UC DAVIS

TAHOE: STATE OF THE LAKE REPORT 2025

Tahoe Environmental Research Center

The 2025 Tahoe: State of the Lake Report is dedicated to Anne Liston, who began her journey with the Goldman Lab at UC Davis in 1996 as an intern. She went on to contribute significantly to research on omega-3 fatty acids in lakes, and became the Laboratory Manager at TERC in 2006 and retired in 2025.

Your steadfast commitment to scientific excellence and mentorship has left an enduring mark on the Tahoe Environmental Research Center.

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INTRODUCTION

The University of California, Davis has conducted continuous monitoring of Lake Tahoe and its watershed since 1968, amassing a unique record of change for one of the world's most beautiful and vulnerable lakes.

In the UC Davis Tahoe: State of the Lake Report, we summarize how natural processes and human activity in the watershed and beyond are affecting the lake's clarity, physics, chemistry, and biology. We also present a portion of the data collected in 2023 — presenting all of it would be overwhelming. While Lake Tahoe is unique, the forces and processes that shape it are similar to those acting in most natural ecosystems. As such, Lake Tahoe is an indicator for other systems both in the western United States and worldwide.

Our goal is to understand the lake's complexity and to use that knowledge to provide the scientific underpinnings for ecosystem restoration and management actions. Choosing among those options and implementing them is the role of management agencies that also need to account for and balance a host of other considerations.

This annual report is intended to inform non-scientists about the factors that affect lake health. One indicator of Lake Tahoe's health status, the annual clarity, is reported earlier each year. In this report, we publish many other environmental and water quality factors that serve as other indicators of the lake's condition and help explain the lake's changing clarity. This report sets the context for understanding the year-to-year changes as well as those that are observed over many decades.

Part of this report describes research and education taking place independently of the long-term monitoring. These updates highlight some of the most exciting and promising findings of work that is still in progress. The insights being gained through this research will help keep Lake Tahoe at the cutting edge of science for years to come. Many of the sections explore new ideas and approaches to address the ever-evolving challenges at Lake Tahoe.

The data we present are the result of efforts by a great many scientists, engineers, students, technicians, and educators who have worked at Lake Tahoe throughout the decades since monitoring commenced. I would, however, like to acknowledge (in alphabetical order) the contributions to this year's report by Maggie Anderson, Lily Bailey, Nick Bently, Brandon Berry, Mike Bruno, Tom Burt, Michael Cane, Luciana Cardoso, Bob Coats, Corrin Clemons, Troy Corliss, Alicia Cortés, Daniel Crownover, Randy Dahlgren, Mike Deas, MJ Farruggia, Helen Fillmore, Alex Forrest, Drew Friedrichs, Kendall Galvez, Fatima Garcia, Scott Hackley, Tina Hammell, Stephanie Hampton, Sarah Harry, Brenna Hatch, Jade Hinson, Penelope Holland, Simon Hook, Mahren Hudson, Camille Jensen, Jackelyn Lang, Kenneth Larrieu, Mui Lay, Anne Liston, Shannon Lynch, Patricia Maloney, Keeley Martinez, Jasmin McInerney, Claire Moats, Antonina Myshyakova, Holly Oldroyd, Kanarat Pinkanjananavee (Job), Wesley Radford, Gerardo Rivera, Steven Sadro, S. Geoffrey Schladow, Heather Segale, Katie Senft, Oscar Sepúlveda Steiner, Steven Sesma, Samantha Sharp, Soffia Ramsey, Roland Shaw, David Smith, Adrianne Smits, Micah Swann, Lidia Tanaka, Misa Terrell, Ruth Thirkill, Raph Townsend, Alison Toy, Susan Ustin, Sergio Valbuena, Aaron Vanderpool, Rachel Vanette, Lindsay Vaughan, Jonathan Walter, Shohei Watanabe, Michael Welsh, Logan Witt, and Erik Young to this year's report. In particular, Shohei Watanabe was responsible for the majority of the data analysis, Cara Hollis led the effort to write the State of the Lake overview, and Heather Segale and Alison Toy led the compilation, layout, and editing of the final report. We would also like to thank all of the members of the UC Davis TERC Advisory Board.

Funding for the actual data collection and analysis has come from many sources over the decades. While many additional water quality variables could be tracked, funding ultimately limits what we measure and report on. Current funding for the long-term monitoring and analysis is provided by the Lahontan Regional Water Quality Control Board, Tahoe Regional Planning Agency, U.S. Geological Survey, and UC Davis.

Funders for current projects include the following: CalFire, California Delta Stewardship Council, California Natural Resources Agency, California Tahoe Conservancy, Incline Village General Improvement District, NASA Jet Propulsion Laboratory, the National Science Foundation, Nevada Department of Tourism and Cultural Affairs, Nevada Division of Environmental Protection, Nevada Division of State Lands, Parasol Tahoe Community Foundation, Santa Clara Valley Water District, the Tahoe Resource Conservation District, the Tahoe Truckee Community Foundation, the Tahoe Water Suppliers Association, the U.S. Bureau of Reclamation, and the U.S. Embassy, Chile.

Our monitoring is frequently done in collaboration with other research institutions and agencies. In particular, we would like to acknowledge our collaborators at UC Davis, California Conservation Corps (CCC), the Desert Research Institute (DRI), the National Aeronautics and Space Administration (NASA), the National Oceanographic and Atmospheric Administration (NOAA), the Tahoe Resource Conservation District (TRCD), the U.S. Forest Service, (USFS), the U.S. Geological Survey, the University of Miami at Ohio, and the University of Nevada, Reno (UNR).

We are very proud to recognize the funding support for actual production of this annual report from the following organizations: California Tahoe Conservancy, Incline Village Waste Not Program, Lahontan Regional Water Quality Control Board, Lake Tahoe Marina Association, Mountain Workspace, Parasol Tahoe Community Foundation, Tahoe Fund, Tahoe Lakefront Owners' Association, League to Save Lake Tahoe, Tahoe Regional Planning Agency, Tahoe Truckee Airport Community Partner, Tahoe Water Suppliers Association, and True Point Solutions. We sincerely thank these organizations for their dedication in supporting science to save the lake.

Sincerely,

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EXECUTIVE SUMMARY

As the new Director of the UC Davis Tahoe Environmental Research Center, this year is the last year that I have the opportunity to see our work through fresh eyes. Accordingly, this year we take a step back to examine the full breadth of infrastructure that UC Davis and our partners have built over decades to enhance our understanding of Lake Tahoe, an infrastructure that allows us to examine the past and present state of the lake, and supports our exploration of the next research frontiers. This infrastructure includes more than just data and technologies that fuel our research, it comprises the people who transform data into knowledge, and the partnerships that translate knowledge into action.

The foundation of this infrastructure is our long history of studying Lake Tahoe.

The University of California, Davis has conducted research in the Lake Tahoe Basin since the late 1950s, with continuous monitoring of Lake Tahoe and its watershed beginning in 1968. Over these decades, this research has created not only a unique record of change for one of the world's most iconic and vulnerable lakes, but also a robust network of collaborators. Our research has, by design, moved beyond the scholarship and education of UC Davis faculty and students, informing management and policy in the Basin as well as the conservation and restoration practices undertaken by our partners.

Each year, the *State of the Lake Report* represents an opportunity to synthesize the results of our Lake Tahoe research to date in the context of broader research findings and ongoing environmental challenges. Our aim is to make this research accessible, and to create a more holistic understanding of the ecological health of the Basin and its resilience than is typically possible within our individual research reports. We are deeply grateful to our partners who support our work throughout the year, including support for the production of the *State of the Lake Report*.

This year's *Tahoe: State of the Lake Report* presents data from 2024 in the context of the long-term record.

Air temperatures in the Tahoe Basin have increased over the past 113 years for which daily temperature records are available at Tahoe City. The number of days when air temperatures averaged below-freezing has declined by over 27 days since 1911, contributing to generally more rain and less snow as well as earlier snowmelt at Lake Tahoe. From when snow records started in 1910, snow was about half of the annual total precipitation whereas in 2024 it is now estimated to comprise 30–40% of the total precipitation.

Maximum air temperatures have also increased, although the warming trend in maximum temperature is less steep than that of minimum temperature.

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"Previous year" for some parameters means data collated in terms of the water year, which runs from October 1 throught September 30; for other parameters, it means data for the calendar year, January 1 through December 31. Therefore, for this 2024 report, Water Year data are from October 1, 2023 through September 30, 2024. Calendar year data are from January 1, 2024 through December 31, 2024.

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In 2024, the annual average air temperature maximum was 57.4 °F (14.1 °C) which was 2.8 °F warmer than the previous year, and the average annual minimum for 2024 was 31.8 °F (-0.1°C), which was 2.4 °F (°C) warmer than the previous year.

The amount of total precipitation (water equivalent of rain and snow) from year to year remains highly variable, without an overall annual trend, with a long-term average (1910–2024) of 31.4 inches. The 2024 Water Year had an annual average of 29.0 inches of precipitation, slightly below the long-term average at Tahoe City.

Water temperature has continued to increase, which has implications for the biology of the lake. Algae, whether attached as periphyton or free-floating as phytoplankton, and zooplankton are known to increase their growth as temperatures warm. Microbial activities that process nutrients and carbon also speed up with higher temperatures. The annual rate of warming is 0.21 °F per decade, with the rate of warming most pronounced at the surface (0.39 °F per decade) and during the summer. As is typical, July showed the warmest temperature for 2024 (maximum 74.9 °F) and the average (68.8 °F) was the warmest July average surface temperature in our 26-year record observed with the temperature sensors suspended 5-feet below the four buoys TERC maintains in collaboration with NASA.

These warming temperatures are important not only because they can alter biological processes, like phytoplankton growth, but also because they have critical implications for lake mixing. Warm water floats on top of cold water, and as the temperature difference increases, this stratification increasingly resists mixing. Stronger stratification reduces the oxygen that can move from the atmosphere to the lower layers, as well as limiting the nutrients that can come from the bottom to feed phytoplankton, altering biogeochemistry, horizontal flows of water and materials coming from streams, and composition of the plankton in both layers. With warming and other environmental changes, we see that the strength of stratification has increased by 13.8 percent over the past 56 years, and 2024 showed an especially high value for resistance to mixing (lake stability index), second only to that seen in 2017. Overall, the length of the stratified season has increased by 29 days since 1968, mostly through an earlier beginning, and the length of the 2024 stratified period was on trend at 196 days.

In addition to stratification changes, warming can alter the interactions of the lake with inflowing streams. New research aims to understand the dynamics at the interface of streams with the lake. If stream water is colder than the lake, it will plunge deeper, carrying much of its load of sediment and nutrients. If it

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is warmer, the incoming stream water will float, with implications for water clarity and the fate of materials that come into the lake from the watershed.

Among the inflows, in 2024 the Upper Truckee River brought in the majority of nutrients (phosphorus and nitrogen) and suspended sediments, as is often the case. Phytoplankton use these nutrients for growth, and their abundance can affect water clarity, as do suspended sediments — these effects are particularly strong for phytoplankton, sediments, and other particles that are very small (1–6 microns). Nearshore algae — periphyton and metaphyton (unattached mats of algae near shore) can also be promoted by additional nutrients. Phosphorus levels in the lake declined since their early highs in the 1980s, likely due to the many efforts associated with Total Maximum Daily Load (TMDL) management. While phosphorus levels remain below the highs seen in the 1980s, it is worth noting that over the last 18 years, both phosphorus and nitrogen measured in the lake have been increasing, highlighting the need for continued vigilance.

While we frequently discuss phytoplankton in the context of their effects on water clarity, phytoplankton are also essential to a healthy ecosystem, turning energy from the sun into biomass that feeds the rest of the food web in the lake. We monitor phytoplankton using multiple approaches. Primary productivity in open water is a measurement of how rapidly algae can turn carbon from the atmosphere into biomass. Through 2019, primary productivity continued to increase. Unfortunately, a methodological challenge we are currently troubleshooting prevented us from updating the primary productivity estimates for 2020–2024. While primary productivity increased, we did not see a long-term trend in chlorophyll, which can be a variable proxy for algal biomass. Innovative, newly published research by a UC Davis postdoctoral fellow is helping to make chlorophyll a more accurate measurement for us and for the many other researchers around the world who use chlorophyll to estimate phytoplankton biomass. In our future work, we will determine how this new chlorophyll correction may improve our multiple measures of phytoplankton. Among the phytoplankton, diatoms dominated the biomass, which is typical, and very small cyanobacteria were more numerous than usual. Currently, picoplankton — phytoplankton smaller than detection limits for standard microscopes — remain unmonitored. The size of picoplankton (< 2 microns) falls within the range of particles known to strongly affect Lake Tahoe's water clarity (1–6.73 microns) and represents an interesting area for further research.

After steep declines in water clarity through the 1990s, annual average clarity (62.3 feet in

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2024) appears to have plateaued. Winter trends have stabilized or improved, but summer trends remain concerning. We have monitored particles since 2009, with attention to those most strongly affecting water clarity in the 1–6.73 micron size class, and we saw a sudden increase after 2015. This past year we recorded the highest number of particles since monitoring began, with over 6 million particles per liter in the 1–6 micron size class. The spike in particle number occurred during the spring melt, timing that is typical. The specific identity of these particles remains unknown, complicating our ability to determine why the increase in particles occurred since 2015 or for this particular year.

To understand why Lake Tahoe's clarity is not improving at a greater rate, we suggest that targeted research is needed into the nature of the clarity-reducing particles and their potential aggregates. The relative importance of sediment and detritus entering from the watershed (e.g., spring run-off) and airshed (e.g., pollution and smoke), and phytoplankton growth in response to changing environmental conditions can imply different processes at play in water clarity. These factors and their relative importance for water clarity may have changed since the last detailed investigation that occurred in 2006.

Beyond clarity, TERC also has been collecting data on characteristics of the light that enters the water. Light entering the water is essential for photosynthesis yet also contains damaging UV light, just as it does on land. A recent TERC-led study found that drought years allowed 100 times more UV light to a reach a 32-foot depth, and to penetrate nearly 4 times deeper into the water, compared to high precipitation years. This pattern occurs because wet years bring more sediment and dissolved organic matter that block UV light. This finding is important because both organisms and lake chemistry are sensitive to UV light.

UC Davis also has a long history of nearshore monitoring where many important lake processes occur, where people interact most directly with the lake, and where most of the pressure from aquatic invasive species occurs. Since 2003, TERC has systematically monitored fixed nearshore sites for periphyton, or attached algae, that makes rocks around the shoreline of Lake Tahoe green and slimy (or white when sun bleached). In 2024, measurements of periphyton biomass were below average. However, periphyton in Tahoe are very difficult to monitor because these mats slough off under intense wave action from year to year, such that monitoring a single site does not allow us to see when a new periphyton mat grows and dies elsewhere. We are cautiously optimistic that our new approach for assessing extent of periphyton

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and metaphyton will yield more effective monitoring. In this new approach, we image the full shore from a helicopter, with detailed images allowing estimation of the extent of growth, validating these results with SCUBA diving and snorkeling on targeted areas. Future research will also examine the utility of satellite remote sensing, in conjunction with the ongoing periphyton and metaphyton assessments. Further, a new graduate student this year will be examining the potential to monitor Tahoe nearshore for aquatic invasive species, using environmental DNA (eDNA). Organisms shed DNA in many ways; rapid improvements in technology and methodology have increased the feasibility of monitoring eDNA more broadly to monitor water for invasive species.

