other National Forests, but because of the needs of the lake and the relationship it has with the forests that surround it, the LTBMU has special focus areas, including:

Erosion Control Management
Watershed Restoration
Fire and Fuels Management
Forest Management
Recreation Management

In many ways, the LTBMU can be described as a Restoration Forest, because of the strong ecosystem restoration roles.

National Forest Lands at Lake Tahoe

Through acquisition and land exchanges since the 1950s, National Forest land ownership has grown from 35,000 acres to 154,830 acres, including 3,366 Santini-Burton parcels.

Since 1997, more than 3,064 acres have been acquired by state and federal agencies. Significant acquisitions during this period include more than 300 acres and 2,600 feet of lakefront at the Upper Truckee Marsh, nearly 1,800 acres associated with High Meadows and recently the additional 777 acreage surrounding Incline Lake in Nevada. The majority of National Forest lands encompass most of the non-urban wetlands, meadows and Stream Environment Zones (SEZ); important fish and wildlife habitat; and the available open space for recreation and environmental interpretation opportunities.

2018 Johnson Meadow Acquisition

Partner: Tahoe Resource Conservation District; California Tahoe Conservancy, California Department of Fish & Wildlife, Barton Health, Heavenly Resort
Total Project Cost: $8,315,000
Tahoe Fund Contribution: $100,000

Johnson Meadow, 206 acres of beautiful meadow in South Lake Tahoe and the largest privately-ownedsection of the Upper Truckee River, is now publicly owned. This is a major milestone for the health of Lake Tahoe. The Upper Truckee River has been identified as the most impaired watershed in the TahoeBasin and the highest contributor of fine sediment impacting the clarity of the Lake. The river discharges about 2,200 metric tons of fine sediment per year and delivers approximately 60percent of the fine sediment that enters Lake Tahoe annually from stream erosion.

Acquisition of this property will allow for future restoration of the river that will have a dramatic impact on the Lake's famed clarity. The acquisition will also improve wildlife habitat, climate change resiliency and recreation connectivity. The purchase of the property was made possible through a collaboration between Tahoe Resource Conservation District, the California Tahoe Conservancy, California Department of Fish & Wildlife, Tahoe Fund, and the former property owners, who owned Johnson Meadow for almost a century.

Over the next several years, the Tahoe RCD and their partners will need to identify $10-15 million in funding to begin restoration efforts for Johnson Meadow and $60 million for the entire Upper Truckee River Watershed.

(Editor Note: TWSA sponsored 8 dog waste bag stations for this property, in partnership with Tahoe RCD.)

Purchase of Incline Lake, Nevada

2018 Update: The USDA Forest Service Lake Tahoe Basin Management Unit (LTBMU) has issued a draft decision for management of 1,083 acres of National Forest System lands off the Mt. Rose Highway (SR 431) above Incline Village, Nev. The draft decision incorporates Alternative 2 - "The Incline Plan is a huge step toward improving National Forest recreation opportunities and public access on the North Shore of Lake Tahoe," said Jeff Marsolais, LTBMU Forest Supervisor, in a press release. "I am confident this plan provides for restoration of this important ecosystem as well as sustainable recreational benefits for current and futures generations in the Incline area."

In July 2008, 777 acres around Incline Lake was removed from private land holding and seasonal occupancy, by purchase through the National Forest Service with funds from the Southern Nevada Public Lands Management Act (SNPLMA). The property is a significant watershed resource, a prime recreational resource for the surrounding communities and visitors to the Lake Tahoe region, and host to a variety of plants and wildlife. The property represents approximately 25% of the watershed for Third Creek, a significant source of water for Lake Tahoe, and is located within IVGID's boundaries. The land is adjacent to the Tahoe Meadows and the Mt. Rose Wilderness on Highway 431 outside Reno, NV. Purchase of this area provides significant watershed protection for the Incline Village GID. Incline Lake was drained in 2008with the removal of the man-made earthen dam which created the lake, from safety concerns.

Restoration activities include: removing the dam diversion ditch that connects Third Creek to theformer Incline Lake bed; restoring stream channels and aquatic species habitat throughout the area; revegetating degraded areas with native vegetation species; restoring damaged wetlands, which resulted from previous water diversion activities; repairing erosion along the Franktown Ditch; developing a plan for future white bark pine management; and reducing tree density in meadow and wetland areas through forest thinning and restoration of aspen communities.

The purpose of the Forest Plan amendment is to change the management area designation of

approximately 400 acres of the project area (west of Third Creek) from general conservation (general forest) to back country. The draft Decision Notice/Finding of No Significant Impact is available at *fs.usda.gov/goto/ltbmu/InclineMgmt*.

Historical Activity
Public acquisition and restoration of sensitive lands directly support achievement of all nine environmental thresholds. Since 1982, USFS, California Tahoe Conservancy, and Nevada Division of State Lands acquisition programs have acquired and protected more than 20,000 acres of sensitive lands, comprised of more than 10,000 subdivided lots.

By acquiring many of the sensitive lands adjacent to rivers, creeks, meadows, and the lake, public agencies have protected and preserved the integrity of cultural and historic resources of the indigenous people who occupied the Tahoe Basin in years past.

Program Highlights:

Reduced the development potential within the Lake Tahoe Basin by approximately 20 percent.
Protected thousands of acres of wetlands, meadows, and steep slopes prone to erosion.
Protected miles of rivers and streams.
Provided a land base for stormwater quality projects to achieve further water quality improvement.
Protected valuable soil, vegetation, wildlife, and fisheries resources from further degradation.
Enhanced public ownership and access to Lake shoreline.
Protected and enhanced scenic resources.
Improved air quality by retaining vegetation.
Reduced vehicle miles traveled associated with residential and commercial development.

Commercial Crawfish Harvesting Approved in Nevada and California Tahoe Waters
In December 2011, the Nevada Department of Wildlife and the Nevada Division of State Lands approved for the first time, a commercial fishing operation at Lake Tahoe. This project did not focus on fish extraction, rather it allowed for the first time commercial crawfish harvesting. The project received approval based on support from TERC researchers that it may serve well as a control method on the naturalized invasive species (Signal Crawfish). Harvest operations began in the summer 2012, with the launch of the Tahoe Lobster Company. In 2013, California removed a prohibition on commercial harvesting.

BASIN MONITORING PROGRAMS
More information also available in the "Controls" section of this report.
The Tahoe Science Consortium (TSC)
http://tahoescience.org
Lake Tahoe is a renowned area for scientific study. In 1999, three Tahoe research groups, the University of California-Davis, University of Nevada Reno, and the Desert Research Institute, signed the Tahoe Environmental Science System (TESS), a plan for scientific cooperation in the Basin. During the same year the Lake Tahoe Science Advisory Group was established. Other local projects include volunteer-based monitoring programs and studies on the affects of recreation on water quality.

The Tahoe Science Consortium (TSC) includes representatives from the Desert Research Institute, University of Nevada Reno, University of California, Davis, Tahoe Regional Planning Agency, the U.S. Geological Survey, and the U.S. Forest Service. In 2001, the Lake Tahoe Science Advisory Group identified key research and monitoring needs for the Lake Tahoe Basin.

The TSC provides recommendations for the funding of public projects funded by the Southern Nevada Public Lands Management Act (SNPLMA). A searchable database of the many projects funded at Tahoe is available at: *http://www.blm.gov/nv/st/en/snplma/snplma_prephase_1.html*

TAHOE SCIENCE CONSORTIUM - SCIENCE SYNTHESIS REPORT 2016
http://tahoescience.org/wp-content/uploads/2016/07/TSC-Exec-Summary-Web.pdf

This report summarizes the progress that has been made linking science and management with resources through an applied science program, the SNPLMA Science, and coordinated by the Tahoe Science Consortium (TSC) (http://tahoescience.org). The TSC SNPLMA Science Program was as an integral part of the basin-wide Environmental Improvement Program (EIP), led by management agency executives from federal, state, and bi-state agencies including U.S. Forest Service (USFS), Environmental Protection Agency(EPA), U.S. Army Corps of Engineers (USACE), U.S. Bureau of Reclamation (USBR), California Tahoe Conservancy (CTC), Lahontan Water Quality Board, and Nevada Department of Environmental Protection(NDEP), Nevada Division of State Lands (NDSL), and the Tahoe Regional Planning Agency (TRPA)

This report represents the contributions of over 200 researchers, students, and technical experts from academia, private sector organizations, and federal, state, and local agencies who conducted scientific studies for nearly 10 years on projects supported by the SNPLMA Science Program.

The Tahoe Science Consortium (TSC) represents a unique public-private partnership among major research organizations working in the Lake Tahoe Basin – Desert Research Institute, University of California, Davis, University of Nevada, Reno, U.S. Forest Service, Pacific Southwest Research Station, U.S. Geological Survey. Many scientists and administrators from these organizations served on the TSC Committee of Scientists and TSC Executive Committee over the years. Their support, guidance, and leadership was essential to building a strong network of technical experts across many disciplines whoseresearch, education and outreach has stimulated a culture of science-supported environmental management in the basin.



SNPLMA SCIENCE INVESTMENTS (2007- 2012)

Tahoe Science Projects are supported by the Southern Nevada Public Lands Management Act.

Science Synthesis Report

Executive Summary
Full Report

The Tahoe Science Program was created through the Southern Nevada Public Lands Management Act (SNPLMA) to conduct science to inform efforts to restore Lake Tahoe and its watershed, as authorized in the Lake Tahoe Restoration Act. Beginning in 2006, the Pacific Southwest Research Station (PSW) assumed responsibilty for sponsoring science projects beginning with Round 7. The PSW Station established a competitive grant award program with a rigorous peer review process coordinated by the Tahoe Science Consortium, a collection of universities and agencies with active research programs at Lake Tahoe. The PSW

program coordinator and the Tahoe Science Consortium worked each year with the resource management agencies in the Tahoe Basin to identify research priorities and solicit proposals.

Specific research areas varied from year to year within the eight science themes. These eight priority research issues spanned the research needs identified and prioritized by management agencies in the Tahoe Basin.

In 2016, the Tahoe Science Consortium Science Synthesis Report was presented to SNPLMA sponsors (U.S. Congress and federal agency partners), the science community, and the general public. The report offers an overview of the key findings from the research projects supported by the SNPLMA Science Program and illustrates their relevance to management actions in the Lake Tahoe Basin. The Science Synthesis Report distills hundreds of research projects, publications and reports from this program into succinct findings that provide relevant knowledge for resource managers in the basin.

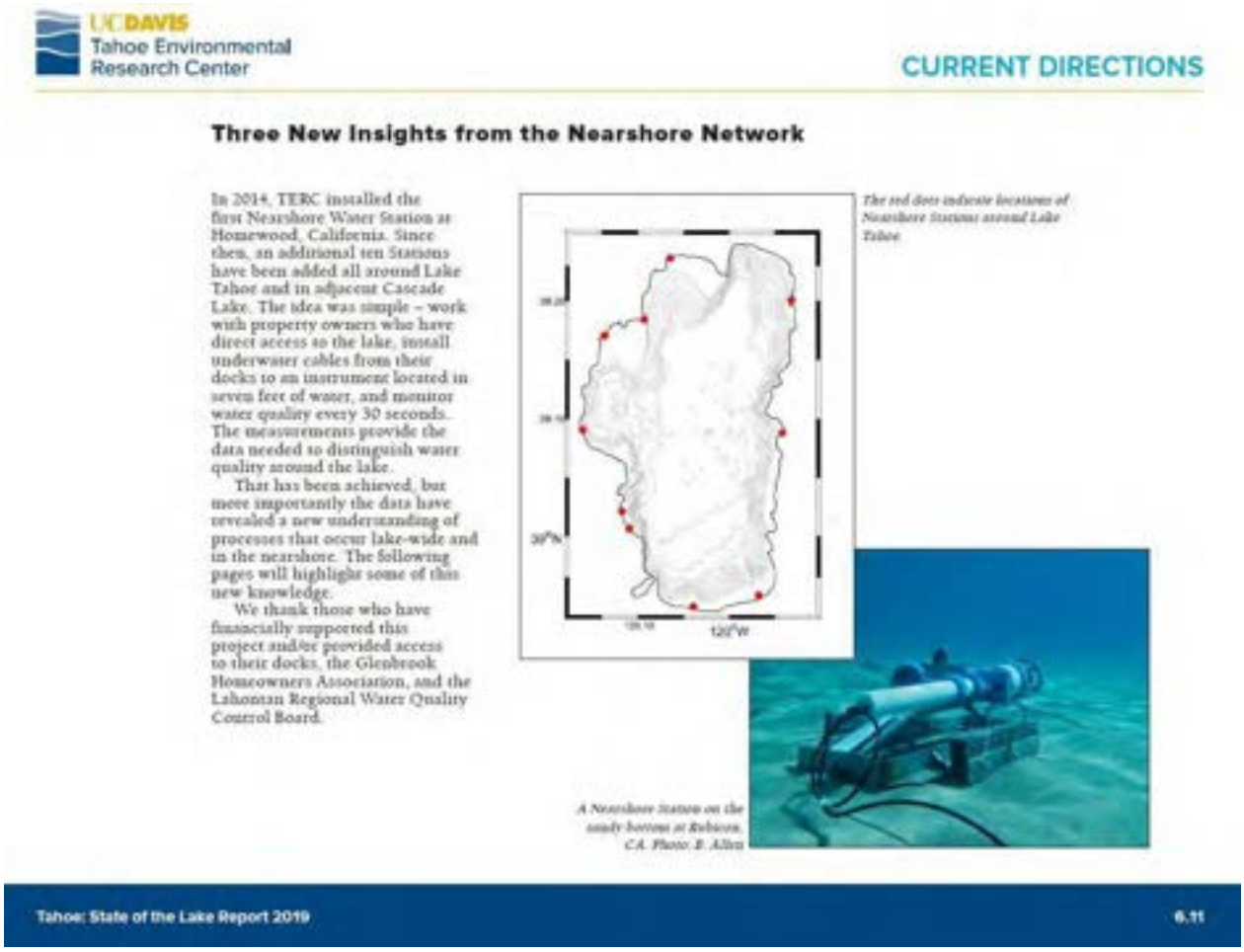
The portfolio of projects supported through the SNPLMA Science Program - 100 projects (95 research and 5 TSC operations) projects were funded in SNPLMA Rounds 7-12. The TSC SNPLMA Science Program was as an integral part of the basin-wide Environmental Improvement Program (EIP), led by management Agency executives from federal, state,and bi-state agencies.

Current Tahoe Research Projects
https://tahoe.ucdavis.edu/sites/g/files/dgvnsk4286/files/inline-files/6_RecentResearch_2_1.pdf

Current Research Synthesis
Since 1959, UC Davis has been engaged in monitoring the status and health of Lake Tahoe and its watershed. The monitoring data are an invaluable resource for assessing the impact of changes that have occurred due to anthropogenic factors and natural variability. Additionally, we engage in shorter- term research that seeks to answer specific questions or to gain understanding of processes and events.This research relies on the long-term monitoring data to provide a context, but it is distinctly separate. The results of this research–conducted by TERC students, postdoctoral researchers, faculty, and staff, and often in collaboration with other institutions, companies, and agencies–has made Lake Tahoe the smartest lake in the world, and arguably the most influential.


Manta Trawl net being pulled across the surface of Lake Tahoe behind the UC Davis Research Vessel John LeConte.
Provided / UC Davis Tahoe Environmental Research Center

Nearshore Monitoring Network
https://tahoe.ucdavis.edu/nearshore-network


UC DAVIS
Tahoe Environmental Research Center

CURRENT DIRECTIONS

Three New Insights from the Nearshore Network

In 2014, TERC installed the first Nearshore Water Station at Homewood, California. Since then, an additional ten Stations have been added all around Lake Tahoe and in adjacent Cascade Lake. The idea was simple – work with property owners who have direct access to the lake, install underwater cables from their docks to an instrument located in seven feet of water, and monitor water quality every 30 seconds. The measurements provide the data needed to distinguish water quality around the lake.

That has been achieved, but more importantly the data have revealed a new understanding of processes that occur lake-wide and in the nearshore. The following pages will highlight some of this new knowledge.

We thank those who have financially supported this project and/or provided access to their docks, the Glenbrook Homeowners Association, and the Lahontan Regional Water Quality Control Board.

The red dots indicate locations of Nearshore Stations around Lake Tahoe

A Nearshore Station on the sandy bottom at Rubicon, CA. Photo: B. Allen

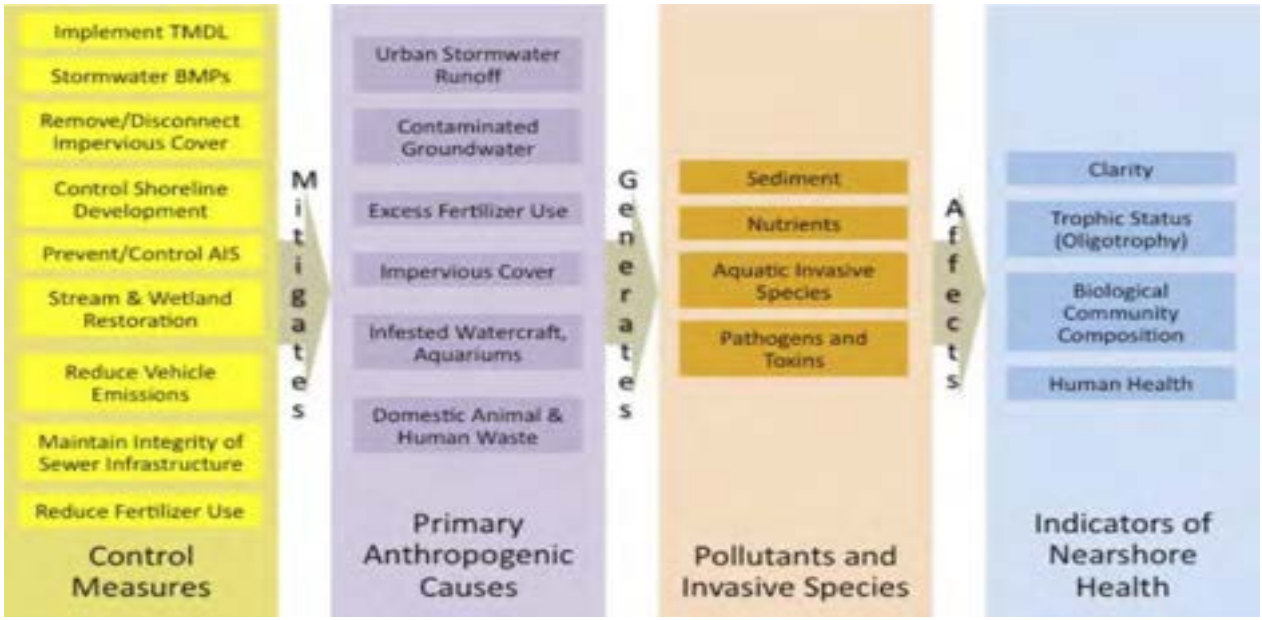
Tahoe: State of the Lake Report 2019 6.11

In 2014, TERC established a network of water quality monitoring stations at the perimeter of Lake Tahoe. The program aims to improve understanding of water quality variability in the nearshore zone. This system provides the essential data needed to guide restoration and future stewardship.

As of December 2018, there are 10 stations installed around Lake Tahoe, and an additional station on Cascade Lake, which feeds into Lake Tahoe. Each station consists of an optical instrument - measuring turbidity (clarity), algal concentration, and dissolved organic matter concentrations - along with a CTD, measuring water temperature, conductivity, lake level, and wave height. An underwater cable enables a real-time data feed.

The Lake Tahoe Nearshore Evaluation and Monitoring Framework
https://www.dri.edu/images/stories/centers/cwes/Lake_Tahoe_Nearshore_Evaluation_and_Monitoring_Framework.pdf

Lake Tahoe Nearshore Evaluation Report
2013 – The Desert Research Institute of Nevada (DRI) released its Final Nearshore Evaluation Report (Report) as approved by the US Forest Service – Pacific Southwest Research Station(PSW). Executive Summary found as Enclosure 1. The full report can be found at *http://www.dri.edu/cwes*.



Examples from the nearshore conceptual model of progression from relevant control measures toindicators of nearshore health.

Annual Lake Tahoe to Pyramid Lake Snapshot Day
http://tahoetruckeesnapshotday.org
https://www.keeptahoeblue.org/our-work/combating-pollution/snapshot-day
Since spring 2008, TWSA staff has held a leadership role in this event, serving as the North Lake Tahoe Coordinator. TWSA staff provides staff support, some event funding, grant fund management and otherleadership roles for this event.

Fecal coliform sampling on Snapshot Day attempts to locate 'hot spots' or areas of potential microbial sources. Over the years Snapshot Day leaders have changed the locations where fecal coliform samplingoccurs, which has helped them determine which sites will continue to be monitored annually and which sites do not pose a microbial threat (Source: R. Whitney pers. comm. 2006).

Snapshot Day Event Summary
In 2021, Snapshot Day reached its 21st anniversary. It remains one of the longest running citizen watershed monitoring events on the West Coast of the United States. Snapshot Day continues to highlight successful engagement with the public in active watershed stewardship, while providing valuable data to the responsible agencies. Covid 19's impacts restricted this event for the past 2 years to staff samplingefforts and limited volunteer engagement.

As previous data sets are compiled and data storage is improved, this program can show long-termtrends and better assist agencies in watershed conditions analysis. Snapshot Day sampling encompasses the North Shore Lake Tahoe, South Shore Lake Tahoe, Middle Truckee River near thetown of Truckee and Lower Truckee River from the Nevada Stateline to Pyramid Lake.

This collaborative effort is sponsored by the Incline Village General Improvement District, the League to Save Lake Tahoe, the Truckee River Watershed Council and the Nevada Division of Environmental Protection.

Snapshot Day is a bi-state event and as such falls under two statewide citizen monitoring programs: California State Regional Water Quality Control Board's (SWQCB) Clean Water Team and the Nevada Division of Environmental Protection water and education outreach activities. Annually, volunteers gathered data at a total of 82 locations throughout the Truckee River watershed.

Incline Village Clean Water Team (Volunteer Monitoring)
The Incline Village Clean Water Team has ended due to low participation. It is under consideration for re-establishment as an 'Adopt-A-Stream program' in order to offer volunteers more participatory tracks such as photo documentation of stream conditions and litter removal, in addition to water sample grabs. Past history on the program: The streams in Incline Village discharge directly into Lake Tahoe. To protect their drinking water source, the Incline Village Clean Water Team (IVCWT) monitoring helped identify existing problems and helps prevent future water quality issues. Bi-monthly, volunteers monitored 11 different sites in Incline Village, on Deer, Incline, Third, and Rosewood Creeks and on an unnamed tributary on Diamond Peak. Volunteers collect: habitat information, physical and chemical characteristics of the water quality, and water samples for lab analysis. The data collected is available to state and local agencies as well as anyone who may have an interest in a specific area.

IVGID/ TWSA Staff Beach Sampling Program
IVGID/TWSA staff has collected regularly scheduled water samples from Incline beaches and stream mouths since 2003. The database is used to track potential contamination locations or trends. Long-term data sets are available upon request to wastenot@ivgid.org.



Tahoe Integrated Information Management System (TIIMS) becomesTRPA EIP Tracker Database
http://www.tiims.org *www.trpa.org*

Editor note: TIIMS website has been closed anda new website serves as the data portal for EIP projects. **New EIP tracker database:** *https://eip.laketahoeinfo.org*



TRPA launched the EIP in an effort to better implement the Regional Plan and highlighted it at the Presidential Forum at Lake Tahoe in 1997. Recognizing that capital investments, research, and monitoring were essential components of the Regional Plan, the EIP called for an initial investment of $908 million in capital projects and $58 million in research and monitoring over 10 years. The EIP also identified hundreds of specific projects and programs to be undertaken by more than 50 funding partners including federal, state, and local agencies, and the private sector. The projects were focused on improving air, water, and scenic quality, forest health, fish and wildlife, and public access to the Lake and other recreation areas. Today, over 400 EIP projects have been completed and hundreds more are in progress, with over $1.8 billion of investment in the highest priority environmental improvement projects.

The Tahoe Integrated Information Management System (TIIMS) was previously used to house and disseminate information about the Lake Tahoe Basin's planning and restoration efforts. TIIMS contains tools to meet the needs of all stakeholders within the Basin. Citizens, research scientists, and resource managers can use TIIMS as a one-stop site for information about Lake Tahoe. TIIMS represented a complete information management solution. TIIMS Partners include Federal, State, tribal, and local agencies within the Lake Tahoe Basin which are involved in a myriad of planning and restoration efforts throughout the watershed ranging from permitting to regulatory enforcement to maintaining and improving the quality of surface and groundwater resources.

Lake Tahoe Status and Trend Monitoring Evaluation Program
http://tahoemonitoring.org

Tahoemonitoring.org is the public reporting website for the Lake Tahoe Status and Trend Monitoring and Evaluation Program (M&E Program) in beta development. It is not fully live as of publication. Water Category: The purpose of the Water Overarching Category is to provide a portal to information related to water quality and conditions of aquatic ecosystems in the Lake Tahoe region.

The following reporting categories are included in this overarching category:
The *Lake Tahoe* reporting category is used to report on the status and trends of indicators that measuredeep water and nearshore conditions of Lake Tahoe in terms of water quality, clarity and biological integrity.
The *Small Lakes* reporting category is used to report on the status and trends of indicators associatedwith biological, physical and chemical integrity of small lakes in the Tahoe Region.

The *Streams and Wetlands* reporting category is used to report on the status and trends of various indicators of biological, chemical and physical conditions of Lake Tahoe tributaries and riparian habitats.
The *Stormwater Quality* reporting category is used to report on the status and trends of indicators themeasure runoff water quality.
The *Aquatic Invasive Species* reporting category is used to report on the status and trends of indicatorsthat measure the extent and distribution of invasive plant and animal species associated with aquatic habitats.
The *Aquatic Species and Communities* reporting category is used to report on the status and trends of indicators that measure special status wildlife, fish and rare plants as well as unique communities foundin aquatic habitats.

Lahontan Water Board and the Nevada Division of Environmental Protection
Total Maximum Daily Load Study (TMDL) *http://ndep.nv.gov/bwqp/tahoe3.htm.*

The United States Environmental Protection Agency (EPA) approved NDEP's Lake Tahoe Total Maximum Daily Load Report (TMDL) submittal in 2011. This FinalEPA approved version has been revised from the California adopted version for which EPA approval was gained the same day. The revisions were necessary to correct errors, clarify Nevada's regulatory structure and approach to implementation and emphasize that the proposed implementation timelines may need to be adjusted for a variety of reasons, but particularly the availability of future funding. The errata sheet indicates all the differences between these versions. However, it is important to emphasize that despite thesubmittal and approval of distinct reports, the Lake Tahoe TMDL effort represents a common and consistentplan between the States of Nevada and California to address the clarity decline within Lake Tahoe.

Final TMDL
Under the Clean Water Act and California law, final TMDLs must contain all the elements addressed during Phase One and Two of the Lake Tahoe TMDL. The Lake Tahoe TMDL implementation plan presents a detailed process for achieving load reductions over a specified time frame. Several expectations have emerged among Lake Tahoe TMDL collaborating agencies. The Lake Tahoe TMDL will integrate with the Pathway efforts to update resource management plans by providing load reduction targets that can be incorporated into the TRPA Regional Plan, the Environmental Improvement Program, and Lake Tahoe Basin Management Unit Forest Plan. The Lahontan Water Board and NDEP will incorporate the Lake Tahoe TMDL implementation needs into the Lahontan Basin Plan and NDEP Continuous Planning Process documents.

The Lake Tahoe TMDL monitoring plan describes procedures for tracking load reductions and documenting progress toward achieving milestones. It also describes how project effectiveness measurements and ongoing research will refine the understanding of factors driving loading to the Lake. The monitoring plan will become the scientific basis for the formal cycles of continual improvement and adaptive management that will be initiated during Phase Three of the Lake Tahoe TMDL. All elements from Phases One and Two will be packaged in a Final TMDL document that will complete Phase Two. Current discussions of likely time frames for achievement of the LakeTahoe TMDL load reductions range from 30 to 100 years.

Charting the Course to Clarity

http://www.waterboards.ca.gov/lahontan/water_issues/programs/tmdl/lake_tahoe/docs/cac_208_09_final.pdf

This report presents highlights of the strategy for restoring Lake Tahoe's clarity. For the first time since researchers began continuously measuring Lake Tahoe's famed water clarity 40 years ago, UC Davis scientists reported today that the historical rate of decline in the lake's clarity has slowed considerably in recent years. Scientists at the UC Davis Tahoe Environmental Research Center say that by using new, more sophisticated models for detecting trends and, by factoring out the effects of annual precipitation, they have concluded that the historic rate of decline in the lake's clarity has slowed since 2001.

Climate Change

Global climate change is projected to have unprecedented impacts on the health of the environment and economy in the Lake Tahoe Basin. As temperatures rise and more precipitation falls as rain rather than snow, management efforts to protect the Basin's forests, fish and wildlife, and fabled water clarity will face unique challenges.

To address these impacts, the Environmental Improvement Program (EIP) partner agencies are formulating a Basin-wide strategy to address climate change. The strategy is intended to ensure that all major planning and regulatory programs at Lake Tahoe are designed to take into account the projected impacts of climate change.

For example, future EIP water quality and erosion control projects will need to be designed for larger peak flows in the winter, and habitat improvement projects will need to take into account potential changes in the type, location, and distribution of vegetation communities. The climate change strategy will provide a starting point for sustainable decision making in the Tahoe Basin. These actions will be addressed in a combination of plans and programs, including the EIP, the Lake Tahoe Regional Plan Update, the Regional Transportation Plan, Community Plans, and local actions.

As part of this comprehensive strategy, the EIP broadly focuses on maintaining healthy forest ecosystems and watersheds and on improving mobility and access with environmentally-friendly transit.Mandates and incentives to develop sustainably-designed communities, projects, and green infrastructure will be developed as part of the update of the TRPA Regional Plan.

The most significant impacts of a future, modeled climate change at Lake Tahoe are changes in hydrologic conditions and reduced frequency of complete vertical mixing of the lake. Hydrology output from the downscaled climate modeling suggests a significant reduction in the amount of precipitation falling as snow in the Tahoe basin. This could have consequences for water supply as well as winter recreational sports. Should the lake's deep mixing be restricted to the extent the models suggest, internal loading of nutrients from the sediments will be very significant and will drive a fundamental change in the biological productivity status of both the pelagic and littoral regions of the lake. These nutrients, particularly phosphorus, will be available to drive algal growth. Reducing the load of external nutrients entering the lake in the coming decades may be the only possible mitigation measure to reduce the impact of climate change on lake clarity and trophic status.

The meteorologic and geographic conditions in the Tahoe basin combine to create a vulnerable ecosystem. Temperatures in the Basin are increasing faster than in the surrounding region. This may bedue to the influence of the lake and its heat (energy) budget on local air temperature, although a decrease in the reflectivity of the snowpack from deposition of soot (black carbon) may also play a role.Second, under historic and current

conditions the lake mixes to the bottom on the average of only onceevery four years. Continued warming will increase the lake's thermal stability, and likely shut down its vertical mixing altogether. Third, on occasion, the lake historically has fallen below its natural outlet elevation during prolonged dry years. Lake level modeling in our study suggests that under some greenhouse gas emission scenarios, outflow from Lake Tahoe could cease by the end of the 21st Century.

Sierra Nevada Alliance (SNA) Community and Resource Protection Programs
https://sierranevadaalliance.org/
Since 1993, the Sierra Nevada Alliance has been protecting and restoring Sierra lands, water, wildlife, and communities. The Sierra Nevada Alliance exists to elevate and support Sierra ecosystems and communities. We are a hub for stewardship of the Sierra Nevada, which we achieve by empowering and collaborating with our partners. Every Sierra ecosystem and community is healthy, resilient, and collectively cared for through thriving partnerships, as a legacy for future generations.

Sierra Climate Change Program
https://sierranevadaalliance.org/programs/regional-climate-change/

We provide technical and grassroots support to communities throughout the Sierra in mitigating climate change and building resilience to its impacts. The Alliance's Climate Resiliency Program goals consider both climate action planning and climate adaptation. We aid communities that are taking action on climate change by assisting in the development and implementation of climate action and adaptation plans. Similarly, we work to meet or exceed local renewable energy and greenhouse gas emissions reduction goals. The Sierra Climate Change Program alerts the public and decision makers to the impacts of climate change in the Sierra and ensure that smart local resource management plans (watershed plans, general plans, hydropower relicensing, integrated regional water management, forestry, etc.) are adopted that protect natural resources by reducing emissions and adapting to climate change. Climate change is presently impacting the Sierra and future impacts could be catastrophic.

The Sierra Nevada supplies 55% of California's developed water rights plus most of the water for Northwestern Nevada through a vast water delivery system that is highly dependent on the Sierra snowpack. Over the past 100 years, there has been a 25% reduction in runoff from April to July in the central Sierra –Sacramento region, and a 10% reduction in the southern Sierra. Leading scientists agree that temperatures will rise even under the best emission reduction scenarios. This increase in temperature results in a projected decline of 25 -40% of the snowpack between years 2025-2050; by 2100 losses could reach 75-90%. The Sierra Nevada Alliance is working with conservation representatives, resource managers, and community leaders to ensure they have cutting edge tools to adapt resource plans and projects that protect Sierra waters, wildlife, and rural communities.

Desert Research Institute (DRI) Center for Watersheds and Environmental Sustainability
The Desert Research Institute and the University of Nevada, Reno have worked together for decades to provide comprehensive studies that have led to a better understanding of threats to Lake Tahoe's air and water quality and the health of the forest. This report was jointly issued to highlight some of the collaborative scientific research that is conducted by both institutions at the Lake Tahoe Summit. The summary of most recent projects, including Aquatic Invasive species and nearshore water quality projects, is available at: *http://www.dri.edu*

Lake Tahoe Nearshore Evaluation Report
October 24, 2013 – The Desert Research Institute of Nevada (DRI) released its Final Nearshore Evaluation Report (Report) as approved by the US Forest Service – Pacific Southwest Research Station (PSW). The full report can be found at *http://www.dri.edu/cwes*.

Lake Tahoe's nearshore is the zone of relatively shallow water around the lake's perimeter that is valued for its recreational and aesthetic qualities, as well as for the biological community it supports. The nearshore is the part of the lake that visitors and residents interact with most. Changes in the nearshore over time have increased interest in managing the nearshore and the factors responsible for its progressively reduced condition. Lahontan and the other member agencies (TRPA, NDEP, US EPA) of the Nearshore Agency Working Group have received public criticism for focusing on Lake Tahoe's mid-lake water quality and transparency, as represented by the Lake Tahoe TMDL, to the perceived paucity of attention paid the nearshore.

Desert Research Institute of Nevada (DRI) Lake Tahoe Watershed Projects
https://www.dri.edu/?s=tahoe

Some of the ongoing DRI projects that deal with nutrient and fine sediment loading to Lake Tahoe andthe health of the watershed include:

- *https://www.dri.edu/new-study-investigates-link-between-clothes-dryers-and-microplastic-pollution-in-lake-tahoe/*
- *https://www.dri.edu/people-powered-research-citizen-science-makes-microplastics-discovery-at-lake-tahoe-possible/*

Past work includes:

- Identifying atmospheric sources of dust and nutrients in the Tahoe basin
- Determining atmospheric dust and nutrient deposition rates on the lake surface
- Measuring and modeling fugitive dust emissions from roads in the Basin
- Characterizing stormwater runoff fine sediment and nutrient loads
- Evaluating nutrient and fine sediment loading for different land uses
- Determining groundwater nutrient loading to the lake
- Conducting near-shore lake clarity surveys to identify areas of high nutrient and fine sedimentloading from surface water, stormwater, and groundwater inflows
- Determining shoreline erosion contributions of fine sediment and nutrients to the lake
- Identifying and quantifying microbiological communities in the lake
- Evaluating restoration project effectiveness in removing fine sediment and nutrients from surfacewater runoff
- Evaluating BMP structures effectiveness in removing fine sediment and nutrients from surfacewater runoff
- Determining the amount of impervious cover, such as roads, parking lots, and roofs that produceincreased stormwater runoff in the Lake Tahoe watershed
- Evaluating the effects of fire on atmospheric sources of nutrients entering the lake
- Identifying the sources of fine sediment that enter the lake
- Developing bio-engineer systems for removal for nutrients and fine sediment in stormwater runoff
- Evaluating the efficiency of highway runoff structures for removal of nutrients and fine sediment
- Evaluating the health of the American Martin population in the watershed
- Help structure adaptive management, so that as new information is gained in the Basinmanagement practices can include this information
- Develop a stormwater monitoring program for the Lake Tahoe watershed

Impacts of Land Use on Water Quality in Lake Tahoe Watersheds
Prepared by Desert Research Institute for NDEP by Gayle L. Dana, Richard B. Susfalk, Paul Verburg
http://www.dri.edu

The goal of this study was to conduct a source assessment of nutrients and sediments in the Third and Incline Creek Watersheds in support of the Lake Tahoe TMDL. The primary objectives were to characterize sediment and nutrient loading from specific land uses and understand nitrogen (N) and phosphorus (P) transport pathways.

Suspended sediment loading was greatest from both watersheds during snowmelt events and was typically dominated by sediment originating from the undeveloped land use accounting for 41-45% of the total sediment exiting the Incline Creek watershed. The ski area and urbanized land uses each contributed between 25 to 32% of the whole watershed sediment load. The undeveloped land use also dominated Third Creek, contributing up to 72% of sediment load delivered directly to Third Creek. In addition to this 27,000 to 356,000 kg of suspended sediment delivered by Third Creek during yearly snowmelt, Rosewood Creek delivered another 45,000 to 109,000 kg to Third Creek just upstream of its discharge to Lake Tahoe. However, on a relative flux basis, suspended sediment delivery from the undeveloped land use was the lowest of all land uses studied. For example, suspended sediment fluxes from the undeveloped land use were between 38 to 73% lower than that from urban and ski area land uses within Incline Creek.