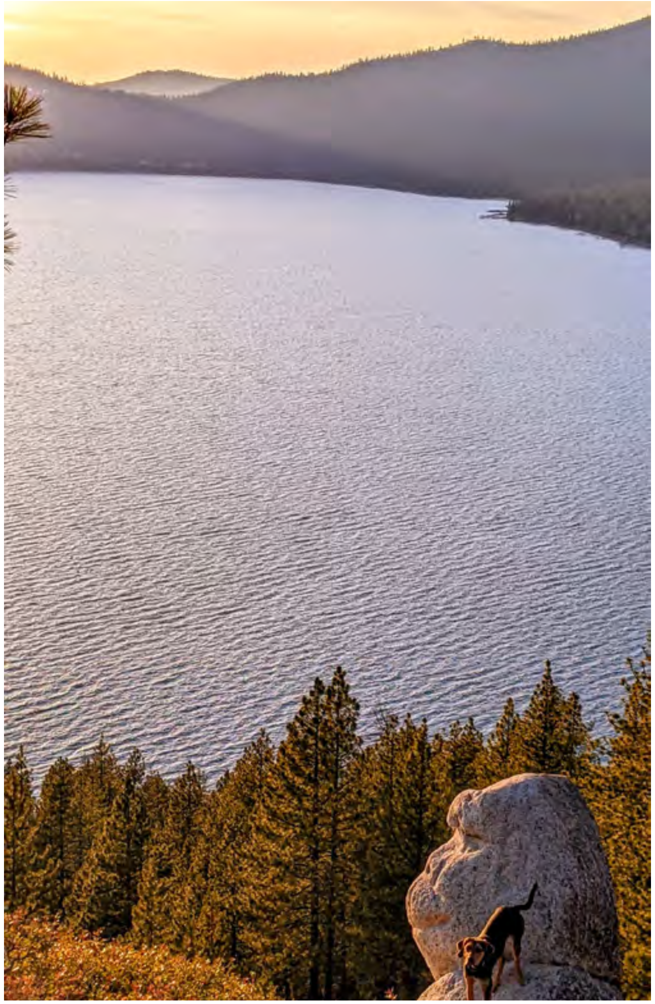
Education about the Lake Tahoe environment remains a cornerstone of TERC's engagement with the Tahoe community, reaching thousands of local residents and visitors each year through tours, school programs, lectures, outreach activities, and exhibits. In 2024, TERC interacted with 10,944 visitors. Collaboration with our network of partners in the Basin has been instrumental in increasing our resilience to unexpected changes such as the April 2025 termination of the AmeriCorps program that supported programs in the Tahoe Basin. This change deeply impacted our 2025 education efforts as well as those of approximately 12 other AmeriCorps volunteers within the Basin. Our enduring network of partners and supporters together amplify the benefits of our collective education efforts and expand the reach of environmental stewardship education across the north, west, east, and south shores of the lake.

Reflecting on the full record of environmental change in Lake Tahoe provides an opportunity to celebrate stewardship successes that have protected the lake from the degradation while also recognizing the need to make additional progress in restoring the lake and building resilience to face current and future environmental challenges.

Warming temperatures affecting our local environment create change in both land and water, and warmer conditions in surrounding lowland regions bring more visitors into the comparatively cool Tahoe Basin. Changes in precipitation and wildfire, pressure from invasive species, and novel pollutants all pose challenges that threaten health of the lake. Working together to reinforce our community's resilience and to maintain the resilience of our research and monitoring infrastructure is essential to continue building a more resilient Tahoe ecosystem.

ABOUT LAKE TAHOE AND THE TAHOE BASIN

- Maximum depth: 1,645 feet (501 meters), making it one of the deepest lakes in the world and second 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)
- Length: 22 miles (35 kilometers)
- Width: 12 miles (19 kilometers)
- Length of shoreline: approximately 75 miles (120 kilometers)
- Volume of water: 40 trillion gallons, plus or minus, enough to cover California in about 14 inches of water
- The daily evaporation from Lake Tahoe (half a billion gallons) would meet the daily water needs of 5 million Americans
- Number of inflowing streams: 63, the largest being the Upper Truckee River
- One outflowing stream — the Truckee River, which exits at Tahoe City, flows through Truckee and Reno, and terminates in Pyramid Lake, Nevada
- Number of monitoring stations TERC utilizes in the Tahoe Basin: 225
- Length of time it would take to refill the lake: about 600 years
- Average elevation of lake surface: 6,225 feet (1,897 meters)
- Highest peak in basin: Freel Peak, 10,891 feet (3,320 meters)
- Latitude: 39 degrees North
- Longitude: 120 degrees West



Alison Toy, UC Davis TERC

ABOUT THE UC DAVIS TAHOE ENVIRONMENTAL RESEARCH CENTER (TERC)

The UC Davis Tahoe Environmental Research Center (TERC) is a world leader in research, education, and public outreach on lakes and watersheds, providing critical scientific information to help understand, restore, and sustain the Lake Tahoe Basin and other systems worldwide. Since 1968, UC Davis has conducted continuous, year-round scientific monitoring of Lake Tahoe, creating the foundation on which restoration and stewardship efforts can be based.

TERC's activities are conducted out of permanent research facilities in the Tahoe Basin and at the University's main campus in Davis, California, about 100 miles west of the lake.

Our main laboratories and offices are in Incline Village, Nevada, on the third floor of the Tahoe Center for Environmental Sciences building. On the first floor, we operate the Tahoe Science Center™, an educational resource for K-12 students and learners of all ages, that is open to the public.

In Tahoe City, California, we operate a field station (housed in a fully renovated, former state fish hatchery) and the Eriksson Education Center. The field station also houses the CITRIS Environmental Robotics Lab @ Tahoe. Tahoe City is homebase for our research vessels, the *R/V John LeConte* and the *R/V Bob Richards*. The *R/V Ted Frantz* operates out of Clear Lake, California and the *R/V Tom* and the *R/V Martini* are currently based in Davis, California. Malyj Manor, a 4-bedroom house in Tahoe City, provides short term housing for students and visiting researchers.

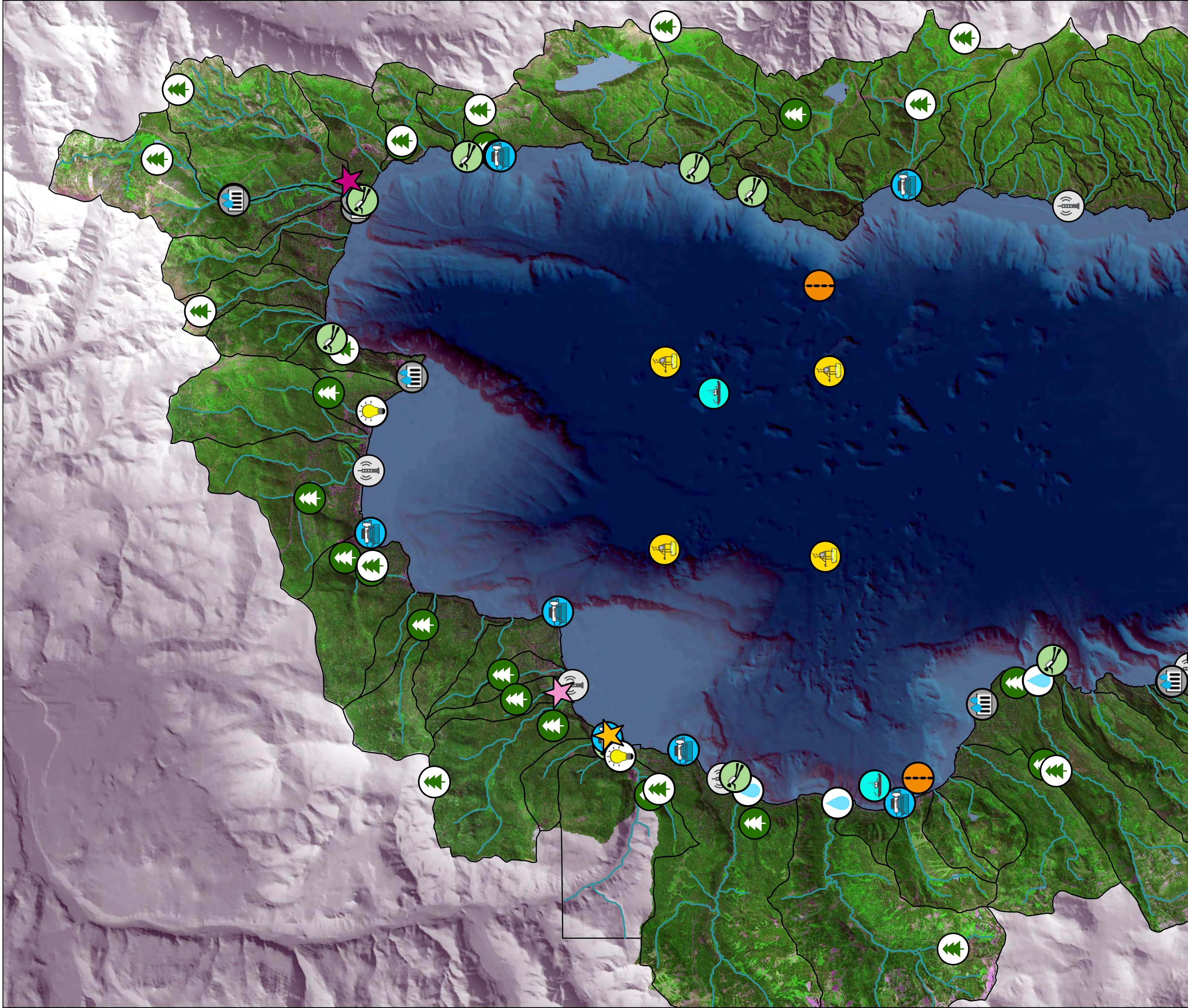
Additional laboratories and offices are located on the UC Davis campus at the Center for Watershed Sciences, Ghausi Hall and in Wickson Hall.

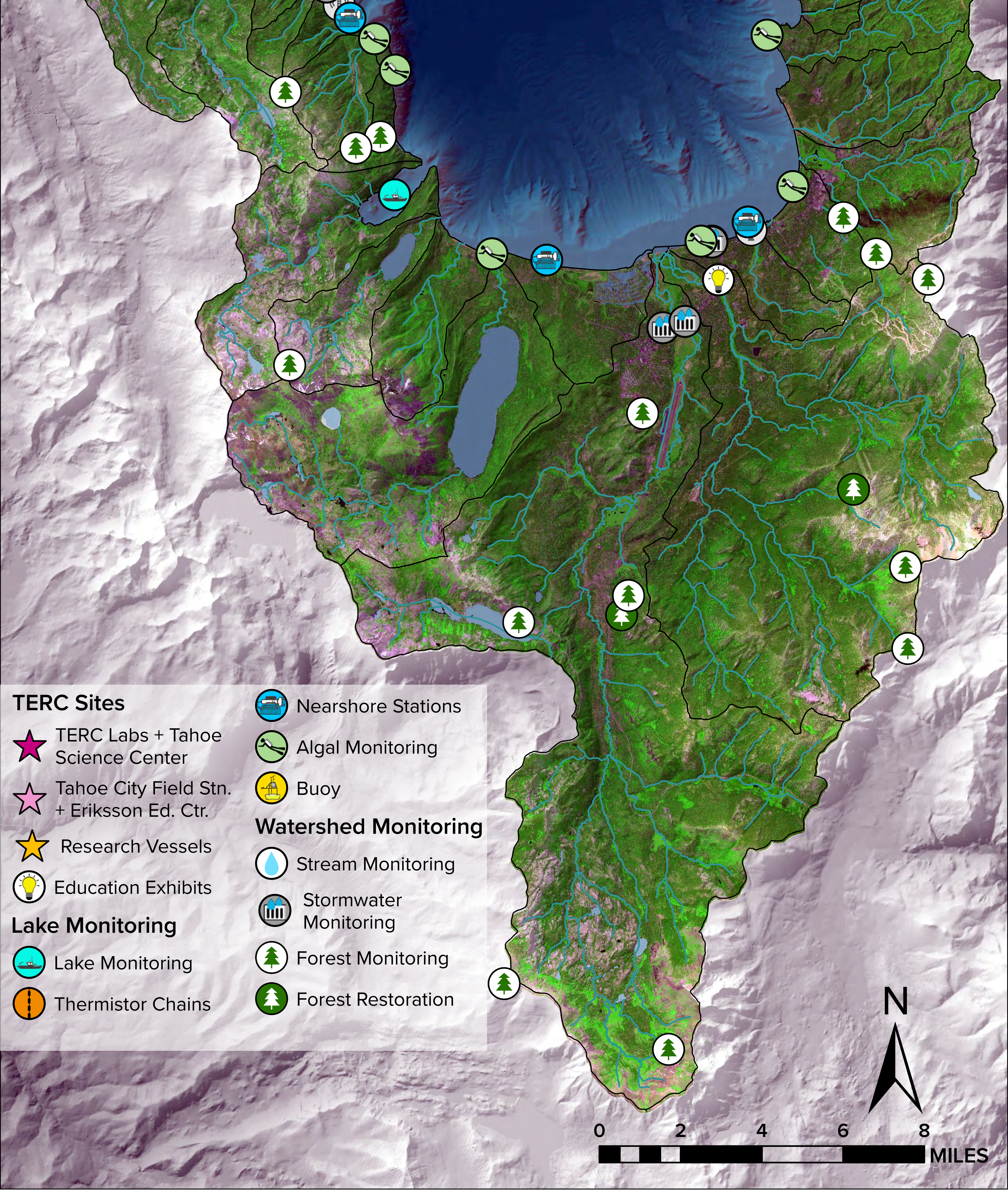
At locations throughout the basin, we have sensors continuously reporting on the health and well-being of the lake and its environs, creating a robust infrastructure for understanding and increasing resilience of the Tahoe Basin.

Our website (https://tahoe.ucdavis.edu) has more information about our programs, including:

- Information for potential students, staff, faculty, research collaborators, and visitors;
- Access to near-real-time data sensors;
- TERC research publications;
- Exhibits and events at the education centers; and
- Information about supporting our research and learning programs.

TAHOE BASIN DATA COLLECTION SITES





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TAHOE: STATE OF THE LAKE REPORT 2025

SCIENCE TO SAVE LAKES

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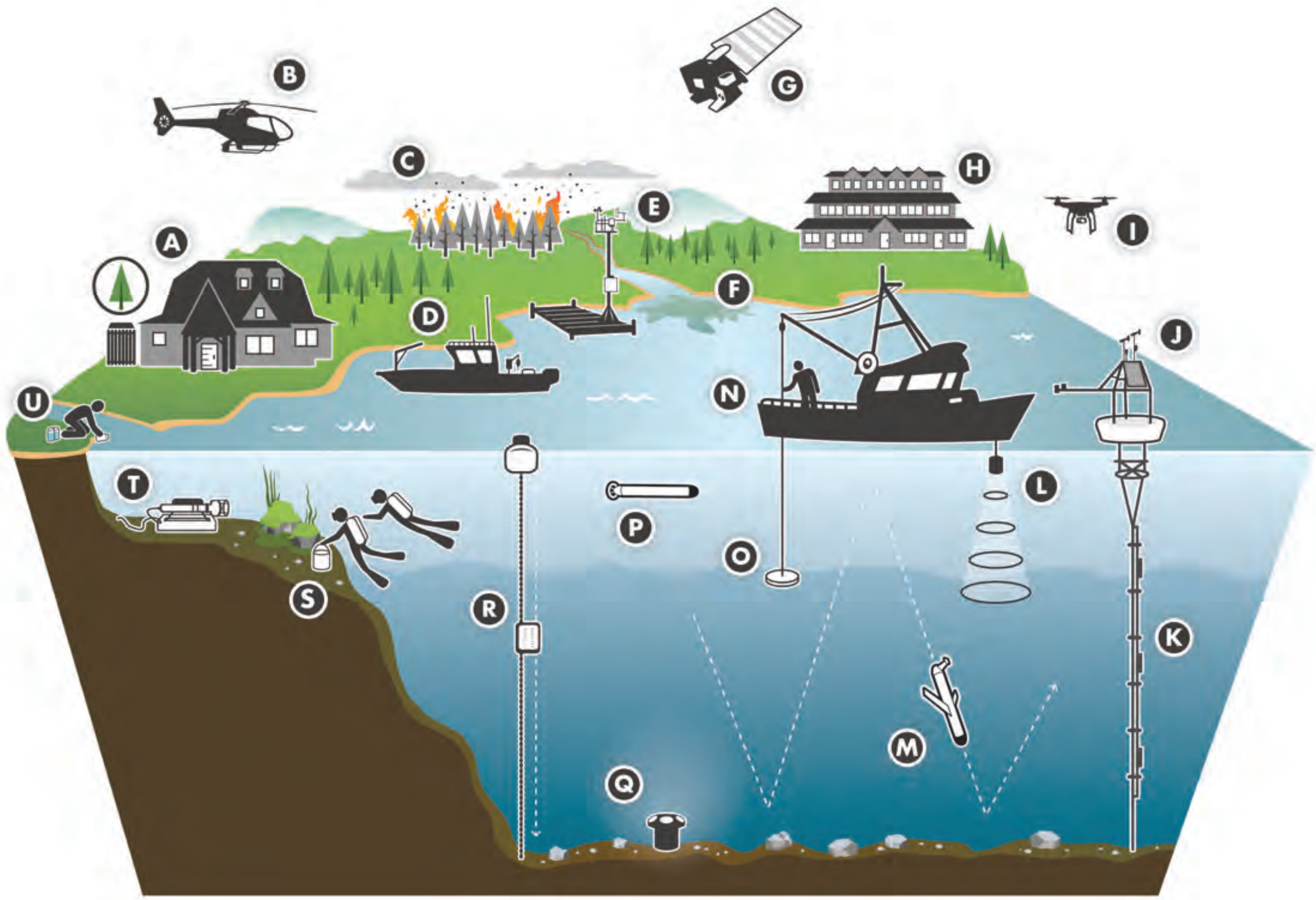
Science to Save Lakes: Infrastructure for Understanding

For over 60 years UC Davis Tahoe Environmental Research Center has built a robust and enduring infrastructure to better understand the Lake Tahoe system. Many people think of equipment when they hear the word "infrastructure," but we recognize that the infrastructure supporting research and monitoring is much more than that. Infrastructure includes not only technologies but also a legacy of knowledge and people who engage passionately in research, education, conservation, and management. This infrastructure is our investment in a resilient future.

This investment in all aspects of infrastructure over the years has created a network of connected understanding that drives researchers toward the most critical questions and supports the mission to find answers, ultimately leading us to our destination—a healthy and resilient watershed.

Components of TERC's infrastructure for understanding can be found all around Lake Tahoe. It takes passionate people, to gather valuable data, to deliver actionable insights, and to build resilient watersheds. (Brandon Berry, UC Davis TERC)

Science to Save Lakes: Infrastructure for Understanding

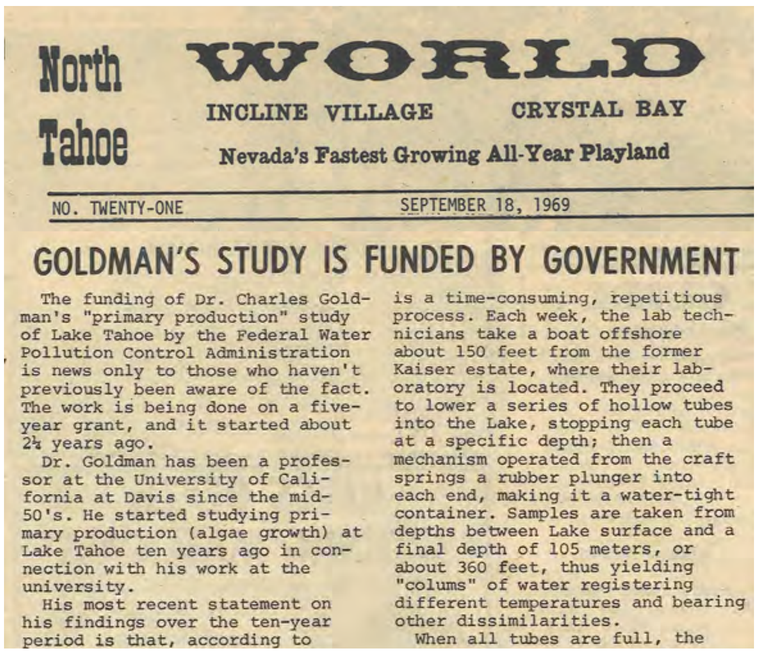


A. Tahoe City Field Station, Forest Ecology Lath House, and Eriksson Education Center
B. Helicopter
C. Atmospheric deposition samplers
D. Research vessels
E. Meteorological stations
F. Stream monitoring stations
G. Remote sensing satellites
H. Laboratories and Tahoe Science Center
I. Drones
J. NASA research buoys
K. Thermistor chains
L. Bioacoustic monitoring sonar
M. Autonomous underwater gliders
N. Vertical profilers
O. Secchi disk
P. Autonomous Underwater Vehicles (AUVs)
Q. Acoustic Doppler Current Profilers (ADCPs)
R. Wave-powered vertical profiler
S. Research divers
T. Nearshore sensor stations
U. eDNA collections

What are the Components of TERC's Infrastructure for Understanding?

Long-term dataset

Foundational to our understanding is our extensive, long-term data set, which UC Davis has been collecting and analyzing for over 60 years. This record of change is one of the longest continuous measurements collected on a lake in the United States, and it allows us to see beyond individual readings, revealing decadal scale trends. It provides researchers insight into how the environment of the Tahoe Basin is changing over time in the face of anthropogenic impacts, global change, and the introduction of new species. This data set holds the key to answering many of the most important questions we need to ask. The data comprise a critical piece of our research infrastructure, serving as a keystone to encourage collaboration, exchange of ideas, and laying the foundation for future scientific breakthroughs in the Tahoe Basin and beyond.



North Tahoe WORLD

INCLINE VILLAGE CRYSTAL BAY

Nevada's Fastest Growing All-Year Playland

NO. TWENTY-ONE SEPTEMBER 18, 1969

GOLDMAN'S STUDY IS FUNDED BY GOVERNMENT

The funding of Dr. Charles Goldman's "primary production" study of Lake Tahoe by the Federal Water Pollution Control Administration is news only to those who haven't previously been aware of the fact. The work is being done on a five-year grant, and it started about 2½ years ago.

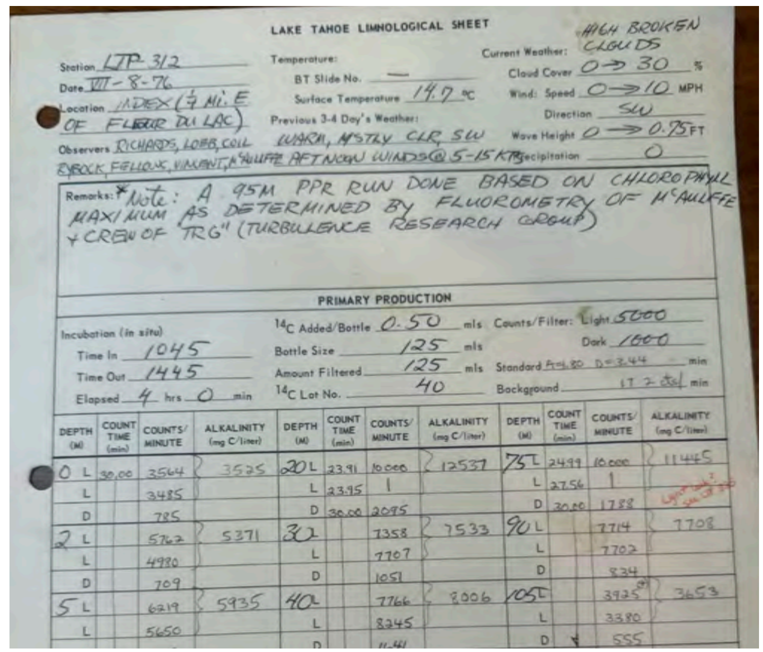
Dr. Goldman has been a professor at the University of California at Davis since the mid-50's. He started studying primary production (algae growth) at Lake Tahoe ten years ago in connection with his work at the university.

His most recent statement on his findings over the ten-year period is that, according to

is a time-consuming, repetitious process. Each week, the lab technicians take a boat offshore about 150 feet from the former Kaiser estate, where their laboratory is located. They proceed to lower a series of hollow tubes into the Lake, stopping each tube at a specific depth; then a mechanism operated from the craft springs a rubber plunger into each end, making it a water-tight container. Samples are taken from depths between Lake surface and a final depth of 105 meters, or about 360 feet, thus yielding "colums" of water registering different temperatures and bearing other dissimilarities.

When all tubes are full, the

Proof we have been monitoring the lake and have been concerned about excessive algae growth for decades. This newspaper article from September 1969 reports on Dr. Charles Goldman receiving funding to conduct primary productivity (algae growth) studies in Lake Tahoe. (UC Davis TERC)



LAKE TAHOE LIMNOLOGICAL SHEET

Station LTP 3/2
Date VII-8-76
Location INDEX (½ Mi. E OF FLEUR DU LAC)
Observers RICHARDS, LOEB, COIL, RYBOCK, FELLOWS, VINCENT, McAULIFFE

Temperature:
BT Slide No. —
Surface Temperature 14.7 °C
Previous 3-4 Day's Weather: WARM, MSTLY CLR, SW AFTNOON WINDS @ 5-15 KTS

Current Weather: HIGH BROKEN CLOUDS
Cloud Cover 0 → 30 %
Wind: Speed 0 → 10 MPH
Direction SW
Wave Height 0 → 0.75 FT
Precipitation 0

Remarks: *Note: A 95M PPR RUN DONE BASED ON CHLOROPHYLL MAXIMUM AS DETERMINED BY FLUOROMETRY OF McAULIFFE + CREW OF "TRG" (TURBULENCE RESEARCH GROUP)

PRIMARY PRODUCTION

Incubation (in situ)
Time In 1045
Time Out 1445
Elapsed 4 hrs 0 min

^{14}C Added/Bottle 0.50 mls
Bottle Size 125 mls
Amount Filtered 125 mls
^{14}C Lot No. 40

Counts/Filter: Light 5000
Dark 1600
Standard [illegible] min
Background [illegible] min

DEPTH (M)	COUNT TIME (min)	COUNTS/ MINUTE	ALKALINITY (mg C/liter)	DEPTH (M)	COUNT TIME (min)	COUNTS/ MINUTE	ALKALINITY (mg C/liter)	DEPTH (M)	COUNT TIME (min)	COUNTS/ MINUTE	ALKALINITY (mg C/liter)
0 L	30.00	3564	3525	20 L	23.91	10,000	12537	75 L	24.99	10,000	11445
L		3485		L	23.95	1		L	27.56	1	
D		785		D	30.00	2095		D	30.00	1788	
2 L		5762	5371	30 L		7358	7533	90 L		7714	7708
L		4980		L		7707		L		7702	
D		709		D		1051		D		834	
5 L		6219	5935	40 L		7766	8006	105 L		3925	3653
L		5650		L		8245		L		3380	
				D		[illegible]		D		555	

Historical data sheet shows that researchers had good weather on July 8, 1976, when they went out on the lake for a day of observations that included Primary Productivity studies (which is still ongoing today) and gathering zooplankton samples. (UC Davis TERC)

What are the Components of TERC's Infrastructure for Understanding?

Passionate people

The passionate and brilliant teams of interdisciplinary researchers who have called TERC home provide another key component of our long and storied history. These individuals have made their unique contributions to our understanding of the lake and the surrounding basin, building on the knowledge captured before them and making advances of their own, so that the next generation of researchers can begin at new heights.

Whether studying the ecology of the lake, the genetics of the forests, the physical movement of the water, the changes in nutrients in the water and soil, the atmospheric conditions, or people's activities in the Basin, this work becomes more than the sum of the parts when collaboration allows us to build a more cohesive understanding of our environment. Such understanding is critical to preserve and restore the ecosystems of the Tahoe Basin for both current and future generations.

While scientists and engineers turn data into knowledge, it is our partnerships that turn knowledge into action. We have collaborated with partners within the basin for decades to translate the scientific insights we provide into actionable management strategies that are implemented by government and non-profit organizations. These partnerships are crucial to translating our science into stewardship.

TERC team members gathered for a Strategic Planning session in Davis. This meeting provided a chance for the normally far-flung team to be in the same room and discuss the future of TERC. (Gayle Guest-Brown, UC Davis)

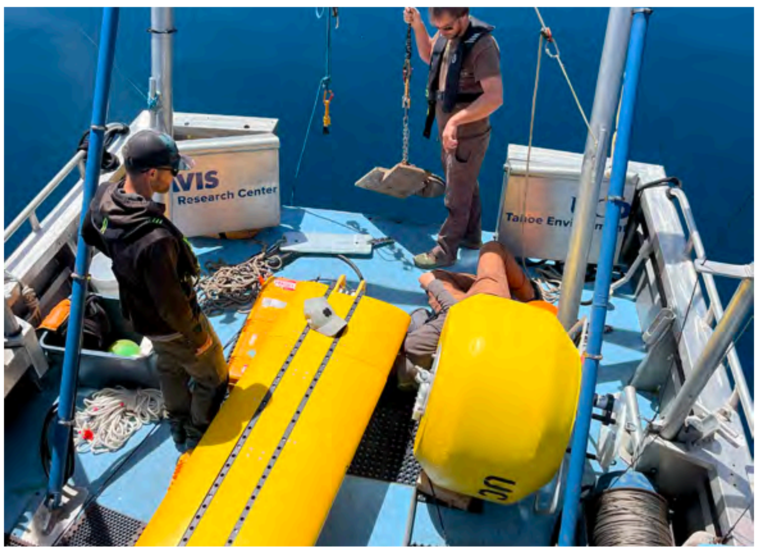
Four leaders of UC Davis research at Lake Tahoe. Left to right, Charles Goldman, Stephanie Hampton, Geoffrey Schladow, and Alex Forrest. (Heather Segale, UC Davis TERC)

What are the Components of TERC's Infrastructure for Understanding?

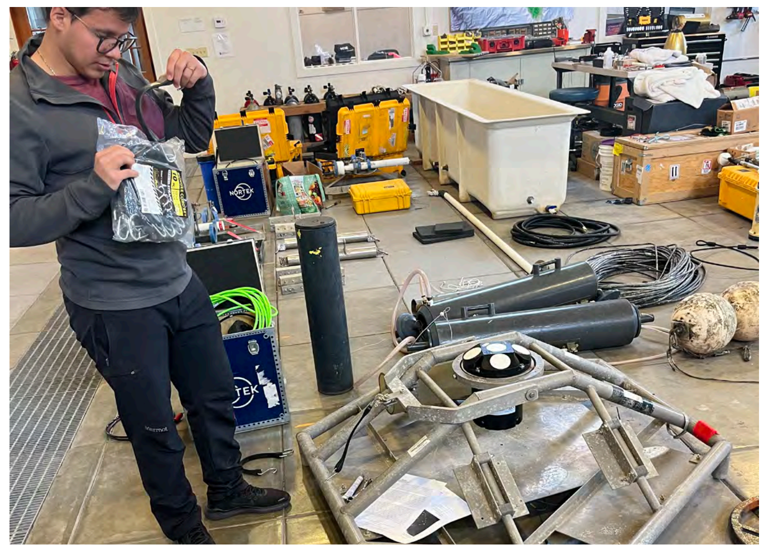
Tools and technology

TERC has Lake Tahoe and the surrounding watershed wired. Our decades-long history of interdisciplinary research and data collection set the stage for Lake Tahoe to become one of the best-monitored lakes and watersheds in the world. The TERC team has employed technology to help us research and monitor from the shallow waters to the deepest depths, shore to shore, and into the streams and trees of the Tahoe Basin.