When normalized by the water flux, sediment mobilization from the urbanized land use during rain or snow events was typically five times greater than that from the undeveloped land use, compared to 15 times greater during rain events, on average. Nitrogen fluxes were decoupled from phosphorus fluxes in the Third Creek urbanized land use, as the highest total N fluxes occurred during the lower water year of 2005. This was in contrast to total P in both watersheds and total N in the Incline Creek urbanized area that had the greatest total nutrient fluxes in conjunction greater water fluxes.

Tahoe Stormwater Particle Assessment and Management for Urban and Roadway Runoff

Heyvaert, Alan C., DRI, Project period 09/02/2010 - 10/31/2012 Funded by USDA - Forest Service

Project Description

http://www.dri.edu/dhs-research-themes/3164-tahoe-stormwater-particle-assessment-and-management-for-urban-and-roadway-runoff
The urban portion of the watershed contributes about 70% of the fine sediment that is delivered to Lake Tahoe. These fine particles significantly affect water clarity in this otherwise pristine lake. Current pollutant reduction strategies are targeting their removal through erosion control and stormwater treatment projects. The investment of significant financial resources to improve the Lake's clarity requires that our understanding of the sources, transport and potential for removal of these particles from urban stormwater be accelerated. The intent of this project is to add to our current, yet incomplete knowledge concerning fine particles.

Lake Tahoe Divers Conservancy

http://www.alpengroup.org/tahoe-divers-conservancy

The Tahoe Divers' Conservancy (TDC) is a grassroots, community based, organization advocating for theprotection of Lake Tahoe and other marine environments of the Sierra Nevada. The mission of the TDC is to document, study and conserve the complex marine environment that defines Lake Tahoe. Scientific research divers conduct on-going research and long term monitoring programs. TCD's advisoryboard is comprised of marine science experts who provide guidance and assistance on research projects.The TDC has been an active partner in the aquatic invasive species pilot removal projects. The group also conducts community underwater and beach cleanups, and maintains an active education and outreach schedule.

Clean Up the Lake - The 72 Mile Underwater Clean Up

https://cleanupthelake.org/our-team
https://www.kcra.com/article/effort-to-clean-up-lake-tahoe-gets-more-funding/34877910#
https://www.sfchronicle.com/tahoe/article/The-trophies-are-trash-in-Lake-Tahoe-diving-16358360.php

2020 saw the formation of a non-profit group with the mission to conduct a 72 mile diver underwater cleanup of Lake Tahoe in summer 2021. Community response has been overwhelmingly supportive. In 2021, CUTL conducted a massive lake-wide cleanup program, documenting the debris found by location ad material type. As of August 2021, the following was documented: 8,122 lbs. collected; 22 miles cleaned beneath the surface of Lake Tahoe; 9.281 pieces of trash; 27 dive days; I74 individual dives; 2,611 volunteer hours.



CUTL Litter Categorization process:
Removing litter from Lake Tahoe via scuba divers and other volunteers is only the first step to our mission. To increase the impact of litter removal we categorize and collect data on every single piece of litter that we remove from the lake. This process has been developed from the United Nation Environmental Program (UNEP) and Intergovernmental Oceanographic Commission's (IOC) litter categorization standard. This standard separates items into 9 different material types (plastic, metal, wood, etc.) and then by 83 various uses (fishing, recreation, construction etc.)



WILDFIRES AND WATERSHED IMPACTS

August, 2021 - The Caldor Fire erupts. The Caldor Fire becomes the 15th-largest and 16th-most destructive wildfire in California's recorded history, according to Cal Fire. Its cause remains under investigation.

October 2021 - Caldor Fire 100% contained, nearly two months after South Lake Tahoe evacuations
https://www.sacbee.com/news/california/fires/article255173052.html
Fire crews work to repair containment lines of California's Caldor Fire in ElDorado County, California. The fire, that was first reported on August 14, had burned 221,775 acres and was 98 percent contained by October 16. The Caldor Fire, which destroyed hundreds of homes in rural El Dorado County and displaced tens of thousands of residents in and near South Lake Tahoe in early September, is now 100% contained. The blaze grew to 221,835 acres (347 square miles) before the U.S. Forest Service announced full containment Thursday. Containment does not mean the fire is extinguished, only that crews have constructed a full perimeter of containment lines around the fire. More than 500 firefighters remain assigned to the Caldor Fire, continuing mop-up and repair efforts to ensure those containment lines hold. "For example, although the fire is contained, large diameter trees and stump holes will continue to smolder well into the winter months," Forest Service officials wrote in a Thursday morning incident update. Containment took more than two months. The Caldor Fire started Aug. 14 near the town of Grizzly Flats, which was largely destroyed as the blaze ripped to the north toward the Pollock Pines area in its fierce initial sprint, before winds started blowing it to the northeast. Through the latter half of August, the fire continued to creep east along Highway 50 and eventually made its way to the western edge of the Lake Tahoe Basin. The city of South Lake Tahoe, home to about 22,000 residents, was put under a mandatory evacuation order Aug. 30, lifted Sept. 5 as weather and fire behavior began to improve. A roughly 50-mile stretch of Highway 50 was also closed to the public for about a month. The Caldor Fire destroyed just over 1,000 structures, most of them in Grizzly Flats but some along the Highway 50 corridor near the summit, near Phillips and Twin Bridges, according to a damage map from Cal Fire. Two civilians were transported from Grizzly Flats with burn injuries. No fatalities were reported.

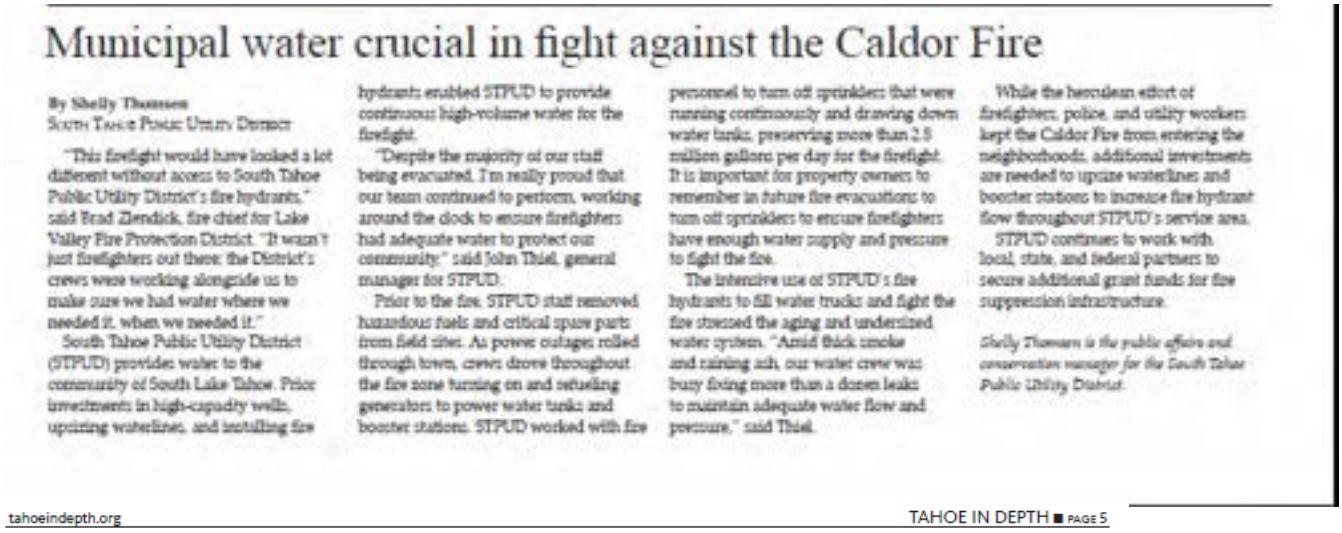
Read more at: https://www.sacbee.com/news/california/fires/article255173052.html#storylink=cpy

Tahoe In Depth Special Caldor Fire Issue
https://www.trpa.gov/wp-content/uploads/CaldorFire_12pgs_No20_FINAL_web.pdf

This issue highlighted lessons learned from the Caldor Fire. During the fire suppression, more than 490 engines, 77 water tenders, 26 helicopters, numerous air tankers, 78 hand crews, 96 bulldozers, and over 4,200 personnel were coordinated to support the firefighting effort. LTBMU firefighters alone laid over 42,000 linear feet (approximately 8 miles!) of fire hose as part of this collective effort.

The changes in reduced fire intensity resulting from prior forest management also helped minimize the direct tree mortality in the residual forest as demonstrated by less tree and crown torching. Remaining living trees within the fire area will help sustain Tahoe's beloved forest character and will promote conditions for protecting water quality, natural regeneration, and diverse wildlife habitats as the ecosystem recovers.

Below is the feature on water utility-fire response nexus:



Municipal water crucial in fight against the Caldor Fire

By Shelly Thomsen
South Tahoe Public Utility District

"This firefight would have looked a lot different without access to South Tahoe Public Utility District's fire hydrants," said Brad Zlendick, fire chief for Lake Valley Fire Protection District. "It wasn't just firefighters out there; the District's crews were working alongside us to make sure we had water where we needed it, when we needed it."

South Tahoe Public Utility District (STPUD) provides water to the community of South Lake Tahoe. Prior investments in high-capacity wells, upsizing waterlines, and installing fire hydrants enabled STPUD to provide continuous high-volume water for the firefight.

"Despite the majority of our staff being evacuated, I'm really proud that our team continued to perform, working around the clock to ensure firefighters had adequate water to protect our community," said John Thiel, general manager for STPUD.

Prior to the fire, STPUD staff removed hazardous fuels and critical spare parts from field sites. As power outages rolled through town, crews drove throughout the fire zone turning on and refueling generators to power water tanks and booster stations. STPUD worked with fire personnel to turn off sprinklers that were running continuously and drawing down water tanks, preserving more than 2.5 million gallons per day for the firefight. It is important for property owners to remember in future fire evacuations to turn off sprinklers to ensure firefighters have enough water supply and pressure to fight the fire.

The intensive use of STPUD's fire hydrants to fill water trucks and fight the fire stressed the aging and undersized water system. "Amid thick smoke and raining ash, our water crew was busy fixing more than a dozen leaks to maintain adequate water flow and pressure," said Thiel.

While the herculean effort of firefighters, police, and utility workers kept the Caldor Fire from entering the neighborhoods, additional investments are needed to upsize waterlines and booster stations to increase fire hydrant flow throughout STPUD's service area.

STPUD continues to work with local, state, and federal partners to secure additional grant funds for fire suppression infrastructure.

Shelly Thomsen is the public affairs and conservation manager for the South Tahoe Public Utility District.

tahoeindepth.org TAHOE IN DEPTH ■ PAGE 5

Tahoe firefighters share lessons from Caldor Fire in new video
https://www.tahoedailytribune.com/news/tahoe-firefighters-share-lessons-from-caldor-fire-in-new-video/

SOUTH LAKE TAHOE, Calif. – As the community celebrates 100% containment of the Caldor Fire, firefighters are sharing lessons learned from the fight to protect neighborhoods in Christmas Valley, Meyers, and South Lake Tahoe in a new bilingual video and a special issue of the Tahoe Regional Planning Agency's Tahoe In Depth newspaper.

Firefighters from Lake Valley Fire Protection District, South Lake Tahoe Fire Rescue and other local, state and federal firefighting agencies noted that in the months and weeks prior to the fire, residents took important steps that helped save their homes such as moving firewood away from homes, cleaning up pine needles, and preparing for a potential evacuation.

"It was inspiring to see that residents did what they could to help us help them. It really made a difference," said Kim George, a fire captain with South Lake Tahoe Fire Rescue, in a press release.

Securing Funding for Fire Flow Needs
Since 2008, more than $3,000,000 in federal funds have been matched (50/50) by from partnership members. In 2016, Sustainable Community Advocates brought forth on behalf of TWSA and individual water suppliers, an initiative to Secure TRPA approval to add Specific Water Supply and Transmission Projects that Improve Firefighting Capability to the adopted list of Environmental Improvement Program (EIP) Projects (Expand Focus Area 02 – Forest Management).

The purpose of this request from the Tahoe Basin Fire Chiefs and members of the Tahoe Water Suppliers Association (TWSA) that TRPA formally add specific water supply and transmission projects that improve firefighting capability to the list of projects adopted in the Lake Tahoe EIP (Expand Focus Area 02 - Forest Management). Consistent with the provisions of TRPA Code Chapter 15, the TRPA Governing Board delegates to its Executive Director the authority to approve this request, so long as it meets the eligibility criteria set forth in Chapter 15.

As a result of the Angora Fire in 2007, and re-prioritized due to the Caldor Fire, emphasis was placed in the Tahoe Basin on developing adequate water supply and services to address fire flow needs. Public water systems in the Tahoe Basin were designed for daily, community water use needs; they were not designed to provide the continuous, highvolume output of water needed for firefighting in the "wildland urban interface" which characterizes many Tahoe neighborhoods. TWSA members have been actively working to secure funding for infrastructure upgrades including: storage tank replacements, booster stations, interties between separate water systems, and emergency power systems to provide additional water supply in case of emergency.

Tahoe Douglas Fire Boat
https://www.tahoefire.org/news/entry/tdfpd-fire-flow-initiative-program

FIRE FLOW INITIATIVE - NEW FIRE BOAT



As part of the Fire Engineer's recommendation, the District has ordered a new fire boat, which is currently being built to our specifications in Wisconsin. The new boat will be equipped with a Skyhook digital anchoring system and joystick steering in the wheelhouse and on the bow, which are safety features that make piloting the boat earier during an emergency response. It will be capable of pumping 1,500 gallons per minute, is designed to allow anchoring on the beach and connection to standpipes. The boat willl have a fast response time, as it will be powered by twin 350HP Mercury Verados capable of traveling up to 45 mph. Other features are GPS, sonar, search lights, and Forward Looking Infrared Radar (FLIR). Fallen Leaf Lake Fire has FLIR on their boat which they have used to assist Search and Rescue efforts in the water and on land by locating missing hikers from the water with the infrared. It will also have a landing-craft door, which lowers into the water for safer rescue of victims.

A project team of firefighters reviewed specifications for the design, will continue to monitor the construction, and will coordinate training when the boat is delivered in November. The cost of the boat is approximately $500,000 and has been paid for by donations and fees from homeowners opting to participate in the FFI program. The manufacturer, Lake Assault, said that the boat will be well-built and if properly maintained, should last 20 years.

Below is an list of recent projects and cost share of TWSA Members on fire flow projects.
(Source: Lake Tahoe Fire Prevention Partnership: L. Nolan)

USFS Funding
Lake Tahoe Fire Prevention Partnership
NOTE: In some cases, actual project costs are estimates and rounded

2016 Funding (Local Match still pending but minimum of $800,000)

Agency	Total Budget Amount including 50% match	Actual Project Costs
STPUD - 2016/2017 Fire Hydrant Service Expansion Project	$ 636,734.00	
NTPUD -2016/2017 Dolly Varden Water Main Replacement Project	$ 175,742.00	
TCPUD - 2016/2017 The Bunker Tank Replacement Project	$ 215,786.00	
IVGID - 2017 Watermain Replacement & Fireflow Enhancement Project	$ 266,058.00	
IVGID - 2016 Watermain Replacement & Fireflow Enhancement PH II	$ 100,000.00	
KGID - 2016/2017 Standby Generator Installation Project	$ 114,136.00	
RHGID - 2016/2017 Fire Hydrant Replacement	$ 21,746.00	
Douglas -Cave Rock Lake Intake Improvements Project	$ 47,806.00	
Lakeside - Cedar/Park/Manzanita Water Line Extension	$ 5,992.00	
Admin	$ 16,000.00	
Totals	**$ 1,600,000.00**	**$ -**

2015 (some projects have not been implemented as yet) Local Cost Match $1,427,000

Agency/Project	Total Budget Amount including 50% match	Actual project costs
STPUD - Fire Hydrant Service Expansion Project	$ 797,048.00	$ 1,000,000
NTPUD - Dolly Varden Water Main Replacement Project	$ 222,280.00	$ 1,400,000
TCPUD - The Bunker Tank Replacement Project	$ 268,372.00	
IVGID - 2015 Watermain Replacement and Fireflow Enhancement Project	$ 457,744.00	
KGID - Waterline Replacements Project	$ 142,654.00	
RHGID - New Pump Soft Starts at Office Booster Station	$ 27,224.00	
Douglas - Lake Water System Improvements	$ 57,176.00	
Lakeside - Fire Hydrant Installation Project	$ 7,502.00	$ 27,000
Admin	$ 20,000.00	
Totals	**$ 2,000,000.00**	

Fuels Reduction Plans for the Lake Tahoe Basin

Updated Lake Tahoe Basin Community Wildfire Protection Plan
http://www.nltfpd.net/whats-new/updated-lake-tahoe-basin-community-wilfire-protectin-plan/
Contact: John Pickett (775) 220-7675, Forester, Tahoe Douglas Fire Protection District

South Lake Tahoe, Calif. –
This new Community Wildfire Protection Plan was collaboratively developed by the 18 member organizations of the Tahoe Fire and Fuels Team (TFFT) and is the culmination of a three-year planning effort.

The Healthy Forest Restoration Act of 2003 created the concept of Community Wildfire Protection Plans. Prior to that time, fire planning was done by federal and state land managers, generally without a partner in the local community, because few community groups addressed fire hazard specifically. At that same time, federal and state agencies, such as the U.S. Forest Service and CAL FIRE, were under increasing budgetary pressures. Fire suppression costs began consuming increasingly large percentages of budgets, but home losses and acres burned continued to increase dramatically. The president and Congress worked together in a bipartisan manner to change course and give communities the tools and authority to take charge of their local risk and plan and implement projects to address that risk.

Since the original Community Wildfire Protection Plans were written, wildland fires have resulted in catastrophic losses from South Lake Tahoe to Austin, Texas – but there were also successes. In fact, many communities that had taken steps to mitigate fire hazard have been entirely successful. The updated Community Wildfire Protection Plan incorporates the elements common to successful programs from across the country. Its goals are to:

- **Create fire-adapted communities:** The plan provides mitigation strategies and community- driven action plans to help create communities where citizens are engaged and active in preparing for wildfire. It facilitates interagency cooperation and strengthens communicationand support between agencies and the public.
- **Restore and maintain fire-resilient landscapes:** The plan provides prioritized locations for fuel reduction treatments to enable land managers to effectively work across jurisdictions and address risks to ecosystems and communities at a landscape scale.
- **Provide effective and efficient wildfire response:** The plan provides strategic treatments on the landscape that will facilitate safer and more successful suppression. This plan provides for tracking, reporting, and sharing of both fuel reduction accomplishments and homeowner/community initiatives.

Lake Tahoe Basin Multi-Jurisdictional Fuel Reduction and Wildfire Prevention Strategy 10-Year Plan
http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fsm9_046334.pdf
The USDA Forest Service Lake Tahoe Basin Management Unit (LTBMU) is lead agency for the *Lake Tahoe Basin Multi-Jurisdictional Fuel Reduction and Wildfire Prevention Strategy 10-Year Plan.*
This strategic Comprehensive Fuels Plan for the Lake Tahoe Basin incorporates approximately 208,800 acres. The plan was developed to comply with the White Pine County Conservation, Recreation and Development Act Of 2006; Public Law 109-432 (H.R. 6111).

The plan facilitates the strategic decisions that must be made by land management, fire and regulatory agencies to reduce the probability of a catastrophic fire in the Basin. It combines all existing fuel treatment plans that have been developed within the basin and provides a communication framework for participating agencies to identify priority areas and to work collaboratively on accomplishing those priorities. In addition, it builds upon current and past fuel reduction projects that have already occurred on nearly 13,000 acres and the efforts of community-based fire departments and fire safe councils that are actively treating fuels around residences.

Two fire councils, the Tahoe Basin Fire Safe Council and Nevada Fire Safe Council, provide resources to California and Nevada homeowners, respectively, to protect their property. Many of the participating local fire departments offer tree removal and thinning services to local residents. Education materials are also provided (TRPA 2005). The states, public land managers (excluding the US Forest Service) and local jurisdictions currently invest significant funding to the fuel reduction effort in the Lake Tahoe Basin.

During the term of the current situation, the communities of the Lake Tahoe Basin must undertake maximum efforts to secure long term funding to support ongoing maintenance. Until the current need for fuel reduction on state, municipal, and private lands is accomplished, the communities of the Lake Tahoe Basin, the environment, and lives of the Basin's residents and guests remain at risk. Significant and reliable funding is needed to complete fuel reduction projects on state, municipal and private property identified in the *Multi-Jurisdictional Fuel Reduction and Wildfire Prevention Strategy 10-Year Plan* for the Lake Tahoe Basin.

Lake Tahoe Basin Management Unit (LTBMU)
Most of the communities in the Lake Tahoe Basin are listed on the national federal registrar for communities at risk of catastrophic fire (LTEEC 2004). A majority of the land in the Tahoe Basin is owned by the US Forest Service, Lake Tahoe Basin Management Unit (LTBMU). LTBMU actively completes control burns annually to reduce the risk of a catastrophic fire in the Basin.
The Lake Tahoe Basin Management Unit prescribed burns are updated regularly at *http://www.fs.fed.us/r5/ltbmu/fire/current.shtml*.

Angora Fire 2007
The Angora Fire began on June 24, 2007 in the North Upper Truckee area in South Lake Tahoe, California and was fully contained on July 2, 2007. It burned in a particularly sensitive area: a watershed that provides a quarter of the water that runs into the lake. About 10 percent of the watershed was destroyed. The Angora Fire burned approximately 3,100 acres of land area in the southwest portion of the Lake Tahoe Basin, California. Undeveloped montane, mixed conifer forest habitat was the dominant land type within the burn area, but significant areas of urban development were also affected.

Angora Fire Effect on Water Supply
TWSA water purveyors have indicated no changes in raw water intake turbidity readings due to the Angora Fire. Unlike the east and north shores, the majority of South Lake Tahoe water supplies are fed from groundwater sources, which are less affected by erosion than the lake source intakes.

Lake Tahoe Basin Management Unit (LTBMU) Monitoring Strategy for the Angora Burn Area
http://www.fs.fed.us/r5/ltbmu/documents/angora-fire/angora_restoration/2009_Docs/Angora_Restoration_Prop_Action_02_11_2009_FINAL.pdf
In the immediate aftermath of the Angora Fire, the Lake Tahoe Basin Management Unit moved quickly to determine monitoring and assessment needs related to impacts on US Forest Service lands, as well as

consequent effects to downslope and downstream resources. Monitoring questions and strategies were identified which would provide essential information to evaluate the impacts of the fire on forest resources and establish a baseline for evaluation of natural recovery and restoration efforts. These monitoring strategies are currently being evaluated as part of planning for the Angora Phase III Restoration Project. The current monitoring strategy is described in this document.
In addition to the studies undertaken by the Forest Service, a small number of studies by other organizations have been granted area access permits to allow researchers and other agencies' staffs to conduct their own research and monitoring efforts and/or to assist the USFS in its data collection efforts. The long term monitoring strategy will be defined as part of the environmental analysis conducted for the Angora Fire Restoration Project.

Formation of the California-Nevada Tahoe Basin Fire Commission
http://www.nltfpd.net/pdfs/TahoeBasinFireRpt_Findings.pdf
As a result of the Angora Fire, the California-Nevada Tahoe Basin Fire Commission was formed as a bi-state management planning committee, tasked with streamlining defensible space planning and fuels reduction projects, in the fall of 2007. The California-Nevada Tahoe Basin Fire Commission completed a comprehensive review of the laws, policies, and practices that affect the vulnerability of the Tahoe Basin to wildfires. The Commission also looked at the myriad of natural and human factors that make this Basin so unique, but also render it uniquely susceptible to the occurrence and deleterious impacts of wildfires.

Commission's findings relative to water quality
The unique water quality and clarity of Lake Tahoe is a natural resource of global significance and is dependent on protection from catastrophic wildfires in the Lake Tahoe Basin. Lake Tahoe is one of the three clearest lakes of its size in the world. The water quality of the Lake and its tributaries is fundamental to the scenic quality and global significance of the Lake Tahoe Basin, yet water quality depends on a fragile balance among soil, vegetation, and human impact. The focus of water quality protection in the Basin is to minimize human disturbance, and to reduce or eliminate the addition of pollutants that result from development or other disturbance. There is perhaps no single disturbance event with greater potential deleterious impact on the Lake than a catastrophic wildfire.

Tahoe Climate Assessment / Water & Waste Water Infrastructure
Integrated Vulnerability Assessment of Climate Change in the Lake Tahoe Basin 2020
https://tahoe.ca.gov/wp-content/uploads/sites/257/2020/04/Integrated-Vulnerability-Assessment-of-Climate-Change-in-the-Lake-Tahoe-Basin_2020.pdf

Key climate change hazards threaten the Basin's built environment with damage and/or disruption.

Water Treatment and Flooding	Wastewater is conveyed out of the Basin via underground pipes, which could become exposed and damaged from flooding and erosion following extreme precipitation events. In addition, lift stations tend to be located in low-lying areas, with several stations in or near 100-year floodplains. Sewer systems could be inundated from storm water leaking into manholes. Peak streamflow and runoff are projected to increase by an average of about 16 percent for six modeled catchments in the Basin by mid-century.

Hazard 1: Extreme Precipitation, Runoff, and Flooding
Projected changes in precipitation patterns for the Basin—such as an increase of both rain-on-snow events and heavy rainfall occurrences—are likely to result in larger and more frequent "extreme" flooding events (i.e., floods that meet or exceed the current 100-year flood threshold). Flooding from overflowing rivers, creeks, ravines, or lowland areas may disrupt critical roadways—many of which have few alternative routes—as well as bike paths and recreation facilities. Flooding can also damage sensitive equipment located on or near ground level. Equipment such as water pumps, communications devices, or electrical switches at substations may be subject to damage from flooding. Erosion related to flooding can undermine roadbeds, scour bridges, and impact power poles, pipelines, and other physical infrastructure. Wastewater removal and treatment infrastructure in the Basin is particularly vulnerable to flooding. The STPUD wastewater treatment plant is partially located in a 100-year flood zone, although land survey data shows that facilities at the plant are above the 100-year flood elevation. Inundation here, at sewer lift stations, or elsewhere that causes wastewater to runoff into the Lake, could cause significant ecological harm. Likewise, flooding could overwhelm the Basin's existing storm water detention basins, adding large volumes of particulates and other runoff pollutants to Lake Tahoe.

Hazard 2: Extreme Precipitation and Landslides
Landslide hazards result from a complex interaction of geology, hydrology, and ecological systems. Climate-related factors, such as the projected change in soil moisture and extreme precipitation, are important risk factors for landslide and debris flow. Landslides can severely damage infrastructure located on or below a sliding slope, such as roads, pathways, power and communications lines, water storage tanks, and pipelines. Landslides also cause lengthy
disruptions as tons of rock, soil, and debris must be removed to restore service. The highways connecting Basin communities traverse high mountain passes, canyons, and cuttings alongside potentially hazardous slope zones. In areas already prone to landslide hazards (e.g., State Route 89 around Emerald Bay), projected increases in the frequency and intensity of extreme precipitation events may increase the frequency of landslides.

Hazard 3: Snowpack and Avalanche
Climate models for all scenarios project a decline in the Basin's maximum snowpack, which is the main climate-related factor affecting avalanche hazard. A decline in peak snowpack indicates a likely reduction in the number, frequency, and severity of slab avalanches. However, while the number and severity of avalanches are likely to decline, visitor traffic to the Basin is projected to increase in the future, particularly during winter seasons with heavy snowfall. This could increase the number of people exposed to avalanche hazards.

Hazard 4: Wildfire
The current wildfire threat to infrastructure varies significantly across the Basin, depending mainly on the proximity of infrastructure to combustible fuels. Moreover, climate change is projected to affect risk factors that both increase and decrease the wildfire hazard in the Basin. Climate models project changes to temperature and hydrology that affect the growth and accumulation of combustible vegetation. This influences projected wildfire intensity geographically within the Basin and across emissions scenario/projection timeframes. In all scenarios, increases in fire intensity (as indicated by the projected size of a potential fire were one to occur) are projected in the mountains west and south of the Lake. Because climate change can reduce wildfire risk factors such as vegetation growth and density of combustible fuels, fire intensity may increase or decrease depending on the location in the Basin. Throughout the rest of the Basin, the direction and degree of change vary across emissions scenarios and timeframes.

VIII. POLLUTION CONTROLS

General methods for controlling pollution in watersheds include: obtaining written agreements with public landowners; participation in regional planning efforts; public education; collaboration between watershed stakeholders and regulators, emergency response programs, and securing funding for watershed programs (EPA 2003). The Tahoe Water Suppliers Association (TWSA) designs programs to meet EPA guidelines and local regulations.

This chapter is a summary of TWSA and Tahoe Basin regional agency control activities during the reporting year including: regulatory changes, environmental improvement projects, public education, mapping and spill reporting projects.

Perchlorate in Drinking Water
https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/Perchlorate.html

The Division of Drinking Water (DDW), at a July 5, 2017 public hearing, presented to the State Water Board its findings and recommendations related to DDW's review of the perchlorate maximum contaminant level (MCL). DDW's recommendations (see the Perchlorate Review Public Document) were to first establish a lower detection limit for purposes of reporting (DLR) to gather additional occurrence data, and then revise the MCL, if the new data support development of a new standard.

The State Water Board approved DDW's proposal to investigate, develop, and propose revisions to the perchlorate DLR (see Resolution 2017-0041). The Perchlorate Detection Limit for Purposes of Reporting (DLR) has been approved. The rule was scheduled to take effect July 1, 2021. Information on the current status of the regulation can be found on the perchlorate regulation webpage.

Perchlorate and its salts are used in solid propellant for rockets, missiles, and fireworks, and elsewhere (e.g., production of matches, flares, pyrotechnics, ordnance, and explosives). Their use can lead to releases of perchlorate into the environment.

For information on the history of perchlorate in California drinking water, click here.

The California Department of Public Health (CDPH) – (via the Drinking Water Program, now the State Water Board, Division of Drinking Water) was mandated by §116293(b) of the Health and Safety Code to adopt a drinking water standard for perchlorate [maximum contaminant level (MCL)]. Health and Safety Code §116365 mandates that the MCL be set as close as possible to the public health goal (PHG), while considering cost and technical feasibility. The PHG is the concentration of a drinking water contaminant that does not pose a significant risk to human health if ingested in drinking water, established by Cal/EPA's Office of Environmental Health Hazard Assessment (OEHHA).

Health and Safety Code §116365(g) requires the State Water Board, at least once every five years, to review its MCLs. In the review, the State Water Board's MCLs are to be consistent with criteria of §116365(a) and (b). Those criteria state that the MCLs cannot be less stringent than federal MCLs, and must be as close as is technically and economically feasible to the PHGs established by the OEHHA. Consistent with those criteria, the State Water Board is to amend any standard if any of the following occur: (1) Changes in technology or treatment techniques that permit a materially greater protection of public health or attainment of the PHG, or (2) New scientific evidence indicates that the substance may present a materially different risk to public

health than was previously determined. Each year by March 1, the State Water Board is to identify each MCL it intends to review that year.

In 2015, OEHHA revised the PHG for perchlorate from 6 ppb to 1 ppb. The revised PHG prompted the review of the perchlorate MCL.

CA Drinking Water Program transferred from the Department of Public Health to State Water Board. A major reorganization of the state agency was implemented in 2014. *http://www.waterboards.ca.gov/drinking_water/programs/index.shtml*

2014 Reorganization Summary

CA State policy declares that every human being has the right to clean, affordable, and accessible water adequate for human consumption, cooking, and sanitary purposes [AB 685 (Eng, Chapter 524, Statutes of 2012)].

The Administration had evaluated the current governance structure of the state's drinking water and water quality activities and concluded that aligning the state's drinking water and water quality programs in an integrated organizational structure would best position the state to both effectively protect water quality and the public health as it relates to water quality, while meeting current needs and future demands on water supplies.

With the Legislature's approval and appropriate legislation, this alignment was achieved by moving the Drinking Water Program from the Department of Public Health to the State Water Board on July 1, 2014.

The Administration's goal in transferring the Drinking Water Program is to align the state's water quality programs in an organizational structure that:

DRINKING WATER PROGRAM / ADMINISTRATIVE STAFFING AT DEPARTMENT OF PUBLIC HEATH

Drinking Water Program Staffing	Number of Staff
Executive Division	15
Operator Certification	7
Drinking Water Technical (SRF)	40.5
Regulatory - Northern CA	77.5
Regulatory - Southern CA	104
ELAP	25
TOTAL Drinking Water Program	**269**

Administrative Staffing	Number of Staff
Administrative Staff	6
Legal Division	5
Legislation/Public Affairs	1
Information Technology	10
TOTAL Administrative Staff	**22**
TOTAL Permanent Staff	**291**

NOTE: The total number of Drinking Water Program staff includes 291 permanent staff positions as well as temporary help.

1) Consolidates all water quality regulation throughout the hydrologic cycle to protect public health and promote comprehensive water quality protection for drinking water, irrigation, industrial, and other beneficial uses;

2) Maximizes the efficiency and effectiveness of drinking water, groundwater, and water quality programs by organizing them in a single agency whose primary mission is to protect water quality for beneficial uses including the protection and preservation of public and environmental health;

3) Continues focused attention on providing technical and financial assistance to small, disadvantaged communities to address their drinking water needs;

4) Consolidates financial assistance programs into a single state agency that is focused on protecting and restoring California water quality, protecting public health, and supporting communities in meeting their water infrastructure needs;

5) Establishes a one-stop agency for financing water quality and supply infrastructure projects;

6) Enhances water recycling, a state goal, through integrated water quality management; and

7) Promotes a comprehensive approach to communities' strategies for drinking water, wastewater, water recycling, pollution prevention, desalination, and storm water.

US EPA Regulatory Changes

Long Term 2 Enhanced Surface Water Treatment Rule (LT2 rule/ LT2ESWTR)
http://water.epa.gov/lawsregs/rulesregs/sdwa/lt2/index.cfm

The deadline for compliance was October 1, 2014. All TWSA members have achieved compliance or were exempted due to existing treatment processes. Information on TWSA member compliance is available in "Chapter V - Description of the Water Supply".

The USEPA developed the Long Term 2 Enhanced Surface Water Treatment Rule (LT2 rule/LT2ESWTR) to improve drinking water quality and provide additional protection from disease-causing microorganisms and contaminants that can form during drinking water treatment. Pathogens, such as *Giardia* and *Cryptosporidium*, are often found in water, and can cause gastrointestinal illness (e.g., diarrhea, vomiting and cramps) and other health risks. In many cases, water needs to be disinfected through the use of additives such as chlorine to inactivate (or kill) microbial pathogens.

Existing regulations did not require unfiltered systems to provide any treatment for Cryptosporidium. Although unfiltered systems maintain watershed control programs to protect water quality, recent national surveys have shown Cryptosporidium to be present in the sources of unfiltered systems. Without treatment, these Cryptosporidium will pass into the water distributed to consumers. Available data indicate that the average risk from Cryptosporidium in unfiltered systems is higher than in filtered systems, so that treatment by unfiltered systems is required to achieve comparable public health protection. Further, with available technologies like UV and ozone, treatment for Cryptosporidium is feasible for all unfiltered systems. Consequently, EPA is establishing requirements under the LT2ESWTR for all unfiltered systems to treat for Cryptosporidium, with the required degree of treatment depending on the source water contamination level.

CALIFORNIA Revised Total Coliform Rule (RTCR) Overview
Final Regulation Text

Beginning July 1, 2021, the California Revised Total Coliform Rule (RTCR) became effective. The revisions include the new Coliform Treatment Technique requirement replacing the Total Coliform MCL, and a new E.coli MCL regulatory limit. The Revised Total Coliform Rule establishes a "find-and-fix" approach for investigating and correcting causes of coliform problems within water distribution systems

Bacteriological Sample Siting Plans

Existing bacteriological sample siting plans will comply with the new Federal rTCR requirements provided the plans:

1. Identify repeat sample locations for each routine sample location
2. Identify triggered source sampling needed to comply with the Groundwater Rule
3. Identify the sample schedule and rotation plan among sampling sites for collection of routine, repeat and triggered source sampling

If your existing plan does not include the additional requirements above, please submit a new plan to your local regulating agency (DDW District Office or County Environmental Health Office). A sample bacteriological sample siting plan will be available soon.

Routine and Repeat Sampling
Routine sampling frequency and number of required samples remain the same for all water systems. Within 24 hours following a total coliform-positive sample result, water systems shall continue to collect a repeat sample set of 3 samples. All routine and repeat samples must be collected according to the approved bacteriological sample siting plan above.

Level 1 Assessment

If a water system collects...	Level 1 Assessment is required within 30 days if...
...Less than 40 routine and repeat samples per month	More than 1 TC-positive sample in a month
...40 or more routine and repeat samples per month	More than 5.0% TC-positive samples in a month

Under the RTCR, a water system which exceeds the trigger levels in the table above must also conduct a Level 1 Assessment. The completed assessment must be submitted to the local regulating agency (DDW District Office or County Health Office) within 30 days of exceeding the trigger level. The Level 1 Assessment will require water systems to identify a possible cause to the total coliform positive samples and corrective actions taken/needed. Failure to complete the corrective actions will be a violation of the Coliform Treatment Technique in the RTCR.

Templates for the Level 1 Assessment for different types of water systems are available below:

- Level 1 Assessment for simple water systems (well, pressure tank, no treatment/chlorination)
- Level 1 Assessment for most groundwater systems (wells, storage/pressure tanks, chlorination)
- Level 1 Assessment for water systems with a surface water treatment plant

- Level 1 Assessment for groundwater systems with chemical removal treatment
- Level 1 Assessment for transient, non-community water systems

US EPA Revised Total Coliform Rule (RTCR) – Final Rule
http://water.epa.gov/lawsregs/rulesregs/sdwa/tcr/regulation_revisions.cfm

Revised Total Coliform Rule: A Quick Reference Guide (PDF)
EPA 815-B-13- 001, September 2013

Public water systems (PWSs) and primacy agencies were required to comply with the revised requirements by April, 2016. Until then, PWSs and primacy agencies must continue complying with the 1989 TCR. On February 13, 2013, EPA published in the Federal Register the revisions to the 1989 TCR. EPA anticipates greater public health protection under the Revised Total Coliform Rule (RTCR). The RTCR:

- Requires public water systems that are vulnerable to microbial contamination to identify and fix problems; and
- Establishes criteria for systems to qualify for and stay on reduced monitoring, which could reduce water system burden and provide incentives for better system operation.

The RTCR establishes a maximum contaminant level (MCL) for E. coli and uses E. coli and total coliforms to initiate a "find and fix" approach to address fecal contamination that could enter into the distribution system. It requires public water systems (PWSs) to perform assessments to identify sanitary defects and subsequently take action to correct them.

The Revised Total Coliform Rule
Date of Implementation: April 1, 2016 / Date of Regulation: February 13, 2013

EPA finalized the Revised Total Coliform Rule (RTCR). The RTCR maintains the purpose of the 1989 Total Coliform Rule (TCR) to protect public health by ensuring the integrity of the drinking water distribution system and monitoring for the presence of microbial contamination. EPA anticipates greater public health protection under the RTCR, as it requires public water systems (PWSs) that are vulnerable to microbial contamination to identify and fix problems, and it establishes criteria for systems to qualify for and stay on reduced monitoring, thereby providing incentives for improved water system operation.

The RTCR, as with the 1989 TCR, is the only microbial drinking water regulation that applies to all PWSs. Systems are required to meet a legal limit (i.e., maximum contaminant level (MCL)) for *E. coli,* as demonstrated by required monitoring. The RTCR specifies the frequency and timing of the microbial testing by water systems based on population served, system type, and source water type. The rule also requires public notification when there is a potential health threat as indicated by monitoring results, and when the system fails to identify and fix problems as required.

The entities potentially affected by the RTCR are PWSs that are classified as community water systems (CWSs) (e.g., systems that provide water to year round residents in places like homes or apartment buildings) or non-community water systems (NCWSs) (e.g., systems that provide water to people in locations such as schools, office buildings, restaurants, etc.); State primacy agencies; and

local and tribal governments. The RTCR applies to approximately 155,000 PWSs that serve approximately 310 million (M) individuals.

The RTCR establishes a health goal (maximum contaminant level goal, or MCLG) and an MCL for *E. coli,* a more specific indicator of fecal contamination and potential harmful pathogens than total coliforms. EPA replaces the MCLG and MCL for total coliforms with a treatment technique for coliforms that requires assessment and corrective action. Many of the organisms detected by total coliform methods are not of fecal origin and do not have any direct public health implication.

What are the key provisions PWSs must comply with under the RTCR?

Provision Category	**Key Provisions**
Contaminant Level	Addresses the presence of total coliforms and E. coli in drinking water. For E. coli (EC), the Maximum Contaminant Level Goal (MCLG) is set at zero and the Maximum Contaminant Level (MCL) is based on the occurrence of a condition that includes routine and repeat samples. For total coliforms (TC), PWSs must conduct a Level 1 or Level 2 assessment of their system when they exceed a specified frequency of total coliform occurrence. Other events such as an MCL violation or failure to take repeat samples following a routine total coliform-positive sample will also trigger an assessment. Any sanitary defects identified during an assessment must be corrected by the PWS. These are the treatment technique requirements of the RTCR.
Monitoring	Develop and follow a sample siting plan that designates the PWS's collection schedule and location of routine and repeat water samples. Collect routine water samples on a regular basis (monthly, quarterly, annually) and have them tested for the presence of total coliforms by a state certified laboratory. Analyze all routine or repeat samples that are total coliform positive (TC+) for E. coli. Collect repeat samples (at least 3) for each TC+ positive routine sample. For PWSs on quarterly or annual routine sampling, collect additional routine samples (at least 3) in the month after a TC+ routine or repeat sample. Seasonal systems must monitor and certify the completion of a state-approved start-up procedures.
Level 1 and Level 2 Assessments and Corrective Actions	PWSs are required to conduct a Level 1 or Level 2 assessment if certain conditions indicate that they might be vulnerable to contamination, and fix any sanitary defects within a required timeframe.
Reporting and Recordkeeping	PWSs are required to report certain items to their states. These reporting and recordkeeping requirements are essentially the same as under TCR with the addition of Level 1 and Level 2 requirements.
Violations, Public Notification (PN) and Consumer Confidence Report (CCR)	PWSs incur violations if they do not comply with the requirements of the RTCR. The violation types are essentially the same as under the TCR with few changes. The biggest change is no acute or monthly MCL violation for total coliform positive samples only.
	PN is required for violations incurred. Within required timeframes, the PWS must use the required health effects language and notify the public if they did not comply with certain requirements of the RTCR. The type of PN depends on the severity of the violation. Community water systems (CWSs) must use specific language in their CCRs when they must conduct an assessment or if they incur an E. coli MCL violation.

Lead and Copper Rule 2021
http://water.epa.gov/lawsregs/rulesregs/sdwa/lcr/index.cfm
https://www.epa.gov/ground-water-and-drinking-water/revised-lead-and-copper-rule

This final rule is effective December 16, 2021. Lead and copper enter drinking water primarily through plumbing materials. Exposure to lead and copper may cause health problems ranging from stomach distress to brain damage. On June 7, 1991, EPA published a regulation to control lead and copper in drinking water. This regulation is known as the Lead and Copper Rule (also referred to as the LCR or 1991 Rule). The treatment technique for the rule requires systems to monitor drinking water at customer taps. If lead concentrations exceed an action level of 15 ppb or copper concentrations exceed an action level of 1.3 ppm in more than 10% of customer taps sampled, the system must undertake a number of additional actions to control corrosion. If the action level for lead is exceeded, the system must also inform the public about steps they should take to protect their health and may have to replace lead service lines under their control. The U.S. Environmental Protection Agency (EPA) signed a final rule to extend the effective date of the Lead and Copper Rule (LCR) Revisions to December 16, 2021. This action represents the next step in EPA's effort to take the time necessary to review the LCR Revisions and ensure that it protects families and communities, particularly those that have been disproportionately impacted by lead in drinking water. This action allows the agency to continue conducting virtual engagements to gather valuable input from communities that have been impacted by lead and to seek feedback from national water associations, Tribes and Tribal communities, and EPA's state co-regulators. This action also extends the revised LCR's compliance deadline to October 16, 2024 to ensure that drinking water systems and primacy states continue to have the full three years provided by the Safe Drinking Water Act to take actions needed for regulatory compliance. For more information, visit: https://www.regulations.gov/docket/EPA-HQ-OW-2017-0300.

Federal Register Notice: Lead and Copper Rule Revisions; Delay of Effective and Compliance

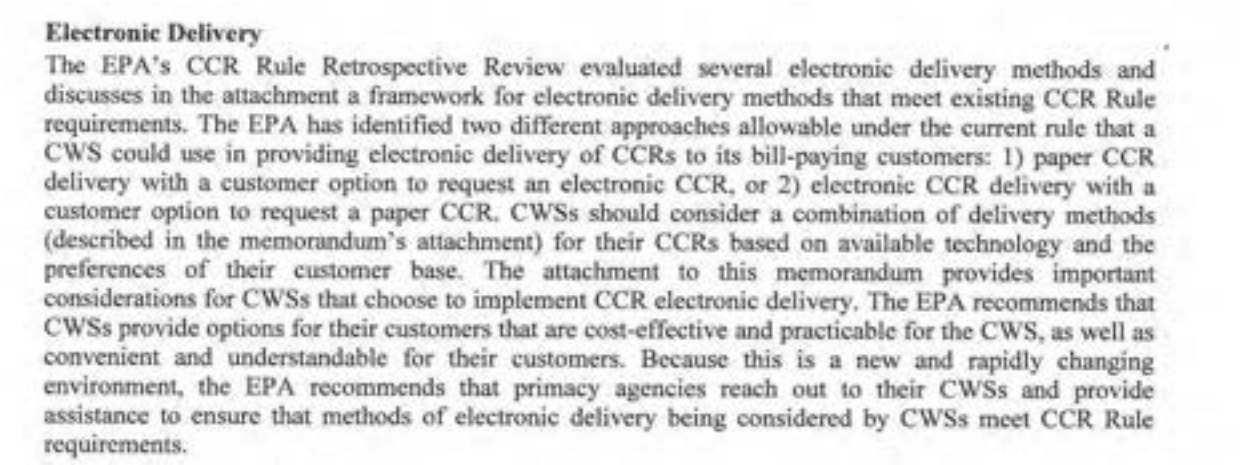
Reduction of Lead in Drinking Water Act
Date of implementation: January 4, 2014 / Date of Regulation: January 4, 2011
Summary:
Amends Safe Drinking Water Act (SDWA) Section 1417 – Prohibition on Use and Introduction into Commerce of Lead Pipes, Solder and Flux.

- Modifies the applicability of the prohibitions by creating exemptions.
- Changes the definition of "lead free" by reducing lead content from 8% to a weighted average of not more than 0.25% in the wetted surface material (primarily affects brass/bronze).
- Eliminated provision that required certain products comply with "voluntary" standards for lead leaching.
- Establishes statutory requirement for calculating lead content.

Electronic Delivery of the CCR
http://water.epa.gov/lawsregs/rulesregs/sdwa/ccr/upload/ccrdeliveryoptionsmemo.pdf

EPA evaluated several electronic delivery methods to determine which forms meet existing CCR Rule requirements as a part of the CCR Rule Retrospective Review. The EPA interpretive memorandum SDWA – Consumer Confidence Report Rule Delivery Options, dated January 2013, clarifies the requirements of the CCR Rule associated with the delivery of the CCR. The memorandum's attachment, Consumer Confidence Report Electronic Delivery Options and Considerations, provides

an overview of electronic delivery methods and describes approaches for community water systems that may want to implement electronic delivery.



Electronic Delivery

The EPA's CCR Rule Retrospective Review evaluated several electronic delivery methods and discusses in the attachment a framework for electronic delivery methods that meet existing CCR Rule requirements. The EPA has identified two different approaches allowable under the current rule that a CWS could use in providing electronic delivery of CCRs to its bill-paying customers: 1) paper CCR delivery with a customer option to request an electronic CCR, or 2) electronic CCR delivery with a customer option to request a paper CCR. CWSs should consider a combination of delivery methods (described in the memorandum's attachment) for their CCRs based on available technology and the preferences of their customer base. The attachment to this memorandum provides important considerations for CWSs that choose to implement CCR electronic delivery. The EPA recommends that CWSs provide options for their customers that are cost-effective and practicable for the CWS, as well as convenient and understandable for their customers. Because this is a new and rapidly changing environment, the EPA recommends that primacy agencies reach out to their CWSs and provide assistance to ensure that methods of electronic delivery being considered by CWSs meet CCR Rule requirements.

California Emerging Contaminants Regulations
https://www.waterboards.ca.gov/drinking_water/programs/

California has ongoing, regulatory requirements for testing, monitoring and reporting on emerging contaminants of concern, beyond USEPA regulations. There are now requirements for testing a variety of potential contaminants, including chemicals and micro-plastics.

2019-22: Microplastics as an Emerging Contaminant
TWSA staff are actively engaged on this topic.

As stated in Health and Safety Code section 116350 *et seq.*, California Safe Drinking Water Act (Act) requires the State Water Resources Control Board (State Water Board) to administer provisions related to drinking water to protect public health. The Act allows the State Water Board to conduct research, studies, and demonstration programs to ensure provision of a dependable, safe supply of drinking water, which may include improving methods to identify and measure the existence of contaminants in drinking water and to identify the source of the contaminants. The Act also grants the State Water Board the authority to implement regulations that may include monitoring of contaminants, and requirements for notifying the public of the quality of the water delivered to customers. On September 28, 2018, Senate Bill No. 1422 was filed with the Secretary of State , adding section 116376 to the Health and Safety Code, and requiring the State Water Board to adopt a definition of microplastics in drinking water on or before **July 1, 2020**, and on or before **July 1, 2021**, to adopt a standard methodology to be used in the testing of drinking water for microplastics and requirements for four years of testing and reporting of microplastics in drinking water, including public disclosure of those results.

Proposed Action - Consistent with Health and Safety Code section 116376 and within its authority, the State Water Board is reviewing existing research and studies to accomplish the following tasks:

On or before July 1, 2020: Adopt a definition of microplastics in drinking water;

On or before July 1, 2021: Adopt a standard methodology for testing of microplastics in drinking water; Adopt requirements for four years of testing and reporting of microplastics in drinking water, including public disclosure of those results;

- Consider issuing quantitative guidelines (e.g., notification level) to aid consumer interpretations of the testing results, if appropriate;
- Accredit qualified laboratories in California to analyze microplastics in drinking water.

Health and Safety Code section 116376 allows the State Water Board to implement these tasks through the adoption of a Policy Handbook that is not subject to the Administrative Regulations and Rulemaking requirements of Government Code section 11340 *et seq*.

Shifting / Reduced Economic Funding for Restoration Projects

Projects and studies used to understand, analyze and mitigate environmental problems such as storm water runoff and aquatic invasive species requires large amounts of funding. Prior to 2011, Lake Tahoe had a significant influx of federal money (often matched with state and local government funds) coming in to support an array of research projects, environmental improvement and capital improvement projects. Although not immediately apparent, since several large projects were being completed from prior funding. Loss of federal funding signaled a drastic slowdown in water quality improvements for the region. Some funding was reinstated in 2016, with the passage of another round of the multi-year Tahoe Restoration Act. Much of that allocation is for fuels reduction.

This influx of funding had decreased drastically, with a major loss being Tahoe Restoration Act funding for multiple years. Funding from the Southern Nevada Public Lands Management Act (SNPLMA) has greatly reduced with the economic downturns of 2008-2011 and drop in real estate process and transactions. There is now an increased emphasis on private-public partnerships to accomplish restoration goals.

2021: Lake Tahoe Restoration Act: Bipartisan Bill Introduced to reauthorize funding

https://www.feinstein.senate.gov/public/index.cfm/press-releases?ContentRecord_id=3E3A74E6-9E03-4E37-9BA9-80DB8246A601

https://www.cortezmasto.senate.gov/news/press-releases/cortez-masto-leads-bipartisan-legislation-to-reauthorize-lake-tahoe-restoration-act

May 12, 2021 , Washington DC —Senators Dianne Feinstein and Alex Padilla (both D-Calif.) today joined with Senators Catherine Cortez Masto and Jacky Rosen (both D-Nev.) to introduce bipartisan legislation to extend authorization of the *Lake Tahoe Restoration Act*.

The original Lake Tahoe Restoration Act was passed in 2000 and authorized $300 million for the restoration of the lake and surrounding basin. The current authorization, which was passed in 2016, will expire in 2024. Reauthorizing the bill will prevent an interruption in conservation and restoration planning.

Companion legislation was introduced in the House by Representatives Mark Amodei (R-Nev.), John Garamendi (D-Calif.), Dina Titus (D-Nev.), Susie Lee (D-Nev.), and Steven Horsford (D-Nev.).

“We’ve made tremendous progress in restoring Lake Tahoe since President Clinton’s visit in 1997 for the first Lake Tahoe Summit. Unfortunately, climate change is magnifying the threats facing Lake Tahoe, including warming lake temperatures, declining clarity, thriving invasive species and more dangerous wildfires,” said Senator Feinstein. “We have a responsibility to protect this magnificent lake. Reauthorizing the *Lake Tahoe*

Restoration Act is a big part of that effort, ensuring that the federal government remains an active partner in preserving the lake and surrounding basin."

The bill is supported by the Tahoe Regional Planning Agency, League to Save Lake Tahoe and Tahoe Chamber of Commerce.

"The threatened scenic, ecological, and recreational richness of Lake Tahoe is of enormous importance to our communities, the states of Nevada and California, and the nation," said Joanne S. Marchetta, executive director of the Tahoe Regional Planning Agency. "We applaud the bi-partisan and bi-state support for this legislation that will allow the continued restoration of a national treasure."

2016: Tahoe Restoration Act is Funded after several year hiatus
http://www.keeptahoeblue.org/news/opinion-pieces/Congress-passes-the-Lake-Tahoe-Restoration-Act

In December of 2016, President Obama signed legislation that included the Lake Tahoe Restoration Act, authorizing $415 million for restoration, research and aquatic invasive species and wildfire prevention at Lake Tahoe. The Act has been a keystone of the effort to protect and restore Lake Tahoe's clarity.

The League to Save Lake Tahoe strongly supported this legislation, which follows action by California and Nevada to renew their commitment to cooperation on Lake Tahoe's environmental goals, without which continued public funding may have been impossible.

The U.S. Senate joined the U.S. House of Representatives in passing the Water Resources Development Act, which included the reauthorization of the Lake Tahoe Restoration Act. This landmark legislation will provide over $400 million in critical public funds for environmental restoration projects, the control of aquatic invasive species and to reduce the threat of catastrophic wildfire.

The Tahoe Fund *www.tahoefund.org*
The Tahoe Fund, established in 2010, has stepped up as a public-private partnership proponent; seeking to raise funds from private donations and investors, in order to keep to fund critical environmental, recreation and improvement projects going in the Tahoe Basin. The Tahoe-based organization's goal is providing funding for conservation, recreation and stewardship education projects at Lake Tahoe. TWSA partnered with the Tahoe Fund on a Bottom Barrier Challenge to raise the funds to complete the Tahoe RCD bottom barrier inventory for 5 acres of lakewide treatment use. Since 2019, TWSA has partnered with the Tahoe Fund on a water bottle filling station grant program, awarding $500-$1000 grants to local businesses and organizations, who put in a water filling station in public area.

Tahoe Beach Apps
Looking for a public beach in Tahoe? Now there is an app for that! The Tahoe Fund, in partnership with the California Tahoe Conservancy's Tahoe License Plate Program, funded the creation and development of the Tahoe Beaches App to help residents and visitors find their way to more than 50 public beaches around Lake Tahoe. The Lake Tahoe Beaches app uses GPS to help you find nearby beaches and driving directions. You can search for beaches by beach features, including: Accessibility, Barbecues, Boat Rentals, Campfires, Campsites Nearby, Fishing Nearby, Food Concessions, Group Facilities, Overnight

Parking, Paddleboard/Kayak, Jet Ski Rentals, Pets OK, Picnic Tables, Playground, Public Bathrooms, Public Transit Nearby, Shade Available, Showers and Volleyball Courts. Each beach has its own profile with helpful information such as: photos, hours of operation, parking info, contact info, nearby transit, directions, ways to help take care of the environment and a full description.

Tahoe Fund Project Portfolio

The Project Portfolio contains projects selected by the Tahoe Fund Board of Directors for funding. The Tahoe Fund is dedicated to educating the general public on the environmental issues facing restoration efforts at Lake Tahoe and to raising funds to support EIP (Environmental Improvement Program) projects that protect the natural environment. The Tahoe Fund provides support for projects in all EIP program areas, but generally focuses its efforts in three areas: Conservation, Recreation, and Education. A full inventory of projects has been developed and is available on the website: *http://www.tahoefund.org*

In 2016 The Tahoe Fund introduced the Tahoe Fund Environmental Venture Trust, a new approach to philanthropy in Tahoe. Like a traditional venture capital fund, the Tahoe Fund Environmental Venture Trust will provide seed funding for a variety of innovative early-stage environmental projects that will help solve the environmental challenges facing Lake Tahoe. The returns will be purely philanthropic. By providing early-stage funding we can help kick start innovative pilot projects and get new projects off the ground.

TWSA/Tahoe Fund Projects:

DRINK TAHOE TAP ® Water Refill Stations
https://www.tahoefund.org/projects/active-projects/drinktahoe-tap-water-refill-stations/



Project Partner: Tahoe Water Suppliers Association
Total Project Cost: $20,000 **Tahoe Fund Grant:** $10,000
With 99.994% purity, Tahoe tap water was voted the best tasting water in the country. The Tahoe Fund is partnering with the Tahoe Water Suppliers Association to encourage businesses in the Tahoe Basin to install more water bottle refill stations so more people can DRINK TAHOE TAP. This will encourage environmental stewardship and reduce the use of single-use plastics by providing a way to easily refill reusable water bottles.

Available on a first-come basis, grants will be offered to Basin businesses who fill out the application, install the water bottle refill stations and submit proof of installation and payment between August 1, 2019 and June 30, 2022. Visit www.drinktahoetap.org to download the application.

Covid-19 impacts have affected water fountain use, but bottle fill stations (with no or low contact operation) are considered safe for use with regular sanitation best practices.

2018 Aquatic Invasive Bottom Barrier Challenge
http://www.tahoefund.org/our-projects/active-projects
Partner: Tahoe Resource Conservation District, Tahoe Water Suppliers Association
Total Project Cost: $52,500 / Tahoe Fund Goal: $26,250 / TWSA Match = 1/1 to Tahoe Fund

In 2017, the Tahoe Water Suppliers Association collaborated with the Tahoe Fund on a "Bottom Barrier Challenge", offering up to $26,000 of matching funds to private donations. The joint fundraising project for bottom barrier mats was launched in June 2017 as a Tahoe Fund Project, closing on Dec. 31, 2017. Aquatic invasive plants are affecting water quality around the shoreline of Lake Tahoe. Through a well coordinated program, the Tahoe Resource Conservation District has been able to remove aquatic invasive weeds with the use of bottom barriers and diver-assisted hand pulling. The current inventory of bottom barriers is 1.6 acres short of the maximum 5 acres of coverage permitted for Tahoe. The Tahoe Water Suppliers Association has issued a matching challenge to purchase the remaining 175 barriers that would bring the inventory to the full 5 acres. They will match every dollar that Tahoe Fund raises between now and the end of 2017. With the full inventory of mats, we can ensure more aquatic invasive weeds are removed from the Lake and water quality is improved."

Other Recent Tahoe Fund Projects:

UV Light Pilot Project
http://www.tahoefund.org/our-projects/active-projects/uv-light-pilot-project/

Partners: Tahoe Resource Conservation District, Inventive Resources Inc., California Tahoe Conservancy Total Project Cost: $270,000 **/** Tahoe Fund Grant: $10,000

In an effort to spur innovation in Tahoe, the Tahoe Fund provided the initial funds for a project that will evaluate UV light as a new method to remove aquatic invasive weeds. This innovative approach will be used in a pilot program at Lakeside Marina & Beach and could change the way aquatic invasive weeds are controlled in Tahoe's watershed and beyond if successful. Aquatic invasive weeds are a serious threat to the crystal clear waters of Lake Tahoe. Aquatic invaders such as Eurasian watermilfoil and curly-leaf pondweed have already established in the Lake. These non-native species change the natural make-up of the waters and threaten to significantly reduce the recreational use of the Lake and surrounding rivers.

A $5,000 grant to the Tahoe Resource Conservation District from the Tahoe Fund's Environmental Venture Trust helped secure $260,000 in public funding from the California Tahoe Conservancy to get the project started this year. An additional $5,000 grant will provide underwater cameras to monitor the effectiveness of the UV light.

Tahoe East Shore Trail
Partners: Tahoe Transportation District, Nevada Division of State Parks, Tahoe Regional Planning Agency,
Nevada Division of State Lands, US Forest Service, Incline Village General, Improvement District, Washoe County, Nevada Department of Transportation, Federal Highway Administration Funds Raised: $1,000,000+

The Tahoe East Shore Trail (formerly the Incline to Sand Harbor Bike Path) is a spectacular three-mile paved path that will provide a new opportunity for the community to experience the natural beauty of the eastern shore of Tahoe. The path will significantly improve the safety of those traveling down the Highway 28 corridor, while creating an exceptional recreational amenity with added environmental benefits. With a 10-foot wide path, it meets the American Disability Act standards to ensure it is accessible to everyone to ride, walk or stroll. The new path begins at the intersection of Lakeshore Drive and Highway 28, expanding the current Lakeshore bike path for three more miles down to the Sand Harbor State Park. Along the way it provides access to Hidden Beach, Memorial Point and various other scenic vistas. It is a major component of the Tahoe Trail that will one day go all the way around the Lake.

The Smartest Forest Fund
Partners: U.S. Forest Service, California Tahoe Conservancy, Nevada Department of Forestry, Tahoe Forest & Fuels Team, Tahoe Central Sierra Initiative

Fundraising Goal: $5,000,000

Last year California and Nevada both experienced their biggest wildfires in history. The Sierra Nevada forest is now home to more than 100 million dead trees. In the Tahoe Basin, we have seen tree mortality explode to over 160,000 trees in just the past few years. Many feel it is not a matter of if, but when we will face a catastrophic wildfire. We know the Camp Fire in Paradise, California could happen here. For all of these reasons, the Tahoe Fund has identified forest health as our number one priority.

The Tahoe Fund is launching the Smartest Forest Fund, a sub-fund of our Environmental Venture Trust, designed to use philanthropy to drive innovation through seed funding. With this Fund, we plan to invest in new ideas and pilot projects. Some will work; some may not. We know our efforts will help bolster the great work already underway by the US Forest Service, California and Nevada to accelerate the pace and scale of fixing our forest. The Tahoe Fund wants to make Tahoe's forest the Smartest Forest on the Planet, because we believe through innovation and technology we can significantly increase the pace and scale of forest restoration in the Tahoe Basin and beyond.

Previous and Ongoing Tahoe Fund Projects:
"Tahoe In Depth"
Tahoe Fund is proud to sponsor "Tahoe In Depth", an award winning environmental newspaper that reports on environmental improvement projects around the Basin. Published twice a year, Tahoe In Depth reaches over 40,000 homeowners with information from some of the 50 partners working to restore the health of the Tahoe environment. (Editor Note: TWSA is also a sponsor.)

"Take Care" Campaign
Litter. Dog poop. Unsafe fires. Bear safety. Drink Tahoe Tap. These are just some of the issues impacting our region. The Tahoe Fund, in partnership with the Lake Tahoe Outreach Committee, developed the Take Care™ campaign to help reduce these impacts and promote a more responsible use of our great outdoors.

In 2020, and 2015, TWSA commissioned "Drink Tahoe Tap" graphics for this campaign. See Action Plan Highlights/Executive Summary for details.

The campaign was designed for use in outreach efforts by public agencies, private businesses and nonprofit organizations in the Region. Aimed at residents and visitors. The initial launch includes messages for: general litter, cigarette butts and beer bottle litter, dog waste, fire safety, bear awareness, and aquatic invasive species prevention. A Take Care Toolkit featuring the digital files for all of the messages is available to download for free at *takecaretahoe.org*.

"We held a workshop in September 2013 with more than 60 regional stakeholders to address these issues," said Amy Berry, Tahoe Fund CEO and member of the Lake Tahoe Outreach Committee. "We heard loud and clear that a unified stewardship brand was needed to bring the region together to elevate our messages and see the biggest impact. We are thrilled to finally make the materials available to our regional partners for use in their outreach efforts."

Lake Tahoe (Environmental) Summits

Nevada and California federal representatives gather at the shores of Lake Tahoe annually every August, to discuss ongoing progress in restoration efforts. The Lake Tahoe Summit is now in its 20th+ years. The Lake Tahoe Summit is an occasion to reinvigorate problem solving efforts and to build pragmatic, strategic partnerships. TWSA is a sponsor of this event- providing water stations and refillable bottles to all attendees.

2021 Tahoe Summit: lawmakers offer dire warning, hope about lake's future

https://thenevadaindependent.com/article/at-annual-tahoe-summit-lawmakers-offer-dire-warning-hope-about-lakes-future

The growing threat of catastrophic wildfires blazing across the West and the resulting detrimental effects, such as hazardous air quality, were top of mind for Nevada and California leaders gathered on a slightly hazy shore Thursday morning for the 25th annual Lake Tahoe Summit (Aug. 19, 2021). Before speakers launched into remarks on climate change, wildfires, infrastructure and legislation aimed at preserving the popular year-round tourist destination, Washoe Tribe of Nevada and California Chairman, Serrell Smokey, began with a prayer.

"We're in a changing world right now," he said. "The waters are low. We pray for snow. We pray for better weather, we pray for better change to come … We have a lot of fires going on around right now, a lot of areas being wiped out. We pray for restoration, we pray for regrowth and new beginnings."

The air quality across the Tahoe region was labeled as "moderate" on Thursday as the Caldor Fire, which is zero percent contained and has scorched more than 65,000 acres, burns less than 100 miles from the southern shore of the lake. While favorable winds provided some relief during the event, a huge plume of smoke from the fire caused the region's air quality to plummet to hazardous levels earlier this week.

"We know that fires and drought and sky-high temperatures are already taking a toll on Lake Tahoe's people and their plants and their animals," said Sen. Catherine Cortez Masto (D-NV).

Elected officials offered solutions against the backdrop of discouraging trends for the lake during the annual event that brings together bistate leadership to collaborate on preservation efforts. According to the 2021 State of the Lake report published by the Tahoe Environmental Research Center, the region's annual average temperature increased by more than 3 degrees last year to 58 degrees. The area saw diminished snowpack and increased rain, with annual precipitation below average at 20 inches. Snow made up less than 50 percent of the precipitation average last year. The precipitation data shows a break in a prior four-year trend

of average or above-average levels. As a result, the lake's water levels fell by two feet last year. In the report, researchers said it's likely that the lake will fall below its natural rim for the first time in a decade by October, at which point the water will stop flowing to the Truckee River. The river delivers 80 percent of all drinking water to Reno and Sparks residents and is the main water source for Pyramid Lake.

"It's easy to get overwhelmed by the evidence of climate change all around us," Cortez Masto said, "but standing here today, we can also see clear reasons for hope."

Tahoe preservation efforts

Sisolak, Cortez Masto and Sen. Jacky Rosen (D-NV) highlighted the $1.2 trillion infrastructure bill, recently approved by the Senate and awaiting a vote in the House, focused on roads, transit, airports and broadband, plus other legislation that provides funding for programs aimed at preserving the Tahoe region.

Cortez Masto said the infrastructure bill includes millions of dollars for environmental protection, habitat restoration programs and wildfire management. She's also spearheading efforts to extend the Lake Tahoe Restoration Act, saying the coming 2024 expiration could be "devastating" to the lake.

Rosen said the funding from the infrastructure bill will help address road and trail repairs, "making [Tahoe] more accessible for everybody."

In addition to the environmental protection programs, the measure requires coordination between federal, state, local and private groups, including the Environmental Protection Agency (EPA) and the Tahoe Regional Planning Agency. The original bill was approved in 2000, authorizing $300 million in federal funds for a decade-long effort to clean up the lake. The legislation expired in 2010 and wasn't reauthorized until 2016. The effort to extend the legislation is widely supported by public and private Tahoe groups, such as the regional planning agency and the League to Save Lake Tahoe, and all six members of Nevada's congressional delegation.

Interior Secretary Deb Haaland, the keynote speaker at the summit, pointed to the Biden administration's "30 by 30" goal to restore and conserve 30 percent of U.S. land and ocean by 2030. "It's a vision that recognizes that nature offers some of the most cost-effective ways to address the climate crisis that we need to do to stem the steep loss of nature and wildlife," said Haaland, who is an enrolled member of the Laguna Pueblo Tribe in New Mexico. "And that we need to address the inequitable access to the outdoors for communities of color." Haaland, one of the first Native American women elected to Congress and the first to serve as a U.S. cabinet secretary, said the initiative supports ranchers, farmers and private landowners while honoring the sovereignty of tribes and elevating Indigenous-led conservation efforts.

Nevada lawmakers also approved a "30 by 30" resolution during this year's legislative session.

The cabinet secretary added that the Department of Interior is taking steps to hire more firefighters and convert more than 500 seasonal firefighters into permanent career positions this year. The Biden administration also announced earlier this week that federal firefighters will receive a pay raise starting next week.

The next 25 years: Many of the state leaders who spoke during the summit pointed to the future, prompting listeners to think about the state of the Tahoe region in 25 years. Rep. John Garamendi (D-CA) compared the lake to a scrapbook that keeps records of human and geological activity. "What will the lake

record of us?" he said. "Failure is an option. This lake will record the highest temperatures … and then literally the destruction of this lake … if we fail to have the courage to step forward."

While all-time high tourism levels boost the $5 billion Tahoe economy, it also increases trash, pollution and at times overwhelms local infrastructure. A 2018 study for the Tahoe Prosperity Center reported that the region sees as many as 24 million visitors each year. Lake clarity, which is used as a factor to determine the health of the lake, decreases during the peak tourism months, according to researchers. Measured by the depth at which a white disk can be seen, clarity levels were best in February 2020 at 80 feet and least clear in May at 50 feet. When researchers from UC Davis first began monitoring clarity levels in 1968, the white disk could be seen at 102 feet deep. The clarity restoration target is 97.4 feet.

As Tahoe continues to face abundant environmental threats caused by climate change and increased tourism, leaders at the summit urged one another to do more to protect the lake. Summit host Sen. Alex Padilla (D-CA) said he visited the region with his children in 2017, emphasizing the opportunity and obligation to ensure visiting the region will be possible for the next 25 years and beyond.

"But scientists and environmental experts continue to remind us that our window to do so is closing," Padilla said. "Time is of the essence."

2020 Lake Tahoe Summit: Resilient Tahoe
The **(**first-ever virtual) 24th annual Lake Tahoe Summit on August 25, 2020, was hosted by Senator Catherine Cortez Masto. The theme for this year's Summit was "Resilient Tahoe" reflecting the legacy of 50 years of bi-state cooperation through the interstate compact and 24 years of bipartisan collaboration at the Summit while looking ahead to future environmental, infrastructure and economic challenges.

2019 Lake Tahoe Summit: Climate Change *https://www.courthousenews.com/lake-tahoe-summit-boasts-bipartisan-rhetoric-but-division-simmers/*

For a moment as columns of sunlight drifted through the pines with the cobalt surface of Lake Tahoe in the background, it seemed as though the partisan rancor so characteristic of this political moment might temporarily evaporate. But such congeniality was short lived, if it ever lived at all. Senator Dianne Feinstein hosted the 23nd annual Lake Tahoe Summit on Tuesday to call attention to pressing environmental concerns like a warming planet and worsening wildfire conditions in California and the rest of the American West.

"The problem we are dealing with now is climate change," California's senior senator said during remarks delivered from the South Shore of Lake Tahoe. "There's no denying global warming, it's already here."

Feinstein drew a contrast between the current summit and the first one, held in 1997 and featuring then-President Bill Clinton and Vice President Al Gore. During that event, leaders talked about how the famed clarity of the crystal blue lake in the Sierra Nevada was declining due to overdevelopment, vehicle emissions, fertilizers leaking into the lake and other ecological issues unique to the Lake Tahoe Basin.

But in 2019, the overarching issues of climate change have superseded local concerns. And officials acknowledge Lake Tahoe serves as a thermometer for a dynamically changing climate. "There is no

greater effort to keep this lake clear," said California Governor Gavin Newsom during the keynote speech at his first ever Lake Tahoe Summit. "This place is a proxy for all our efforts."

2018 Lake Tahoe Summit: Recommitting to collaboration

https://carsonnow.org/story/07/19/2018/lake-tahoe-summit-2018-recommitting-collaboration
By Joanne S. Marchetta

Nearly 25 years ago, the Tahoe Regional Planning Agency and dozens of partners embarked on an unprecedented mission to conserve and restore the Lake Tahoe Basin's treasured natural resources through the Lake Tahoe Environmental Improvement Program.

That partnership has continued to grow. Today, the EIP is one of America's most ambitious and successful landscape-scale restoration programs, with more than 50 local, state, federal, nonprofit, and private sector partners completing projects that improve Lake Tahoe's forests, streams, wildlife habitat, water quality, and public recreation opportunities.

As the annual Lake Tahoe Summit approaches on Aug. 7, hosted this year by U.S. Sen. Dean Heller (RNV), now is the time to reflect on the challenges and successes of this "epic" collaboration and recommit to working together to face the most difficult issues like climate change. This year's summit follows the news that Tahoe's famous water clarity in 2017 fell to the lowest levels ever recorded. The end of the most severe drought in a millennium followed by the wettest winter on record and record summer temperatures all combined to reduce the lake's average annual water clarity to 59.7 feet.
But one bad year does not make a trend. We continue to make major progress on restoring Tahoe's clarity to its historic level of nearly 100 feet by reducing stormwater pollution from roads and urban areas and restoring streams, meadows, and wetlands that play a critical role in the watershed's health.

2017 Tahoe Summit - Combatting the effects of climate change in the Lake Tahoe Basin
http://sanfrancisco.cbslocal.com/2017/08/22/tahoe-summit-points-up-new-environmental-challengesat-lake/

LAKE TAHOE (KPIX 5) — 20 years after the first Tahoe Summit, a new meeting to evaluate the environmental state of the lake and region around it has resulted in a mixed report card. On one hand, visitors are doing a better job of keeping pollution and sediment out of the lake, finally halting that longterm decline in lake clarity. "So Tahoe today is healthier and more resilient because we never shied away from a challenge," said Joanne Marchetta of the Tahoe Regional Planning Agency. But now Lake Tahoe faces a new challenge staying blue.

"It is warming 10 times faster than it did in history. Global warming is affecting this lake," said Sen. Dianne Feinstein. That warmer water makes it easier for algae to grow. And with the warm summer season having increased by 26 days over the last 50 years, there is also evidence of greater threats on land. "The fill-in of our forest — and the fire potential — and the actual fires that take place," said Feinstein.