In the most recent example, we deployed and collected data from the Wirewalker in Lake Tahoe. This wave-powered device continuously measures temperature, conductivity, turbidity (clarity), dissolved oxygen, and dissolved organic matter from the surface to a depth of 150 meters, 24 hours a day. These continuous measurements have been central to a project aimed at understanding what materials enter the lake, including sediment, nutrients, and plant materials, during the spring melt. Also deployed on this project were new Acoustic Doppler Current Profilers (ADCPs), designed to measure the physical speed and movement of water into the lake from streams. Determining empirically what materials enter the lake via inflows when the snow melts will provide important information to Basin managers when they make decisions on how best to protect the lake.



Brandon Berry and Mike Cane inspect the components of the Wirewalker before deploying the technology for the first time in Lake Tahoe. (Keeler Nelsen, UC Davis TERC)



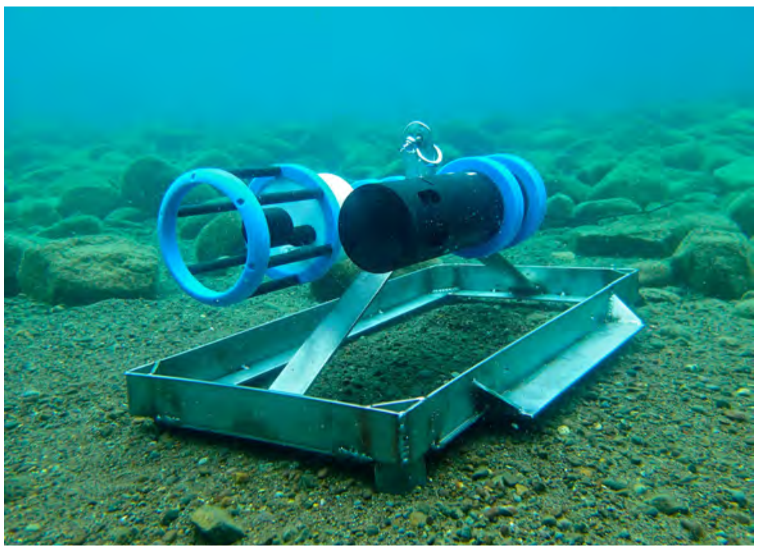
Sergio Valbuena works on metal frames that will hold the Acoustic Doppler Current Profilers (ADCPs) for their deployment on a recent project in Lake Tahoe. (Cara Hollis, UC Davis TERC)

What are the Components of TERC's Infrastructure for Understanding?

Tools and technology

Our history at the lake demonstrates that continuous monitoring is crucial for understanding this complex and dynamic environment. As such, we have built and installed 10 nearshore monitoring stations that reside permanently around the lake, continuously recording and transmitting data in real-time to not only to our team but also to our website where the public can use the data too. These sensors capture wave height, water temperature, turbidity, and dissolved oxygen.

The information collected is combined with weather data from our meteorological stations and shared on our Lake Conditions webpage at https://tahoe.ucdavis.edu/lake-conditions. This page displays current and forecasted water temperatures and wave heights, allowing residents and visitors to plan safe activities on and around Lake Tahoe. These data inform the models our researchers have constructed of the entire lake system that enables predictions of changes that may occur for Lake Tahoe in future climate scenarios.



The nearshore station is located in the shallow waters around Lake Tahoe's shoreline. TERC researchers have deployed 10 nearshore stations that collect continuous data that is utilized to populate our Lake Conditions webpage. (UC Davis TERC)

Current lake conditions are available on our website at https://tahoe.ucdavis.edu/lake-conditions. Anyone can check the current and forecasted wave heights and water temperatures to plan their trips to the lake safely. (UC Davis TERC)

What are the Components of TERC's Infrastructure for Understanding?

Tools and technology

To build these models, our researchers need not only nearshore information, but also data from deep in the lake. To explore deeper water, we deploy gliders and autonomous underwater vehicles (AUVs). The gliders are propelled by internal buoyancy changes that send them from the shallow water into the deep and then back again. As they descend and ascend through the water column, they use wings to translate the vertical to horizontal motion. We can outfit the gliders to take various measurements, including temperature, chlorophyll, turbidity, and dissolved oxygen, and then release them to traverse the lake from shore to shore and top to bottom. Gliders can operate autonomously for up to several months. When their mission is complete, they surface and wait to be picked up by our field team. AUVs are like gliders in that they can be outfitted with various technologies to take different measurements. However, they are equipped with a propeller that allows us to program them to move at specific depths or altitude above the lakebed to particular locations, allowing researchers to focus monitoring and research efforts on specific areas. These two technologies also allow researchers to understand the internal wave structures in the lake. For example, we know that Lake Tahoe is large enough that internal waves are influenced by the Earth's rotation, also known as the Coriolis effect. Understanding the Coriolis influence revealed the dynamics of currents that run along the shoreline, which helps to inform how materials or organisms may move from one part of the lake to another.

Sergio Valbuena inspects TERC's two AUVs (left) and two gliders (right) in the Hatchery in Tahoe City pre-deployment in Lake Tahoe. (Alex Forrest, UC Davis TERC)

Alex Forrest deploys a glider in Lake Tahoe to facilitate research into turbidity, internal waves, and water movement around the lake. (UC Davis TERC)

What are the Components of TERC's Infrastructure for Understanding?

Tools and technology

Other information from the middle of the lake comes from four permanent buoys that we operate in conjunction with NASA, thermistor chains installed on the east and west shores, and vertical profile measurements taken from our Research Vessels: the R/V John LeConte and the R/V Bob Richards.

The buoys are permanently moored and gather meteorological data and temperature data allowing us to capture weather data from the middle of the lake, which is vital for our Lake Conditions webpage and our modeling efforts. The buoys also hold atmospheric deposition buckets that collect materials entering the lake from the sky, information that is especially important for monitoring ashfall during wildfires. One of the buoys holds a microplastic deposition bucket for our partners at Desert Research Institute, to help further their microplastic research. The buoys help measure water temperature in two ways—radiometers estimate surface water temperatures, and thermistor chains hanging at intervals 5-meters under the buoy directly measure water temperature. Having two different ways of measuring temperature provides critical calibration and validation for instruments aboard NASA satellites as they pass over Lake Tahoe on their journey to accurately record surface temperatures worldwide.

Four permanent buoys gather meteorological and surface water temperature data. Additionally, thermistor chains, seen below the buoy, measure water temperature below the surface. (UC Davis TERC)

Michael Cane puts a new atmospheric deposition bucket on top of one of the four buoys permanently moored in Lake Tahoe. (Cara Hollis, UC Davis TERC)

What are the Components of TERC's Infrastructure for Understanding?

Tools and technology

Temperature data from deeper depths is continuously captured on two thermistor chains, one on the west shore near Homewood and one on the east shore near Glenbrook. Water temperature is vital to track because during the warmer months, a layer of warm, less dense water forms in the shallow layers of the lake. This warmer, less dense water forms a barrier that functionally cuts the deep, cooler waters off from atmospheric oxygen. The temperature is critical to continue monitoring because we can see that these temperature-driven stratification periods are lasting longer as the atmosphere continues to heat up, cutting off the bottom of the lake from oxygen for longer periods. The effects of this strengthening barrier between upper and lower water on ecological and physical dynamics over the long-term represent an important area of research.

The R/V John LeConte visits the Glenbrook Thermistor Chain (whose moorings can be seen just below the surface) that continuously monitors water temperatures from the shallows to full-water depth. There is also a dissolved oxygen sensor at the bottom of this chain. (UC Davis TERC)

What are the Components of TERC's Infrastructure for Understanding?

Tools and technology

Two of the best tools we have for middle-of-the-lake monitoring are our research vessels. The boats can go anywhere on the lake to take vertical profile measurements, including measurements of conductivity (a water quality indicator), temperature, UV penetration, and particle abundance and size. Aboard the vessels, researchers take water samples to be analyzed for nutrients and particles back in our laboratory and deploy the famous Secchi disc for clarity measurements. The boats can also deploy bioacoustics sonar technology that lets us track the migration of fish and even zooplankton so that we can monitor how biological factors react to changing environmental conditions. The boats transport divers to deploy equipment, and to do algae sampling and monitoring, collecting periphyton samples at designated monitoring locations around the lake.

The Research Vessel John LeConte has been a workhorse of TERC research on Lake Tahoe, recently celebrating the 49th anniversary of her christening. (UC Davis TERC)

The Research Vessel Bob Richards is a smaller, more nimble boat that can quickly and safely get smaller teams anywhere they need to go on Lake Tahoe. (UC Davis TERC)

What are the Components of TERC's Infrastructure for Understanding?

Tools and technology

Not all the technology we use to understand Lake Tahoe is in the lake. TERC researchers are utilizing remote sensing technologies to more accurately estimate the amount and extent of nearshore algae growth. By using a drone to capture high-resolution images of designated areas of the shoreline, we can then employ machine learning techniques to categorize images and identify algae rapidly. These methods provide more accurate estimates of algae, which is vital information to put in the hands of managers and policymakers. We can then apply what we learned from the high-resolution images and expand the monitoring program to the entire shoreline by utilizing images captured by helicopters to monitor the remaining shoreline.

Brandon Berry pilots the drone as he conducts algae monitoring in Lake Tahoe's nearshore. (UC Davis TERC)

Former TERC Field Director Brant Allen poses with the helicopter, made possible by a generous donor, that we utilize for the remote sensing algae program. (UC Davis TERC)

What are the Components of TERC's Infrastructure for Understanding?

Tools and technology

Stream monitoring is also a vital part of our comprehensive approach to monitoring, since streams provide a connection of the watershed with lake processes, contributing nutrients that promote algal growth and sediments that further affect water clarity. Our team regularly monitors three streams, and our partners at the U.S. Geological Survey monitor seven more for sediment and nutrient content.

Historical picture of former TERC Staff Research Associate Scott Hackley, performing stream monitoring in Ward Creek (UC Davis TERC).

Isaiah Bluestein and Aaron Vanderpool are in the same location, performing stream monitoring in 2024. TERC regularly monitors for sediment and nutrients inputs into the lake. (UC Davis TERC)

What are the Components of TERC's Infrastructure for Understanding?

Tools and technology

Another component of our monitoring is in the forests surrounding Lake Tahoe. Our Forest Biology and Conservation team have long-term monitoring locations throughout the Basin, where they track the spread of White Pine Blister Rust, check for the presence of pine beetles, monitor tree health, mortality, and look for regeneration. The team is also engaged in developing innovative forest restoration approaches for fire-burned areas and a healthy forest composition.

Forestry Team members (Left to Right) Aaron Vanderpool, Camille Jensen, Patricia Maloney, and summer intern Sydney Griscavage after a day in the field at Monitor Pass, taking soil moisture readings and watering plantings. (Aaron Vanderpool, UC Davis TERC)

Tom Burt and California Conservation Corps assists with seed planting research as part of the Forestry and Biology Conservation Labs Climate Resilient Forest Restoration Project. (Aaron Vanderpool, UC Davis TERC)

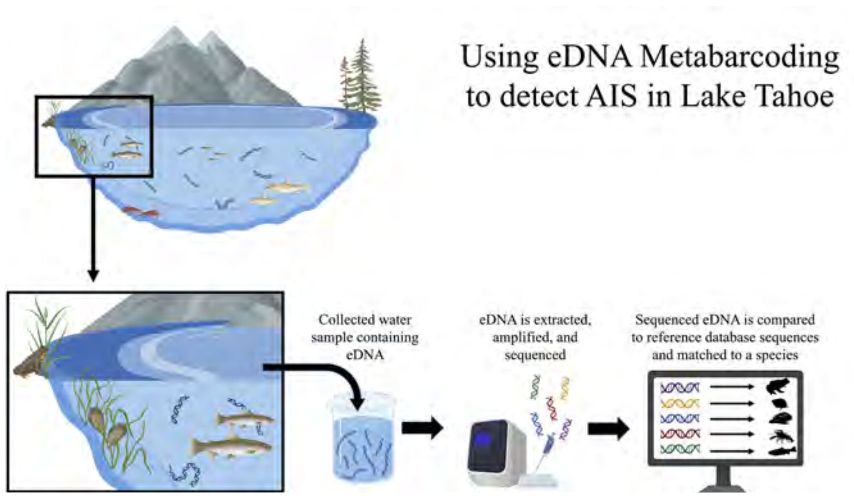
What are the Components of TERC's Infrastructure for Understanding?

Tools and technology

The quest for understanding is never over, and soon, two new technologies will be deployed for Lake Tahoe. One from the shoreline, and one from space.

New TERC Graduate Fellow Grace Rosburg-Francot will be studying the feasibility of deploying Environmental DNA (eDNA) sampling in Lake Tahoe. eDNA detection provides a sensitive, specific, non-invasive, and relatively inexpensive method to detect early invasions of aquatic invasive species (AIS) and monitor their spread. eDNA is DNA shed by organisms into the environment in skin cells, mucus, excrement, and gametes. Water containing eDNA can be collected, filtered, and genetically analyzed to detect individual or multiple species of interest. This approach makes the detection and tracking of AIS easier and faster. Beyond Tahoe, Grace is gathering and analyzing eDNA information across 20 other mountain lakes in the Sierra, in order to determine how variable lake dynamics affect eDNA detection and to improve utility of this approach. If new populations of AIS can be detected early, intervention and mediation strategies can be deployed rapidly, and hopefully prevent the new species from taking hold.

Grace Rosburg-Francot gathering eDNA water samples in the field at Susie lake. (Claire Rosburg)



Environmental DNA (eDNA) metabarcoding to detect aquatic invasive species in Lake Tahoe (Diagram created by Grace Rosburg-Francot in BioRender)

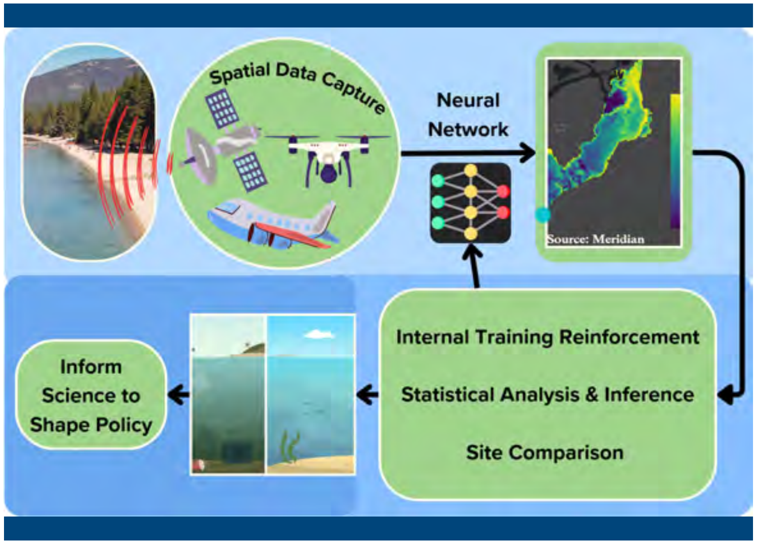
What are the Components of TERC's Infrastructure for Understanding?

Tools and technology

To continue to improve upon our algae monitoring program, new TERC Graduate Fellow Gabe Calistro will be working on utilizing multi-spectral satellite imagery to capture algae conditions across Tahoe's entire shoreline at daily to weekly time scales. The project has two major objectives: First, to develop models and workflows to classify algae from satellite imagery, enabling whole-shoreline estimates of algal biomass at weekly—monthly frequency, and second, to conduct a statistical analysis to link spatial and temporal patterns in algae cover to potential drivers, such as climate variation (precipitation, snowmelt), watershed drivers (like urban development), and within-lake factors (shoreline bathymetry, local nutrient sources, water temperatures). The ability to use satellite remote sensing will facilitate larger scale research and potentially provide less expensive and more comprehensive monitoring of algae.