Opinion: Addressing the challenges of climate change at 2017 Tahoe Summit
Sen. Dianne Feinstein & Joanne Marchetta
August 24, 2017

http://www.sierrasun.com/news/opinion/opinion-addressing-the-challenges-of-climate-change-at-2017tahoe-summit/

Twenty-one years ago, President Clinton came to Lake Tahoe to announce a major environmental restoration effort. That first Lake Tahoe Summit launched an unprecedented public-private partnership that has since invested more than $2 billion to save the lake. Over two decades, through the Environmental Improvement Program, the Tahoe Partnership has created one of the nation's most ambitious and successful environmental restoration and conservation programs. In fact, according to Lake Tahoe scientists, had this partnership not formed, lake clarity could be nearly 20 feet worse than it is today. While the lake and its forests are healthier now from this work, we must double-down on our effort in the face of threats from climate change. Earlier this month, the Tahoe Environmental Research Center at UC Davis released its annual report on the state of Lake Tahoe. The report is a clarion call-to-action for all who love this lake.

2016 Lake Tahoe Summit: A Time to Reflect
http://www.npr.org/sections/thetwo-way/2016/08/31/492177267/obama-at-lake-tahoe-praisesconservation-efforts

This year's summit was hosted by retiring Nevada Sen. Harry Reid and Sens. Barbara Boxer and Dianne Feinstein of California were also in attendance. The summit brings together lawmakers on all levels that are committed to protecting North America's largest alpine lake, according to the summit website. The Obama administration announced a number of Lake Tahoe-centric conservation efforts ahead of his remarks, including private-public investments and a recommitment to the Salton Sea. During his remarks, Obama noted that both he and Reid will soon be parting ways with their offices in Washington, though he said both would remain committed to the cause. Against the backdrop of the picturesque Lake Tahoe, President Obama said environmental conservation is a key part of fighting the impact of global warming. Obama spoke on the first of a two-day environmental tour at an annual summit designed to keep the health of Lake Tahoe a priority for the federal government and the states it borders, Nevada and California. "We embrace conservation because healthy and diverse lands and waters help us build resilience to climate change," the president said. "We do it to free more of our communities and plants and animals and species from wildfires, and droughts, and displacement. We do it because when most of the 4.5 million people who come to Lake Tahoe every year are tourists, economies like this one live or die by the health of our natural resources."

More media coverage:
http://www.unr.edu/nevada-today/news/2016/20th-anniversary-of-lake-tahoe-summit

President Barack Obama talked about "riding off into the sunset" soon with the man behind the annual Lake Tahoe Environmental Summit, Nevada Sen. Harry Reid. Both Obama and Reid will be leaving office following the November elections. Yet, if there was a theme to Wednesday's 20th Lake Tahoe Summit - which was highlighted by Obama's keynote address, before a standing-room-only crowd of about 9,000 in the sun-splashed Harvey's Outdoor Arena at Stateline - it was one of celebration, mixed with the realization that there is still work to be done at Tahoe.

"Lake Tahoe is better today than when we started two decades ago," said Reid, whose invitation to President Bill Clinton and Vice President Al Gore led to the first Tahoe Summit and brought unprecedented attention the Tahoe's declining clarity in 1997. Since then, about $2 billion in federal, state, local, individual and private funding has reversed Tahoe's ecological decline. "We've had the

best scientific research in the world here," Reid added, "the best minds at the universities in Nevada and California are working on this 12 months of the year. ... Today's Lake Tahoe Summit is a celebration of progress, of unity, though there is much more work to be done."

Obama, who was visiting Lake Tahoe for the first time, cast the effort to save Lake Tahoe against the much broader backdrop of the issues associated with global climate change. Obama said global climate change is being felt at Lake Tahoe through rapidly warming waters and air temperatures that will lead to new challenges in the management of the lake and the science and innovation developed to save it.

UNR/DRI Tahoe Summit Research Reports
https://tahoe.blogs.unr.edu/2015/08/2015-tahoe-summit

In conjunction with the annual Tahoe Summit, the University of Nevada, Reno and the Desert Research Institute publishes a report highlighting their collective research and outreach efforts in the Tahoe Basin.

Lake Tahoe Restoration Acts - History

$415 million Lake Tahoe Restoration Act signed by Obama in December 2016
http://www.tahoedailytribune.com/news/senate-approves-415-million-lake-tahoe-restoration-act

WASHINGTON, D.C. – The Senate approved the Lake Tahoe Restoration Act of 2015, which was included as part of a $10-billion water projects bill.. The legislation authorizes $415 million over 10 years for forest management, environmental and watershed restoration, storm water management and other environmental projects in Lake Tahoe. It has now moved on to the House of Representatives. The Lake Tahoe Restoration Act was included as underlying text in the national Water Resources Development Act, which allocates funds for other projects like the replacement of lead-contaminated pipes in Flint, Michigan, and the restoration of Florida's Everglades. The Senate measure sanctions 29 projects in 18 states for dredging, flood control and other such projects overseen by the U.S. Army Corps of Engineers.

The $415 million set aside for the Lake Tahoe Restoration Act is earmarked for a number of different environmental restoration and protection projects, including:

Wildfire Prevention – $150 million for wildfire fuel reduction and forest management.
Environmental Improvement Program – $80 million for projects like bike trails, creek restoration and fire treatment.
Invasive Species Management Program – $45 million to prevent and manage invasive species.
Stormwater Projects – $113 million for storm water management, erosion control and watershed restoration projects.
Lahontan Cutthroat Trout Recovery Program – $20 million to recover this threatened species, which is also Nevada's state fish.

Project Oversight – $5 million will go towards monitoring these projects, and another $2 million to cover the cost of land exchanges and sales in the Tahoe Basin. This is a follow-up to the original $300 million Lake Tahoe Restoration Act, which expired in 2010.

NOT FUNDED: **Lake Tahoe Restoration Act of 2013**
http://www.feinstein.senate.gov/public/index.cfm/files/serve/?File_id=95f88ea0-efe5-4ab5-84ffa2446c12c162

H.R. 3390: Lake Tahoe Restoration Act of 2013 (Amodei - NV) The Lake Tahoe Restoration Act of 2013 continues the federal commitment at Lake Tahoe by authorizing $415 million over 10 years to improve water clarity, reduce the threat of fire, combat invasive species and restore and protect the environment in the Lake Tahoe Basin.

http://www.trpa.org/tahoe-leaders-hail-house-introduction-of-restoration-act/

The Tahoe Regional Planning Agency leads the cooperative effort to preserve, restore, and enhance the unique natural and human environment of the Lake Tahoe Region, while improving local communities, and people's interactions with our irreplaceable environment.

NOT FUNDED: Lake Tahoe Restoration Act of 2011
The Lake Tahoe Restoration Act of 2011 was introduced but did not pass Congress. It had proposed a federal commitment at Lake Tahoe by authorizing $415 million over 10 years to improve water clarity, reduce the threat of fire, and restore the environment. This lack of federal funding may create a dramatic slowdown in research projects, improvement projects, and infrastructure upgrades in the Tahoe Basin.

FUNDED: Lake Tahoe Restoration Act of 2009-10
The Lake Tahoe Restoration Act 2009 was introduced for congressional review and approved. The 2009 legislation was the successor to the Lake Tahoe Restoration Act of 2000, which was introduced by Senators Feinstein, Reid, Boxer and then-Senator Richard Bryan (D-NV). That legislation led to major investments in the environmental health of the Tahoe Basin, including $424 million by the federal government, $612 million by the state of California, $87 million by the state of Nevada, $59 million by local governments, and $249 million in in-kind contributions from the private sector.

Regulatory: Regional Planning Efforts

TRPA Water Quality 208 Plan Lake Tahoe (208) Water Quality Management Plan
Adopted June 2013
http://www.trpa.org/wp-content/uploads/Final-U.S.-EPA-Adopted-Lake-Tahoe-208WQMP_2013.06.19.pdf
208 Plans are required for certain areas by the Federal Clean Water Act (section 208). These plans promote efficient and comprehensive programs for controlling water pollution in a defined geographic area. The Lake Tahoe 208 Plan was updated by TRPA on December 12, 2012, which initiated the need for parallel updates of the Plan by the states of Nevada and California and the U.S. Environmental Protection Agency.

The Lake Tahoe Water Quality Management Plan (also known as the 208 Plan or WQMP) is a framework that sets forth the components of the water quality management system in the Lake Tahoe Region, the desired water quality outcomes for the Tahoe Basin, and the mechanisms adopted by all the relevant entities to achieve and maintain those outcomes. The WQMP is organized to reflect the water quality management plan elements required by the U.S. Environmental Protection Agency's (U.S. EPA) regulations at 40 C.F.R. Section 130.6, which implements Sections 208 and 303(e) of the Clean Water Act, as well as the unique situation in the Lake Tahoe Region.

Because Lake Tahoe is located in both California and Nevada, to protect and enhance the unique environment in the Lake Tahoe Basin, the respective State legislatures approved a bi-state compact,

which was ratified by the US Congress in 1969. The Lake Tahoe Regional Planning Agency Compact created a unique bi-state regional planning agency, the Tahoe Regional Planning Agency (TRPA), which has the responsibility to set environmental carrying capacity thresholds for water quality and other aspects of the environment, create and keep updated a regional plan and regulations to attain and maintain the thresholds, and implement the regional plan and regulations through various permitting processes and memoranda of understanding. Given that the Regional Plan includes bi-state water quality policies and the TRPA implements regulations to realize the objectives of those policies, in the 1970's, both Governors also designated, with approval by the U.S. EPA, the TRPA as the area-wide planning agency for the Tahoe Region under Section 208 of the Clean Water Act.

Since that designation more than 30 years ago, water quality administration has grown in complexity and programs have been added to make the management system more comprehensive. Water quality improvement programs are administered, managed, and implemented today in the Tahoe Region by a multitude of agencies at different levels of government under a wide array of statutory and regulatory authorities.

Furthermore, since the last comprehensive revision of the WQMP was approved in 1988, the State of California and the State of Nevada have determined the total maximum daily load (TMDL) of fine sediment particles, total phosphorus, and total nitrogen that may enter the Lake in order to restore the desired water clarity. The TMDL effort was the result of more than 10 years of research and analysis at a cost of approximately $10 million. The U.S. EPA approved the Lake Tahoe TMDL in 2011. Both States are now working with their respective local governments, state transportation agencies and other resource management agencies in the Lake Tahoe Region on an ongoing basis to identify and implement the necessary steps to reduce pollutant loads. Concurrent with WQMP adoption, the TRPA Regional Plan is being updated to complement and support TMDL implementation.

Tahoe Regional Planning Agency (TRPA) - Code of Ordinances
The overriding regulations on development in the Tahoe Basin are the codes set by the Tahoe Regional Planning Agency Ordinances. These documents are available at:
http://www.trpa.org/regional-plan/code-of-ordinances/

Historical Action on Shorezone Ordinance
Taking 20 years of negotiation and preparation, the TRPA Shorezone Ordinance (Preferred Alternative 6A) was adopted by the Tahoe Regional Planning Agency (TRPA) Governing Board in October 2008. However on Sept. 16, 2010 - the 2008 passage of the Shorezone Ordinance by TRPA was revoked by federal court ruling. The Shorezone Ordinance had been legally challenged since its adoption, by several Tahoe area environmental groups. The decision sends the Tahoe Regional Planning Agency "back to the drawing board" in regulating development near Lake Tahoe's shore. After extensive legal review - in 2013, these new codes became effective.

TRPA Shorezone (Shoreline) Ordinance Passes in 2018
http://www.trpa.org/programs/shorezone

On October 24, 2018, TRPA Governing Board voted for adoption of Alternative 1, the Shoreline Ordinance. This completed a multi-year effort by the Tahoe Regional Planning Agency worked with community members and stakeholders to update its shoreline policies and regulations.

For more information about the shoreline planning process: www.shorelineplan.org.

Tahoe Regional Planning Agency (TRPA) and the Lake Tahoe Basin Management Unit (LTBMU) have developed regulations on land use related to water quality standards. While many of the standards support drinking water efforts, they do not directly address drinking water pathogens.

The Tahoe Water Suppliers Association has supported local source water protection projects and planning efforts with ongoing participation in the Tahoe Regional Planning Agency Shorezone Ordinance amendment process, Shorezone Development Review process, risk assessment of proposed projects and staff support on the Aquatic Invasive Species working group.

Alternative 1 – Proposed Shoreline Plan: The goal of this alternative is to enhance the recreational experience at Lake Tahoe while protecting the environment and responsibly planning for the future. This alternative, developed through a consensus-based approach, incorporates the policies developed by the Steering Committee and was endorsed by the Regional Plan Implementation Committee of the TRPA Governing Board. The Shoreline Plan would mete out new private and public development over time. At buildout, it would allow for up to 2,116 new moorings (buoys, lifts or public slips), 128 new private piers, 10 new public piers, and two new public boat ramps. Some new and existing buoys could be converted to slips, and vice versa at facilities open to the public (e.g., marinas).

TWSA member participation in the Shorezone (now called Shoreline) Ordinance amendments process has included:

- Submission of written and verbal comments on multiple occasions in 2016, and earlier in 2006, 2007 and 2008, to the "Lake Tahoe Shorezone Ordinance Amendments / Environmental Impact Statement (EIS)". The TWSA recommendation of a 1320 foot (¼ mile) 'buffer' around intakes was set as a trigger for water provider consultation, for proposed new piers into the current code. Buoy fields remain at 600 feet as the trigger for consulation, through the TRPA review and implementation process. This requires that any proposed project within the buffer goes through a risk assessment evaluation by the applicable water purveyor. The results will be provided to TRPA, with suggested mitigation measures.

- TWSA staff monitors and attends the TRPA/Interagency Shorezone Coordination Group (reviews all shorezone project proposals); providing input relative to water purveyor concerns.

- TWSA/USACE Risk Assessment Model Projects 2014/2008
  Phase 1 was completed in October 2008. Included is the 2008 project is a spreadsheet based tool that is to be utilized by the purveyors to analyze potential risk from shorezone development. In spring 2013, NDEP contracted with Tahoe Science Consortium on updates to the Lake Tahoe Risk Assessment model; with potential upgrades to include new current data collected by TERC, analysis of increased risk from two potential new beach recreation areas in the southeastern corner of Lake Tahoe; and the increased safety of pathogen destruction from purveyor's additional treatment processes required by LT2. Phase 2 was completed June 2014. TWSA offers staff support to TRPA / TRCD and other partners for water quality monitoring efforts during the Asian Clam removal projects.

EXECUTIVE SUMMARY – *http://shorelineplan.org/wp-content/uploads/2018/05/0-ExecSumm.pdf*
The Tahoe Regional Planning Agency (TRPA) adopted its first Regional Plan and Code of Ordinances in 1987 to guide resource management and development, and protect the Tahoe Region's natural

ecology and unique values. The Regional Plan included a Shorezone Subelement and implementing ordinances that regulated development along the shoreline of Lake Tahoe. The 1987 ordinances recognized that there was uncertainty about the effect of shoreline structures on fisheries. Because of this uncertainty, the ordinances prohibited new structures in areas identified as prime fish habitat and called for further study to evaluate the effects of shoreline structures on fish habitat and spawning. By the early 1990s, the studies had been completed, and they concluded that the placement of piers and buoys in spawning and feed/cover habitat has limited effect on fish populations and that those effects can be mitigated (Byron et al. 1989; Beauchamp et al. 1991, 1994). In response to the conclusions of the fish habitat studies, TRPA led multiple shorezone planning initiatives to replace the prohibition of structures in prime fish habitat with a comprehensive shoreline plan that would allow for lake access structures while protecting the environment. Any plan that would govern development along Lake Tahoe's shoreline proved to be highly controversial. TRPA prepared multiple plans and environmental analyses, which were released in 1995, 1999, 2004, 2006, and 2008.

TRPA Shoreline Plan for Lake Tahoe

The TRPA Governing Board approved a new Shoreline Plan for Lake Tahoe in October 2018. The plan supports boating, paddling, swimming, and other water-based recreation, while also ensuring effective natural resource management for continued attainment of environmental goals in the Lake Tahoe Region. The plan includes updated shorezone regulations (Chapters 80-85 of the TRPA Code of Ordinances) and a Shoreline Implementation Program.



PERMITTING

The Shoreline Plan lifts a longstanding moratorium on new shorezone structures at Lake Tahoe, setting caps and regulations for new shorezone structures such as piers, moorings, and public boat ramps. The plan also creates a framework for marinas to enhance their facilities if environmental improvements are made part of the project. For more information about TRPA permits for moorings,
structures, and other shorezone activities, please review the fact sheets at the bottom of this page or visit TRPA's Applications & Forms Page.

During this pier allocation period (2019-2020), TRPA may allocate seven multiple-parcel piers. TRPA reviewed the submitted proposals based on the prioritization criteria in the code, which resulted in awarding six multiple-parcel pier applications the opportunity to submit a complete New Pier Application to TRPA. There were 23 projects tied for the seventh multiple-parcel pier allocation, which was decided by a random drawing on July 17, 2019. During this pier allocation period, TRPA allocated five single-parcel piers. TRPA performed a random drawing of the submitted proposals based on the code, which resulted in awarding five single-parcel pier applications the opportunity to submit a complete New Pier Application to TRPA.



MOORINGS

The Shoreline Plan authorizes up to 1,486 new private moorings at Lake Tahoe, including buoys, boatlifts, and boat slips. Fifteen percent of that total will become available for permitting in 2020 through the mooring lottery, with additional moorings available for permitting in following years. The Shoreline Plan requires property owners to register and permit all existing moorings with TRPA. Moorings can be registered through the Lake Tahoe Info website starting March 1, 2019.



BOATING

The Shoreline Plan creates new programs to ensure shoreline structures and boating activity do not harm the environment, scenery, or recreation experiences at Lake Tahoe. These programs include coordinated enforcement against illegal boat moorings on the lake, more projects to prevent the spread of harmful aquatic invasive species, enhanced monitoring to better assess noise and scenic impacts from boating activity and shoreline structures, stronger boating safety education, and new provisions to keep boats with aftermarket exhaust systems that exceed TRPA, California, and Nevada noise limits from operating on the lake.

The cost of these programs will be paid for through new fees apportioned to various shoreline users and structures. These fees include annual mooring registration fees, an increase in boat sticker fees, and boat rental concession fees that take effect for the 2019 boating season. Lake Tahoe watercraft inspection sticker fees increased by $12 in 2019. This increase is needed to help pay for boater education, no-wake zone enforcement, and projects to prevent the spread of harmful aquatic invasive species in Lake Tahoe.



NO-WAKE ZONES

The new shoreline program includes stronger boater education and enforcement of the 600-foot no-wake zone at Lake Tahoe. The plan expands the no-wake zone to include all Emerald Bay and creates a 100-foot no-wake zone buffer around swimmers and paddlers and a 200-foot no-wake zone buffer around shoreline structures. These no-wake zones are in place to prevent unsafe boating in areas where boaters, paddlers, and swimmers share the lake, and to reduce noise impacts from boating.

BACKGROUND

The TRPA Governing Board approved the Lake Tahoe Shoreline Plan in October 2018 after more than three years of strong public outreach and collaboration with a wide range of partners. Planning partners included the Lake Tahoe Marina Association, Tahoe Lakefront Owners' Association, League to Save Lake Tahoe, Lahontan Regional Water Quality Control Board, Nevada Division of State Lands, and California State Lands Commission. The plan is the first comprehensive update to TRPA's shorezone regulations in several decades.

CHAPTER 60: WATER QUALITY

60.1. WATER QUALITY CONTROL

60.1.1. Purpose

This section implements the Water Quality Subelement, Land Use Element, of the Goals and Policies. This section also implements, in part, TRPA's programs to attain and maintain federal, state, and local water quality standards under Article V(d) of the Compact.

60.1.2. Applicability

This section sets forth standards for the discharge of runoff water from parcels and regulates the discharge of domestic, municipal, or industrial wastewaters. These standards and prohibitions apply to discharges to both surface waters and ground waters.

60.1.3. Discharge Limits

Discharges shall not exceed the following standards:

A. Surface Runoff

Pollutant concentrations in surface runoff shall not exceed the readings in Table 60.1.3-1 at the 90th percentile.

TABLE 60.1.3-1: SURFACE RUNOFF

Constituent	Maximum Concentration
Dissolved Inorganic Nitrogen as N	0.5 mg/l
Dissolved Phosphorus as P	0.1 mg/l
Dissolved Iron as Fe	0.5 mg/l
Grease and Oil	2.0 mg/l
Suspended Sediment	250 mg/l

1. If the constituent levels of water entering a site from upstream areas are of a superior or equal quality to the above, those waters shall meet the quality level listed in Table 60.1.3-1 prior to discharge from the site.

2. If the constituent levels of waters entering a site do not meet the quality levels in Table 60.1.3-1, there shall be no increase in the concentrations of these constituents in water discharged from the site, based on a 24-hour average.

B. Discharges to Ground Waters

Waters infiltrated into soils shall not exceed the maximum constituent levels in Table 60.1.3-2.

TABLE 60.1.3-2: DISCHARGES TO GROUND WATERS

Constituent	Maximum Concentration
Total Nitrogen as N	5 mg/l
Total Phosphate as P	1 mg/l
Iron as Fe	4 mg/l
Turbidity	200 NTU
Grease and Oil	40 mg/l

Where there is a direct hydrologic connection between ground and surface waters, discharges to groundwater shall meet the standards for surface runoff. A direct hydrologic connection shall be presumed to exist wherever, by virtue of proximity to a surface water body, nature of soils, or slope or gradient, the residence time of runoff water discharged into the ground is too short to remove pollutants from the runoff. Sediment traps, consistent with the *Handbook of Best Management Practices,* shall be used to protect infiltration devices from excessive levels of siltation.

C. Prohibition of Wastewater Discharge

The discharge of domestic, municipal, or industrial wastewater to Lake Tahoe, its tributaries, the ground waters of the Tahoe region, or the Truckee River within the Tahoe region, is prohibited, except for existing discharges under alternative plans for wastewater disposal authorized by state law and approved by the state agency of appropriate jurisdiction, and for catastrophic fire protection of the STPUD Luther Pass Pump Station as detailed in subparagraph 4 below. California and Nevada prohibit wastewater discharge through the enactment of the Porter-Cologne Act, and the Executive Order by the Governor of Nevada dated January 27, 1971.

1. Holding Tanks and Other No-Discharge Systems

To avoid a discharge of wastewater that is prohibited, holding tanks or other no-discharge systems may be approved in the following instances:

a. As a temporary measure associated with a temporary use, including but not limited to, sporting events, community events, and construction; or

b. As a permanent measure associated with remote public or private recreation sites, including but not limited to, trailheads, and undeveloped walk-in campgrounds, and summer home tracts where connection to a sewer system is not feasible or would create excessive adverse environmental impacts.

2. Accidental Releases of Sewage

To help prevent accidental releases of sewage, all sewage collection and treatment districts shall prepare and submit a report to TRPA within 120 days of a determination by the district that any unit treatment process, or major component of its collection system serving the Tahoe region, has reached 85 percent of its design capacity. Such report shall identify

what measures, if any, will be needed to accommodate projected population increases consistent with the Regional Plan, including capital improvements, operational changes, changes in discharge permits, and changes in financial programs.

3. **Sewage Exfiltration**
In conjunction with TRPA project approvals for all agencies that collect or transport sewage, TRPA shall require that such agencies have in place and vigorously implement plans for detecting and correcting sewage exfiltration problems in their collection and transport facilities.

4. **Recycled Wastewater Use for Fire Protection**
This exception allows for the use of recycled wastewater in emergency conditions to prevent severe harm to life, property, and the environment and to protect public facilities from destruction by wildfire in accordance with applicable state laws. Such emergency condition of catastrophic wildfire and authorization for recycled wastewater use shall be made and certified by the fire incident commander and reported to the TRPA Emergency Response Coordinator.

D. Prohibition of Toxic or Hazardous Waste Discharge
The discharge of toxic or hazardous waste to Lake Tahoe, other lakes in the region, their tributaries, the ground waters of the Tahoe region, the lands of the Tahoe region, or the Truckee River within the Tahoe region is prohibited.

E. Prohibition of Certain Watercraft
Commencing June 1, 1999, the launching, mooring, or operation of all two-stroke engine powered watercraft within the region is prohibited, except:

1. Any two-stroke engine powered watercraft whose fuel is directly injected into the cylinder shall be exempt from the prohibition;

2. Injected in to the crankcase prior to entering the cylinder and the fuel injection engine was purchased before January 27, 1999, shall be prohibited commencing October 1, 2001;

3. Any watercraft powered by a two-stroke engine whose engine is certified as meeting the U.S. EPA 2006 standard or the CARB 2001 standard shall be exempt from the prohibition;

4. Sailboats utilizing two-stroke engines as auxiliary power shall be prohibited commencing October 1, 2001;

5. Any watercraft powered by a two-stroke engine rated at ten horsepower or less shall be prohibited commencing October 1, 1999; or

6. Any watercraft powered by an engine that has been certified as meeting EPA's 2001-2005 emission standard shall be prohibited commencing October 1, 2001.

60.1.4. Snow Disposal

All persons conducting public, commercial, or private snow removal or disposal operations shall dispose of snow in accordance with site criteria and management standards in the *Handbook of Best Management Practices*, the Design Review Guidelines, and the criteria below.

A. Requirements for Individual Parcels

Removal of snow from individual parcels shall be limited to structures, paved areas, and unpaved areas necessary to safely park or provide safe pedestrian access. Snow shall not be plowed into or stored in a SEZ.

B. Requirements for Dirt Roads

Snow removal from dirt roads is subject to regulation pursuant to Section5.12 Remedial Action Plans. When TRPA approves snow removal from a dirt road, pursuant to project approval or in accord with provisions of Section5.12, the agency shall specify required winterization practices, BMPs, the specific means of snow removal, and a schedule for either paving the dirt road or ceasing snow removal.

60.1.5. Deicers and Abrasive Control

Salt and abrasives used to control ice on streets, highways, sidewalks, and parking areas shall be regulated in accordance with the standards provided below.

A. Storage Areas

Storage areas for deicing salt and abrasives shall be in conformance with the *Handbook of Best Management Practices*.

B. Reporting

The state highway departments and other large users of deicers and abrasives identified by TRPA shall maintain a tracking and reporting program to monitor the use of deicers and/or abrasives in their respective jurisdictions pursuant to State of California and Nevada requirements. TRPA shall incorporate this information into its annual monitoring report in accordance with Chapter 16: *Regional Plan and Environmental Threshold Review*.

C. Restrictions

The use of deicing salt and abrasives may be restricted where damage to vegetation in specific areas may be linked to their use or where their use would result in a violation of water quality standards. Mitigation for the use of road deicing salt or abrasives may be required and may include requirements to use alternative substances or change distribution patterns, frequency of application, and amount of application. Revegetation of parcels may be required where evidence indicates deicing salts or abrasives have caused vegetation mortality. Memorandums of understanding may be entered into with highway and street maintenance organizations to address use of salts or abrasives in relation to safety requirements.

60.1.6. Spill Control

All persons handling, transporting, using, or storing toxic or hazardous substances shall comply with the applicable requirements of state and federal law regarding spill prevention, reporting, recovery, and clean-up. Sewage collection, conveyance, and treatment districts shall have sewage spill contingency, prevention, and detection plans approved by the state agency of appropriate jurisdiction and submitted to TRPA for review and approval within three years of the effective date of the Regional Plan.

A. Cooperative Sewage Spill Plans
Sewage collection, conveyance, and treatment districts may join together to develop cooperative plans, provided that the plans clearly identify those agencies covered by the plan, are agreed to by each agency, and are consistent with applicable state and federal laws.

B. Sewage Spill Plan Criteria
Sewage spill contingency, prevention, and detection plans shall comply with the criteria set forth by the state agencies of appropriate jurisdiction and TRPA. Such plans shall include provisions for detecting and eliminating sewage exfiltration and stormwater infiltration from sewer lines and facilities.

60.1.7. Pesticide Use

The use of insecticides, fungicides, and herbicides shall be consistent with the *Handbook of Best Management Practices*.

A. Pesticide Use Discouraged
TRPA shall discourage pesticide use for pest management. Prior to applying any pesticide, potential users of pesticides shall consider integrated pest management practices, including alternatives to chemical applications, management of forest resources in a manner less conducive to pests, reduced reliance on potentially hazardous chemicals, and additional environmentally sound pest management tactics.

B. Criteria for Pesticide Use
The following criteria apply to pesticide use:

1. Only chemicals registered with the Environmental Protection Agency and the state agency of appropriate jurisdiction shall be used and only for their registered application;
2. Alternatives to chemical application shall be employed where practical; and
3. No detectable concentration of any pesticide shall be allowed to enter any stream environment zone, surface water, or ground water unless TRPA finds that application of the pesticide is necessary to attain or maintain the environmental threshold standards.

60.1.8. Fertilizer Management

A. Fertilizer Management Approaches Generally

Fertilizer management allowing for site-specific management approaches shall be consistent with the *Handbook of Best Management Practices*. The recommended approaches for landscaping are found in the *Home Landscaping Guide for Lake Tahoe and Vicinity* or its approved equivalent. Section 61.4 Revegetation, contains requirements for revegetation approaches. Fertilizers shall not be used, except as described below, in or near stream and drainage channels or in stream environment zones, including setbacks determined under Section 53.9: Procedure for Establishing SEZ Boundaries and Setbacks, and in shorezone areas except as otherwise provided in this subsection (see Chapter 90: *Definitions*, and Section 80.3: Definitions). Fertilizer use for maintenance of preexisting landscaping according to subparagraph 61.3.3.B.2 shall be minimized in stream environment zones and adjusted or prohibited if found through evaluation of continuing monitoring results to be in violation of applicable strictest water quality discharge and receiving water standards. These ordinances are applicable to both inorganic and organic fertilizer applications. Fertilizer management involves use and application approaches to achieve management standards and shall include the following considerations where appropriate:

1. The appropriate type of fertilizer to avoid release of excess nutrients;
2. Fertilizer management programs proposing the use of phosphorus shall demonstrate the need for the particular site conditions and vegetation to be maintained or established, and shall consider the use of slow release and phosphorus-free fertilizer;
3. The rate and means of application to avoid excessive application or application to non-target areas or native vegetation;
4. The timing and frequency of application to minimize the use of fertilizer, avoid early and late season fertilizer use when vegetation growth is not active;
5. Appropriate watering schedules and efficient irrigation systems to avoid excessive leaching and runoff of nutrients;
6. Preferred plant materials for the intended use and site conditions with an emphasis on native and adapted species to minimize the need of fertilizer;
7. Landscape design that minimizes the use and impacts of fertilizer application;
8. Critical areas such as backshore areas and SEZ setbacks in close proximity to Lake Tahoe and other bodies of water, or water quality treatment basins where the use of fertilizer shall be avoided;
9. Design and maintenance of drainage control systems including holding ponds where necessary;

10. Surface and groundwater monitoring programs to determine compliance with existing nitrogen and phosphorus discharge standards; any required monitoring will be at owners expense, where annual reporting is required in critical areas and as determined in program review or compliance determination;

11. Public outreach, either in the form of public and private programs, fliers for utility district and other organization distribution, and workshops, or affiliate membership outreach on fertilizer management shall be included in fertilizer management plans. Public outreach applies in particular to small residential users for agency outreach programs, owners associations, condominiums, property and landscape managers, and landscapers; and

12. For large users (defined under subparagraph 60.1.8.C below) and large turf projects, a soil testing program may be appropriate to assess the required concentrations of nitrogen and phosphorus in the soil for vegetation use, adjusting for Tahoe Basin growing conditions. This may mean no or low application rates of phosphorus-containing fertilizer will be required for some sites and uses.

B. Fertilizer Management Programs

Projects that include landscaping or revegetation shall include, as a condition of approval, a fertilizer management program that addresses each of the considerations set forth in subsection 60.1.8.A, as appropriate to the size of the project.

C. Existing Uses

1. At TRPA Request and Large Users

At the request of TRPA and for large users that require regular fertilizer maintenance, including but not limited to golf courses, parks, cemeteries, plant nurseries, recreational ball fields, and large residential yards with an acre or more of turf, certain uses shall be required to submit fertilizer management programs for review and approval by TRPA. Review criteria shall include the considerations listed in subsection 60.1.8. Failure to comply with the request or to provide a program satisfactory to TRPA may result in an enforcement action.

2. Monitoring Report

Following the first growing season after the approval of fertilizer management programs, large users of fertilizers such as plant nurseries and those managing more than one acre of turf, or as otherwise identified by TRPA under an existing large user survey, shall initiate a tracking program to monitor fertilizer use on lands under their control. Such users shall review fertilizer management programs with TRPA or Lahontan RWQCB staff and present annual reports for the prior season's use and monitoring if required to TRPA by June 1 (or as required by Lahontan) of each year. The report shall include information on the rate, amount, and location of use. This information shall be presented in a format developed by TRPA consistent with the reporting requirements of other agencies to eliminate duplication and shall be verifiable. TRPA shall include this information in its annual monitoring report under

Chapter 16, including such measures of progress as numbers of approved programs, annual fertilizer use reports received, and reported reductions in fertilizer use or monitored parameter improvement.

D. Requirements for Fertilizer Sales
Public outreach, including seller fertilizer recommendations consistent with subsection 60.1.8, provision of agency-developed fliers, and brochures of user information and recommended fertilizer rates from the *Home Landscaping Guide for Lake Tahoe and Vicinity* or its authorized equivalent, shall be required in conjunction with fertilizer sales in the Tahoe Basin. Outlying fertilizer retailers with potential purchases from the Tahoe Basin shall be requested to provide the same public outreach.

E. Snow Hardeners
The use of ammonium nitrate or other substances containing nitrogen or phosphorus to harden snow is prohibited.

60.2. WATER QUALITY MITIGATION

60.2.1. Purpose

The purpose of this section is to implement the Goals and Policies, Goal 4, Policy 1, Development and Implementation Priorities Subelement, Implementation Element, and specifically the requirement that new residential, commercial, and public projects completely offset their water quality impacts.

60.2.2. Applicability

A. General Applicability
This section is applicable to all projects and activities that result in the creation of additional impervious coverage, unless the project or activity is exempted pursuant to subparagraph B below.

B. Exemptions
The projects and activities provided below that create impervious coverage shall be exempt from water quality mitigation requirements:

1. Transfer
Impervious coverage permitted as a result of transfer of coverage.

2. 208 EIP Projects
Capital Environmental Improvement Program projects for erosion and runoff control and stream environment zone protection and restoration projects as described in TRPA's Water Quality Management Plan for the Lake Tahoe Region.

3. Limited Exception for Additional or Transferred Development Within Adopted Community Plans
Additional or transferred development located within an adopted community plan, the water quality impacts of which were evaluated in the EIS for the community plan and mitigated by the provisions of the community plan, shall be exempt from the requirement of subsection

60.2.3 provided TRPA finds that the implementation element of the community plan, as a whole, meets the standards of subsection 60.2.3.

60.2.3. Required Offsets

All projects and activities that result in the creation of additional impervious coverage shall completely offset the potential water quality impacts of the project through one, or a combination, of the methods listed below.

A. Mitigation Projects
Implementation of offsite water quality control projects or stream environment zone restoration projects as a condition of project approval, pursuant to TRPA guidance on identification, design, and effectiveness of offsite mitigation projects. Applicants who wish to exercise this option shall include plans for the offsite mitigation project with their application. TRPA shall approve the offsite mitigation plans in conjunction with the approval of the project. Before issuing an approval, TRPA shall find that the offsite mitigation proposal completely offsets the expected impacts of the project.

B. Water Quality Mitigation Fund
Contribution to a water quality mitigation fund established by TRPA for implementing offsetting programs.

60.2.4. Fee Required

A fee shall be assessed for each square foot of additional land coverage created. The amount of contribution shall be established in the Rules of Procedure.

60.2.5. Use and Distribution of Mitigation Funds

TRPA shall deposit water quality mitigation funds in a trust account. Interest accruing to the trust account shall remain in the account until used on water quality mitigation projects or water quality planning. TRPA shall keep track of the amount of funds collected for each local jurisdiction and shall disburse funds to the local jurisdictions, upon their request, for expenditure within the jurisdiction of origin, provided TRPA finds that the expenditure is consistent with TRPA's Water Quality Management Plan. Accrued interest may be used for water quality planning in the region. TRPA shall encourage the local jurisdictions to use funds as expeditiously as possible.

60.2.6. Stream Environment Zone Restoration Program

To provide financial resources for implementation of the stream environment zone restoration program, at least 25 percent of the water quality mitigation funds collected for each local jurisdiction shall be used for stream environment zone restoration projects included in the TRPA's Water Quality Management Plan. This jurisdictional set-aside shall be individually evaluated and may be waived if TRPA determines that there are no more SEZ restoration projects identified in a given jurisdiction.

60.2.7. Water Quality Revolving Fund

TRPA shall establish a separate fund, to be known as the Water Quality Revolving Fund, for the purpose of depositing funds received through grants, fines, and voluntary contributions. TRPA may make grants from this fund to local governments and other

public entities for abatement and control of water quality problems by the same procedures as set forth in subsection 60.2.5.

60.3. SOURCE WATER PROTECTION

60.3.1. Purpose

This section contains regulations pertaining to recognition of source water, prevention of contamination to source water, and protection of public health relating to drinking water. It strengthens provisions of the Goals and Policies that address groundwater protection, and implements elements of the TRPA Source Water Protection Program.

60.3.2. Applicability

This chapter applies to projects that are identified as a possible contaminating activity located in identified source water protection zones as depicted on TRPA Source Water Assessment maps, and retrofit of existing development with Best Management Practices that identified source water protection zones as depicted on TRPA Source Water Assessment maps, and retrofit of existing development with Best Management Practices.

60.3.3. Source Water Protection Standards

To protect public health and to insure the availability of safe drinking water, TRPA shall review proposed projects identified as possible contaminating activities to source water that are located within a source water protection zone depicted on TRPA Source Water Assessment maps according to the following standards and procedures:

A. Source Water Defined
Water drawn to supply drinking water from an aquifer by a well or from a surface water body by an intake, regardless of whether such water is treated before distribution.

B. Possible Contaminating Activity Defined
Activities equivalent to TRPA primary uses identified by either the California Department of Public Health or the Nevada Bureau of Water Quality Planning, regardless of where the project is located, as having the potential to discharge contaminants to surface or groundwaters. Such uses are listed in subsection 60.3.5.

C. Source Water Protection Zone Defined
A zone delineated around drinking water sources in the following manner as depicted on the TRPA Source Water Assessment maps.

1. Protection Zone
A protection zone consisting of a fixed 600 foot radius circle shall be identified around wells, lake intakes, and springs assessed by TRPA. Protection zones shall be delineated using the best available source water location data known to TRPA. Protection zones may be located using the centroid of the parcel in which the well, lake intake, or spring is found. Protection zone delineations may be modified by TRPA as follows: Upon receipt of source water assessment information collected by the California Department of Public Health, the Nevada Bureau of

Water Quality Planning, or other public agencies responsible for conducting drinking source water assessments in accordance with state Source Water Assessment and Protection Programs and if recommended by the California Department of Public Health or the Nevada Bureau of Water Quality Planning; or upon receipt of source water assessment information provided by the property owner in which the well, spring, or lake intake is located and if the California Department of Public Health or the Nevada Bureau of Water Quality Planning concurs with the new delineation.

D. Review of Proposed Possible Contaminating Activities Located in Source Water Protection Zones

Proposed uses determined by TRPA to be projects that are identified as a Possible Contaminating Activity, with a project area located in a source water protection zone, shall not be approved unless TRPA finds that:

1. The project complies with the requirements to install BMPs as set forth in subsection 60.4.3;
2. TRPA has solicited comments from the operator/owner of the source water, and the department of environmental health with jurisdiction over the source water, and all such comments received were considered by TRPA prior to action being taken on the proposed project;
3. A spill control plan is submitted to TRPA for review and approval. The plan shall contain the following elements:
   a. Disclosure element describing the types, quantities, and storage locations of contaminants commonly handled as part of the proposed project;
   b. Contaminant handling and spill prevention element;
   c. Spill reporting element, including a list of affected agencies to be contacted in the event of a spill;
   d. Spill recovery element; and
   e. Spill clean-up element.
4. Submittal of a spill control plan may be waived provided a state or local agency with jurisdiction over the subject source water provides a written statement to TRPA that a plan containing the above elements remains on file with that agency, or TRPA staff determines, at its discretion, that requiring a spill control plan would not result in significant additional protection of the source water.

E. Requirements of Existing Uses Located in Source Water Protection Zones

Existing uses that are identified as a possible contaminating activity located in a source water protection zone shall comply with subparagraph 60.3.3.D.3. Compliance with subparagraph 60.3.3.D.3 shall occur pursuant to the deadlines set forth in subparagraph 60.4.4.A.

60.3.4. Source Water Assessment

An inventory of wells, springs, and lake intakes that serve five or more user service connections shall be prepared for the Lake Tahoe Region. An inventory shall be prepared in consultation with local and state environmental health agencies. Sources omitted from the inventory due to a lack of information provided by local and state environmental health agencies shall be added as appropriate if additional source information is received by TRPA. Source water protection zones delineated on the source water assessment maps shall be modified pursuant to subparagraph 60.3.3.C.1.

60.3.5. Possible Contaminating Activities

A. Residential

1. Domestic animal raising

B. Commercial

1. **Retail**
   - **a.** Service stations
2. **Services**
   - **a.** Auto repair and service
   - **b.** Business support services
   - **c.** Laundries and dry cleaning plant
   - **d.** Repair services
3. **Light Industrial**
   - **a.** Batch plants
   - **b.** Fuel and ice dealers
   - **c.** Industrial services
   - **d.** Recycling and scrap
4. **Wholesale/Storage**
   - **a.** Storage yards
   - **b.** Vehicle storage and parking
   - **c.** Vehicle and freight terminals

C. Public Service

1. **General**
   - **a.** Airfields, landing strips, and heliports
   - **b.** Collection stations
   - **c.** Hospitals
   - **d.** Local public health and safety facilities
   - **e.** Regional public health and safety facilities
   - **f.** Power generating
   - **g.** Public utility centers
   - **h.** Schools

2. **Linear Public Facilities**
   a. Transit stations and terminals

D. **Recreation**
1. Beach recreation
2. Boat launching facilities
3. Developed campgrounds
4. Golf courses
5. Marinas
6. Recreational vehicle parks
7. Rural sports

E. **Resource Management**
1. **Timber Management**
   a. Timber stand improvement
2. **Range**
   a. Grazing
   b. Range pasture management
3. **Watershed Improvements**
   a. Runoff control

F. **Shorezone**
1. Construction equipment storage
2. Seaplane operations
3. Tour Boat operations
4. Water-oriented outdoor recreation concessions

60.4. BEST MANAGEMENT PRACTICE REQUIREMENTS

60.4.1. Purpose

This section sets forth the requirements for installation of Best Management Practices (BMPs) for the protection or restoration of water quality and for attainment of minimum discharge standards.

60.4.2. Applicability

BMPs, as described in the *Handbook of Best Management Practices* (Volume II of the Lake Tahoe Basin Water Quality Management Plan), or equivalent practices approved by TRPA, shall be applied to all public and privately owned lands.

60.4.3. Project Compliance Program

TRPA shall enforce the project compliance programs as provided below.

A. Temporary BMPs
Temporary BMPs in accordance with the *Handbook of Best Management Practices*, and as required in Section 33.5, shall be implemented on construction sites and maintained throughout the construction period until winterization and permanent BMPs are in place.

B. Permanent BMPs
Application of required permanent BMPs within the parcel or entire project area boundaries, whichever is greater, shall be a condition of project approval. Standard requirements are set forth in subsections 60.4.5 and 60.4.6.

1. Conditions of project approval shall set forth a schedule for installation of permanent BMPs on the project area. In no case shall permanent BMP installation be scheduled later than the date set for the completion of the project (see Chapter 2: *Applicability of the Code of Ordinances*).

2. Retrofitting of the project area outside the construction site boundary with permanent BMPs shall also be made a condition of project approval. If the project area involves more than one parcel, the entire project area will be treated as one parcel for purposes of this section. TRPA shall keep track of the status of retrofitting of project parcels, and or project areas, as provided in Chapter 6: *Tracking, Accounting, and Banking*.

3. The below categories of projects, if not carried out in conjunction with another type of project, may be exempt from the requirements of subparagraph 60.4.3.B.2.

   a. Installation of erosion control facilities;

   b. Restoration of disturbed areas;

   c. SEZ restoration;

   d. Underground storage tank removal, replacement, or maintenance;

   e. Hazardous waste spill control or prevention facilities;

   f. Sewage pump-out facilities for RVs or boats; and

   g. Minor utility projects pursuant to subparagraph 30.6.2.F.

60.4.4. BMP Retrofit Program

Persons owning property not subject to a retrofit requirement prior to January 1, 1993, under subsection 60.4.3, or a discharge permit under subparagraph 60.4.4.D, shall install and maintain BMPs on their property with existing uses in accordance with the provisions below.

A. Priority System
Properties with existing uses shall install BMPs in accordance with subsection 53.10.5, the watershed priority system:

1. **Priority Group 1**
   Properties with existing uses in watersheds with a point score less than or equal to 30 shall install BMPs not later than October 15, 2000.

2. **Priority Group 2**
Properties with existing uses in watersheds with a point score of 30 to 46, inclusive, shall install BMPs not later than October 15, 2006.

3. **Priority Group 3**
Properties with existing uses in watersheds with a point score of 47 or greater shall install BMPs by October 15, 2006, or not later than October 15, 2008, pursuant to a fee schedule to be developed for BMP inspections, evaluations, and certifications.

B. **Parcels and Unpaved Roadways without Appropriate BMPs**
Parcels and unpaved roadways without appropriate BMPs in place pursuant to the dates described above are subject to enforcement under Article IX Compliance Procedures, Section 9.19, of the Rules of Procedure for violation of 60.4.

C. **Disclosure Requirements**
Owners of property for sale shall, prior to sale, disclose to a purchaser the property's BMP status on a TRPA approved form. The purchaser of the property shall provide the disclosure form to TRPA within 30 days of sale.

D. **Discharge Permits**
Not later than December 31, 1992, TRPA shall notify property owners with existing uses in the following categories 1 through 3 below of the requirements of this subsection. Not later than March 31, 1993, the persons so notified shall inform TRPA that: (1) they have an existing valid state or federal stormwater discharge permit, (2) they will apply for a state or federal stormwater discharge permit, or (3) they will submit to TRPA a remedial action plan pursuant to Section 5.12 of the Code of Ordinances. Not later than June 30, 1994, all persons so notified shall have either a valid state or federal stormwater discharge permit or an approved remedial action plan pursuant to Section 5.12. Such permits and action plans shall be consistent with the provisions of the Water Quality Management Plan for the Tahoe Region.

1. **Commercial Uses**
Retail or entertainment facilities, greater than one acre, and storage yards.

2. **Recreation Uses**
Downhill ski areas, marinas, and golf courses.

3. **Public Service Uses**
Transportation routes, and corporation yards.

60.4.5. Priority for Installation of Retrofitting Measures

Schedules for BMP compliance shall include the measures proposed for each year and the estimated cost for those measures. The estimated cost shall be based on unit costs established by TRPA. Unless otherwise approved by TRPA, a schedule that phases BMP compliance shall implement the BMP measures in the following order:

A. Pave legally established roads, driveways, and parking areas;

B. Install drainage conveyances;

C. Install walkways and stabilize cut and fill slopes;

D. Vegetate denuded areas; and

E. Treat surface runoff from land coverage.

60.4.6. Standard BMP Requirements

Pursuant to subsection 60.4.3, standard conditions of approval for projects shall meet the requirements provided below.

A. Runoff Water

Runoff water from impervious surfaces shall meet the discharge standards of Section 60.1 and shall be controlled as provided below.

1. Infiltration Requirements

Except as provided in subsection 60.4.8, infiltration facilities to discharge runoff to groundwater shall be required. Infiltration facilities shall be designed to accommodate the volume from a 20-year, one-hour storm. An average intensity of one inch per hour shall be used for this calculation. Infiltration facilities shall be designed utilizing the methodology set forth in the BMP Handbook. The bottom of infiltration trenches or dry wells shall be a minimum of one foot above the seasonal high water table. If TRPA finds that the runoff from impervious surfaces from a 20-year, one-hour storm will infiltrate naturally on the parcel, TRPA may waive the requirement to install infiltration facilities.

2. Excess Runoff

Runoff in excess of that infiltrated pursuant to paragraph 1 above shall be controlled in accordance with the methods and design standards in the Handbook.

B. Cut and Fill Slopes

Cuts and fills with slopes greater than 2:1 shall be stabilized with methods consistent with the BMPs.

C. Denuded Areas

All denuded areas, including slopes less than 2:1, shall be vegetated with approved species listed in the Handbook.

D. Drainage Conveyances

Drainage conveyances through a parcel shall be designed for at least a 10-year, 24-hour storm. Storm drain culverts and drain channels shall be designed by a qualified professional. Drainage conveyances through a SEZ shall be designed for a minimum of a 50-year storm.

E. Roads, Driveways, and Parking Areas
All roads, driveways, and parking areas proposed for year-round use shall be paved in accordance with Chapter 34: *Driveway and Parking Standards*.

F. Protection of BMPs
After installation, all BMPs shall be provided with adequate protection to prevent damage from vehicles.

G. Consistency with Defensible Space Requirements
In addition to subsections A – F above, water quality BMPs shall be installed and maintained consistent with the defensible space requirements of the applicable fire agency.

60.4.7. Additional Requirements

In addition to the standard requirements of subsection 60.4.6, project conditions of approval shall list any other appropriate required BMPs to meet minimum discharge standards. Construction in stream environment zones or Land Capability Districts 1 through 3, inclusive, normally shall require special conditions of approval because of the sensitivity of those areas to disturbance.

60.4.8. Special Circumstances

A. Where special circumstances occur, alternative BMPs may be approved to meet water quality standards. Special circumstances may include, but not be limited to, streets, highways, bike trails, existence of high ground water table, unusual upstream or downstream flow conditions, and presence of unusual concentrations of pollutants.

B. Infiltrating runoff volumes generated by the 20 year, 1-hour storm may not be possible in some locations due to shallow depth to seasonal groundwater levels, unfavorable soil conditions, or other site constraints such as existing infrastructure or rock outcroppings. For new development or redevelopment projects, site constraints do not include the existing built environment. In the event that site conditions do not provide opportunities to infiltrate the runoff volume generated by a 20 year, 1-hour storm, project proponents must either (1) meet the numeric effluent limits in outlined in subsection 60.1.3 for the 20-year 1-hour storm, or (2) coordinate with the local municipality or state highway department to document that shared stormwater treatment facilities treating private property discharges and public right-of-way stormwater sufficiently contribute to meeting the jurisdiction's average annual fine sediment particle and nutrient load reduction requirements.

60.4.9. Maintenance of BMPs

BMPs shall be maintained to ensure their continued effectiveness.

"Tahoe In Depth"
http://www.trpa.org/about-trpa/press-room/tahoe-in-depth/
Tahoe In Depth is a biannual publication coordinated by TRPA that aims to inspire environmental understanding and stewardship at Lake Tahoe. TWSA has submitted articles on water conservation and source water protection. The purpose of *Tahoe In Depth* is to give homeowners, landowners, visitors, and policymakers clear, straightforward, and interesting information about the Lake Tahoe environment – from successful restoration to ongoing challenges. The goal is to help people better understand the work being done to restore Tahoe's clarity and the role they can play in helping reach that outcome.

The publication explores the natural and cultural history of the Tahoe Basin while providing balanced, reliable information on a wide spectrum of scientific and planning efforts under way to protect Lake Tahoe's unique scenic and ecological qualities.

Spearheaded by the Tahoe Regional Planning Agency, various agencies working in the Tahoe Basin have contributed stories and financial assistance to *Tahoe In Depth*. Other stories and content for the publication have been written or selected by an independent editor working with TRPA and contributors.

New Gateway Signs Mark Nevada Entrances to Lake Tahoe Watershed
http://www.trpa.org/about-trpa/press-room/new-gateway-signs-mark-nevada-entrances-to-laketahoe-watershed

Visitors to the Lake Tahoe Summit on Tuesday, August 19, 2015 will notice new gateway signs along three Nevada highways leading into the Lake Tahoe Watershed. Installed near Daggett Summit on Nevada State Route 207, Spooner Summit on U.S. Highway 50 and on Nevada State Route 431 the Mount Rose Highway, the decorative gateway signs read, "Entering the Lake Tahoe Watershed — Help
Protect It!". The signs were installed in July in a collaborative project led by the Tahoe Regional Planning Agency, U.S. Environmental Protection Agency, Nevada Division of Environmental Protection and Nevada Division of State Lands.

The signs are meant to help remind the millions of people who visit Lake Tahoe each year that they are entering a special place and have a duty to help protect its famously clear waters and environment. Fourth of July celebrations this year left thousands of pounds of trash on area beaches for community volunteers to clean up, showing there is still a strong need to remind people of their responsibility to help protect Lake Tahoe and its beaches. That same responsibility goes for keeping trash and other pollutants out of stormwater drainage systems and the 63 streams flowing into Lake Tahoe in a watershed that covers 312 square miles.

TRPA Threshold Standards and Regional Plan
2019 Update
http://www.trpa.org/wp-content/uploads/Thresholds_Regional-Plan_Amended_2019_4_24.pdf

The Science Behind the Regional Plan

Download the Environmental Threshold Carrying Capacities



In 1982, TRPA adopted nine environmental threshold carrying capacities (thresholds), which set environmental standards for the Lake Tahoe basin and indirectly define the capacity of the Region to accommodate additional land development. Many of the environmental thresholds will take generations to achieve and a sustained commitment to conservation is imperative. The Environmental Improvement Program is intended to accelerate threshold attainment.

There are nine threshold areas:

Water Quality: Return the lake to 1960s water clarity and algal levels by reducing nutrient and sediment in surface runoff and groundwater.

Air Quality: Achieve strictest of federal, state, or regional standards for carbon monoxide, ozone, and particulates; increase visibility; reduce U.S. 50 traffic; and reduce vehicle miles traveled.

Scenic Resources: Maintain or improve 1982 roadway and shoreline scenic travel route ratings, maintain or improve views of individual scenic resources, and maintain or improve quality of views from public outdoor recreation areas.

Soil Conservation: Preserve natural stream environment zones (SEZ), restore 25% of disturbed urban SEZ areas (1,100 acres), and reduce total land coverage.

Fisheries: Maintain 180 miles of good to excellent stream habitat, achieve nearly 6,000 acres of excellent lake habitat, and attempt to reintroduce Lahontan Cutthroat Trout.

Vegetation: Increase plant diversity in forests, preserve uncommon plant communities including deepwater plants, enhance late seral forests and reduce forest fuels, and maintain minimum sustainable populations of sensitive plants including Tahoe Yellow Cress.

Wildlife: Provide habitat for special interest species, prevent degradation of habitats of special significance.

Noise: Minimize noise disturbance from single events, and minimize background noise disturbances in accordance with land use patterns.

Recreation: Preserve and enhance high quality recreational experience. Preserve undeveloped shorezone and other natural areas, and maintain a fair share of recreational capacity for the general public.

A Threshold Evaluation Report is completed every four years as part of the Agency's adaptive management cycle– Plan-Do-Check-Adjust. The report compiles information from monitoring of over 100 indicators basin wide. The results are compiled and evaluated every four years to assess if the Regional Plan is working and to advise the TRPA Governing Board on making critical adjustments in the Code of Ordinances and other planning documents.

THRESHOLD STANDARDS

Threshold standards establish the Environmental Improvement Program partners' shared goals for restoration and maintenance of the qualities of the Tahoe Region.

The adopted current threshold standards are stated below. The agency will maintain and update online inventories of the administrative status and disposition of each threshold standard.

WATER QUALITY

DEEP WATER (PELAGIC) LAKE TAHOE

NUMERICAL STANDARDS

WQ1) The annual average deep water transparency as measured by Secchi disk shall not be decreased below 29.7 meters (97.4 feet), the average levels recorded between 1967 and 1971 by the University of California, Davis.
WQ2) Maintain annual mean phytoplankton primary productivity at or below 52gmC/m2/yr.

LITTORAL LAKE TAHOE

NUMERICAL STANDARDS

WQ3) Attain turbidity values not to exceed three NTU.
WQ4) Turbidity shall not exceed one NTU in shallow waters of the Lake not directly influenced by stream discharges.
WQ5) Attain 1967-71 mean values for phytoplankton primary productivity in the littoral zone.
WQ6) Attain 1967-71 mean values for periphyton biomass in the littoral zone.

MANAGEMENT STANDARD

WQ7) Support actions to reduce the extent and distribution of excessive periphyton (attached) algae in the nearshore (littoral zone) of Lake Tahoe.

AQUATIC INVASIVE SPECIES

MANAGEMENT STANDARDS

WQ8) Prevent the introduction of new aquatic invasive species into the region's waters.
WQ9) Reduce the abundance of known aquatic invasive species.
WQ10) Reduce the distribution of known aquatic invasive species.
WQ11) Abate harmful ecological impacts resulting from aquatic invasive species.
WQ12) Abate harmful economic impacts resulting from aquatic invasive species.
WQ13) Abate harmful social impacts resulting from aquatic invasive species.
WQ14) Abate harmful public health impacts resulting from aquatic invasive species.

TRIBUTARIES

NUMERICAL STANDARDS

WQ15) Attain applicable state standards for concentrations of dissolved inorganic nitrogen.
WQ16) Attain applicable state standards for concentrations of dissolved phosphorus.
WQ17) Attain applicable state standards for dissolved iron.
WQ18) Attain a 90 percentile value for suspended sediment concentration of 60 mg/1.

SURFACE RUNOFF

NUMERICAL STANDARDS

WQ19) Achieve a 90 percentile concentration value for dissolved inorganic nitrogen of 0.5 mg/1 in surface runoff directly discharged to a surface water body in the Basin.

WQ20) Achieve a 90 percentile concentration value for dissolved phosphorus of 0.1 mg/1 in surface runoff directly discharged to a surface water body in the Basin.

WQ21) Achieve a 90 percentile concentration value for dissolved iron of 0.5 mg/1 in surface runoff directly discharged to a surface water body in the Basin.

WQ22) Achieve a 90 percentile concentration value for suspended sediment of 250 mg/1 in surface runoff directly discharged to a surface water body in the Basin.

GROUNDWATER

MANAGEMENT STANDARDS

WQ23 - WQ32) Surface runoff infiltration into the groundwater shall comply with the uniform Regional Runoff Quality Guidelines as set forth in Table 4-12 of the Draft Environmental Threshold Carrying Capacity Study Report, May, 1982. Where there is a direct and immediate hydraulic connection between ground and surface waters, discharges to groundwater shall meet the guidelines for surface discharges, and the Uniform Regional Runoff Quality Guide lines shall be amended accordingly.[1]

OTHER LAKES

NUMERICAL STANDARD

WQ33) Attain existing water quality standards.

LOAD REDUCTIONS

MANAGEMENT STANDARDS

WQ34) Reduce fine sediment particle (inorganic particle size < 16 micrometers in diameter) load to achieve long-term pelagic water quality standards (WQ1 and WQ2).

WQ35) Reduce total annual phosphorus load to achieve long-term pelagic water quality standards (WQ1 and WQ2) and littoral quality standards (WQ5 and WQ6).

WQ36) Reduce total annual nitrogen load to achieve long-term pelagic water quality standards (WQ1 and WQ2) and littoral quality standards (WQ5 and WQ6).

WQ37) Decrease total annual suspended sediment load to achieve littoral turbidity standards (WQ3 and WQ4).

WQ38) Reduce the loading of dissolved phosphorus to achieve pelagic water standards (WQ1 and WQ2) and littoral quality standards (WQ5 and WQ6).

WQ39) Reduce the loading of iron to achieve pelagic water standards (WQ1 and WQ2) and littoral quality standards (WQ5 and WQ6).

WQ40) Reduce the loading of other algal nutrients to achieve pelagic water standards (WQ1 and WQ2) and littoral quality standards (WQ5 and WQ6).

WQ41) The most stringent of the three dissolved inorganic nitrogen load reduction targets shall apply:

[1] See attachment A

i. Reduce dissolved inorganic nitrogen loads to pelagic and littoral Lake Tahoe from[2]:

a) surface runoff by approximately 50 percent of the 1973-81 annual average,

b) groundwater approximately 30 percent of the 1973-81 annual average, and

c) atmospheric sources approximately 20 percent of the 1973-81 annual average.

ii. Reduce dissolved inorganic nitrogen loading to Lake Tahoe from all sources by 25 percent of the 1973-81 annual average.

iii. To achieve littoral water quality standards (WQ5 and WQ6).

2015 TRPA Draft Threshold Evaluation Report

http://www.trpa.org/regional-plan/threshold-evaluation

The Draft 2015 Threshold Evaluation Report offers a snapshot of the health of the ecosystem in the Tahoe Basin by documenting the status and trends of 178 threshold standards in nine categories:

http://www.trpa.org/documents/rp_update/Final_TVAL/1_2011_TEVAL_Chapters_Clean_2012-1024/TEVAL2011_Ch4_WaterQuality_Oct2012_Final.pdf

http://www.trpa.org/wp-content/uploads/10_Ch4_WaterQuality_FINAL_9_30_2016.pdf

TRPA Regional Plan Update – Final EIS Released Oct. 2012

http://www.trpa.org/regional-plan/regional-plan-eis

Concurrent with the release of the TRPA Threshold Evaluation Report (previous section); was the release of the long awaited final TRPA Regional Plan Update. This plan, has been drafted to serve as the guiding document for basin wide human activities.

The Final Draft Environmental Impact Statement for the Lake Tahoe Regional Plan Update posted online October 24, 2012. An unprecedented level of public input has been received on the plan to date and public meetings were held October, November and December 2012 to provide opportunities for public input. The Tahoe Regional Planning Agency's Regional Plan Update is the blueprint for the Tahoe Basin's sustainable future The Regional Plan Update will help guide how communities evolve, how ecosystems function, whether the transportation network is efficient and effective, and whether the Basin at large is restored, more pristine, and sustainable.

Public involvement in developing the updated plan has been extensive. The Final Environmental Impact Statement (EIS) includes all comments received on the EIS during the public comment period, agency responses to comments, as well as all contents of the Draft EIS. Legal challenges to the plan were dismissed in November 2016.

Water quality threshold standards adopted by TRPA set a target to return the Lake to the transparency observed in the late 1960s. Within the six major indicator categories, TRPA uses seven water quality standards to assess the water quality of Lake Tahoe and its tributaries. Table 3.8-1 lists each indicator category and associated standard(s). The status and trend of each threshold relative to the associated standard(s) is described in Section 3.8.2, Affected Environment.

Table 3.8-1. TRPA Water Quality Thresholds

Indicator Category	Standard	Numerical Standard and/or Management Standard
Littoral Lake Tahoe	Sediment Loading	Decrease sediment load as required to attain turbidity values not to exceed 3 NTU in littoral Lake Tahoe. In addition, turbidity shall not exceed 1 NTU in shallow waters of Lake Tahoe not directly influenced by stream discharges.
Deep water (pelagic zone)	Winter clarity, pelagic Lake Tahoe	Average winter Secchi depth, December-March, shall not be less than 33.4 meters.
Deep water (pelagic zone)	Phytoplankton primary productivity	Annual mean phytoplankton primary productivity shall not exceed 52 $gC/M^2/yr$.
Tributary water quality	Annual average concentrations of appropriate constituents	Concentrations of appropriate constituents in any tributary stream for which states have established standards (as mg/l); 90th percentile value suspended sediment of 60 mg/L.
Stormwater runoff quality	Surface discharge to surface water	Pollutant concentrations in surface runoff discharged to surface water shall not exceed the following concentrations at the 90th percentile: › 0.5 mg/L dissolved inorganic nitrogen as N › 0.1 mg/L dissolved phosphorus as P › 2.0 mg/L grease and oil › 0.5 mg/L dissolved iron › 250 mg/L suspended sediment
Stormwater runoff quality	Surface discharge to groundwater	Surface runoff infiltrated into soils shall not exceed the following concentrations at the 90th percentile: › 5.0 mg/L total nitrogen as N › 1.0 mg/L total phosphorus as P › 4.0 mg/L total iron › 40 mg/L grease and oil › 200 NTU turbidity Where there is a direct hydrologic connection between ground and surface waters, discharges shall meet the guidelines for surface discharges (WQ-5).
Other lakes	Concentrations of appropriate constituents	Water quality parameters and standards established by California and Nevada.

mg/l = milligrams per liter
NTU = Nephelometric Turbidity Units
$gC/M^2/yr$ = grams of carbon per square meter per year
Source: TRPA 2012a

Regional Plan

Goals and Policies

TRPA has established a number of goals and policies related to water quality. Goals include the reduction of sediment and nutrients to Lake Tahoe and the elimination or reduction of other pollutants. Policies address a range of issues, including snow removal, wastewater spill prevention, underground storage tanks, dredging, and reduction of impacts from motorized watercraft. The existing goals and policies for water quality protect and enhance lake clarity and beneficial uses within the following regulatory framework:

- Concentration-based discharge standards and infiltration requirements for stormwater treatment that control water quality impacts associated with new development;
- Regulations requiring the retrofitting of developed properties with Best Management Practices (BMPs) that reduce erosion and stormwater runoff;
- Regulatory preservation and restoration of Stream Environment Zones (SEZs) to protect and enhance their water quality values; and
- Prohibiting the discharge of wastewater, toxic waste, and solid waste into Lake Tahoe, its tributaries, and groundwater resources.

Code of Ordinances

The TRPA Code of Ordinances contains a range of requirements intended to help achieve water quality threshold standards, goals, and policies. Chapter 60 of the Code is the primary chapter directed at water quality and the installation of BMPs. A number of other chapters contain provisions pertaining to the protection of water resources and water quality for hydrology, coverage, and grading and excavation (Table 3.8-2).

Table 3.8-2. Selected Code Requirements Related to Water Quality Protection

Code Section	Requirements
Chapter 30	Sets forth regulations concerning the land capability system, land capability districts, prohibition of additional land coverage in certain land capability districts, and transfer and mitigation of land coverage.
Chapter 33.3	Sets standards for grading and excavation.
Chapter 33.4	Sets requirements for special investigations, reports, and plans, determined to be necessary by TRPA to protect the environment against significant adverse effects from grading projects.
Chapter 33.5	Sets forth the requirements for grading and construction schedules when grading or construction is to occur pursuant to a TRPA permit.
Chapter 35	Sets forth regulations pertaining to recognition of natural hazards, including floodplains, prevention of damage to property, and protection of public health relating to such natural hazards.
Chapter 60.1	Sets discharge standards for runoff and discharge to surface and groundwater.
Chapter 60.2	Sets forth requirements that new residential, commercial, and public projects completely offset their water quality impacts.
Chapter 60.3	Contains regulations pertaining to recognition of source water, prevention of contamination to source water, and protection of public health relating to drinking water.
Chapter 60.4	Sets standards for installation and maintenance of BMPs for the protection or restoration of water quality.

Source: TRPA 2012b

Regulations for stormwater discharge are based on maximum allowable concentrations for nitrogen, phosphorus, iron, turbidity, suspended sediments, and grease and oil. Standards for stormwater discharge to surface water are different than those for discharge to groundwater. In general, discharge standards to

groundwater are more lenient because of the natural filtering capacity of soils and the potential for nutrient uptake from vegetation. TRPA discharge standards for surface water and groundwater in the Code are the threshold standards for those indicator reporting categories (see Table 3.8-2). In addition to numerical discharge limits, the Code also restricts the discharge of wastewater and toxic substances, sets requirements for snow removal and control of salts, and sets criteria for pesticide use and fertilizer control.

In addition to stormwater runoff quality standards, regulations are in place for containment of stormwater runoff volumes and flows. These regulations are designed to reduce the hydrologic impacts of urbanization on peak runoff rates and volumes, protect water quality, and protect property and public safety. TRPA regulations require containment, at a minimum, of the stormwater runoff volume generated by a 20-year return period, 1-hour duration "design storm" from impervious surfaces. The calculation of runoff volume is made by multiplying the intensity of the 20-year, 1-hour design storm (taken as 1 inch of rain in 1 hour) by the impervious surface area. Runoff that is contained and subsequently infiltrated is required to meet the maximum concentration requirements for discharge to groundwater (Table 3.8-2).

Water Quality Management Plan for the Lake Tahoe Region (208 Plan)

The *Water Quality Management Plan for the Tahoe Region* (208 Plan) was prepared by TRPA in compliance with Section 208 of the federal Clean Water Act. The 208 Plan contains overlapping elements with the Regional Plan, including the Handbook of Best Management Practices, the Stream Environment Zone Protection and Restoration Program, and the Capital Improvement Program for Erosion and Runoff Control. The 208 Plan identifies pollution sources, control needs, and management practices to improve water quality.

The 208 Plan contains management programs that pertain to urban runoff and erosion, airborne nutrients, waste management, natural area management, and other water quality issues in Lake Tahoe and the Shorezone. Programs are implemented through designated management agencies, including TRPA, the U.S. Forest Service (USFS), and other federal, state, and local governments. To determine if water quality goals are attained and maintained, water quality programs require continuous scientific monitoring of environmental conditions related to the threshold standards for pelagic Lake Tahoe, littoral Lake Tahoe, tributary streams, surface runoff, groundwater, land coverage, and SEZs. TRPA must publish annual or semi-annual reports on monitoring program implementation and must evaluate the results at least every 5 years (Goals and Policies, p. VII-23).

FEDERAL

Federal Antidegradation Policy

The U.S. Environmental Protection Agency (EPA) has designated Lake Tahoe an Outstanding National Resource Water (ONRW). ONRWs are provided the highest level of protection under EPA's Antidegradation Policy, stipulating that states may allow some limited activities that result in temporary and short-term changes to water quality, but that such changes should not adversely affect existing uses or alter the essential character or special uses for which the water was designated an ONRW. EPA interprets this provision to mean that no new or increased discharges to ONRWs and no new or increased discharge that would result in lower water quality are permitted.

Clean Water Act

Section 404

The federal Water Pollution Control Act, commonly referred to as the Clean Water Act (CWA), provides for the restoration and maintenance of the physical, chemical, and biological integrity of the nation's waters. Section 404 of the CWA prohibits the discharge of fill material into waters of the United States, including wetlands,

except as permitted under separate regulations by the U.S. Army Corps of Engineers (USACE) and EPA. To discharge dredged or fill material into waters of the United States, including wetlands, Section 404 requires projects to receive authorization from the Secretary of the Army, acting through the USACE. Waters of the United States are generally defined as "waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide; territorial seas and tributaries to such waters."

Section 401

Under CWA Section 401, applicants for a federal license or permit to conduct activities that may result in the discharge of a pollutant into waters of the United States must obtain certification for the discharge. The certification must be obtained from the state in which the discharge would originate or, if appropriate, from the interstate water pollution control agency with jurisdiction over the affected waters at the point where the discharge would originate. Therefore, all projects that have a federal component and may affect state water quality (including projects that require federal agency approval, such as issuance of a Section 404 permit) must also comply with CWA Section 401. Water quality certification requires evaluation of potential impacts in light of water quality standards and CWA Section 404 criteria governing discharge of dredged and fill materials into waters of the United States. EPA delegates water pollution control authority under CWA Section 401 to the states.

Section 402

Section 402 of the CWA establishes the National Pollutant Discharge Elimination System (NPDES) permit program to regulate discharges of pollutants into waters of the United States. An NPDES permit sets specific discharge limits for point-source discharges of pollutants into waters of the United States and establishes monitoring and reporting requirements, as well as special conditions. EPA delegates water pollution control authority under CWA Section 402 to the states, which oversee compliance.

CALIFORNIA

LAHONTAN REGIONAL WATER QUALITY CONTROL BOARD

The Porter-Cologne Act created the California State Water Resources Control Board (SWRCB) and nine Regional Water Quality Control Boards (RWQCBs) in California. The SWRCB protects water quality by setting statewide policy, coordinating and supporting RWQCB efforts, and reviewing petitions that contest RWQCB actions. The RWQCBs issue waste discharge permits, take enforcement action against violators, and jointly administer federal and state laws related to water quality in coordination with EPA and USACE.

The Tahoe Region is located within the jurisdiction of the Lahontan RWQCB (LRWQCB). The LRWQCB Region is approximately 570 miles long, covering an area of 33,131 square miles, from the California-Oregon border to the Antelope Valley watershed in Los Angeles and San Bernardino Counties. In addition to the Tahoe Region, the Lahontan Region includes Death Valley, Mount Whitney, Owens Valley, Mono Lake, and portions of Lassen and Modoc Counties.

On the California side of the Tahoe Region, LRWQCB implements the CWA, the California Water Code (including the Porter-Cologne Act), and a variety of laws related to control of solid waste and toxic and hazardous wastes. LRWQCB has authority to set and revise water quality standards and discharge prohibitions. It issues federal permits, including NPDES permits and Section 401 water quality certifications, and state waste discharge requirements or waivers of waste discharge requirements. Its planning and permitting actions require compliance with the California Environmental Quality Act (CEQA).

Water quality standards and control measures for surface and ground waters of the Lahontan Region are contained in the Water Quality Control Plan for the Lahontan Region (Basin Plan). The Basin Plan designates beneficial uses for water bodies. It establishes water quality objectives, waste discharge prohibitions, and other implementation measures to protect those beneficial uses. Chapter 5 of the Basin Plan, Water Quality Standards and Control Measures for the Lake Tahoe Basin, summarizes a variety of control measures for the protection and enhancement of Lake Tahoe.