These exciting new projects are part of the continual evolution of our infrastructure for understanding Lake Tahoe, and we will learn more about the lake with every passing year.

Gabe Calistro is a new research fellow working with Yufang Jin and Adrianne Smits to add cost effective ways to monitor algae blooms at larger spatial coverage using satellite technologies.

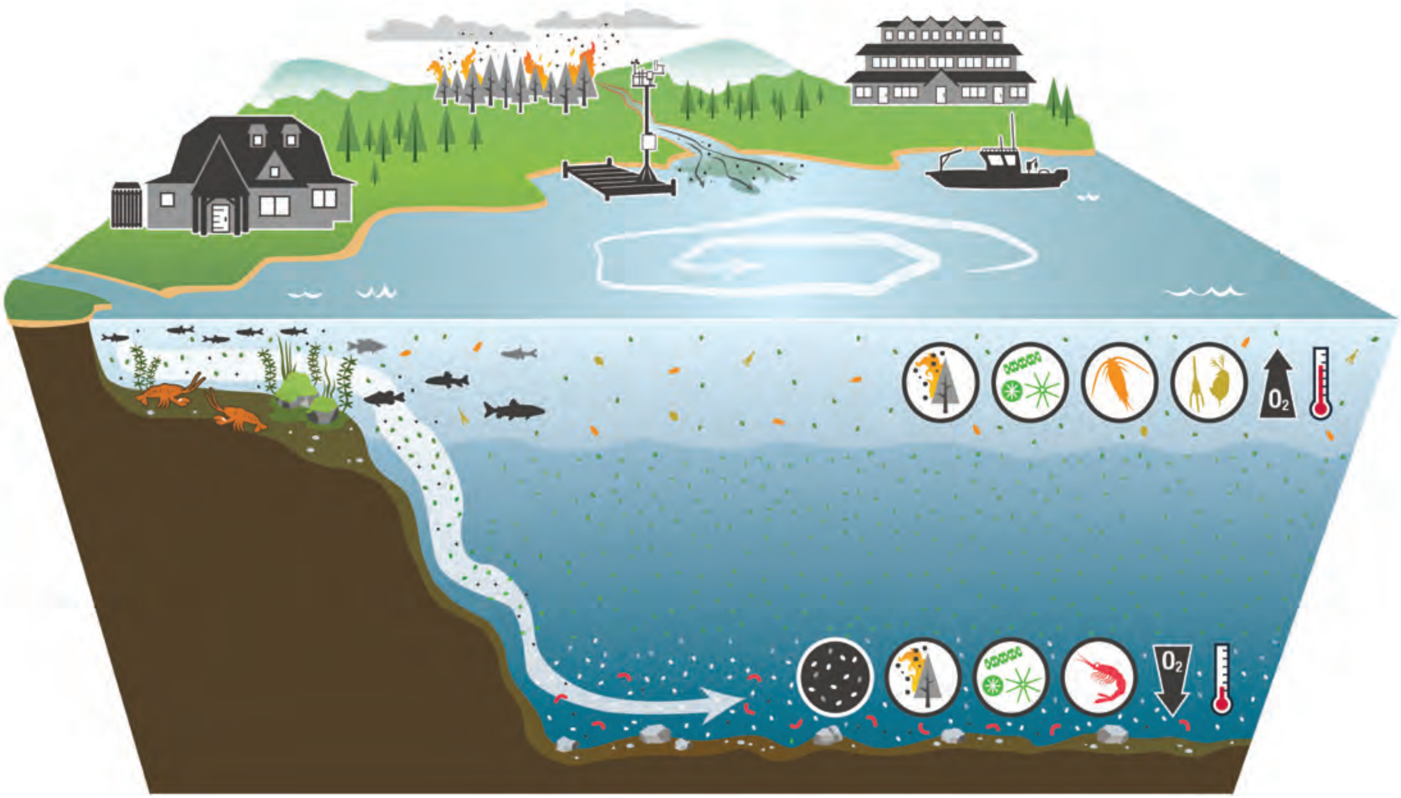


Earth observation satellites, helicopters, and drones capture imagery that can be utilized to build a neural network to increase the scale, accuracy, and speed of algae monitoring. (Diagram by Gabe Calistro)

What is the Goal of all this Work?

Resilient watersheds

Resilience. Resilient watersheds and resilient research. The health of the lake and the health of the surrounding forests, as well as the humans and other organisms contained within both, are inextricably linked. Interdisciplinary teams must work together to collect and share data, ask the right questions, and find the answers needed to keep Lake Tahoe a healthy and clean source of fresh water that sustains life in the Basin, and help to future-proof the lake for inevitable changes.



UC Davis TERC monitoring provides a model for early detection and prediction of changes in ecological function and water quality and can quantify the impacts of environmental changes and catastrophes such as wildfires. Examples of our research include investigations of forest health, meteorology, particles that impact clarity, nutrient cycling, horizontal and vertical mixing, algae composition, zooplankton, oxygen levels, temperature, and native and invasive species.

What is the Goal of all this Work?

Resilient research

With this infrastructure of interconnected data, people, and technology in place, we will find ways to persevere through a larger landscape of changes in funding and policy for environmental research. We will continue to do research and monitoring that provide valuable insights into Tahoe's health, and to support the communities of Lake Tahoe with the education and timely information needed for overcoming current and future environmental challenges. Based on the lessons learned from our technological deployments at Lake Tahoe, we also apply this knowledge to other lakes and reservoirs, sharing our expertise to enhance the understanding and management of these water bodies. Because our work extends beyond the water and into the forests and streams, we have a broad network of organizations and communities to support our work. TERC researchers apply lessons learned here to projects throughout California, the United States, and the world.

Clear Lake on a beautiful day. TERC researchers have been studying the systems of Clear Lake for years. Now the team is working to restore Oaks Arm of Clear Lake by utilizing a hypolimnetic oxygenation system. (Cara Hollis, UC Davis)

Isaiah Bluestein and Keeler Nelsen at Shasta Lake. At Shasta Lake, the team deployed ADCPs to investigate leakage into a temperature control device that selectively draws cool water from different levels of the lake. The team successfully identified the leakage, and the dam operations were able to react to control the water temperatures in the Sacramento River. (Mike Cane, UC Davis TERC)

What is the Goal of all this Work?

Tahoe is a living laboratory. The lessons learned here can be applied worldwide to help preserve and protect freshwater ecosystems and all the life they support.

The most exciting aspect of the infrastructure we have built here is that it will continue to evolve, improve, and expand. The more passionate people we can attract to come and work at Tahoe, the better our questions will be, and the more data we will collect. The more data we collect, the more questions researchers will be able to answer. The questions answered will lead us to new questions and new people to research them with the latest innovations. TERC has the necessary infrastructure to improve continually. Come with us on the journey.

Lake Tahoe water and sky (Aaron Vanderpool, UC Davis TERC)

2024 Research Highlights

Utilizing long-term data to understand UV penetration fluctuations in Lake Tahoe

TERC researcher Dr. Shohei Watanabe recently led and published a study analyzing 18 years of UV penetration measurements taken during the routine monthly measurements on the lake, finding that the lake is experiencing large-scale shifts in ultraviolet radiation (UV) as climate change intensifies wet and dry extremes in the region. One of the key outcomes of the study was the discovery of a 100-fold difference in UV radiation between wet and dry years. Essentially, wet years wash more particulates and dissolved organic matter from the surrounding landscape into the lake, which blocks the UV radiation. This finding would have significant implications for lake ecosystems that increasing susceptible to greater extremes in a changing climate.

This study was only possible because of the long-term datasets that TERC researchers, collect in collaboration with their university and agency partners. One or two years of measurements would not have revealed such significant fluctuations related to climatic perturbations. Exploring decadal or longer trends in data requires robust, long-term datasets and there are very few places in the world that have curated data of these lengths.

The next steps stemming from this research will involve conducting shorter term, process driven studies to determine how these UV variations on yearly time scales affect Lake Tahoe's carbon cycle, primary productivity, and other biological processes.

Shohei Watanabe gathers UV penetration data on Lake Tahoe from atop one of TERC buoys operated in conjunction with NASA. (Karin Higgins, UC Davis)

This multi-channel radiometer is used to capture UV penetration data by lowering it into Lake Tahoe during recurring monitoring trips in various locations around the lake. (Brandon Berry, UC Davis TERC)

2024 Research Highlights

New correction model to accurately measure phytoplankton biomass

Characterizing phytoplankton (algae) biomass is key to understanding the light, nutrient, and mixing dynamics that drive lake ecosystems. In situ fluorometry is a tool that is frequently used in Lake Tahoe as part of our ongoing monitoring and a widely used technology for estimating phytoplankton biomass worldwide. However, there are inherent issues in using this technology to take daytime measurements, as daytime fluorometry signals are biased by a phenomenon known as non-photochemical quenching. Non-photochemical quenching is a process that phytoplankton use to dissipate excess light energy as heat. Non-photochemical quenching will result in contamination of daytime fluorometry measurements and cause the amount of phytoplankton to be underestimated. Up until now, even though some universal models have been proposed, there is no universal correction method for inland waters and locally developed models are required for individual lakes. This is time-consuming and not effective for comparing between different lake systems.

TERC Researcher and NASA Postdoctoral Fellow, Dr. Samantha Sharp, has published a novel model for correcting non-photochemical quenching impacts in lake systems as a simple exponential function of available light in the water column. This model was developed using data collected from two of the sites being studied by TERC researchers; Lake Tahoe and Clear Lake, CA. From the clear waters of Lake Tahoe to the productive, nutrient-rich waters of Clear Lake, these two lakes represent the endmembers in terms of lake productivity and clarity, thereby producing a model with potential application to other systems.

The results of this research have wide-ranging benefits, enabling more accurate estimation of phytoplankton biomass in lakes across diverse conditions. Research is currently underway to extend and validate this model for other lake systems that don't have such extreme conditions as the two lakes studied.

Samantha Sharp develops a new model to accurately measure phytoplankton biomass.

2024 Research Highlights

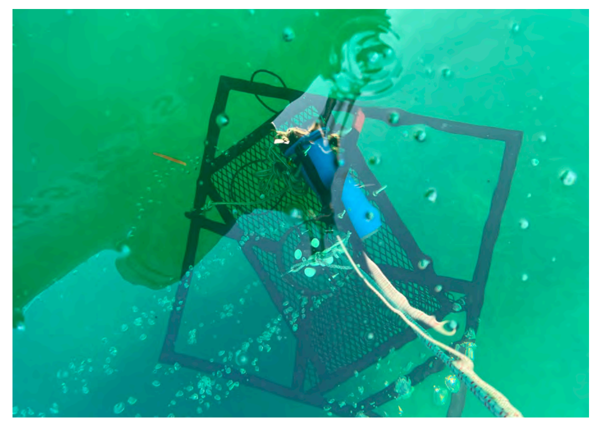
Understanding spring melt impacts on particles and nutrients

TERC researchers, led by Dr. Sergio Valbuena, have begun an exciting, multi-year project with the U.S. Bureau of Reclamation and the Tahoe Science Advisory Council to understand what is washing into the lake during spring melt. These researchers are examining the fate of clarity-reducing particles, nutrients that spur algae growth, and organic matter from the watershed. If entering streams and rivers are colder than the lake water, they will plunge to the lake bottom carrying their loads to depth. Conversely, if they are warmer than the surrounding lake water they will remain on the surface making the transported nutrients available to organisms near the surface. This work is using collected field data to calibrate hydrodynamic models to understand how these inflows will impact the lake.

To start, the TERC researchers gathered two months of continuous measurements using multiple monitoring technologies at the mouth of Incline Creek and Ward Creek. The new Wirewalker, powered by internal wave action, measured from the surface to 150 meters depth up to a maximum 28 times a day, taking water temperature, conductivity, turbidity (clarity), dissolved oxygen, and dissolved organic matter readings. Multiple Acoustic Doppler Current Profilers (ADCPs) were put in place to take continuous measurements of water movement as the creeks entered the lake to help the team understand how the creek water interacts with the lake. We also utilized our nearshore monitoring stations to measure turbidity, temperature, and conductivity, as well as taking numerous vertical profile measurements from one of our research vessels. Glider measurements were also collected to understand the spatial variability of the system. All of the data collected will be analyzed to understand not only what is coming into the lake, but also how it is distributed through the water column and how it ultimately impacts the lake. Now that the data have been collected, researchers are excited to begin the validation of the numerical models and using these to inform our understanding of the exciting and complex system.

This buoy holds the Wirewalker in place. If you see it the lake, please do not touch, it is vital to take continuous measurements. (Keeler Nelsen, UC Davis TERC)

Sergio Valbuena inspects the Wirewalker as the team works to unbox the equipment before deployment on the USBR project. (Keeler Nelsen, UC Davis TERC)



The Acoustic Doppler Current Profilers (ADCP) being lowered into place. (Keeler Nelsen, UC Davis TERC)

TAHOE:
STATE
OF THE
LAKE
REPORT
2025

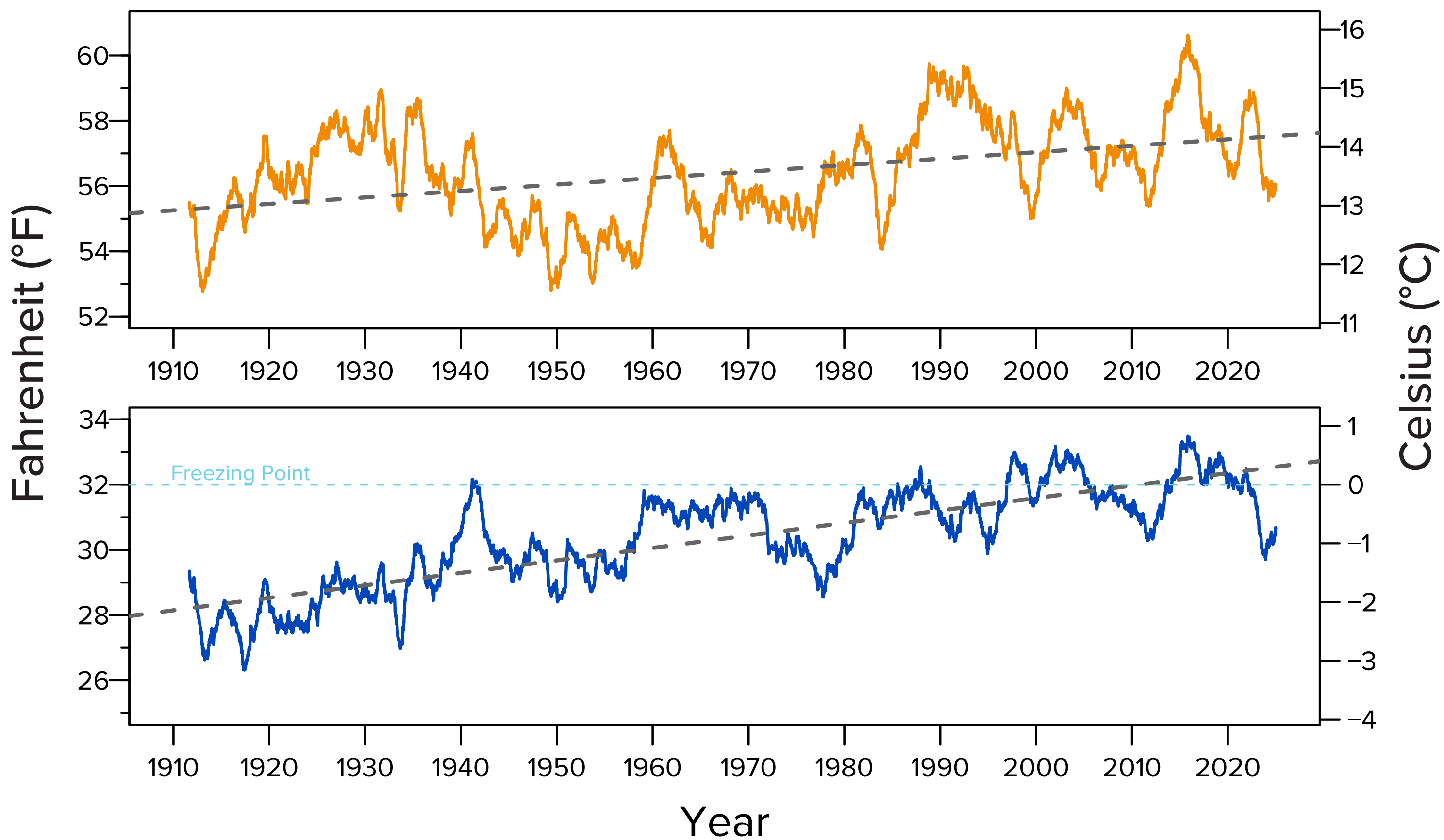
METEOROLOGY

Air temperature - smoothed daily maximum and minimum

Daily since 1911

Over the last 113 years, daily air temperatures measured at Tahoe City have increased. The long-term trend in average daily minimum temperature (bottom figure) has increased by 4.33 °F (2.41 °C) and the long-term trend in average daily maximum temperature (upper figure) has risen by 2.24 °F (1.25 °C). The trend line for the minimum air temperature has exceeded the freezing temperature of water for the last 14 years, contributing to generally more rain and less snow as well as earlier snowmelt at Lake Tahoe. These data are smoothed using a two-year running average to remove daily and seasonal fluctuations.