NEVADA

NEVADA DIVISION OF ENVIRONMENTAL PROTECTION, BUREAU OF WATER QUALITY PLANNING

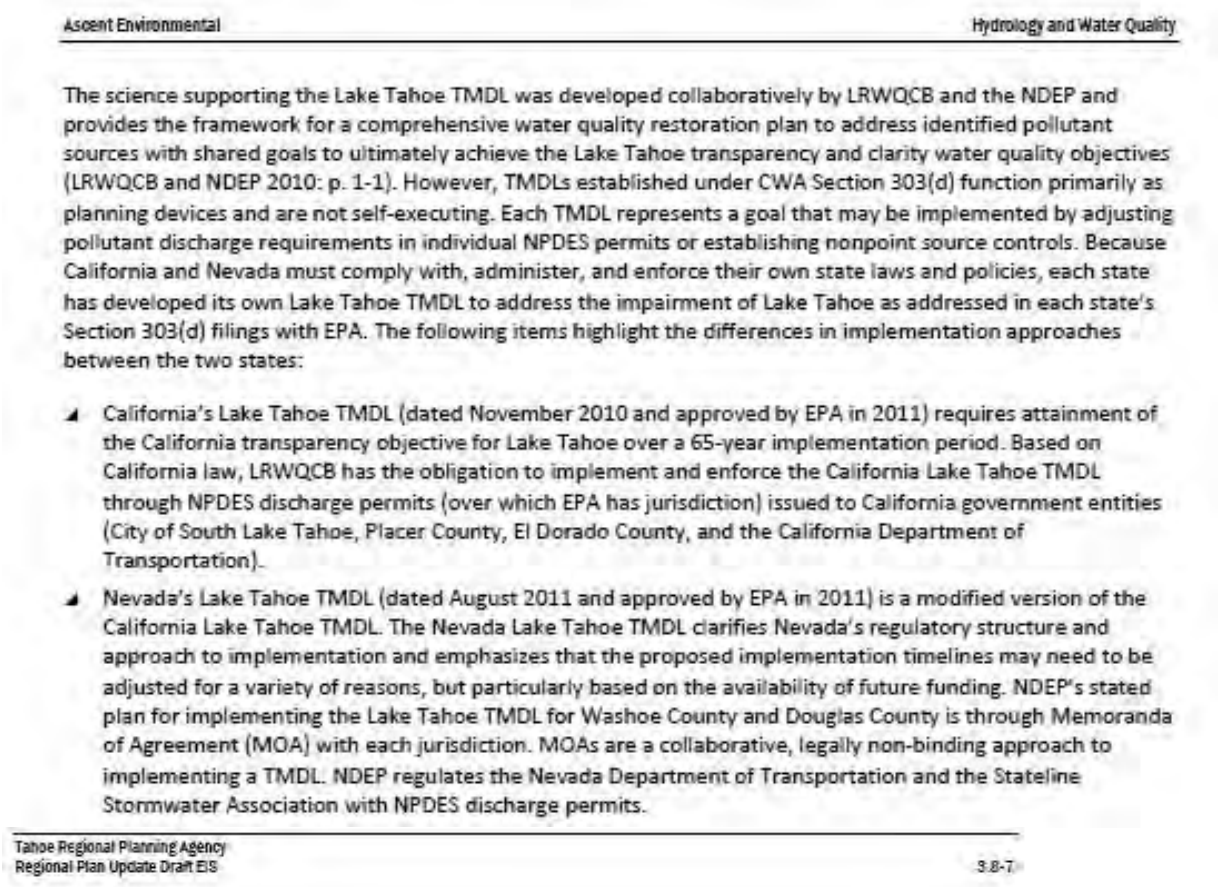
The Nevada Division of Environmental Protection (NDEP) Bureau of Water Quality Planning (BWQP) is responsible for several water quality protection functions, including: collecting and analyzing water data, developing standards for surface waters, publishing reports, providing water quality education, and implementing programs to address surface water quality. The BWQP is divided into four branches: water quality standards, monitoring, nonpoint source pollution management, and the Lake Tahoe management program. The branches are responsible for the following duties and responsibilities:

- The Water Quality Standards Branch is responsible for developing and reviewing water quality standards; determining total maximum daily loads and wasteload allocations from point sources; and determining load allocations from non-point sources.
- The Monitoring Branch is responsible for administering the state's water quality monitoring program. This branch maintains and updates water quality data for the national water quality data base (Water Quality Exchange Network - WQX) and is responsible for preparation of Nevada's Water Quality Assessment Report, which is required under CWA Section 305(b) of the Clean Water Act (CWA).
- The Nonpoint Source (NPS) Pollution Management Program aims to control nonpoint sources of pollution in Nevada. NPS pollution results from a variety of diffuse and dispersed human activities.
- The Lake Tahoe Watershed Program unit collaborates with LRWQCB to develop the Total Maximum Daily Load for Lake Tahoe.

LAKE TAHOE TOTAL MAXIMUM DAILY LOAD

Section 303(d) of the Clean Water Act requires states to compile a list of impaired water bodies that do not meet water quality standards and to develop a total maximum daily load (TMDL) for impaired water bodies to determine the key pollutants and contributing sources to the impairment. Lake Tahoe is one of 41,237 impaired waters in the United States listed in EPA's National Summary of Impaired Waters and TMDLs (EPA 2012). While both California and Nevada have identified Lake Tahoe as an impaired water body, the scientific basis for the impaired classification is different between the states:

- California has identified Lake Tahoe's lack of transparency as the primary basis for its impaired status under its Section 303(d) impaired water listings filed with EPA. To comply with California's Lake Tahoe transparency standard, a 25-centimeter (10-inch) white Secchi disk would need to be visible 29.7 meters (97.4 feet) below the surface of Lake Tahoe on an average annual basis.
- Nevada has identified Lake Tahoe's lack of clarity as the primary basis for its impaired status under its Section 303(d) impaired water listings filed with EPA. Clarity is defined as a quantitative measure of the vertical extinction of light (VEC) per meter of depth. A lower VEC reading indicates more clarity to the water. To comply with Nevada's Lake Tahoe clarity standard, a VEC of 0.08 per meter is necessary.



Ascent Environmental Hydrology and Water Quality

The science supporting the Lake Tahoe TMDL was developed collaboratively by LRWQCB and the NDEP and provides the framework for a comprehensive water quality restoration plan to address identified pollutant sources with shared goals to ultimately achieve the Lake Tahoe transparency and clarity water quality objectives (LRWQCB and NDEP 2010: p. 1-1). However, TMDLs established under CWA Section 303(d) function primarily as planning devices and are not self-executing. Each TMDL represents a goal that may be implemented by adjusting pollutant discharge requirements in individual NPDES permits or establishing nonpoint source controls. Because California and Nevada must comply with, administer, and enforce their own state laws and policies, each state has developed its own Lake Tahoe TMDL to address the impairment of Lake Tahoe as addressed in each state's Section 303(d) filings with EPA. The following items highlight the differences in implementation approaches between the two states:

- California's Lake Tahoe TMDL (dated November 2010 and approved by EPA in 2011) requires attainment of the California transparency objective for Lake Tahoe over a 65-year implementation period. Based on California law, LRWQCB has the obligation to implement and enforce the California Lake Tahoe TMDL through NPDES discharge permits (over which EPA has jurisdiction) issued to California government entities (City of South Lake Tahoe, Placer County, El Dorado County, and the California Department of Transportation).
- Nevada's Lake Tahoe TMDL (dated August 2011 and approved by EPA in 2011) is a modified version of the California Lake Tahoe TMDL. The Nevada Lake Tahoe TMDL clarifies Nevada's regulatory structure and approach to implementation and emphasizes that the proposed implementation timelines may need to be adjusted for a variety of reasons, but particularly based on the availability of future funding. NDEP's stated plan for implementing the Lake Tahoe TMDL for Washoe County and Douglas County is through Memoranda of Agreement (MOA) with each jurisdiction. MOAs are a collaborative, legally non-binding approach to implementing a TMDL. NDEP regulates the Nevada Department of Transportation and the Stateline Stormwater Association with NPDES discharge permits.

Tahoe Regional Planning Agency
Regional Plan Update Draft EIS 3.8-7

TRPA Regional Plan Development History

TWSA was an active participant of the multi-year Regional Pathway process over its entire process. The Pathway process was used to collaboratively update the Lake Tahoe Basin Regional plans led by Tahoe Regional Planning Agency, Lake Tahoe Basin Management Unit, Nevada Environmental Protection Agency and the Lahontan Regional Water Quality Control Board.

The 2012 Update: Restoring Lake Tahoe and Supporting Sustainable Communities

http://www.trpa.org/regional-plan

Legal challenges to the Regional Plan were dismissed in November 2016.

http://legal-planet.org/2016/11/05/tahoe-regional-planning-agency-wins-big-in-ninth-circuit/planet.org

The Tahoe Regional Planning Agency (TRPA) won a major legal victory in the U.S. Court of Appeals for the Ninth Circuit. A unanimous three-judge panel of that court rejected environmentalists' challenge to TRPA's adopted Regional Plan for the Lake Tahoe Basin in *Sierra Club v. Tahoe Regional Planning Agency.* The Ninth Circuit decision effectively concludes a decade-long process by which TRPA formulated, held multiple hearings on, and ultimately adopted a revised Regional Plan for the Tahoe Basin. That Plan's most noteworthy element is its concentration of development in relatively densely-constructed "community centers" in already-urbanized portions of the Tahoe Basin. The environmental trade-off is that in exchange for that intensified development, currently-developed areas outside those community centers will be returned to open space.

TRPA Environmental Improvement Projects (EIP)
http://www.trpa.org/about-trpa/how-we-operate/environmental-improvement-program

TRPA launched the EIP in an effort to better implement the Regional Plan and highlighted it at the Presidential Forum at Lake Tahoe in 1997. Recognizing that capital investments, research, and monitoring were essential components of the Regional Plan, the EIP called for an initial investment of $908 million in capital projects and $58 million in research and monitoring over 10 years. The EIP also identified hundreds of specific projects and programs to be undertaken by more than 50 funding partners including federal, state, and local agencies, and the private sector. The projects were focused on improving air, water, and scenic quality, forest health, fish and wildlife, and public access to the Lake and other recreation areas. The prime directive of the EIP was to move the Tahoe Basin closer to environmental threshold attainment. Today, over 400 EIP projects have been completed and hundreds more are in progress, with over $1.8 billion of investment in the highest priority environmental improvement projects.

The Lake Tahoe Environmental Improvement Program (EIP) is a partnership of federal, state, and local agencies, private interests, and the Washoe Tribe, created to protect and improve the extraordinary natural and recreational resources of the Lake Tahoe Basin.





EIP partners implement projects that include everything from new bike trails to creek restorations to programs that protect the lake from aquatic invasive species.

The Lake Tahoe Restoration Act of 2016 authorized up to $415 million over 7 years for the Environmental Improvement Program.

The Act requires that the EIP maintain a priority list of projects, for the program areas of Forest Health, Aquatic Invasive Species, Watershed Restoration, Lahontan Cutthroat Trout, and Accountability.

The primary goal of the TRPA Environmental Improvement Program is to "lead the cooperative effort to preserve, protect and enhance the unique natural and human environment of the Lake Tahoe Region," (TRPA 2004). The Environmental Improvement Project (EIP) is administered by the Tahoe Regional Planning Agency.

The EIP program identifies restoration and improvement projects needed to meet nine environmental thresholds in the basin. The information is quite extensive on EIP projects, past, current and future. TWSA members act as managers and/or resources on EIP water quality improvement projects identified within their watersheds. The EIP is a public-private partnership that rivals some of the largest collaborative restoration initiatives in the United States in its scope.

The program identified projects and programs needed to fulfill nine environmental thresholds in the Tahoe Basin. The thresholds include: water quality, air quality, soil conservation, vegetation, fisheries, wildlife, scenic resources/community design, recreation, and noise. TRPA, Nevada Tahoe Conservation District, and Lake Tahoe Basin Management Unit have completed extensive work on the tracking program to evaluate the progress of EIP project installations.

2018 Update
http://www.trpa.org/wp-content/uploads/EIP_Report_Update.pdf

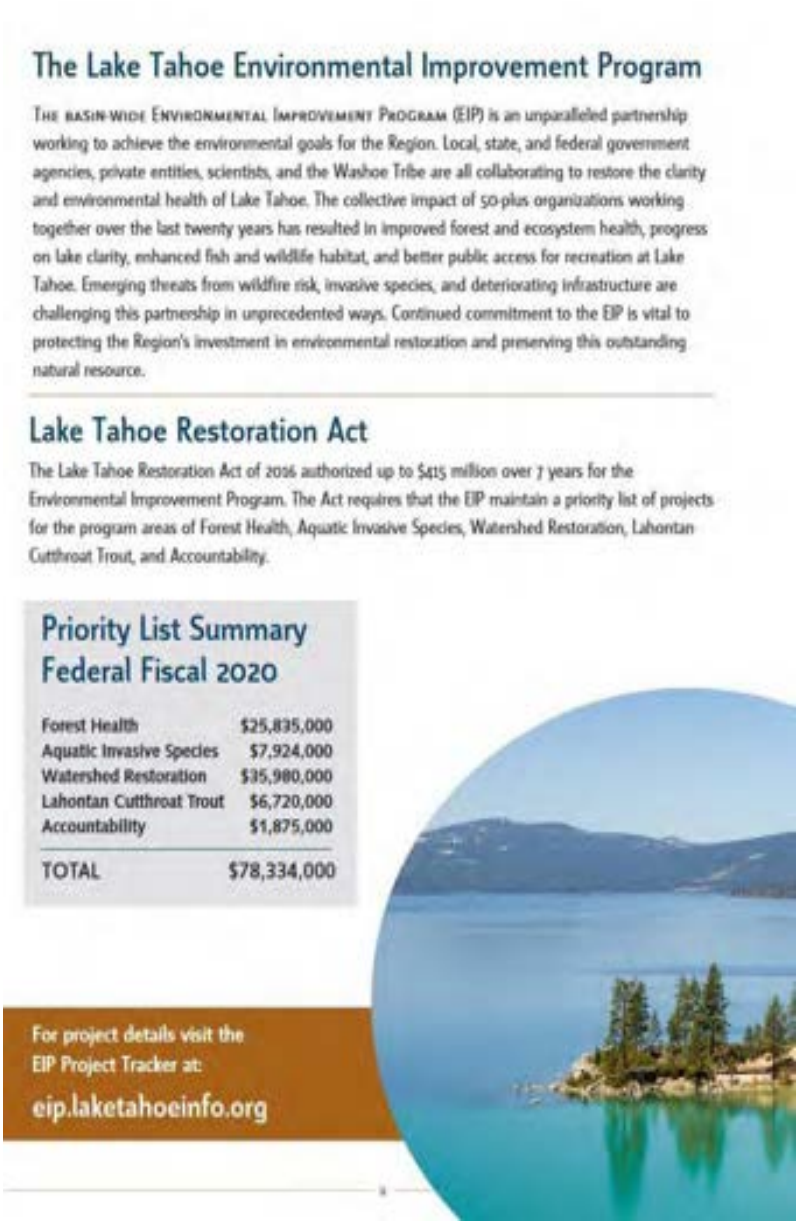
EIP Project Databases - TRPA EIP Projects Related to Water Quality
TRPA EIP tracker database *https://eip.laketahoeinfo.org*

2020 Update *https://www.trpa.gov/wp-content/uploads/documents/Annual_Report_2020_Final.pdf*
TRPA's Environmental Improvement Division leads the Lake Tahoe Environmental Improvement Program (EIP). The EIP is an unparalleled partnership working to achieve the environmental goals of the Tahoe Region. Local, state, and federal agencies, private entities, scientists, and the Washoe Tribe of Nevada and California have collaborated for more than 20 years to restore the environmental health of Lake Tahoe.

Key 2020 EIP Accomplishments
• Collaboratively developed a basin-wide priority list of EIP projects for federal funding resulting in

approximately $16 million for projects under the Lake Tahoe Restoration Act. This included $6 million for Forest Health, $6 million for Watershed Restoration, and $4 million for Aquatic Invasive Species.
• Awarded more than $2.4 million in mitigation funds to local jurisdictions and land banks for restoration projects, new maintenance equipment, water quality improvement projects, and land acquisition. • The California Tahoe Conservancy broke ground on the restoration of the Upper Truckee Marsh. This project will restore over 250 acres of floodplain and enrich native fish and bird habitat. The restored marsh will also act as a natural pollution filter, improving water quality in Lake Tahoe.

Future Focus
• Continue to strengthen the EIP collaborative partnership by working with all sectors to align priorities, collaboratively develop multi-jurisdictional projects, and increase the pace and scale of restoration basin-wide. • Develop funding strategies for the Forest Action Plan, the AIS Control Action Agen-da, and watershed restoration projects through the Lake Tahoe Restoration Act and other state, local and private sources.



Tahoe Keys Weed Control
TRPA continued to lead the collaborative stakeholder process to help solve one of Lake Tahoe's most pressing environmental challenges. In the summer of 2020, TRPA and the Lahontan Water Board released a comprehensive draft environmental review of the proposed test project to treat aquatic weeds.

Stormwater Management
Reducing polluted stormwater runoff from urban areas and roads is a foundation of the EIP's water quality focus area. Area-wide solutions offer opportunities for the public and private sectors to partner and meet stormwater infiltration and erosion control requirements, generate funding for system maintenance, implement the Lake Tahoe Total Maximum Daily Load (TMDL) Program, and achieve other community goals.

Key 2020 Accomplishments
• Surpassed 20,000 Best Management Practice (BMP) Certificates since 1999. In 2020, issued 361 BMP

certificates: 313 for single-family residential parcels, 28 for multi-family residential parcels, and 20 for commercial parcels.
• Certified 88 new businesses in the Lake-Friendly Business Program for BMP compliance. 233 members to date: 130 in California and 103 in Nevada.
• Initiated the Ski Run "Mountain to Marina" Green Infrastructure Project, a multiple benefit water quality project that incorporates regional stormwater treatment, bicycle and pedestrian connectivity, parking, recreation access enhancement, and fuels reduction in an area of mostly resident workers and families in South Lake Tahoe.

Future Focus
• Continue basin-wide progress in achieving Total Maximum Daily Load reductions by supporting local jurisdictions and reviewing plans and permit applications for BMPs.
• Continue providing technical assistance to property owners complying with TRPA's incentive programs including coverage exemptions and mooring registrations.



FOREST HEALTH AND FIRE PROTECTION $25,835,000

Decrease the threat of catastrophic wildfire through forest fuels treatments and upgrades to water infrastructure.

- Hazardous Fuels Reduction and Forest Restoration	$16,810,000
- Regional Water Infrastructure Upgrades for Fire Protection	$9,025,000
Total Request:	**$25,835,000**

AQUATIC INVASIVE SPECIES $7,924,000

Control and remove existing aquatic invasive species and invest in innovative techniques.

- Aquatic Invasive Species Control	$7,924,000
Total Request:	**$7,924,000**

WATERSHED RESTORATION & EROSION CONTROL $35,980,000

Improve water quality with innovative stormwater treatment projects and restoration of rivers and meadows. Transform communities through implementation of multiple-benefit projects.

- River and Meadow Restoration	$12,750,000
- Urban Water Quality Improvement	$23,230,000
Total Request:	**$35,980,000**

Aquatic Resources
Lake Tahoe faces a constant and serious threat from the introduction and spread of aquatic invasive species (AIS), and the popularity of boating during the COVID-19 pandemic emphasized the importance of a stable, comprehensive prevention program. TRPA leads the multi-sector AIS partnership at Lake Tahoe, and its accomplishments are the result of the collective contributions of many organizations and individuals. Multi-agency control programs are working to manage invasive species already established here, and the watercraft inspection program is keeping new invasives out of the Tahoe Region.

Key 2020 Accomplishments
• Agencies and marina partners phased opening of boat inspections in keeping with COVID-19 travel restrictions and protocols.
• Implemented COVID-19 safety protocols throughout the watercraft inspection season, including an appointment system to maintain distance and sanitation.
• Watercraft inspectors and boat launch partners oversaw 14,500 unique vessel launches including 4,600 inspections at regional inspection stations—58 percent of inspected boats required decontamination.
• Intercepted 20 boats with invasive mussels onboard, an 80 percent increase from 2019.
• Began control work on a 100-acre invasive weed infestation in Lake Tahoe that has spread from the Tahoe Keys. This work will continue in 2021 to manage further spread of this in-lake population.

• Continued implementing the AIS Control Action Agenda with invasive weed control work at Taylor and Tallac Creek marsh in partnership with the USDA Forest Service.
• Expanded tests of emerging aquatic weed control methods such as using ultraviolet light.
Also, work began on the installation of new bubble curtains in two marina locations to prevent plant fragments from floating lakeward. Future Focus
• Continue to investigate emerging solutions for prevention, control, and monitoring and develop funding strategies to achieve the AIS Control Action Agenda.
• Continue to collaboratively develop an effective control approach for the expansive infestation of aquatic invasive weeds in the Tahoe Keys.

Take Care Tahoe

Take Care partners continue to be the go-to source for disseminating the rapidly changing stewardship guidelines related to recreating in Lake Tahoe. Over 3,000 yard signs have been distributed throughout Lake Tahoe to encourage people to stay safe while visiting.

In July, Raley's in Incline Village became the first major Tahoe area business to encourage their customers not to buy single-use water bottles. Instead, the grocer asks its patrons to consider purchasing DRINK TAHOE TAP branded reusable Klean Kanteen water bottles. In addition to making the bottles available to customers for purchase, Raley's has incorporated signage from the Take Care Tahoe campaign in their in-store displays where single-use plastic water bottles are shelved to help educate customers about the impacts of single-use and microplastics on the environment and the Lake Tahoe watershed.



The Take Care Bear helps stock shelves with reusable water bottles.

TRPA Quarterly Report

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AGENDA ITEM NO. X.A.1

Restoration In Progress: Environmental Improvement Program Update Planning Horizon to 2018
Full report: *http://www.trpa.org/wp-content/uploads/EIP_Report_Update.pdf*
4 page summary*: http://www.trpa.org/wp-content/uploads/EIP_4PG_2011_FNL.pdf*

A Conservation Plan for Lake Tahoe: The Environmental Improvement Program (1997-2006)
http://www.trpa.org/wp-content/uploads/EIP_4PG_SUMM-FINAL.pdf

TRPA Stormwater Management Program
http://www.tahoebmp.org
(Editor Note: The Updated TRPA Regional Plan shifts the burden of BMP compliance from individual property sites to a more regional approach to BMP Compliance. The following information is included as the current policy follows these guidelines.)

Erosion from developed land in the Tahoe Basin is the biggest driver of lake clarity loss. Stormwater runoff from residential, commercial, tourist, recreation, industrial and public service projects conveys sediment and nutrients onto public roads and ultimately to Lake Tahoe. By retrofitting developed public and private parcels with erosion control measures, known as Best Management Practices (BMPs), this program keeps runoff from entering roadways. Most of the rain and snow that falls on impervious surfaces on these lands (i.e., rooftops, driveways and parking areas) runs off and flows into roadside drainage channels. This runoff then combines with stormwater from public roads to produce a large volume of water containing nitrogen, phosphorus, and fine sediment. Roadside ditches erode and when these flows enter natural stream channels, the channels also erode. Once the stability of a natural stream is disturbed, the process continues for years or even decades.

Stormwater running off disturbed land picks up soil particles from unvegetated land or bare soil. During storms, soil particles from these bare areas are washed into street gutters or storm drains. In addition, vehicles driven or parked on bare dirt compact the soil, reducing infiltration and increasing runoff. Developed lands also contribute other types of pollutants. Fertilizer applied to lawns and gardens, releases nitrogen, phosphorus, and other nutrients. When these nutrients reach the Lake, they stimulate algae growth.

BMPs are the first line of defense to reduce stormwater erosion from developed properties. Private property owners are the primary implementers of BMPs throughout the Tahoe Basin. BMPs are improvements such as infiltration trenches and drywells that infiltrate roof and driveway runoff on-site which prevent runoff from entering the public right-of-way. Revegetation of disturbed areas and stabilization of eroding slopes keep soil in place and prevents the transport of sediment and nutrients off-site. Paving dirt driveways and parking areas also helps improve water quality. Large developed properties require a higher level of BMP implementation and may include the construction of detention and infiltration facilities as well as treatment vaults.

Public entities also implement BMPs on publicly-owned properties. To accelerate BMP implementation, EIP partners are working with private property owners on neighborhood or area-wide treatment solutions. Through outreach to residents in neighborhoods where public projects are being designed, property owners have opportunities to meet their retrofit requirements and public agencies can implement more effective water quality improvement projects.

Providing assistance to property owners is an important element in implementing BMPs. Local, regional, state, and federal agencies, and conservation districts assist private landowners in implementing BMPs. EIP partners provide technical assistance in the form of BMP site evaluations and implementation plans. TRPA, the Natural Resources Conservation Service, in conjunction with the Tahoe Resource Conservation District and the Nevada Tahoe Conservation District, will continue to provide this technical assistance. Public education and technical assistance are crucial components in integrating BMPs with defensible space for fire safety.

2013: Residential BMP Designer tool online

http://www.tahoebmp.org/BMPDesigner.aspx

BMP Designer - Create a BMP Design for Single Family Residences

The BMP Designer allows homeowners, contractors, and consultants to create BMP designs in a friendly, self-guided web application. Specifically created with single family homes in mind, this unique tool directs the user through the BMP design process from laying out site conditions to a

complete BMP plan. Users can even submit their plan for approval and help the TRPA Final Inspection by uploading photos of the work performed.

U.S. Forest Service Projects and Actions – Lake Tahoe Basin
The US Forest service maintains a database of ongoing projects. These projects include extensive erosion control and water quality improvement projects. Project details on the following items are located at**:**
http://www.fs.usda.gov/projects/ltbmu/landmanagement/projects

USFS Tahoe Projects
Follow the links provided below to view detailed project documents. For older local projects, visit the Projects & Plans Archive. Scroll down or follow this link to learn more about Access and Travel Management Plans (ATMs).

For current projects, visit the Projects & Plans webpage.

- Angora Hazard Tree Removal
- Angora Reforestation
- Baldwin Beach Restroom Replacement
- Baldwin Grazing Allotment Management
- Barker Pass Road Slide Repair
- Fallen Leaf Campground BMP Retrofit
- Heavenly MojoMan Challenge
- Heavenly Mountain Resort Galaxy Test Wells
- High Meadow Ecosystem Restoration
- Meadow Restoration Pilot
- Meeks Creek Meadow Ecosystem Restoration
- Meyers Weather Station Replacement
- Nevada Beach and Day Use Area BMP Retrofit
- Roundhill Pines Prospectus
- Spooner Hazardous Fuels Reduction and Healthy Forest Restoration
- William Kent Campground BMP Retrofit and Administrative Site Redevelopment
- Zephyr Cove Pier Replacement
- Angora Restoration
- Aspen Community Restoration
- Big Meadow Creek Watershed Fire Regime Restoration
- Blackwood Creek Restoration
- Burke Creek Highway 50 Crossing and Realignment Project
- CalPeco Electrical Line Upgrade Project (FEIS)
- Camp Richardson Corral Permit Reissuance
- Camp Richardson Resort Campground and Vehicle Circulation BMP Retrofit
- Camp Richardson Resort Permit Renewal
- Carnelian Hazardous Fuels Reduction and Healthy Forest Restoration
- Diamond Peak Ski Area Reissuance of Special Use Permit
- Emerald Fire Restoration Project
- Heavenly Mountain Resort Epic Discovery Project
- Heavenly Mountain Resort 2010 Capital Projects
- Heavenly Mountain Resort 2011 Capital Projects
- Heavenly Mountain Resort 2012 Capital Projects
- Heavenly Mountain Resort 2013 Capital Projects
- Heavenly Mountain Resort 2017 Capital Improvement Projects
- Heavenly Mountain Resort Tamarack Project

- Historic Facilities BMP Retrofit
- Homewood Mountain Resort 20-Year Ski Slope Permit
- Homewood Snowcat Tours
- Incline Fuels Reduction and Healthy Forest Restoration Project
- Incline Lake Dam Project
- Incline Management Plan
- Integrated Management and Use of Roads, Trails and Facilities
- Kingsbury Stinger Trail Reconstruction and BMP Upgrades Project
- Lahontan Cutthroat Trout Restoration in the Upper Truckee River
- Lake Tahoe Ecosystem Underburn
- Lower Truckee Riverbank Stabilization
- LTBMU Routine Road Maintenance
- LTBMU Trails Maintenance
- Meeks Bay Campground BMP Retrofit
- Meeks Bay Restoration Project
- Meeks Creek Meadow Ecosystem Restoration
- Meeks Meadow Washoe Restoration
- Meyers Landfill
- Non-Federal Lands Hazardous Fuel Reduction Projects
- NV Energy 634 Line Rebuild Project
- Ongoing Lands Projects
- Proper Food Storage Order
- Restoration of Fire Adapted Meadow Ecosystems
- Sierra Nevada Yellow-Legged Frog Restoration
- South Shore Fuel Reduction and Healthy Forest Restoration
- South Tahoe Fuel Treatment Project
- SR-28 Corridor Improvement Plan
- SR-28 Shared Use Path
- SR-89/Fanny Bridge Community Revitalization Project
- Tahoe Yellow Cress Conservation
- Taylor Creek Environmental Education/Visitor Center
- Taylor Tallac Restoration Project
- Terrestrial Non-Native Plant Species Treatment
- Truckee River First Four Mile Streambank Stabilization and Restoration
- Upper Echo Lakes Hazardous Fuels Reduction
- Upper Truckee River Reach 5 Restoration
- Valhalla Pier Erosion Control and Accessibility Retrofit
- West Shore Wildland Urban Interface Hazardous Fuels Reduction and Forest Health Project
- Zephyr Cove Pier Replacement
- Zephyr Cove Stable Upgrade

Zephyr Point Fire Lookout Relocation

USDA / US Forest Service - Lake Tahoe Basin Management Unit Monitoring Program Reports

The USDA / US Forest Service Lake Tahoe Basin Management Unit (LTBMU) provides multi-year, extensive reporting on forest land projects.

For an overview of ongoing projects and reports please visit:
https://www.fs.usda.gov/detail/ltbmu/maps-pubs/?cid=FSM9_046480

Examples are below:

Upper Truckee River Reach 5 Effectiveness Monitoring Report - Apr. 3, 2019 (PDF 8,182 KB)
Heavenly SEZ Demonstration Project Monitoring Report - Dec. 2017 (PDF 3,375 KB)
Vegetation Structure Response to Channel Restoration Blackwood Creek - Dec. 2017 (PDF 5,517 KB)
LTBMU Annual Soil and Water BMP Monitoring Report for FY15 - October 2016 (PDF 338 KB)
LTBMU Rare Botanical Species 2015 Monitoring Report - May 1, 2016 (PDF 870 KB)
Lake Tahoe Federal Grants Program Status Report 1984 - 2015 (PDF 1,325 KB)
LTBMU Invasive Plant Management Report - 2015 (PDF 596 KB)
Upper Truckee River Lahontan Cutthroat Trout Restoration Project Annual Report - 2015 (PDF 1,089 KB)

2020: Forest Service acquires 120 acres on Brockway Summit

SOUTH LAKE TAHOE, Calif., Dec. 10, 2020

The USDA Forest Service Lake Tahoe Basin Management Unit (LTBMU) is pleased to announce we have completed the purchase of a significant parcel of undeveloped land on the North Shore of Lake Tahoe. The acquisition includes two parcels that total approximately 120.4 acres on Brockway Summit that will be added to the National Forest System (NFS) of lands within the LTBMU. “We are excited to announce the completion of this long-awaited purchase,” said Deputy Forest Supervisor, Danelle D. Harrison. “By adding this parcel to the National Forest System, we can better protect the water quality, scenic and recreational resources and help preserve the quality of experience on the Tahoe Rim Trail, which is adjacent to the property.”
These parcels are part of a much larger property on the north side of the ridgeline outside of the LTBMU owned by Sierra Pacific Industries and adjacent to Northstar Ski Area. All other private lands on the LTBMU side of the ridge have been previously acquired by the NFS from Sierra Pacific's predecessors in ownership. “We wish to thank everyone whose hard work and determination contributed to this highly anticipated acquisition, and we also thank Sierra Pacific Industries for giving the Forest Service the opportunity to purchase this property,” said Lands Program Manager, Bob Rodman.

In addition, our sincere thanks go out to the California Tahoe Conservancy, who were integral partners during the purchase, assisting with the appraisal and helping to keep the landowners engaged during the arduous purchase process.

The Forest Service land acquisition program initiated when Congress passed the Santini-Burton Act that directed the LTBMU to acquire environmentally sensitive lands around the Tahoe Basin to safeguard them from potential development in order to protect the water quality of Lake Tahoe. This property is one of the few remaining large properties in the Lake Tahoe Basin that was suitable for acquisition by the Forest Service.

The Santini-Burton Act
http://www.fs.usda.gov/detail/ltbmu/landmanagement/resourcemanagement/?cid=fsm9_046519
Congress passed Public Law 96-586, defined as the Santini-Burton Act, on December 23, 1980. In passing the Act, Congress declared that the environmental quality of the Lake Tahoe Basin was jeopardized by overdevelopment of sensitive lands and that the unique character of the Lake Tahoe Basin is of national significance deserving further protection. The passage marked a major commitment and emphasis by the Lake Tahoe Basin Management Unit in land acquisition and watershed restoration focused on protecting and restoring the environmental quality of Lake Tahoe.

Specific provisions in the Act directed the Forest Service to:

1. acquire environmentally sensitive land

2. restore watersheds on acquired National Forest Systems lands
3. administer erosion control grants to units of local government.

The Act authorized the Forest Service to acquire, by purchase and donation, sensitive lands in the Lake Tahoe Basin. Receipts from the sale of surplus Federal land in the Las Vegas area, to be advanced through the Land and Water Conservation Fund, were earmarked for the purchases. Properties eligible for purchase under the Act are wetlands, stream environment zones, or steep and fragile lands. The first acquisition recorded in October 1982. To date, over 3,500 parcels (or Urban Lots) totaling 13,000 acres valued at $105 million have been acquired under the authority of the Santini Burton Act. Some recent significant acquisitions include more than half a mile of lakefront and acreage at Secret Harbor, approximately 300 feet of beachfront on the south shore, and several large acreage parcels adjacent to existing National Forest System lands in the Kingsbury area.

A Map of Santini-Burton Purchase lots in the Tahoe Basin is available at:
http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5371156.pdf

A provision of the Santini-Burton Act authorized a sum equal to 15 percent of the acquisition dollars for erosion control grants to local governments. Allocations to the five local jurisdictions are proportionate to the acres acquired under the Act. Over $16 million have been appropriated for these grants, funding in whole or in part over 80 water quality improvement projects.

LTBMU Forest Plan
https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd507523.pdf
Purpose: The purpose of this Land Management Plan—also known as the Forest Plan—is to provide strategic guidance to the Lake Tahoe Basin Management Unit (LTBMU) for forest management over approximately the next 15 years. This plan guides the restoration or maintenance of the health of the land, to promote a sustainable flow of uses, benefits, products, services, and visitor opportunities. The plan provides a framework for informed decision making, while guiding resource management programs, practices, uses, and projects. It does not include specific project and activity decisions. Those decisions are made separately, after more detailed analysis and public involvement. The Forest Plan is adaptive in that it can be amended when appropriate, to update the management direction based on new knowledge and information. The Forest Plan is strategic in nature and does not attempt to prescribe detailed management direction to cover every possible situation. While all components necessary for resource protection and restoration are included, the plan also provides flexibility needed for the responsible official to respond to uncertain or unknown future events and conditions such as fires, floods, climate change, changing economies, and social changes that may be important to consider at the time decisions are made for projects or activities.

Stormwater Management:
Tahoe RCD Stormwater Monitoring Programs
*https://tahoercd.org/tahoe-stormwater-monitoring/stormwater-monitoring-program T*he Tahoe Resource Conservation District (TRCD) has recently received several grants to implement a basin-wide stormwater monitoring program in Lake Tahoe. Regulatory agencies, municipal jurisdictions, and scientists alike have agreed that establishing a collaborative monitoring program is vital to the goal of improving lake clarity. A regional stormwater monitoring program will not only serve to fill scientific gaps and provide a means by which jurisdictions can assess the cumulative effect of environmental

improvement programs in specific watersheds, but it will help to track basin-wide progress toward achieving Lake clarity goals.

Tahoe RCD Monitoring Sites
(click link to each specific site)

- SR431
- Incline Village
- Lakeshore
- Tahoma
- Rubicon
- Pasadena
- Speedboat
- Tahoe Valley
- Upper Truckee River / Hwy 50
- Elks Club

The Lake Tahoe "Total Maximum Daily Load" (TMDL) identifies fine sediment particles (FSP) as the largest single contributor to Lake Tahoe's clarity loss. These particles are mainly carried by stormwater runoff coming off our urban environment. Lake Tahoe's distinction as an Outstanding Natural Resource by the federal government means that the governing jurisdictions surrounding Lake Tahoe must strive to undo the damage to the Lake's clarity that has taken place over the last century and provide evidence to support that their restoration actions are having positive effects. The Tahoe RCD Stormwater Monitoring Program is leading the scientific monitoring of stormwater runoff at eight locations around the Lake Tahoe Basin. Not only do we measure the pollutant loads reaching Lake Tahoe through the stormwater pipes you may have seen; we also monitor the performance of public water quality projects, such as infiltration basins and stormwater filtration vaults. With the data, we can determine the effectiveness of these types of stormwater treatment actions. Stormwater monitoring is a necessary strategy for truly understanding whether our collective actions are helping restore Lake Tahoe. Since monitoring results are only as good as the data collected, Tahoe RCD developed the Regional Stormwater Monitoring Program in the Lake Tahoe Basin. It outlines protocols for consistent data collection, management, analysis and reporting of stormwater monitoring data. Now that this is in place, it's easy to make "apples to apples" comparisons of water quality data collected around the lake. Tahoe RCD analyzes the data and publishes the results in an annual report, aiding the jurisdictions in collectively reaching the goals of the Lake Tahoe TMDL and helping them make informed management and treatment decisions to reverse Lake Tahoe's clarity loss.

(View the Tahoe RCD Annual Stormwater Monitoring Report and other publications).

Developing the administrative and scientific structure to implement the Regional Storm Water Monitoring Program (RSWMP) is a new role for the TRCD, but has been a long term planning effort for many Basin partners. The TRCD will work with partners to create a centralized yet flexible structure to integrate and coordinate future stormwater monitoring efforts around the Basin. A second major goal for the TRCD is to establish a comprehensive web-based database for housing all Lake Tahoe stormwater data in one location. To lead these efforts the Tahoe RCD has spent the last twelve months recruiting staff members and building partnerships integral to developing and

implementing RSWMP. This work was possible through the Department of Conservation's Watershed Coordinator Program Funds.

Implementers' Monitoring Program (IMP) Component of the Regional Storm Water Monitoring Program (RSWMP)
http://tahoercd.org/wp-content/uploads/2013/08/Implementers-MP-130812.final_.pdf

Submitted to the Lahontan Regional Water Quality Control Board and the Nevada Division of Environmental Protection on April 30, 2013. Funds for this project are provided by the USDA Forest Service Lake Tahoe Basin Management Unit through the Southern Nevada Public Lands Management Act and the Department of Conservation for a Watershed Coordinator.

This document is intended to function as the Lake Tahoe Basin's first collaborative monitoring plan for implementation efforts related to the urban stormwater source category of the Lake Tahoe Total Maximum Daily Load (TMDL). This monitoring program was developed jointly by the California and Nevada implementing jurisdictions in an attempt to collectively fulfill California National Pollutant Discharge Elimination System (NPDES) Permit requirements or Nevada Interlocal Agreement commitments. However, this monitoring plan also represents a historic first step toward implementing a comprehensive Regional Stormwater Monitoring Program (RSWMP) envisioned for the Tahoe Basin. All data will be collected in a manner consistent with RSWMP monitoring protocols so it can easily be analyzed to align with the goals and objectives presented in the multi-agency driven RSWMP Data Quality Objective Plan (Heyvaert et al 2011a), Quality Assurance Project Plan (Heyvaert et al 2011b), and Sample Analysis Plan (Heyvaert et al 2011c).

The Lake Tahoe Total Maximum Daily Load (TMDL) is a comprehensive, long-term plan to reverse the decline in deep-water transparency of Lake Tahoe and restore mid-lake clarity to the 1967-1971 level of 29.7 meters (97.4 feet). TMDL science suggests that up to two thirds of the decrease in clarity is attributable to fine sediment particles (FSP, <16 µm in diameter), and that the urbanized areas, roadways in particular, account for approximately 72% of FSP that eventually enter the lake (Lake Tahoe TMDL Technical Report, 2010).

The Municipal permit requires California jurisdictions in the Lake Tahoe Basin to take measures to decrease pollutant loading from stormwater runoff in urbanized areas. Local California jurisdictions must implement pollutant controls to decrease FSP and nutrient inputs, and must monitor and evaluate select urban catchment outfalls and Best Management Practices (BMPs) for flow volumes and sediment and nutrient loads.

While monitoring data will not be used assess credits earned under the Lake Clarity Crediting Program for implementing effective pollutant controls, it will provide empirical data that will begin to (1) inform assumptions used to estimate runoff volumes and pollutant loads modeled with the Pollutant Load Reduction Model (PLRM) (2) assess nutrient and sediment loading at chosen catchments, (3) evaluate BMP effectiveness at chosen BMPs.

Similar permits or regulatory programs have been adopted for the California Department of Transportation (Caltrans) under NPDES NO. CAS000003, NPDES Statewide Stormwater Permit for Waste Discharge Requirements for State of California Department of Transportation, Order No. 2012-0011DWQ effective July 1, 2013.

The three urban jurisdictions located within Nevada, Washoe County, Douglas County and the Nevada Department of Transportation (NDOT) will each enter into Interlocal Agreements with the Nevada Division of Environmental Protection to implement the Lake Tahoe Total Maximum Daily Load. These agreements were slated to become effective in August 2013.

Monitoring includes flow measurements and water quality sampling at eleven monitoring stations: the outfalls of the five selected catchments, and the inflows to and outflows from the selected BMPs located within three of those catchments.

The monitoring plan includes:
· Measuring continuous flow at each of the eleven monitoring stations,
· Measuring continuous turbidity at selected monitoring stations,
· Taking samples across the hydrograph during four different storm event types at ten of the eleven monitoring stations,
· Analyzing samples for total nitrogen (TN), total phosphorus (TP), total suspended solids (TSS), turbidity, and fine sediment particles (FSP),
· Calculating seasonal and annual runoff volumes at each of the eleven monitoring stations and nutrient and sediment loads at ten of the eleven monitoring stations.

Watershed Management Guidebook Published Jan. 2013
http://tahoercd.org/wp-content/uploads/2013/03/TIP-WEB-version-FINAL.pdf

A publication by Integrated Environmental Restoration Services, Inc. Produced in collaboration with the Lahontan Regional Water Quality Control Board and the Tahoe Resource Conservation District. The *Watershed Management Guidebook* presents a set of principles and practices for managing disturbed watersheds. It has been developed based on years of practice to help link initial project plan to actual outcomes in watershed projects. The Guidebook does not provide all the answers or completely prescriptive approaches. Instead, it offers tools to help achieve greater alignment between intentions and outcomes. There is a growing recognition that relying solely on mathematical models to help us manage dynamic watersheds and their complex processes is not practical. By assessing outcomes and embracing the uncertainty inherent in managing watersheds, we can produce not only high quality results but we can continue to add to our knowledge base and improve future projects. This Guidebook was created to share a process that has been evolving for over 20 years and that has produced surprising results. This process has achieved results by valuing direct assessment over expert opinion, embracing unexpected outcomes, and in the process, building relationships and a common language among participants at every level in watershed management efforts.

Nevada Tahoe Conservation District (NTCD) Best Management Practices Retrofit Program
http://ntcd.org
Nevada Tahoe Conservation District's (NTCD) Best Management Practices (BMP) Retrofit Program is part of the nationwide Backyard Conservation Program. The BCP is designed to educate private homeowners about simple, inexpensive conservation measures they can utilize in their own backyards. The Backyard Conservation Program is a joint effort of the Wildlife Habitat Council, the National Association of Conservation Districts, and the Natural Resources Conservation Service. The Conservation Districts in the Tahoe Basin are recognized throughout the country for progressive Backyard Conservation Programs.

The Nevada Tahoe Conservation District's BMP Program works primarily with single-family residences located on the Nevada side of the Lake Tahoe Basin, providing homeowners with information on how to control erosion and infiltrate stormwater runoff on their properties in compliance with the Tahoe Regional Planning Agency's (TRPA) BMP Ordinance. The Conservation District's have worked hard to maintain a close relationship with the local fire districts and the TRPA in order to develop a consistent message regarding BMP implementation and Fire Defensible Space practices. Nevada Tahoe Conservation District staff also works closely with the Natural Resources Conservation Service (NRCS), who provides engineering oversight, technical expertise and guidance with BMP designs.

Other programs and projects at the NTCD include: storm water management assessment, BMP asset inventory, a street sweeper effectiveness study, stream restoration projects, biologic base water quality improvement, water quality monitoring, forest health projects and outreach, biomass utilization and coordination; watershed storm water management planning.

Zephyr Cove Water Quality Improvement Project

The goal of the Zephyr Cove Water Quality Improvement Project is to treat sediment and nutrient laden stormwater flows from US Highway 50 by re-routing flows to an infiltration basin and safely conveying any overflow to Lake Tahoe while minimizing beach erosion. After many years of planning with multiple stakeholders and agencies, the design was finalized in 2016 and constructed in two phases, a 2016 Phase 1 and a 2017 Phase 2. Construction of the project was completed in June 2017 and the project is currently undergoing irrigation to establish vegetation. The project was funded by the Nevada Department of Transportation, the Nevada Division of State Lands, the Nevada Division of Environmental Protection, and the US Forest Service.

Hybrid BMP Project

This project constructed eight LID infiltration features in the Washoe County Right-of-Way during the Fall of 2011. The rain gardens were integrated into an existing landscaping and stormwater improvement project and are designed to hydraulically isolate themselves when full. Preliminary monitoring results are promising with nearly 80% of all water in the catchment area being treated through infiltration. Studies have shown infiltration to be the most promising method in the treatment of fine sediment and integrating off-line rain gardens throughout the Tahoe Basin could result in a significant reduction of fine sediment delivery to Lake Tahoe and surrounding water bodies.

Hybrid BMP Project Awarded TRPA Best in Basin

NTCD in collaboration with Washoe County and Gradex Construction was awarded the Best in Basin for Erosion Control for the Hybrid BMP Project located in Incline Village.

Cave Rock Estates GID Stormwater System Retrofit Project

In 1990 and 2003, the Cave Rock Estates Erosion Control Project and the Cave Rock Estates Slope Protection Project installed treatments to control the sediment load that comes from this area. Slope stabilization and conveyance systems were created to move the bulk of Cave Rock Estates stormwater runoff to a bed filter at the bottom of the subdivision where is it treated. It then joins with Nevada Department of Transportation (NDOT) stormwater, and is sent through two deep sediment traps before entering Lake Tahoe. The bed filter *was* now 22 years old and at the end of its operational life. It was designed prior to the identification of fine sediment particles (sub-16 µm sediment) as the target pollutant in the Lake Tahoe TMDL Program. NTCD and Cave Rock Estates GID have been working together on a plan to retrofit the existing bed filter to be more effective at fine

sediment particle removal. This area-wide strategy is a new model for stormwater management and is paving the way for larger, more community based systems in the Basin. The Cave Rock Estates GID Stormwater System Retrofit Project was implemented in the summer of 2014 and a Phase 2 was implemented in Summer 2016 to improve the direction of runoff into the treatment area. The project is working well since installation.

Burke Creek Final Report
http://www.ntcd.org/NV_ourtahoewatershed
One of the NTCD major projects for 2011 was an overall analysis of the Burke Creek Watershed in the southeast corner of Lake Tahoe next to the Nevada/California state line. Burke Creek serves as the watershed to several TWSA member municipal intakes.

Tahoe Resource Conservation District (Tahoe RCD / TRCD) Watershed Resources Programs *www.TahoeRCD.org*

Tahoe RCD's Watershed Resources Program manages large erosion control and revegetation projects and also educates property owners on conservation landscaping practices for the California side of the lake.



Johnson Meadows Acquisition
TWSA provided 10 dog waste stations for this location. In 2018, the Johnson Meadows property on the Upper Truckee River (South Tahoe) was purchased. Johnson Meadow is situated in the heart of the city of South Lake Tahoe, El Dorado County, California. It is located within the Upper Truckee River watershed, the largest watershed in the Lake Tahoe Basin, draining over 56 square miles and providing some of the most significant wet meadow floodplain habitat in the entire Sierra Nevada.

https://tahoercd.org/home/programsand-prjects-link-page/johnson-meadow/

Tahoe RCD recently acquired title to approximately 206 acres comprising the Johnson Meadow property in order to provide continuous public ownership of the lower nine miles of the Upper Truckee River (UTR) before the river enters Lake Tahoe. This nine-mile reach of the UTR is centered downstream of property owned by the City of South Lake Tahoe and California Department of Parks and Recreation (Washoe Meadows State Park) and upstream of the Upper Truckee Marsh, owned by the California Tahoe Conservancy. Johnson Meadow is situated in the floodplain of the UTR and was the largest privately-owned meadow in the Tahoe Basin.

Acquisition of Johnson Meadow is a critical step in restoring the UTR watershed, and this river reach contains significant wildlife habitat, including river, riparian, meadow, and upland habitat areas. Acquisition was made possible through funding from California Tahoe Conservancy, California Department of Fish and Wildlife and the Tahoe Fund. The purpose of this land purchase is to provide ecosystem and watershed protection benefits through preservation, management, and future restoration of meadow, riparian, aquatic and upland habitats in Johnson Meadow.

Best Management Practices (BMP) Retrofit Program

Tahoe Resource Conservation District's (Tahoe RCD or TRCD) Best Management Practices (BMP) Retrofit Program is also part of the nationwide Backyard Conservation Program. This program parallels the NTCD program, but works primarily with single-family residences located on the California side of the Lake Tahoe Basin, providing homeowners with information on how to control erosion and infiltrate stormwater runoff on their properties in compliance with the Tahoe Regional Planning Agency's (TRPA) BMP Ordinance.

Biological Resources Program

Tahoe RCD's Biological Resources Program consists of the Terrestrial Invasive Weed and Aquatic Invasive Species Programs. Through these programs, TRCS participates in the Lake Tahoe Aquatic Invasive Species Coordination Committee and the Lake Tahoe Basin Weed Coordinating Group. These groups are comprised of diverse agencies and community members dedicated to protecting the Lake Tahoe Basin from invasive species through education, research, prevention, early detection, survey and control. Our Aquatic Invasive Species (AIS) Program implements Lake Tahoe's mandatory Watercraft Inspection Program, Truckee Regional AIS Prevention Program (TRAISPP), and Lake Tahoe's Survey and Control Program. The Lake Tahoe Watercraft Inspection Program, prevents the introduction of AIS such as Quagga and Zebra mussels into the Tahoe Basin. With funding from the Truckee River Fund, TRAISPP implemented a pilot Watercraft Inspection Program in 2010, in the lower Truckee River watershed. Our Survey and Control Program includes projects aimed at controlling AIS currently in Lake Tahoe.

Watercraft Inspection Sub-Program Highlights

Tahoe RCD coordinates Lake Tahoe's Watercraft Inspection Program by providing qualified inspectors at public launch facilities, technical support for private launches, trainings, and decontamination of watercraft. The Watercraft Inspection Program was implemented in 2008. Details are also provided in previous chapter (Watershed Activities).

Other Tahoe RCD Projects:

Community Watershed Partnerships (CWP) *https://tahoercd.org/wp-content/uploads/2015/11/Tahoe-Valley-Meyers-CWP-Report-FULL.pdf* One of the newest projects focused on community watershed protection is the Community Watershed Partnership (CWP) a holistic conservation initiative which engages locals, land managers and agencies in neighborhoods throughout the Lake Tahoe Basin. Funded by a grant from NRCS, Community Watershed Partnership is a holistic conservation process which takes

place at the community scale. Montgomery Estates in South Lake Tahoe is the first neighborhood targeted through this pilot program. Residents are encouraged to provide input on current and planned conservation projects in their own neighborhood. Expected outcomes include enhanced recreational opportunities, defensible space, wildlife habitat, water quality.

Angora Community Demonstration Garden

With our partner agencies and the Tahoe community, Tahoe RCD has re-vegetated a property burned in the Angora Fire to create a demonstration garden. The garden is located at 1383 Mt. Olympia Circle in South Lake Tahoe. The garden includes examples of Tahoe native and adapted vegetation, defensible space, water conservation, and erosion control practices specific to properties in the Angora Burn area. Additionally, the garden features irrigation techniques and a variety of composts and mulches.

Angora Forest Stewardship Project

With funding from the National Forest Foundation, Tahoe RCD partnered with the Nevada Tahoe Conservation District and the US Forest Service to organize over 1,000 South Tahoe community members and students to plant more than 7,000 tree seedlings during the spring of 2009 on urban USFS lots in the Angora burn area. The majority of the trees planted were Jeffrey and Sugar pines and Incense cedars. Additionally, community groups and local homeowners have adopted lots and are performing on-going maintenance and monitoring of the trees. Prior to the spring tree planting, the Tahoe RCD, US Forest Service, and partner agencies developed and implemented an interdisciplinary forest health curriculum for all Lake Tahoe unified elementary schools. The curriculum was based on the Project Learning Tree curriculum and reached over 1,700 students in grades K-5.

Brockway Erosion Control Project

With funding received from the California Department of Transportation, Tahoe RCD conducted revegetation and slope stabilization work along the Highway 267 corridor over Brockway summit. The goal of the Brockway Summit Cal Trans Project is to reduce the overall contribution of fi ne sediments and nutrients entering Lake Tahoe from the Highway 267 corridor. Revegetation and slope stabilization practices are being implemented, thus improving the overall scenic quality of the area. TRCD worked with CalTrans and Integrated Environmental Restoration Services (IERS) on project design and installation. To date, approximately 50,000 square feet of bare, eroding slopes have been treated within the project area, and over 2000 plants, trees and shrubs have been planted.

Homewood Erosion Control Project

With funding from the Department of Water Resources, Tahoe RCD developed a public-private partnership to implement erosion control and water quality improvement practices at Homewood Mountain Resort to achieve pollutant load reductions within the Homewood Creek Watershed. The goal of this program is to make this the first watershed in the Lake Tahoe Basin to achieve the Lake Tahoe Total Maximum Daily Load (TMDL) Clarity Challenge of a 32% reduction in fine sediment loading. Through the Homewood Erosion Control Project and partnership with Homewood Mountain Resort (JMA Ventures) important improvements to Tahoe's water quality have been made. . The restoration activities conducted through this project help to reduce non-point source pollutant loading in Homewood and Madden Creeks, which rank among the leading sources of upland erosion in the Tahoe Basin, contributing fine sediments and nutrients into Lake Tahoe. Erosion control and water quality improvements have been completed on over 125,000 square feet of disturbed bare soil within the Homewood property.

Tahoe Yellow Cress Conservation Program
http://www.trpa.org/conservation-efforts-protecting-tahoe-yellow-cress
Beginning summer 2011, Tahoe RCD worked with the Natural Resources Conservation Services and Nevada Tahoe Conservation District doing Tahoe Yellow Cress conservation work with lake front private property owners. This included creating site specific stewardship plans for Tahoe Yellow Cress populations with recommendations for care, planting and protection, and an educational brochure.

North and South Tahoe Environmental Education Coalition (STEEC) School Programs
http://nteec.webs.com
http://steec.org
A not-for-profit, collaborative network of local agencies and organizations dedicated to bringing high quality environmental education programs to all North and South Tahoe students in grades K-12. LTEEC/STEEC has joined hundreds of Lake Tahoe volunteer educators and reached thousands of Tahoe Basin elementary students annually.

LRWQCB Load Reduction Planning Tool / Lake Tahoe Watershed, Nevada & California
http://tahoebmp.org/BMPHandbook.aspx

The Pollutant Load Reduction Model (PLRM) is designed for evaluating and comparing pollutant load reduction alternatives for storm water quality improvement projects in the Tahoe Basin. The PLRM uses publicly available software and source code to provide users with complete access to the tools developed. The PLRM is intended to be practical for application by users possessing a basic understanding of hydrology, water quality, and water resources modeling.

The purpose of this document is to provide a step-by-step methodology for estimating and comparing potential water quality pollutant loads from redevelopment projects under both existing conditions and proposed redeveloped conditions in the Lake Tahoe Basin on a parcel or multiple parcel scale. This Load Reduction Planning Tool (LRPT) methodology can be used as a planning tool to estimate changes in potential water quality pollutant loading associated with the proposed redevelopment projects. The LRPT could be used early in the planning process by planners, developers and/or regulators to identify alternatives and design modifications that could be made to the redevelopment project to reduce pollutant loads generated from the site. This methodology is applicable to a much smaller spatial scale than the Pollutant Load Reduction Model (PLRM) and it is not intended to replace PLRM or other water quality planning tools approved by Lahontan Regional Water Quality Control Board (RWQCB), the Tahoe Regional Planning Agency (TRPA), or the Nevada Division of Environmental Protection (NDEP).

The Pollutant Load Reduction Model is part of a multi-stakeholder effort to provide technical tools for project planners, funders, implementers, and regulators to work collaboratively to minimize the deleterious effects of urban storm water on the remarkable clarity of Lake Tahoe, a keystone in the ecological and economic health of the Lake Tahoe Basin. This project is pursuant Section 234 of the Water Resources Development Act of 1996 (PL 104-303) which provides for coordinated interagency efforts in the pursuit of water quality and watershed planning.

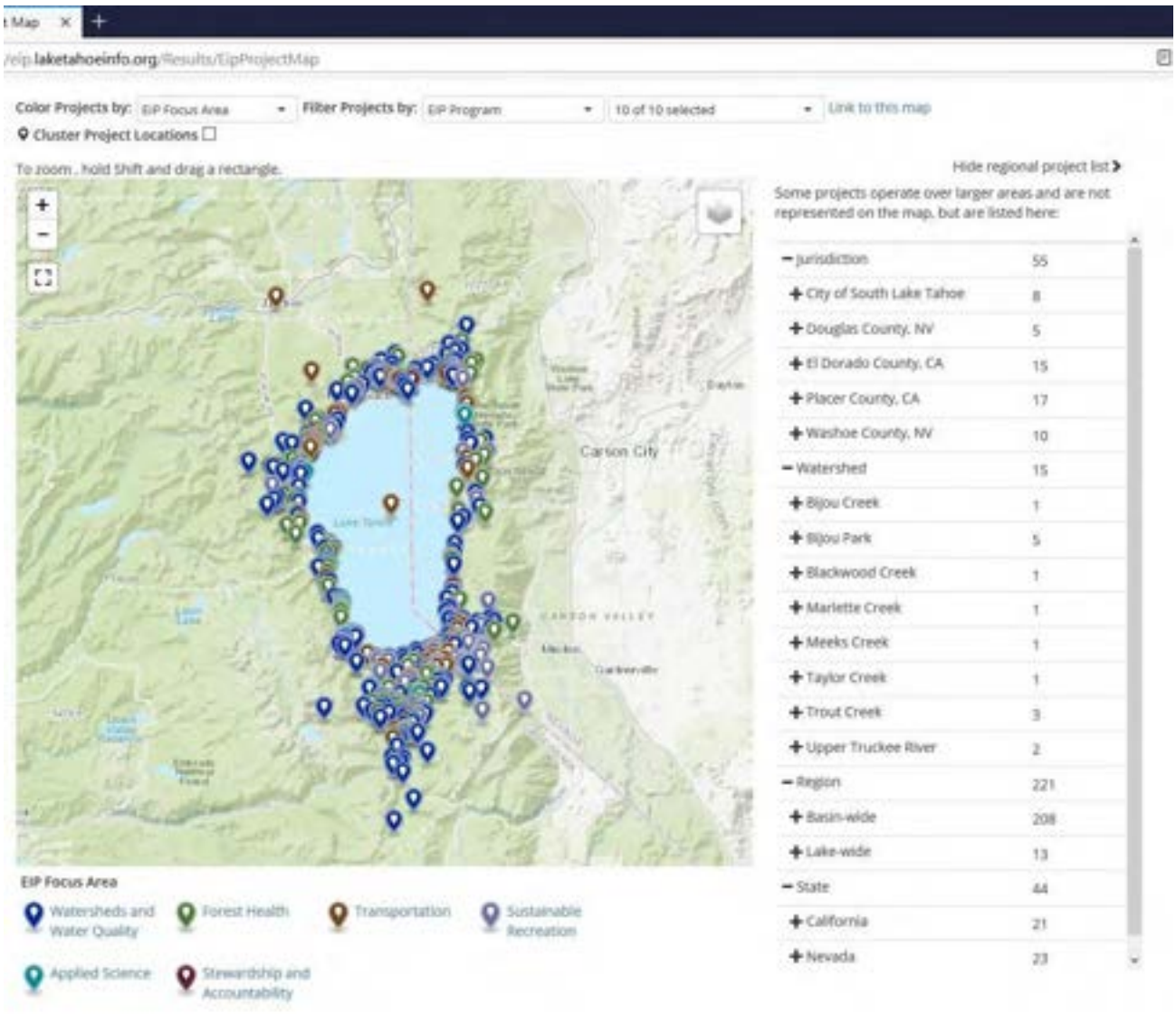
Regional EIP/ CIP Projects
Hundreds of large and small scale projects have been completed. CIP/EIP infrastructure projects include: storm drains, storm water collection and retention systems; street curbs, gutters, sidewalks, lighting, pavement; bike paths, land and stream restoration, revegetation projects, public access

improvements and ADA retrofits. The EIP Project Tracker is an online user-friendly database that displays information about projects with interactive maps, charts, and photos.

TWSA Member Agency CIP Projects:
This section has been moved to Chapter 5 - Description of Water Supply

Tahoe Basin CIP/EIP projects are listed in detail in the master EIP list provided at EIP Project Tracker. 2020 Focus:
http://www.trpa.org/wp-content/uploads/EIP_LTRA-PriorityList_2020_final2.pdf

http://www.trpa.org/about-trpa/how-we-operate/environmental-improvement-program



The following information provides links to projects by jurisdiction.

Nevada Department of Transportation (NDOT) road improvement projects in the Tahoe Basin:
https://www.nevadadot.com/projects-programs/road-projects/lake-tahoe-environmental-improvement

California Department of Transportation (CalTrans) Projects
http://www.dot.ca.gov/dist3/Projects/

El Dorado County (CA) Department of Transportation (DOT); 2009 – 2018 ; CIP / EIP Program DOT's Tahoe environmental improvement program continues to be funded entirely by federal, state, and local agency grants that have water quality improvement as one of their main goals.

Placer County (CA) Environmental Improvement Program (EIP) Placer County Tahoe Basin Projects
http://www.caltrans.ca.gov/dist3/departments/envinternet/placer28/Appendix%20G.pdf
Placer County (DPW) completes semi-annual (spring and fall) project monitoring and reporting for all completed Lake Tahoe erosion control projects within Placer County. There are approximately 55 completed projects to date. Reports include tracking of road sanding materials reclamation and storm water BMP device operating and maintenance. Reports are on file in the Truckee office. Contact: Nova Lance-Seghi [NSeghi@placer.ca.gov] for more information.

Douglas County (NV) Environmental Improvement Program (EIP)
Douglas County projects are listed in detail in the master EIP list provided at
https://eip.laketahoeinfo.org/Results/EipProjectMap

Washoe County (NV) Environmental Improvement Program (EIP) These projects are listed in detail in the master EIP list provided at
https://eip.laketahoeinfo.org/Results/EipProjectMap
Washoe County schedules EIP projects over two years with one year overlap. The first projects were scheduled for 2006-2008 and the last project is scheduled for completion in 2018. Washoe County prefers to construct projects with a total project costs between $1 million and $2 million (today's dollars) to ensure that all of the improvements can be constructed during one season. Wshoe County Public Works has a continuing effort to construct erosion control and water quality improvements within county right-of-way in order to reduce sediment and nutrient loads in stormwater runoff that reaches Lake Tahoe. The improvements have included timber retaining walls, block walls, curb and gutter, storm drain pipe, detention/infiltration basins, sediment traps, rock lined ditches, check dams, plants and vegetation. The projects are funded by Washoe County Water Quality Mitigation funds which are collected by the Tahoe Regional Planning Agency, (TRPA), federal grants, state bonds and local funds.

City of South Lake Tahoe CIP
http://www.cityofslt.us/index.aspx?NID=629
The Engineering Department is responsible for implementation of the City's adopted five year Capital Improvement Program (CIP), which consists of a variety of projects to construct, maintain, rehabilitate the City's infrastructure, facilities, and specialized equipment.

Lake Tahoe Basin Prosperity Plan
http://tahoeprosperity.org
The Lake Tahoe Basin Prosperity Plan (LTBPP) is a regional collaboration effort to develop a Basin-wide economic prosperity strategy. The region includes all land that sheds water into the Lake Tahoe Basin in California and Nevada. The LTBPP will result in an action plan to create a more resilient economy that enhances environmental quality and ensures an improved standard of living for all residents. The Plan will

provide a framework for a competitive regional strategy that recognizes local differences, leverages the distinct attributes of all communities throughout the Basin, and enables local governments, institutions, and businesses to work as partners in revitalizing the Basin economy.

United States Environmental Protection Agency (US EPA) Activities
https://www.epa.gov/lake-tahoe
US EPA Region 9 has provided more than $31 million since 1997, to promote water quality efforts in and around the lake. Several years ago, the EPA placed a full-time staff person in Tahoe to work with the community and local agencies to coordinate ongoing watershed projects in the area. The EPA supports a variety of watershed projects in an effort to reduce sediment and pollutants from flowing into the lake.

U.S. EPA approves TMDL collaborative bi-state plan (August 2011)
http://yosemite.epa.gov/opa/admpress.nsf/2dd7f669225439b78525735900400c31/54821f7aaa6df567852578ee00629305

The water clarity of Lake Tahoe declined from a visibility level of 105 feet in 1967 to an all time low of 64 feet in 1997. Ten years of scientific study ascertained that fine particulate matter is the prime factor in diminished clarity at Lake Tahoe. The Clean Water Act allows states and U.S. EPA to develop a "diet" for impaired waters like Lake Tahoe to help them recover. This diet is called the Lake Tahoe TMDL (Total Maximum Daily Load).

The TMDL represents a decade of collaborative effort between federal, state and local agencies and public stakeholders to better understand the pollutants and sources affecting the Lake's clarity and to develop a cost-effective, workable solution for improvement.

"The Total Maximum Daily Load offers a roadmap to improve Lake Tahoe's clarity so future generations can enjoy this majestic lake," said U.S. Senator Dianne Feinstein of California. "More than a decade of research went into this plan and I commend California, Nevada and the Environmental Protection Agency for coming together to implement it."

Scientific analysis demonstrates that restoring lake clarity is possible if pollutant load reductions can be achieved in each of the four primary sources of these pollutants: urban stormwater runoff, forest runoff, stream channel erosion and atmospheric deposition. The TMDL outlines measures to reduce each of these sources, with a focus on the urban stormwater runoff source, as it is both the greatest source and the best opportunity to control the pollutants. The TMDL calls for advanced and innovative controls to achieve the needed pollution reductions.

U.S. Environmental Protection Agency
Pacific Southwest / Region 9

Serving Arizona, California, Hawaii, Nevada, the Pacific Islands and 148 tribes

Water Division
August 2019

75 Hawthorne Street, San Francisco, CA 94105
866-EPA-WEST • www.epa.gov/region9

23 Years of Investing in a Clear, Healthy Lake Tahoe

Lake Tahoe is an EPA Priority Watershed, in part because of its iconic clarity and beauty. But climate change and human disturbance of the watershed threaten this national treasure. Lake clarity recovered from the impacts of extensive logging in the 19th century, but rapid, unregulated development following the 1960 Winter Olympics again increased fine sediment and nutrients flowing into the lake. Between 1968 and 1997, annual average clarity fell dramatically from around 100 feet to 64 feet (Figure 1).

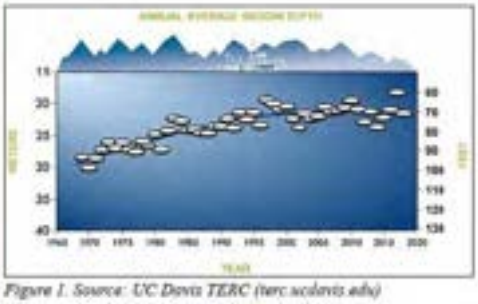


Figure 1. Source: UC Davis TERC (terc.ucdavis.edu)

A new era of ecosystem and watershed restoration began in 1997 with the visit of President Clinton to Lake Tahoe, where he helped launch the **Environmental Improvement Program**. This $2.3 billion effort has helped achieve Tahoe Basin improvements for air and water quality, soil conservation, forest health, wildlife and fisheries, and scenic and recreational resources. The decline in annual average lake clarity halted in recent years, with 2018 seeing a rebound to 70.9 feet after 2017's extreme winter and the worst annual average Secchi depth ever recorded: 60.4 feet. Past improvements may be attributed in part to local management of urban runoff guided by innovative decision-making tools. Continued progress as we face growing challenges of climate change, like increasing tree mortality, forest fires, warmer lake temperatures and proliferation of invasive species, will require constant vigilance and dedicated resources.

What Is EPA Doing to Protect Lake Tahoe?

EPA has been charged with protection of the Tahoe Basin ever since Section 114 of the 1972 Clean Water Act required implementation of a study to "…preserve the fragile ecology of Lake Tahoe." EPA's involvement accelerated sharply after the 1997 Presidential Forum, where President Clinton announced a number of air- and water-quality goals, as well as a full-time, on-site EPA Lake Tahoe Basin Coordinator. Since then, EPA has invested over $47 million, including $9 million for a lake clarity restoration plan, known as a Total Maximum Daily Load (TMDL). EPA also oversees implementation of the Clean Water Act, Safe Drinking Water Act, Clean Air Act and other statutory requirements by our partner agencies in California and Nevada, and by local partners.

What Is the Lake Tahoe Total Maximum Daily Load (TMDL) and What Does It Do?

The Lake Tahoe TMDL is the centerpiece of efforts to reverse the decline in the lake's deep-water clarity and restore it to historic levels. The TMDL and its Implementation Plan were adopted by California and Nevada, and approved by EPA in 2011 following a 10-year, $10 million development effort funded by state and federal agencies. Both the scientific research and stakeholder input that underpin the final restoration plan are among the most advanced ever applied to a TMDL in the Clean Water Act's 47-year history. Key elements include:

- **Understanding Pollutant Sources:** Quantified relative amounts of fine sediment, phosphorus and nitrogen inputs to Lake Tahoe from major pollutant sources including urban and forest stormwater runoff, stream channel erosion, and atmospheric deposition.

- **Targeting Load Reductions:** Calculated needed load reductions for the largest pollutant sources in order to achieve the interim "Clarity Challenge" target of 78 feet by 2026 and the long-term TMDL numeric clarity goal of 97 feet by 2076 (Figure 2).

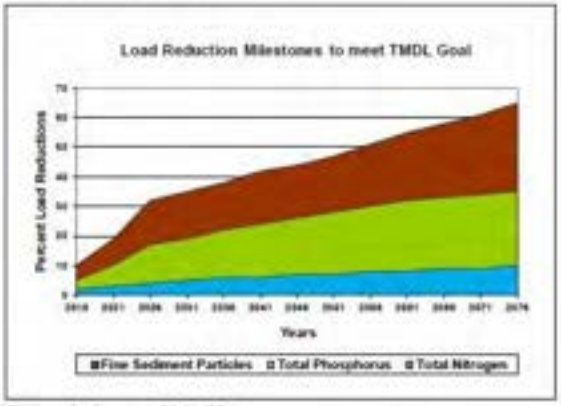


Figure 2. Source: U.S. EPA

- **Creating and Implementing a Strategy:** Developed a strategy to achieve pollutant load reductions through many possible actions, including improved roadway operations and maintenance, targeted street sweeping programs, infiltration basins to capture and treat urban stormwater, stabilization and revegetation of eroding slopes, removal of impervious cover and restoration of soil infiltration, and numerous non-urban source control and reduction measures, including reconnecting streams with their floodplains.

- **Tracking and Reporting Results:** The TMDL included development of the **Lake Clarity Crediting Program** (clarity.laketahoeinfo.org), an innovative, comprehensive accounting system that measures the amount of key urban stormwater pollutants entering the lake and sets load reduction targets, or "Lake Clarity Credits," that city, county and highway agencies must achieve. The program enables greater transparency and accountability for expenditures on water quality improvement projects and is a model for other urban stormwater programs confronting similar issues. Adaptive TMDL Management System procedures enable TMDL program managers to report on accomplishments, better identify and respond to challenges, and make adjustments to ensure that the TMDL is working. Results show that the TMDL achieved 2016 fine sediment load reduction goals and currently is on track to achieve the 2021 milestone of 21% load reductions.

What Are EPA's Priorities for Lake Tahoe?

EPA will continue to work with our federal, state and local partners, and the Washoe Tribe to support the TMDL planning and implementation needed to restore deep water clarity, improve nearshore water quality, and protect Lake Tahoe as a drinking water source. EPA will continue to support projects with multiple and sustainable benefits, especially to improve watershed resilience to the effects of climate change. We will also continue to invest in applying and improving scientific tools to predict and measure project benefits.

What Can YOU Do to Protect Lake Tahoe?

Visit the Tahoe Regional Planning Agency website and find **"10 WAYS TO SAVE LAKE TAHOE"** (www.trpa.org/get-involved/10-ways-to-save-lake-tahoe)



For more information:

Jacques Landy, U.S. EPA
Lake Tahoe Basin Coordinator
Tel: (775) 589-5248
Email: landy.jacques@epa.gov

Learn more about the activities of EPA and partner agencies at EPA's Lake Tahoe website at

www.epa.gov/lake-tahoe

Online Interface = Clarity Tracker
https://clarity.laketahoeinfo.org/Results/Index

The Lake Clarity Tracker is the central hub for information related to the Lake Tahoe TMDL Program. The **About** page provides an overview of the Lake Tahoe TMDL and the TMDL Management System. The **Results** pages provide the status of pollutant load reduction accomplishments for various source categories. The **Resources** pages include technical information and resources related to results tracking and reporting as well as documents related to program management and operations.

The Lake Clarity Tracker and the Lake Tahoe Info Stormwater Tools are sponsored by the Lahontan Regional Water Quality Control Board and the Nevada Division of Environmental Protection.

For more information about Clean Water Act TMDLs, please visit:
http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/

For more information about California's TMDL for Lake Tahoe, please visit:
http://www.waterboards.ca.gov/lahontan/water_issues/programs/tmdl/lake_tahoe/index.shtml

For more information about Nevada's TMDL for Lake Tahoe, please visit:
http://www.epa.gov/region9/water/tmdl/nevada.html and http://ndep.nv.gov/bwqp/tahoe.htm

Lake Tahoe Water Pollution Control Plan (TMDL):
http://ndep.nv.gov/bwqp/file/lccp_handbook_v099.pdf

Additional information can be found in the:
Lake Tahoe Total Maximum Daily Load Technical (Tech) Report http://ndep.nv.gov/bwqp/tahoe.htm

The United States Environmental Protection Agency (US EPA) Lahontan Regional Water Quality Control Board (LRWQB) and Nevada Division of Environmental Protection (NDEP) have been working together collaborating with numerous other federal, state and local entities to develop a water quality plan (known as the Lake Tahoe Total Maximum Daily Load (TMDL). The plan will identify the sources of pollution and specify reductions in sediment and nutrients that are necessary to restore the lake's clarity.

The State of Nevada has designated Lake Tahoe as a Water of Extraordinary Aesthetic or Ecologic Value. However, NDEP was forced to list the waterbody on its 303(d) List of Impaired Waterbodies due to exceedances in the clarity standard. In addition, monitoring conducted over the last 40 years has indicated a steady trend of loss in the Lake's transparency.

The Lake Tahoe TMDL is a scientific effort at the forefront of the campaign to return Lake Tahoe water clarity to historic levels. The scale of the TMDL effort signifies the importance of this national treasure; to date the TMDL Program has involved research by nearly 200 scientists and engineers and more than a $10 million investment by the federal government and the states of Nevada and California as well as eight years of cooperation and participation by Tahoe resource management agencies, local governments and the public.

The analysis indicates that the primary pollutants controlling clarity are fine sediment particles and the nutrients phosphorous and nitrogen. Fine sediment particles (FSP) cloud the water while nutrients fuel

algal growth. Although each affects the distance that light is able to penetrate into the water column, the analysis indicates FSP, particularly those less than 16 micrometers, appear to be more important than nutrients due to their light scattering effect. The vast majority of FSP entering the Lake are derived from the urban area. Modeling results suggest that a 65% reduction in FSP, accompanied by reductions in nitrogen and phosphorous, are necessary to restore historic clarity within Lake Tahoe.

Phase 3, the current phase, represents the transition from the science-based policy formation phases to the implementation and performance evaluation phase. In this phase the recommended strategy will be implemented by local government agencies, as well as state, regional and federal regulatory and land management agencies through their respective programs. Load reduction requirements will be established based on allocations contained in the TMDL document.