Data source: Long-term NOAA daily maximum and minimum temperatures data set.

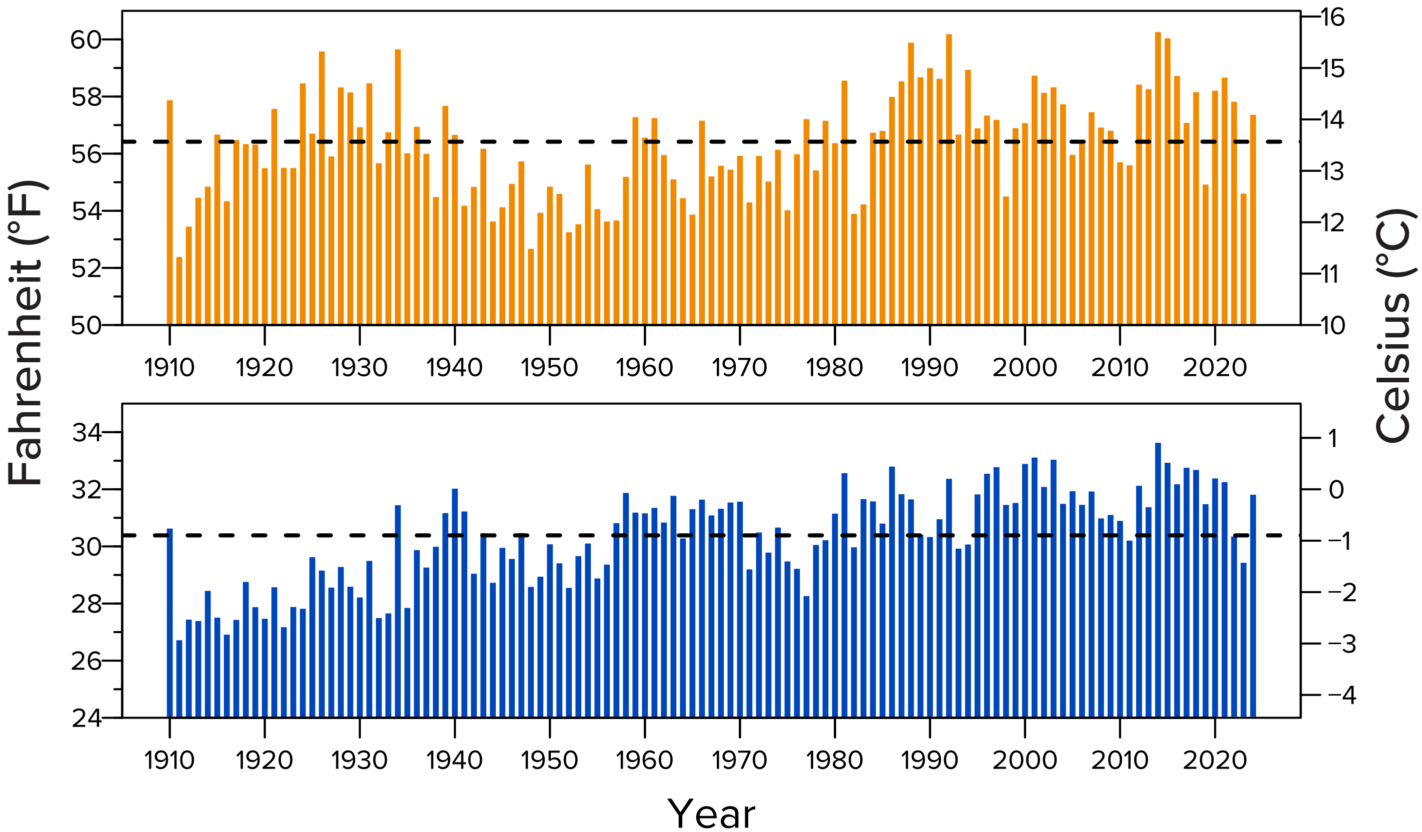


Air temperature - annual average maximum and minimum

Since 1910

The annual average maximum (upper figure) air temperature in 2024 was 57.4 °F (14.1 °C), which was 2.8 °F warmer than the previous year and above the long-term average (dashed line) air temperature. The 2024 annual average minimum was 31.8 °F (-0.1°C), which was 2.4 °F (°C) warmer than the previous year and slightly higher than the long-term average (dashed line) air temperature. The long-term averages for the maximum and the minimum are 56.4 °F (13.6 °C) and 30.4 °F (-0.9 °C), respectively.

Data source: Long-term NOAA daily maximum and minimum temperatures data set measured at Tahoe City.



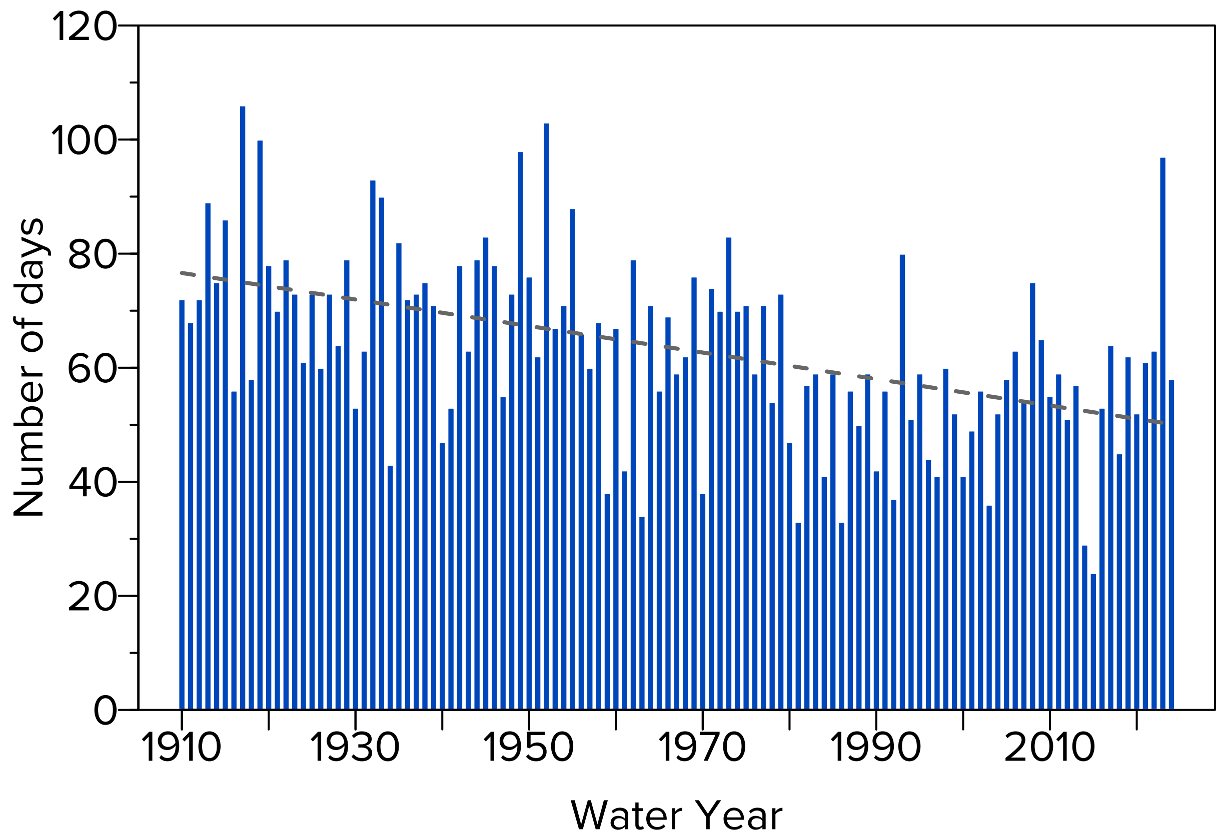
Below-freezing air temperatures

Yearly since 1910

The method used for this analysis sums the number of days with daily average temperatures below freezing between December 1 and March 31 for each Water Year (WY). Although year-to-year variability is high, the number of days when air temperatures averaged below-freezing has declined by 27 days since 1911. In WY 2024, the number of freezing days was 58, just above the declining long-term trend line. This amount, which is much lower than the previous year, is consistent with the measured air temperatures for 2024.

Data source: Long-term NOAA daily maximum and minimum temperatures data set measured at Tahoe City.

Note: The Water Year extends from October 1 through September 30.

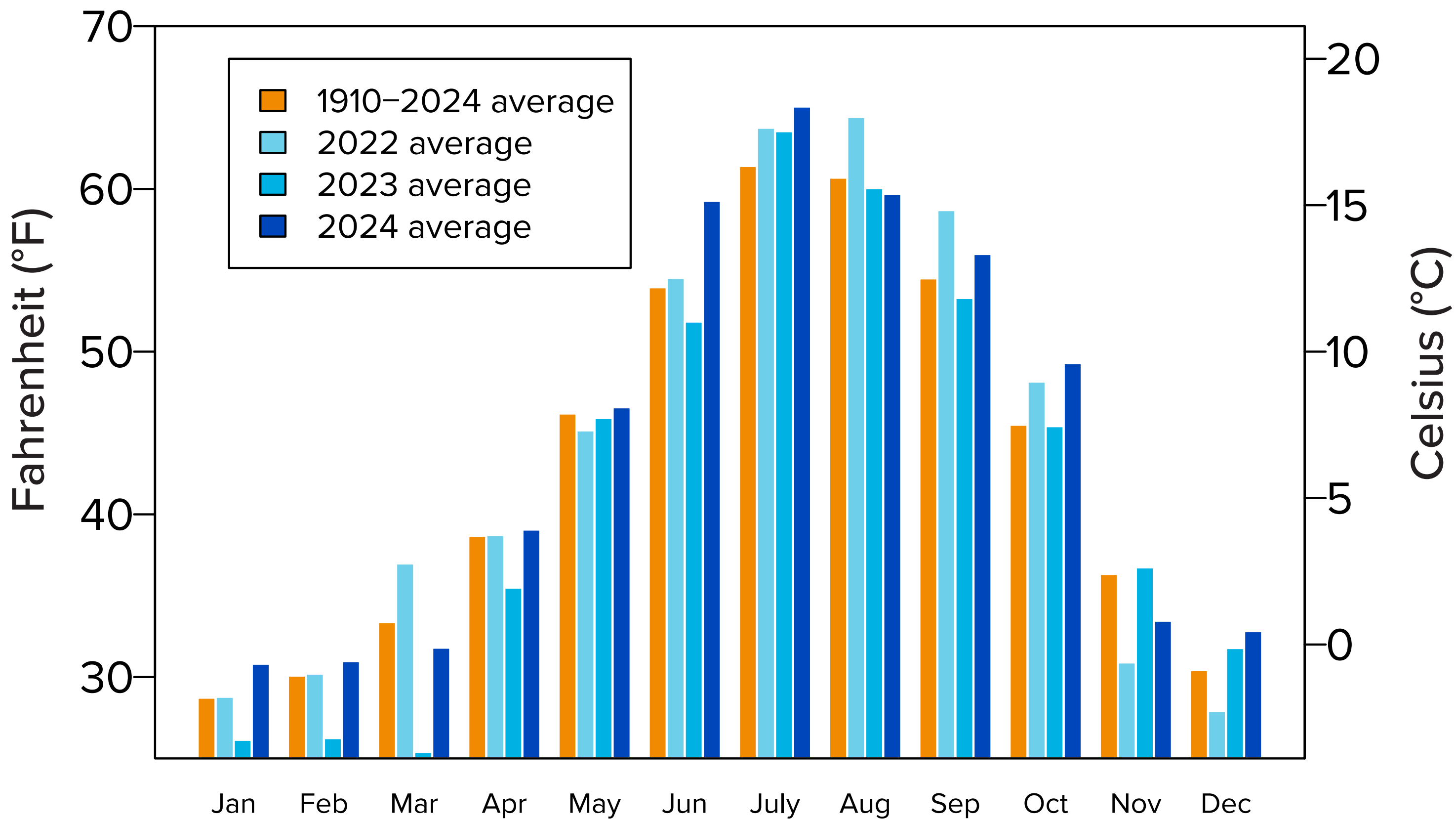


Monthly air temperature

2022, 2023. 2024, and 1910 to 2024

In 2024, monthly daily average air temperatures were higher than the long-term average for 9 of the months of the year and distinctly warmer during the months of January, June, July, September, October, and December.

Data source: Long-term NOAA daily maximum and minimum temperatures data set.