Progress toward meeting the Clarity Challenge will be assessed through the TMDL Management System, a program intended to define the process and protocols by which consistent methods and tools are used to quantitatively estimate and track the amount of load reductions achieved through specific actions on the ground. In addition, monitoring programs are a key part of evaluating progress.

Lake Clarity Crediting Program

https://www.enviroaccounting.com/TahoeTMDL/Program/Display/ForUrbanJurisdictions

The Lake Clarity Tracker is the central hub for information related to the Lake Tahoe TMDL Program. The **About** page provides an overview of the Lake Tahoe TMDL and the TMDL Management System. The **Results** pages provide the status of pollutant load reduction accomplishments for various source categories. The **Resources** pages include technical information and resources related to results tracking and reporting as well as documents related to program management and operations. The Lake Clarity Tracker and the Lake Tahoe Info Stormwater Tools are sponsored by the Lahontan Regional Water Quality Control Board and the Nevada Division of Environmental Protection.

The Crediting Program encourages the use of the following approved tools:

- The Pollutant Load Reduction Model is the standard load reduction estimation tool, which integrates load reductions achieved through combinations of source control practices and treatment BMPs in a catchment. The beta-version of the PLRM is now available on TIIMS.
- The Best Management Practice Maintenance Rapid Assessment Methodology (BMP RAM) is the standardized rapid inspection protocol to assess and report the functional condition of treatment BMPs. Results will inform jurisdictions when treatment BMPs are in need of maintenance.
- The Road Rapid Assessment Methodology (Road RAM) is the standardized rapid inspection protocol to assess and report on the pollutant potential of roadways. Results can be used to inform a number of water quality management questions, including the implementation of actions and strategies to control pollutants from roadways and protect downslope water quality; relative effectiveness of roadway operations practices, and relative maintenance needs of jurisdictions. Please contact Jason Kuchnicki to request access to the database.
- The TMDL Accounting and Tracking Tool (A&T Tool) is the central credit accounting system. It stores information related to catchment schedules and inspection results and generates reports showing the credits awarded each year for specific catchments and urban jurisdictions. The A&T Tool also tracks and reports load reductions at all scales from specific catchments to the overall basin. The A&T Tool is available for use by urban stormwater jurisdiction staff. Please contact Jason Kuchnicki for instructions and to request access.

NDEP and the Lahontan Water Board initiated the Crediting Program Support Services project, through which local governments and transportation agencies tested and trained the protocols, tools and methods described in the Handbook on a non-regulatory basis.

2020 Lake Tahoe Clarity Report Trends Holding but Threats Remain
https://www.ucdavis.edu/news/2020-lake-tahoe-clarity-report
https://www.tahoesciencecouncil.org7/
July 08, 2021

Lake Tahoe's water clarity measurements, which are indicators of the health of the watershed, averaged 62.9 feet through 2020, the UC Davis Tahoe Environmental Research Center and the Tahoe Regional Planning Agency announced today. Lake Tahoe's clarity peaked in February 2020 when it was deeper than 80 feet. It was at its lowest in mid-May when it measured at slightly more than 50 feet. These readings were within the average range of the last decade. Average clarity in 2020 was just slightly better than the previous year's average of 62.7 feet. Clarity has been measured by UC Davis researchers since the 1960s as the depth to which a 10-inch white disk, called a Secchi disk, remains visible when lowered through the water. Because lake clarity measurements vary from day to day and year to year, managers and scientists remain focused on long-term trends as an indicator of the lake's health.

Measurements show Lake Tahoe's annual clarity has plateaued over the past 20 years. Despite this progress, summer clarity continues to decline by over a half-foot per year. "While there is a good understanding of how fine clay particles and tiny algal cells reduce clarity, the biggest challenges are in reducing their presence in the surface water," said Geoffrey Schladow, director of the UC Davis Tahoe Environmental Research Center. "Here climate change, and in particular the warming of the surface water, is exerting an undue influence." The clarity of Lake Tahoe's cobalt blue waters tends to peak during the wintertime. (Brant Allen/UC Davis TERC) A recent review of clarity data by the Tahoe Science Advisory Council reaffirmed the understanding of main drivers of clarity loss. The council commissioned a panel of scientists from regional academic and government research institutions, which concluded that fine sediment particles and algae continue to be the dominant variables affecting Tahoe's clarity. They recommended that water quality agencies continue to focus on reducing fine sediment and nutrient loads.

Past UC Davis research and the council's report pointed to several other factors affecting Tahoe's famed clarity. Climate change is altering precipitation and snowmelt patterns and increasing the temperature of the lake and impeding deep lake mixing. Such mixing in late winter can bring cold, clear water up from deep in the lake, which improves clarity. In 2020, the mixing was extremely shallow and contributed to the lack of improvement. "Adaptive management is crucial when confronting evolving threats like climate change, invasive species, and expanding visitation rates in the Tahoe Basin, but it is an approach that requires targeted data to assess response to changing conditions and management actions," said Alan Heyvaert, past Tahoe Science Advisory Council co-chair and Desert Research Institute associate research professor. "This council report demonstrates the value of continued investment and innovation in sustained monitoring and assessment at Tahoe."

Nevada Division of Environmental Protection
Best Management Practice Maintenance / Rapid Assessment Methodology (BMP RAM)
http://lands.nv.gov/docs/LTLPreports/Stormwater%20Best%20Management%20Practices/Stormwater%20System%20Operation%20and%20Maintenance%20Handbook.pdf

The BMP RAM is a simple, repeatable field observation and data management tool that can assist Lake Tahoe natural resource managers in determining the relative condition of urban stormwater treatment BMPs. The primary purpose of the BMP RAM is to inform the user of the relative urgency of water quality maintenance for Treatment BMPs. The BMP RAM evaluations, therefore, do not specifically address or consider the quality of the design of a particular Treatment BMP relative to others. Rather, the BMP RAM provides a practical, consistent and reliable tool to track the condition of a particular Treatment BMP relative to its observed condition at the time of installation or immediately following complete maintenance.

Three items are available for download on the website. The Technical Document contains background information describing how the tool works and the rationale for tool development choices. The User Manual describes the specific protocols to create a Treatment BMP Inventory, conduct field observations, and interact with the database. The Database is the tool used to house and manage data and calculate RAM scores. Microsoft Access and familiarity with the Technical Document and User Manual are required to operate the database.

Nevada Division of State Lands (NDSL)
Nevada State Lands permits buoy, piers, break walls and other and structures within Lake Tahoe, itself, and in the near shore. TWSA receives copies of permit applications (new and renewal) for water provider comments relative to these structures and uses.

The Nevada Division of State Lands operates the Nevada Land Bank, which performs several functions on the Nevada side of the Lake Tahoe Basin. It receives fund distributions from the Tahoe Regional Planning Agency ('TRPA") from fees TRPA collects for excess land coverage on developed land parcels in the Tahoe Basin, in accordance with TRPA's regulations. Land coverage consists of impervious or disturbed soils, on lands of various classes of environmental sensitivity, that can have a detrimental affect on the Tahoe Basin environment and Lake Tahoe water quality. The fees received are used by the Land Bank to purchase, restore and permanently retire coverage, preserving land in its natural state.

Nevada Tahoe License Plate Program
http://www.tahoefund.org/ways-to-give/buy-a-tahoe-license-plate

The State of Nevada collects fees for special Lake Tahoe license plates. The fees go into a dedicated Lake Tahoe fund, which is administered by the Division of State Lands. These funds are used for projects and programs to preserve or restore the natural environment of the Lake Tahoe Basin. This program is completely separate from the Tahoe Science Program and SNPLMA funding. However, both programs use a competitive review process and help to fulfill the mission of restoring Lake Tahoe through the EIP.

Nevada and California Lake Tahoe license plates benefit conservation and recreation projects in the basin. On behalf of the California Tahoe Conservancy, the Tahoe Fund coordinates the very successful Plates for Powder winter license program. Over 96% of the funds from purchase and renewal fees for Lake Tahoe License plates are used to build, maintain and protect the trails, water quality, wildlife and forest health of the Lake Tahoe basin.

To learn more about how your support helps keep Tahoe beautiful or to learn about specific conservation, recreation and watershed restoration projects, visit the California Tahoe Conservancy and the Nevada Division of State Lands.

California Tahoe Conservancy

http://tahoe.ca.gov

The California Tahoe Conservancy was created in 1984 to restore and sustain a balance between the natural and the human environment and between public and private uses at Lake Tahoe. Successful partnerships are integral to protecting Lake Tahoe's unique environment. The Conservancy participates in and supports a range of partnerships with Federal, State, regional, local non-profit and academic agencies and organizations. The mission of the California Tahoe Conservancy is to lead California's efforts to restore and enhance the extraordinary natural and recreational resources of the Lake Tahoe Basin. Major restoration projects are planned on CTC and partner land holdings in the South Lake Tahoe area.

California License Plate Program

http://www.tahoefund.org/ways-to-give/buy-a-tahoe-license-plate/

The California Tahoe Conservancy administers Tahoe projects with funding generated by California's Lake Tahoe license plate program.

League to Save Lake Tahoe

http://www.keeptahoeblue.org/our-work/

The League's core focus is to protect Lake Tahoe's inspiring water clarity. Efforts include researching development plans and projects to ensure these projects comply with rules to protect Lake Tahoe. The League also works to secure funding for river and watershed restoration and conduct outreach about the environmental challenges facing Lake Tahoe. The League has three primary program areas: Advocacy & Monitoring, Legislative Advocacy and Outreach & Education.

Eyes on the Lake is the League's newest volunteer program helping to prevent the spread of aquatic invasive plants in Tahoe's waters. Volunteers learn how to identify plants in the classroom and in the field. Help protect the Lake while you play. **Pipe Keepers** is a volunteer-based, water quality monitoring program that examines the turbidity (clarity) of the water being released from storm drains into Lake Tahoe and I braved the elements to collect water samples, take photos, and raise awareness about neighborhood storm drains impacts on lake and river waters.



Volunteer Beach Cleanups and Tahoe Blue Crews, are some of the newest League community engagement activities. They are organizing several litter cleanups and graffiti removal events annually.

Tahoe Cigarette Butt Disposal Project

TWSA has partnered with the League on the Tahoe Cigarette Butt Disposal Project. 250 metal bins, obtained from a grant by Keep America Beautiful, are being installed lake-wide in 2019-23. https://www.keeptahoeblue.org/news/pressreleases/250-cigarette-butt-collection-canistersto-be-installed-at-lake-tahoe



Tahoe Science Consortium (TSC)

http://tahoescience.org

The EPA helped to establish and is currently supporting the activities of a consortium of Lake Tahoe Basin scientists. The Tahoe Science Consortium promotes integration among the many current and future scientific projects in the basin, prioritizing future research informed by a comprehensive science plan, creating an environment that promotes the contributions of the best available science, and emphasizing close cooperation with land and resource managers to facilitate the transfer of information in an effective manner.

ARkStorm@Tahoe Project

http://tahoescience.org/arkstorm-project

In 2018, TWSA staff served on an "*Arkstorm – Lessons Learned"* panel at the Nevada Water Resources Association, Fall Symposium. Organizers discussed the winter of 2016-17 as a 'light version' test period for emergency preparations and response during future ArkStorms. An *ArkStorm @ Tahoe Preparedness Workshop* was held at the September 12, 2013 TWSA Board meeting. The TWSA members and other agency representatives spent 3 hours to discuss the operations of water and sewer supply systems during a potential long-term storm event. The exercise is designed to address potential social and ecological impacts of extreme winter storm events in the Lake Tahoe region. What is an ARkStorm? Atmospheric rivers (ARs) are large flows of water vapor that typically occur in fall and winter, bringing huge amounts of moisture over the Pacific to the U.S. West Coast. Landfalling ARs are storm events with the potential to deliver extreme amounts of precipitation to the West Coast, including California and Nevada, over a just a few days. The name "ARkStorm" was coined to describe large AR storm sequences, which, for instance, can produce precipitation in California that in places can exceed totals experienced only once every several hundred to 1,000 years. Scientists with the U.S. Geological Survey (USGS) Multi Hazards Demonstration Project (MHDP) designed a scientifically-plausible winter ARkStorm scenario for California emergency managers, stitching together historical AR storms from 1969 and 1986, separated by only 4 days. This hypothetical ARkStorm would rival but not exceed the intense California winter storms of 1861 and 1862 that left the Central Valley of California flooded and the state's economy destroyed. It was designed to exceed any single storm in the 20th Century. On March 14, 2014, a Tabletop Exercise (TTX) was held at the Regional Emergency Operations Center (REOC), Reno, NV.

Integrated Science Plan for the Lake Tahoe Basin: Conceptual Framework and Research Strategies
http://www.tahoescience.org/wp-content/uploads/2010/11/Science-Plan-Intro1.pdf edited by Zachary P. Hymanson and Michael W. Collopy

An integrated science plan was developed to identify and refine contemporary science information needs for the Lake Tahoe basin ecosystem. The research priorities are reviewed and revised regularly to ensure they reflect the changing information needs and evolving priorities of agencies charged with the welfare of the Lake Tahoe basin.

The main objectives were to describe a conceptual framework for an integrated science program, and to develop research strategies addressing key uncertainties and information gaps that challenge government agencies in the theme areas of:

(1) air quality,
(2) water quality,
(3) soil conservation,
(4) ecology and biodiversity, and
(5) social sciences.

Southern Nevada Public Land Management Act (SNPLMA) (Public Law 105-263)
http://www.blm.gov/nv/st/en/snplma.html

The Southern Nevada Public Land Management Act (SNPLMA) became law in October 1998. It allows the Bureau of Land Management to sell public land within a specific boundary around Las Vegas, Nevada. The revenue derived from land sales is split between the State of Nevada General Education Fund (5%), the Southern Nevada Water Authority (10%), and a special account available to the Secretary of the Interior for:

- Parks, Trails, and Natural Areas
- Capital Improvements
- Conservation Initiatives
- Multi-Species Habitat Conservation Plan (MSHCP)
- Environmentally Sensitive Land Acquisitions
- Hazardous Fuels Reduction and Wildfire Prevention
- Eastern Nevada Landscape Restoration Project
- Lake Tahoe Restoration Projects

Tahoe Science Projects supported by SNPLMA
The US Forest Service Pacific Southwest Research Station (PSW) receives funding through the Southern Nevada Public Lands Management Act (SNPLMA) to conduct science to inform efforts to restore Lake Tahoe and its watershed, as authorized in the Lake Tahoe Restoration Act. PSW assumed responsibility of SNPLMA for sponsoring science projects. The PSW Station established a competitive grant award program with a rigorous peer review process coordinated by the Tahoe Science Consortium, a collection of universities and agencies with active research programs at Lake Tahoe.

A database of the many projects funded at Tahoe is available at:
https://www.fs.fed.us/psw/partnerships/tahoescience/browse_projects.shtml

Lake Tahoe Interagency Monitoring Program (LTIMP)
This program was consolidated into the TRPA EIP program database.

The formation of this program resulted from a series of meetings, beginning in 1978, initiated by the University of CA, including state and federal agencies. It was apparent that a strong environmental monitoring program was necessary to accommodate the needs of the various agencies concerned with land-use planning and regulation. The University's basic research program alone could not provide the expanded water quality data requirements in the Tahoe basin. As a result of these discussions LTIMP was formally established in 1979 to collect water/air quality information necessary to support the extensive regulatory/research activities in the basin.

Lake Tahoe Geographic Response Plan (LTGRP) 2014 Update
http://www.epaosc.org/site/doc_list.aspx?site_id=2261
http://ndep.nv.gov/bca/response_plan/ltgrp_summary_0308.pdf

This plan details interagency protocol and instruction for site response in the event of a major spill at Lake Tahoe. Incidences with unreported spills in the Edgewood, Burke, and McFaul watersheds led to a discussion with Nevada Bureau of Corrective Actions regarding the spill notification process in August of 2004. As a result, TWSA participated with the US Environmental Protection Agency and other Lake Tahoe Basin agencies in the development of the Lake Tahoe Geographic Response Plan. The Plan defines spill reporting and spill response procedures. In September 2007, the report was issued. In 2014, the plan was updated.

The TWSA participates in the ongoing development of the Lake Tahoe Geographic Response Plan (LTGRP), which establishes the policies, responsibilities, and procedures required to protect life, environment, and property from the effects of hazardous materials incidents. This plan establishes the emergency response organization for hazardous materials incidents occurring within the Lake Tahoe watershed. The plan is generally intended to be used for oil spills or chemical releases that impact or could potentially impact drainages entering Lake Tahoe, Lake Tahoe itself, and its outflow at the Truckee River. Plan coverage is for El Dorado, Placer Counties, California; Douglas, Washoe Counties, and Carson City, Nevada. The LTGRP is the principal guide for agencies within the Lake Tahoe watershed, its incorporated cities, and other local government entities in mitigating hazardous materials emergencies. This plan is consistent with federal, state, and local laws and is intended to facilitate multi-agency and multi-jurisdictional coordination, particularly among local, state, and federal agencies, in hazardous materials emergencies.

Lake Tahoe Wastewater Infrastructure Partnership (LTWIP)
Presently inactive, 2007 saw the formation of a parallel organization to the TWSA, the Lake Tahoe Wastewater Infrastructure Partnership (LTWIP). The groups' purpose is to develop, implement and maintain effective operation, maintenance and capital replacement programs to meet state-of-the-art industry standards, satisfy State and Federal requirements, and advocate for the protection of Lake Tahoe as an outstanding National water body.

Members include Douglas County Sewer Improvement District No. 1 (DCSID), Incline Village General Improvement District (IVGID), Kingsbury General Improvement District (KGID), North Tahoe Public Utility District (NTPUD), Round Hill General Improvement District (RHGID), South Tahoe Public Utility District (STPUD), Tahoe Douglas District (TDD) and Tahoe City Public Utility District (TCPUD).

Each of the Parties owns and operates a public sewer collection and/or treatment system within the Lake Tahoe Basin. These sewer systems could negatively impact the surface waters of Lake Tahoe upon failure or spillage. The Parties recognize the environmental sensitivity of the Lake Tahoe Basin, and the extraordinary responsibilities placed on their organizations as a result of their operation and maintenance of these sewage systems. Common standards and practices, and project prioritization are key steps to meeting those responsibilities.

The US Army Corp of Engineers (USACOE) had executed a Project Management Plan for Technical Assistance – Lake Tahoe Watershed Restoration with LTWIP, which included technical assistance related to the identification of sewer system defects, project identification, project prioritization, and application of consistent engineering standards for the execution of a wastewater capital replacement program within the Lake Tahoe Basin. This scope of work was completed and an additional task was added to assist the agencies with the preparation and completion of Sewer System Management Plans to meet California State Water Resources Control Board requirements under the Sanitary Sewer Overflow Reduction Plan.

This new California regulation required all sewer agencies in California to develop and implement a sewer system management plan (SSMP). The SSMP documents the agency's program to properly operate and maintain its sanitary sewer system. Each SSMP is required to address the following elements: Goals, Organization, Legal Authority, Operation and Maintenance Program, Design and Performance Provisions, Overflow Emergency Response Plan, Fats, Oils, and Grease (FOG) Control Program, System Evaluation and Capacity Assurance Plan, Monitoring, Measurement, and Program Modifications, SSMP Program Audits, and Communication Program.

The TRPA is adopting a similar requirement for a SSMP in the update of the Regional Plan. The plans completed as described above will meet this new requirement. The language included in the TRPA Regional Plan Update approved in 2012 is as follows:

60.1.6. Spill Control
All persons handling, transporting, using, or storing toxic or hazardous substances shall comply with the applicable requirements of state and federal law regarding spill prevention, reporting, recovery, and clean-up. Sewage collection, conveyance, and treatment districts shall have sewage spill contingency, prevention, and detection plans approved by the state agency of appropriate jurisdiction and submitted to TRPA for review and approval within three years of the effective date of the Regional Plan.

A. Cooperative Sewage Spill Plans
Sewage collection, conveyance, and treatment districts may join together to develop cooperative plans, provided that the plans clearly identify those agencies covered by the plan, are agreed to by each agency, and are consistent with applicable state and federal laws.

B. Sewage Spill Plan Criteria
Sewage spill contingency, prevention, and detection plans shall comply with the criteria set forth by the state agencies of appropriate jurisdiction and TRPA. Such plans shall include provisions for detecting and eliminating sewage exfiltration and stormwater infiltration from sewer lines and facilities.

The Public Utility member agencies of the LTWIP and of TWSA have completed a new standardized

Memorandum of Understanding (MOU) with the TRPA that regulates routine activities in the Lake Tahoe Basin. The existing MOU's were outdated and inconsistent among the Public Utilities. These were adopted in March 2012.

The new MOU lists the activities that are exempt or qualified exempt from obtaining a TRPA permit which are broader than the list in the TRPA Code of Ordinances. The new MOU includes performance based standards for exempt and qualified exempt activities rather than prescriptive standards, where possible. This listing of activities allows the agencies to complete a wide range of projects and daily operations and maintenance activities without having to pull special permits. It still requires the agencies to follow all Best Management Practices, Land Coverage program rules, and other requirements such as seasonal restrictions.

A future task is that the special districts should be able to electronically report their activities to TRPA on-line, through the TRPA website, with a password unique to their organization. They should also be able to attach PDFs with their reporting forms for construction drawings and related information. An alternative to the current TRPA "QE stamp" will be developed for the special districts to use as evidence to building departments, etc. Reporting is currently done by the agency and is available for review by TRPA upon request.

To assure reliable sewer operations and avoid significant economic and environmental costs associated with inadequate operation and maintenance of these systems, the Parties desire to improve their practices and standards, implement state of the art asset management concepts, and comply with additional requirements.

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Table 3.0: TWSA partner agencies' intake structure description.

Figure 1.0: Comparison of annual mean and maximum turbidity results for TWSA purveyors for the 2020-2021 reporting year.

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Table 5.1(a): Summary RHGID and TCPUD raw water turbidity data for the 2020-2021 reporting year in relation to weather.

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Table 5.4: For the 2020-2021 reporting year, a comparison of annual mean and annual maximum total coliform (CFU or MPN/100 mL) including weather data by maximum date for TWSA water suppliers.

Table 5.5: Comparison of TWSA purveyors' annual maximum Total Coliform results for the July 1, 2011-June 30, 2021 reporting years.

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Table 5.7: Violations by TWSA Purveyors of the Health, Reporting, or Monitoring Requirements of the Environmental Protection Agency's Safe Drinking Water Act (SDWIS 2020-2021).

Table 6.0: IVGID source water turbidity data results from July 1, 2020, through June 30, 2020. Turbidity analyses completed on samples collected daily from raw water at the IVGID intake.

Table 6.1: IVGID annual source water total and E. coli coliform data results from July 1, 2020, through June 30, 2021. Coliform analyses completed on samples collected daily from raw water at the IVGID intake.

Table 6.2: IVGID monthly source water total and E. coli coliform data result from July 1, 2020, through June 30, 2021. Coliform analyses completed on samples collected daily from raw water at the IVGID intake.

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Figure 2.1: Yearly Mean and Max Turbidity Results for Incline Village General Improvement District between July 1, 2011 and June 30, 2021.

Figure 2.2: Monthly Mean and Max Total Coliform Results for Incline Village General Improvement District between July 1, 2011 and June 30, 2021.

Figure 2.3: Yearly Mean and Max Coliform Results for Incline Village General Improvement District between July 1, 2011 and June 30, 2021.

Table 7.0: Glenbrook Water Cooperative source water turbidity data summary July 1, 2020, through June 30, 2021. Turbidity analyses completed on samples collected daily from raw water at the Glenbrook intake.

Table 7.1: Glenbrook Water Cooperative annual source water total coliform data results from July 1, 2020, through June 30, 2021. Coliform analyses completed on samples collected from raw water at the Glenbrook intake.

Table 7.2: Glenbrook Water Cooperative monthly source water Total Coliform data results from July 1, 2020, through June 30, 2021. Analyses completed on samples collected from raw water at the Glenbrook Water Company intake.

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Figure 3.1: Yearly Mean and Max Turbidity Results for Glenbrook Water Cooperative between July 1, 2011 and June 30, 2021.

Figure 3.2: Monthly Mean and Max Total Coliform Results for Glenbrook Water Cooperative between July 1, 2020 and June 30, 2021.

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Table 8.0: Cave Rock/Skyland source water turbidity data results from July 1, 2020, through June 30, 2021. Turbidity analyses completed on samples collected daily from raw water at the Cave Rock/Skyland intake.

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Table 9.2: Zephyr Water Utility District monthly source water total and E. coli coliform data results from July 1, 2020, through June 30, 2021. Coliform analyses completed on samples collected daily from raw water at the ZWUD intake.

Figure 5.0: Monthly Mean and Max Turbidity Results for Zephyr Water Utility District between July 1, 2020 and June 30, 2021.

Figure 5.1: Yearly Mean and Max Turbidity Results for Zephyr Water Utility District between July 1, 2011 and June 30, 2021

Figure 5.2: Monthly Mean and Max Coliform Results for Zephyr Water Utility District between July 1, 2020 and June 30, 2021.

Figure 5.3: Yearly Mean and Max Coliform Results for Zephyr Water Utility District between July 1, 2011 and June 30, 2021.

Table 10.0: RHGID source water turbidity data results from July 1, 2020, through June 30, 2021. Turbidity analyses completed on samples collected daily from raw water at the RHGID intake.

Figure 6.0: Monthly Mean and Max Turbidity Results for Round Hill General Improvement District between July 1, 2020 and June 30, 2021.

Figure 6.1: Yearly Mean and Max Turbidity Results for Round Hill General Improvement District between July 1, 2011 and June 30, 2021.

Table 11.0: KGID source water turbidity data results from July 1, 2020, through June 30, 2021. Turbidity analyses completed on samples collected daily from raw water at the KGID intake.

Table 11.1: KGID annual source water total and E. coli coliform data results from July 1, 2020, through June 30, 2021. Coliform analyses completed on samples collected daily from raw water at the KGID intake.

Table 11.2: KGID monthly source water total and E. coli coliform data results from July 1, 2020, through June 30, 2021. Analyses completed on samples collected daily from raw water at the KGID intake.

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Figure 7.1: Yearly Mean and Max Turbidity Results for Kingsbury General Improvement District between July 1, 2011 and June 30, 2020.

Figure 7.2: Monthly Mean and Max Coliform Results for Kingsbury General Improvement District between July 1, 2020 and June 30, 2021.

Figure 7.3: Yearly Mean and Max Coliform Results for Kingsbury General Improvement District between July 1, 2011 and June 30, 2021.

Table 12.0: Edgewood Water Company Turbidity Data Summary, July 1, 2020 through June 30, 2021. Turbidity measurements are completed on samples collected daily from raw water at the Edgewood intake

Table 12.1: Edgewood Water Company annual source water total and E.coli coliform data results from July 1, 2020, through June 30, 2021. Coliform analyses completed on samples collected daily from raw water at the Edgewood Water Company intake.

Table 12.2: Edgewood Water Company monthly source water total and E. coli coliform data from July 1, 2020, through June 30, 2021. Analyses completed on samples collected from raw water at the Edgewood Water Company intake.

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Figure 8.1: Yearly Mean and Max Turbidity Results for Edgewood Water Company between July 1, 2011 and June 30, 2021.

Figure 8.2: Yearly Mean and Max Turbidity Results for Edgewood Water Company between July 1, 2020 and June 30, 2021.

Figure 8.3: Yearly Mean and Max Coliform Results for Edgewood Water Company between July 1, 2011 and June 30, 2020.

Table 13.0: LPA source water turbidity data results from July 1, 2020, through June 30, 2021. Turbidity analyses completed on samples collected daily from raw water at the LPA intake.

Table 13.1: LPA annual source water total and E. coli coliform data results from July 1, 2020, through June 30, 2021. Coliform analyses completed on samples collected daily from raw water at the LPA intake.

Table 13.2: Lakeside Park Association monthly source water Total and E.coli Coliform data results from July 1, 2020, through June 30, 2021. Analyses completed on samples collected daily from raw water at the Lakeside Park Association intake.

Figure 9.0: Monthly Mean and Max Turbidity Results for Lakeside Park Association between July 1, 2020 and June 30, 2021.

Figure 9.1: Yearly Mean and Max Turbidity Results for Lakeside Park Association between July 1, 2011 and June 30, 2021.

Figure 9.2: Monthly Mean and Max Total Coliform Results for Lakeside Park Association between July 1, 2020 and June 30, 2021.

Figure 9.3: Yearly Mean and Max Total Coliform Results for Lakeside Park Association between July 1, 2011 and June 30, 2021.

Table 14.0: Tahoe City Public Utility District (TCPUD) McKinney/Quail source water turbidity data results from July 1, 2019 through June 30, 2020. Turbidity analyses completed on samples collected daily from raw water at the McKinney/Quail intake.

Table 14.1: TCPUD McKinney/Quail source water total and E. coli coliform data results from July 1, 2020, through June 30, 2021. Coliform analyses completed on samples collected daily from raw water at the McKinney/Quail intake.

Table 14.2: TCPUD monthly source water total and E.coli coliform data results from July 1, 2020, through June 30, 2021. Analyses completed on samples collected daily from raw water at the McKinney/Quail intake.

Figure 10.0: Monthly Mean and Max Turbidity Results for Tahoe City Public Utility District between July 1, 2020 and June 30, 2021.

Figure 10.1: Yearly Mean and Max Turbidity Results for Tahoe City Public Utility District between July 1, 2011 and June 30, 2021.

Figure 10.2: Monthly Mean and Max Total Coliform Results for TCPUD between July 1, 2020 and June 30, 2021.

Figure 10.3: Yearly Mean and Max Total Coliform Results for TCPUD between July 1, 2011 and June 30, 2021.

Table 15.0: NTPUD source water turbidity data results from July 1, 2020, through June 30, 2021. Turbidity analyses completed on samples collected daily from raw water at the NTPUD intake.

Table 15.1: NTPUD annual source water total and E. coli coliform data results from July 1, 2020, through June 30, 2021. Coliform analyses completed on samples collected daily from raw water at the NTPUD intake.

Table 15.2: NTPUD monthly source water total and E. coli coliform data results from July 1, 2020, through June 30, 2021 Coliform analyses completed on samples collected daily from raw water at the NTPUD intake.

Figure 11.0: Monthly Mean and Max Turbidity Results for North Tahoe Public Utility District between July 1, 2020 and June 30, 2021.

Figure 11.1: Yearly Mean and Max Turbidity Results for North Tahoe Public Utility District between July 1, 2011 and June 30, 2021.

Figure 11.2: Monthly Mean and Max Total Coliform Results for North Tahoe Public Utility District between July 1, 2020 and June 30, 2021.

Figure 11.3: Yearly Mean and Max Total Coliform Results for North Tahoe Public Utility District between July 1, 2011 and June 30, 2021.

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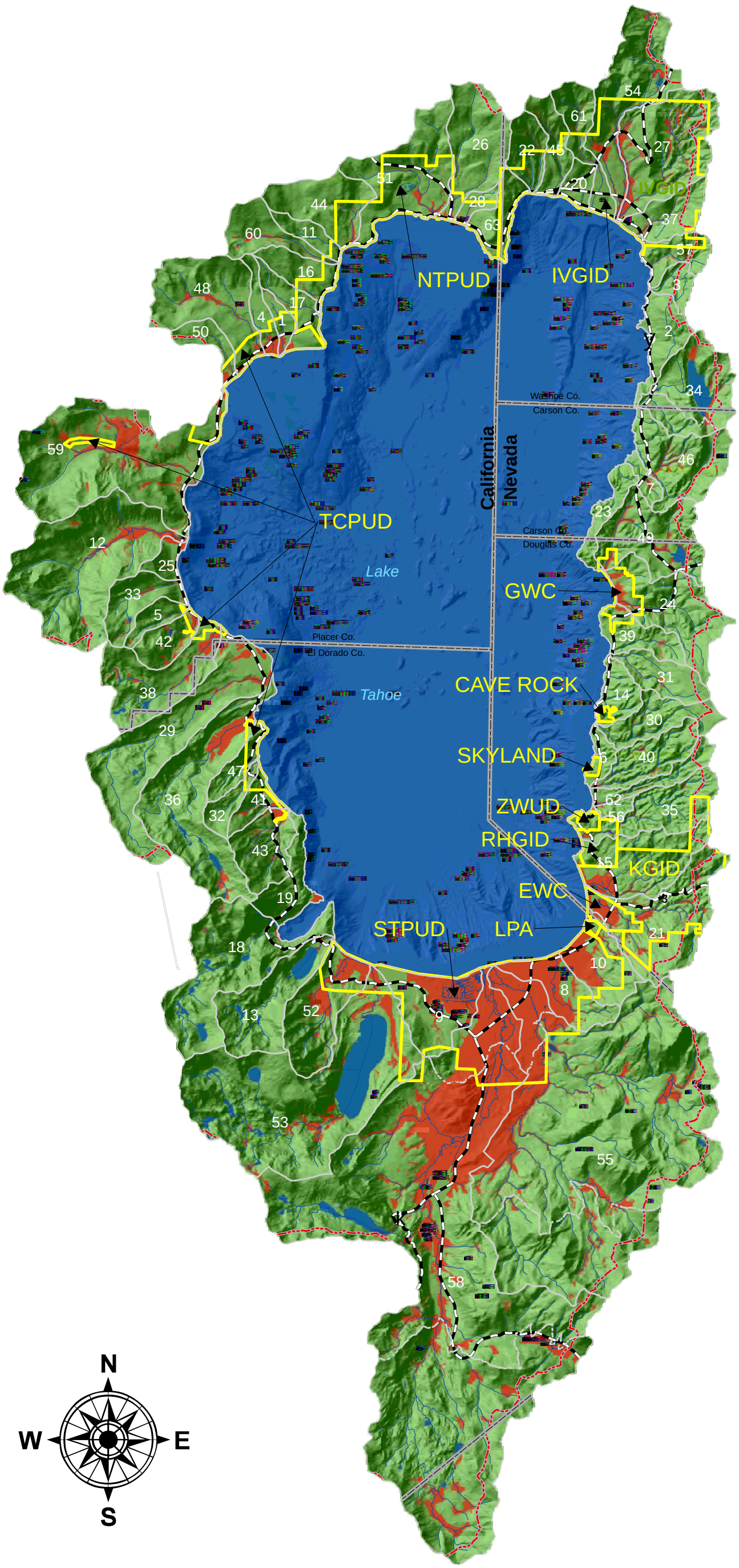
TWSA Service Boundaries and Watersheds



Map ID	Watershed Name
1	LAKE FOREST CREEK
2	SAND HARBOR
3	UNNAMED
4	BARTON CREEK
5	HOMEWOOD CREEK
6	SKYLAND CREEK
7	SECRET CREEK
8	BIJOU CREEK
9	CAMP RICHARDSON
10	BIJOU PARK
11	CARNELIAN BAY CREEK
12	BLACKWOOD CREEK
13	CASCADE CREEK
14	CAVE ROCK CREEK
15	BURKE CREEK
16	CEDAR FLATS
17	DOLLAR CREEK
18	EAGLE CREEK
19	BLISS STATE PARK
20	UNNAMED CREEK
21	EDGEWOOD CREEK
22	FIRST CREEK
23	DEADMAN POINT
24	GLENBROOK CREEK
25	EAGLE ROCK CREEK
26	GRIFF CREEK
27	INCLINE CREEK
28	BROCKWAY CREEK
29	GENERAL CREEK
30	LINCOLN CREEK
31	LOGAN HOUSE CREEK
32	LONELY GULCH CREEK
33	MADDEN CREEK
34	MARLETTE CREEK
35	McFAUL CREEK
36	MEEKS CREEK
37	MILL CREEK
38	McKINNEY CREEK
39	NORTH LOGAN HOUSE CREEK
40	NORTH ZEPHYR CREEK
41	PARADISE FLAT
42	QUAIL CREEK
43	RUBICON CREEK
44	CARNELIAN BAY CANYON
45	SECOND CREEK
46	SECRET HARBOR CREEK
47	SIERRA CREEK
48	BURTON CREEK
49	SLAUGHTERHOUSE CREEK
50	TAHOE STATE PARK
51	SNOW CREEK
52	TALLAC CREEK
53	TAYLOR CREEK
54	THIRD CREEK
55	TROUT CREEK
56	SOUTH ZEPHYR CREEK
57	TUNNEL CREEK
58	UPPER TRUCKEE RIVER
59	WARD CREEK
60	WATSON CREEK
61	WOOD CREEK
62	ZEPHYR CREEK
63	EAST STATELINE POINT

Supplier Abbreviations:

CR/SKY	Cave Rock/Skyland Water District
EWC	Edgewood Water Company
GWC	Glenbrook Water Cooperative
IVGID	Incline Village General Improvement District
KGID	Kingsbury General Improvement District
NTPUD	North Tahoe Public Utility District
RHGID	Round Hill General Improvement District
TCPUD	Tahoe City Public Utility District
ZWUD	Zephyr Water Utility District
LPA	Lakeside Park Association
STPUD	South Tahoe Public Utility District

Legend

- Creeks/Streams
- Lake Tahoe Basin Boundary
- Major Road or Highway
- Stream Environmental Zone
- 1 — Watershed
- Lake — Body of Water
- GID — TWSA Water Supplier Service Boundary

Map provided by TWSA.
Source: TRPA GIS Database
Incline Village GID GIS Database

0 1.5 3 6 9 Miles

1 inch = 3 miles

N W E S

Plate 1: Tahoe Water Suppliers' service area boundaries and watershed features. TWSA members include Cave Rock/Skyland Water District, Edgewood Water Company, Glenbrook Water Company, Incline Village General Improvement District, Kingsbury General Improvement District, North Tahoe Public Utility District, Round Hill General Improvement District, Tahoe City Public Utility District, Lakeside Park Association, Zephyr Water Utility District and South Tahoe Public Utility District as collaborators.