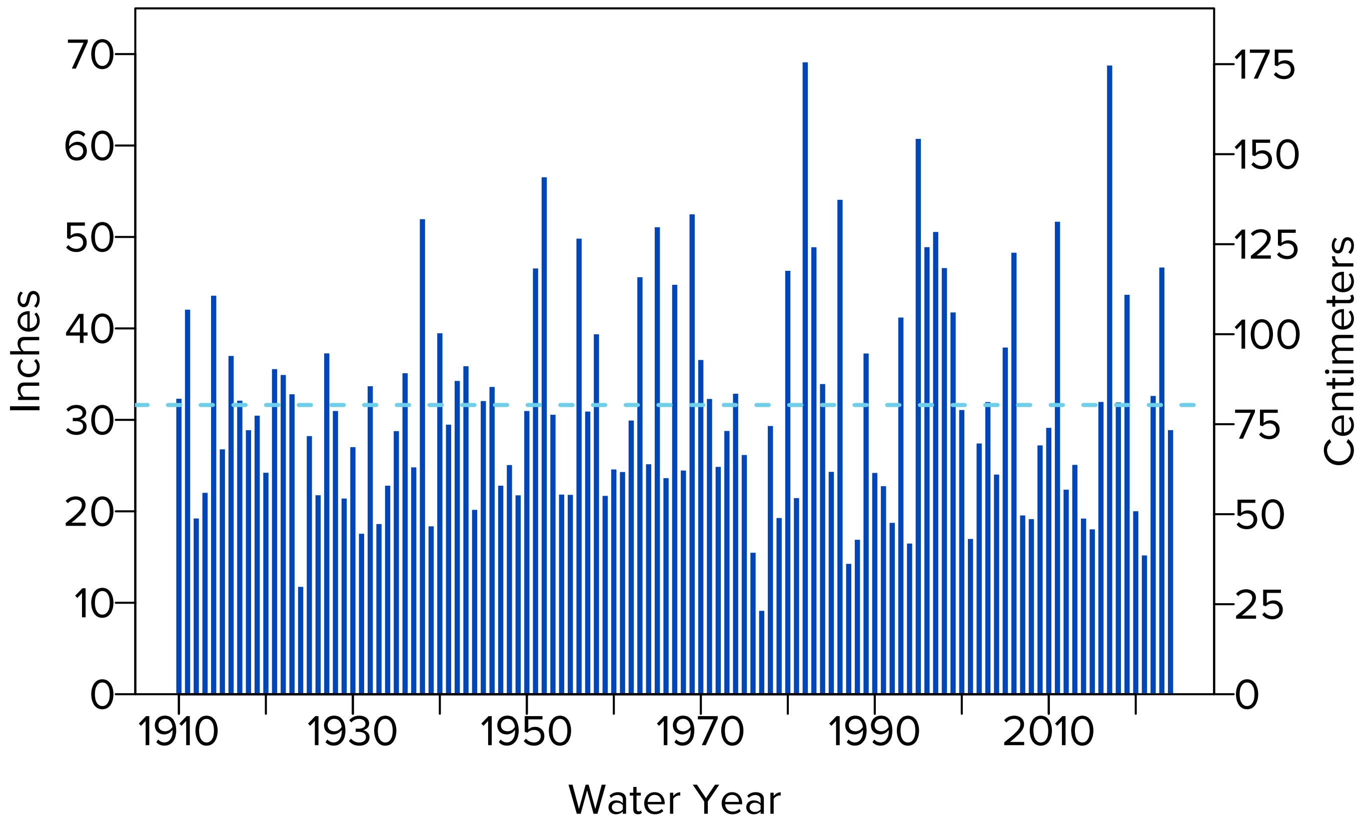


Annual precipitation

Yearly since 1910

From 1910 to 2024, average annual precipitation (water equivalent of rain and snow) measured at Tahoe City was 28.99 inches. The maximum recorded was 69.2 inches in 1982. The minimum recorded was 9.2 inches in 1977. At 28.99 inches, 2024 was 2.6 inches below the long-term average (shown by the dashed line). Generally, there is a gradient in precipitation from west to east across Lake Tahoe, with almost twice as much precipitation falling on the west side of the lake. There is also an increase in precipitation with elevation in the Tahoe basin. Precipitation is summed over the Water Year, which extends from October 1 through September 30.

Data source: Long-term NOAA daily precipitation data set.

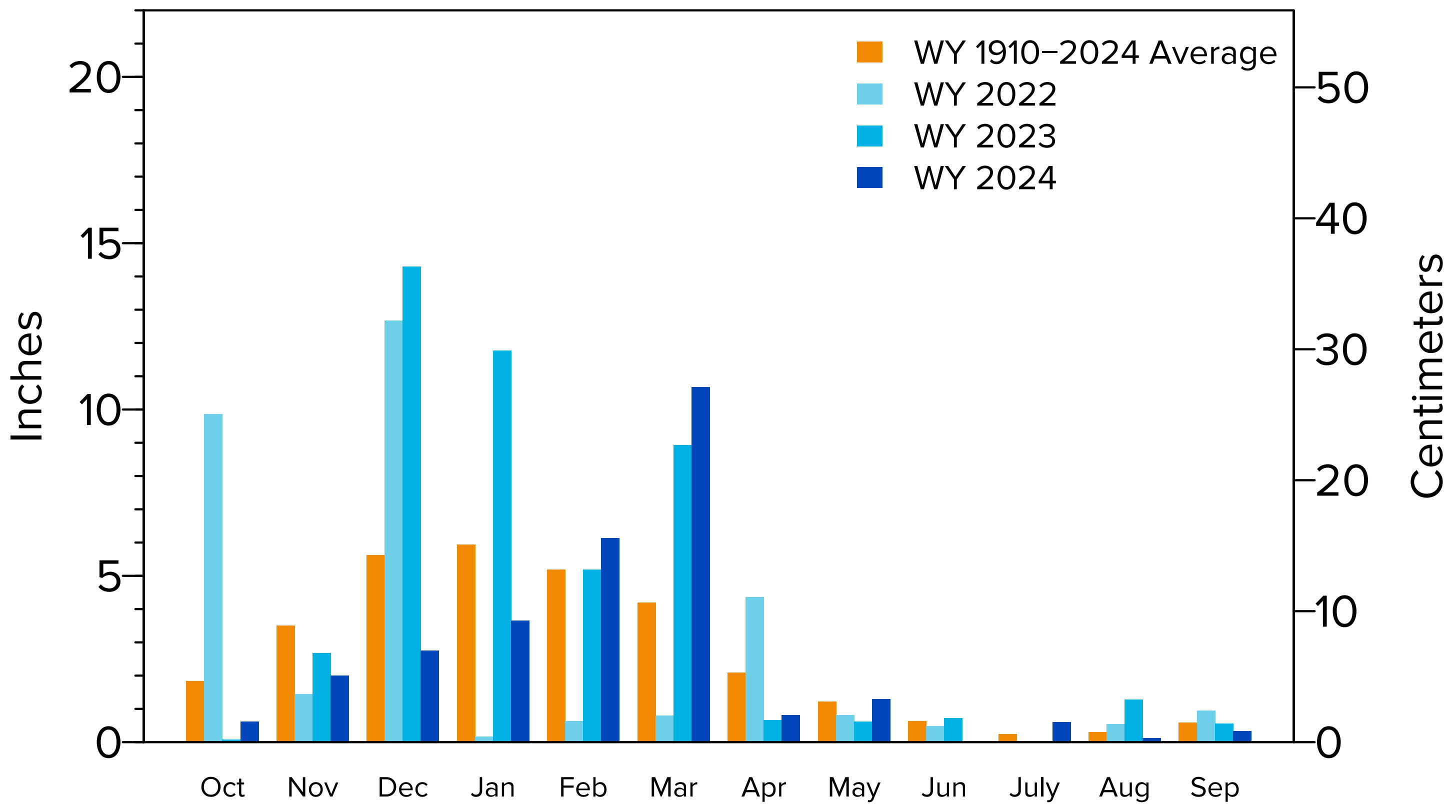


Monthly precipitation

2022, 2023, 2024, and 1910 to 2024

The 2024 Water Year had an annual average of 28.99 inches of precipitation, slightly below the long-term average of annual precipitation of 31.4 inches at Tahoe City. Precipitation in October, November, December, January, April, June, August and September (8 months) of the 2024 Water Year was below the long-term averages for those months. The 2024 Water Year extends from October 1, 2023 through September 30, 2024.

Data source: Long-term NOAA daily precipitation data set.

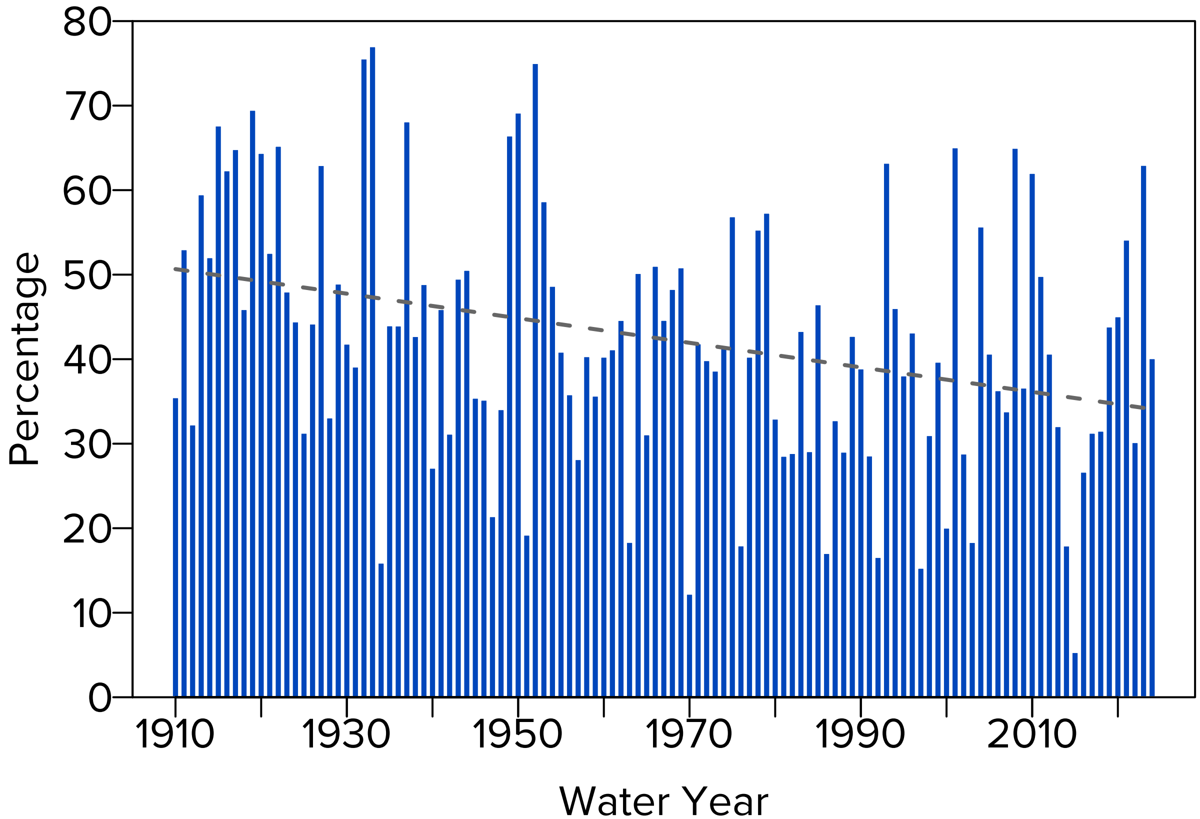


Snow as a fraction of annual precipitation

Yearly since 1910

Snow has declined as a fraction of total precipitation from an average of 51 percent in 1910 to 34 percent in 2024. In Tahoe City, snow represented 40 percent of the 2024 total precipitation, just above the trendline. These data are calculated based on the assumption that precipitation falls as snow whenever the average daily temperature (the average of the daily maximum and minimum temperatures) is below freezing. Precipitation is summed over the Water Year, which extends from October 1 through September 30.

Data source: Long-term NOAA daily air temperature and precipitation data sets.



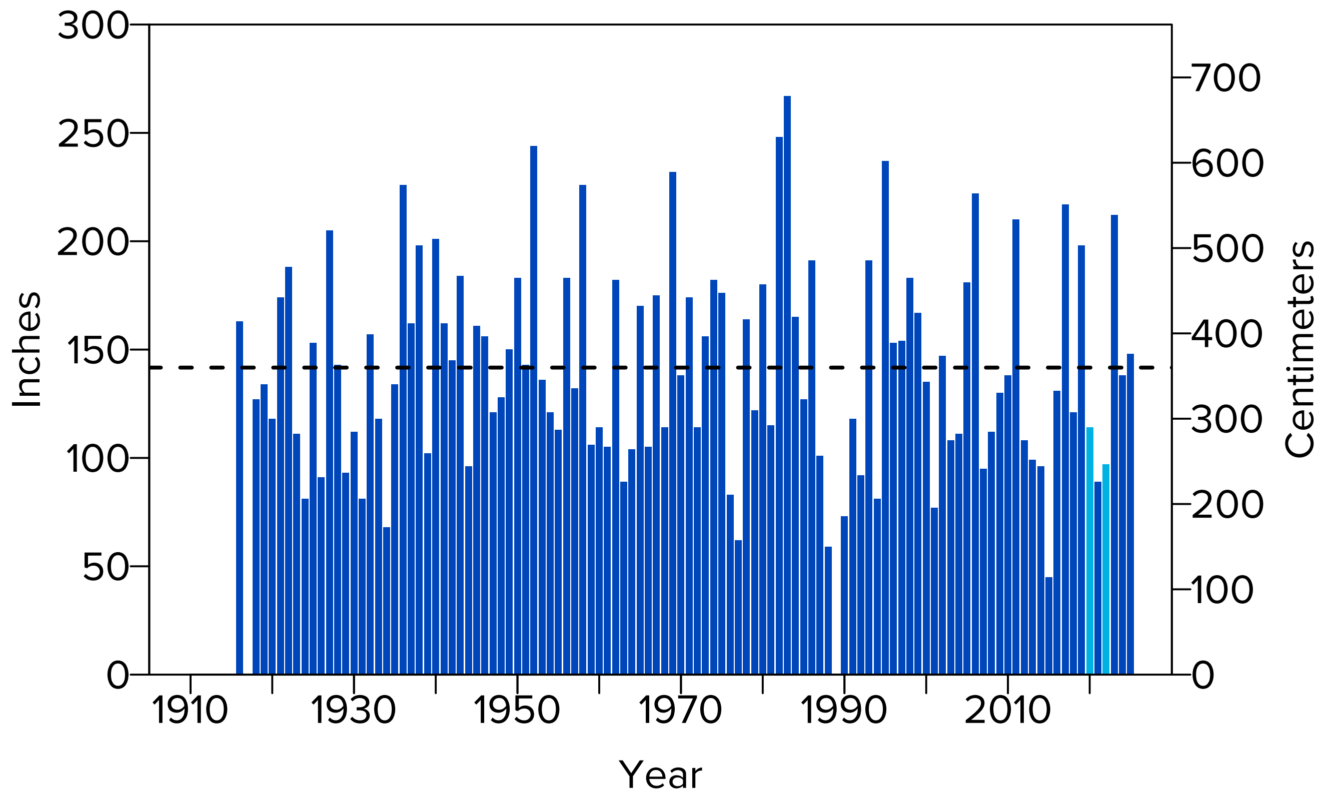
April snowpack

Since 1916

The depth of the snowpack is measured over the year at multiple locations throughout the Sierra. Shown here are the readings taken on approximately April 1 since 1916 at the Lake Lucille Snow Course Station (located in Desolation Wilderness, elevation 8,188 feet (Lat. 38.86 deg. Long. -120.11 deg.). In 2020 and in 2022, the April snowpack readings at Lake Lucille were not made due to storm conditions. Instead, the values were estimated by correlation with values made at the Rubicon #1 snow course. The correlation estimates are shown with the lighter blue columns. For April 2, 2025, the value was 148 inches, just above the long-term average. The largest amount on record was 267 inches on April 5, 1983. The average snow depth (shown by the dotted line) over the period 1916–2024 was 142.3 inches.

Note: April snow depth data are not available for 1917 and 1989.

Data source: USDA Natural Resources Conservation Service, California Monthly Snow Data.

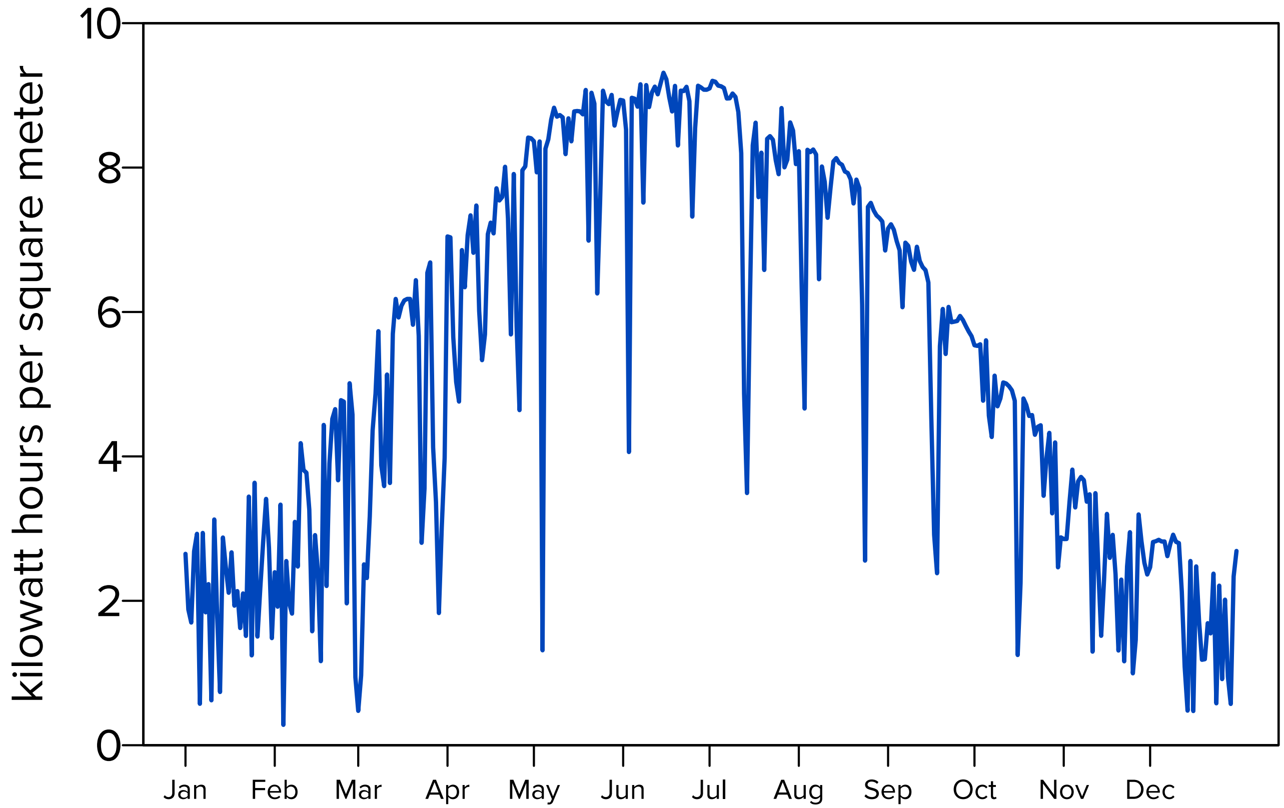


Daily solar radiation

In 2024

In 2024 solar radiation showed the typical annual pattern of sunlight, peaking at the summer solstice on June 21 or 22. Dips in daily solar radiation are primarily due to cloud coverage. Smoke and other atmospheric constituents play a smaller role. It is worth noting that solar radiation on a cloudless day in mid-winter can exceed that of a cloudy or smokey day in mid-summer.

The TERC meteorological station where these data are collected is located on the U.S. Coast Guard dock at Tahoe City.



TAHOE: STATE OF THE LAKE REPORT 2025

PHYSICAL PROPERTIES

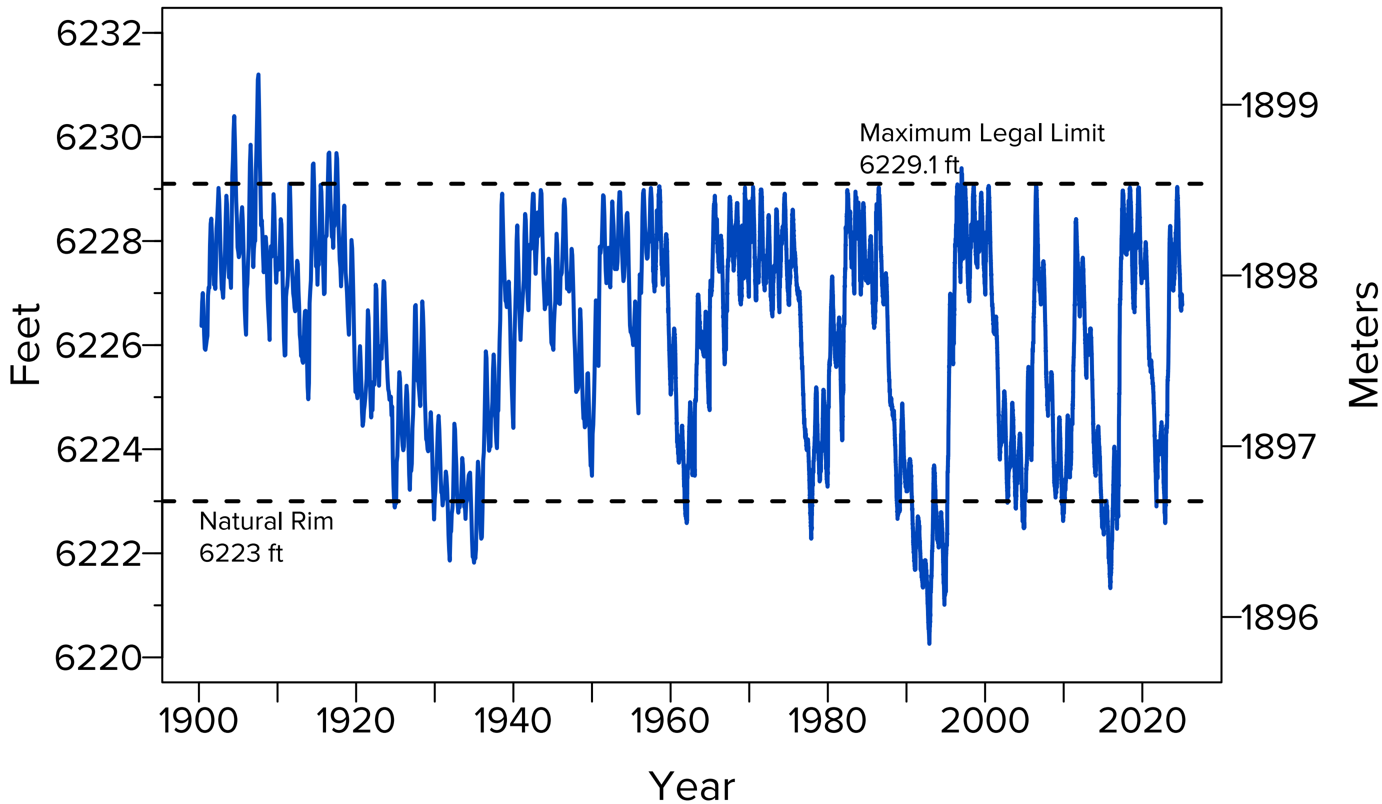
UC DAVIS
Tahoe Environmental
Research Center

Lake surface level

Daily since 1900

Lake surface levels vary throughout the year. Lake levels rise due to high stream inflow, groundwater inflow, and precipitation of rain and snow directly onto the lake surface. It falls due to evaporation, in-basin water withdrawals, groundwater outflows, and outflows via the Truckee River at Tahoe City. In 2024, the highest lake level was 6,229.04 feet on June 11, and the lowest was 6,226.66 feet on December 11, 2024, three feet higher than the natural rim of the lake. The natural rim of the lake is at an elevation of 6,223 feet. Lake Tahoe fell below its rim on October 24, 2022, but rose back above it on December 27, 2022. When the lake was below its rim, outflows via the Truckee River ceased. Several episodes of lake level falling below the natural rim are evident in the last 114 years of the record. The frequency of low water episodes appears to be increasing with four episodes observed from 1900–2000 and four episodes since 2000. The lowest lake level on record is 6,220.26 feet on November 30, 1992, 2.74 feet below the natural rim.

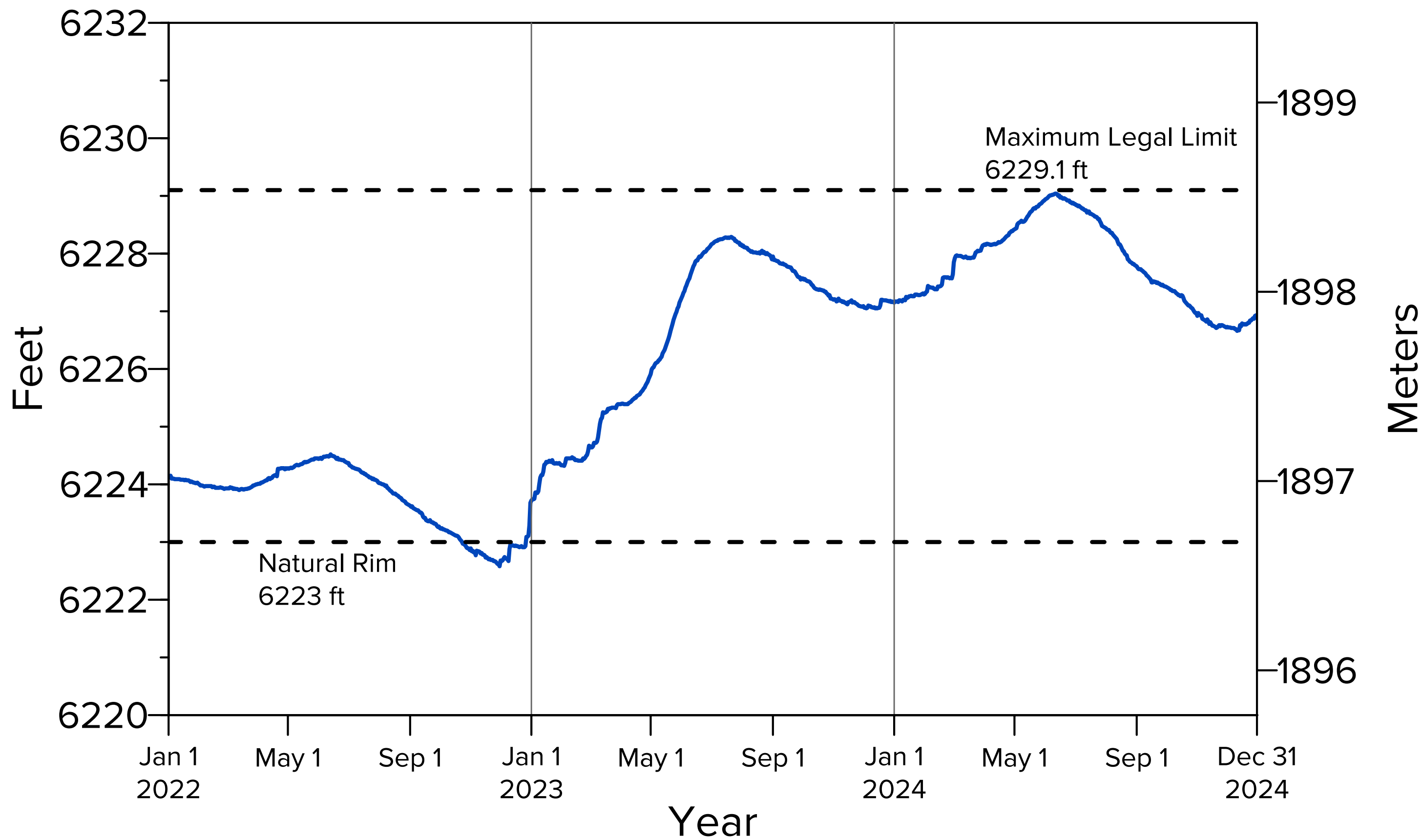
Data source: U.S. Geological Survey level recorder in Tahoe City.



Lake surface level

Daily in 2022, 2023, and 2024

The subset of lake surface data is extracted from the same data as in Fig. 8.1 for the most recent three years from 2022–2024. This more time-restricted presentation of recent lake level data better displays the annual patterns of rising and falling lake level in greater detail. For example, the rapid increases in water level directly result from storm events (e.g. spring of 2024). In 2024, on account of the typical precipitation rates, the winter and spring rises in lake level are evident and nearly reached the maximum legal limit (6,229.1 ft) of the lake. Snowmelt in spring continued the rise in lake level, but after June 11, the water level slowly fell as a result of outflow and evaporation from the lake. Increases at the end of 2024 were a result of winter precipitation.
Data source: U.S. Geological Survey level recorder in Tahoe City.



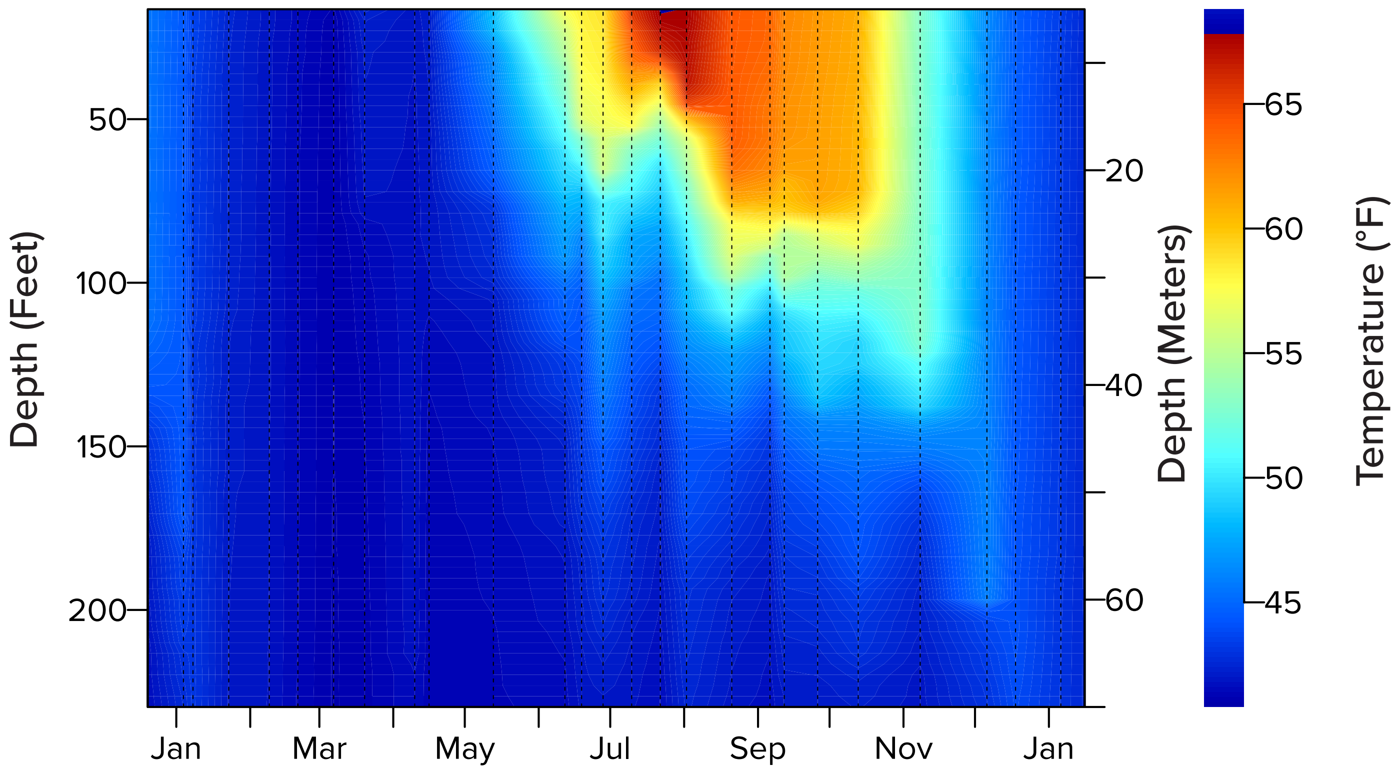
Water temperature profile

In 2024

Water temperature profiles are measured in the lake using a CTD (conductivity, temperature, depth) profiler on the days indicated by the dashed vertical lines (25 sampling events in 2024). The measured temperature is accurate to within 0.005 °F. The vertical distribution of water temperature is a very important lake attribute as it is directly related with water density within the lake.

During the summer months, the warmer, lighter water (warmer colors) remains suspended at the lake surface above the thermocline in the region known as the epilimnion. The temperature in the upper 230 feet (70 m) of Lake Tahoe is displayed as a color contour plot. In the early part of 2024, the lake temperature followed the typical seasonal pattern. In February and March, the lake surface was at its coldest, while it was at its warmest in August before fall cooling took place.

Data source: TERC lake monitoring.

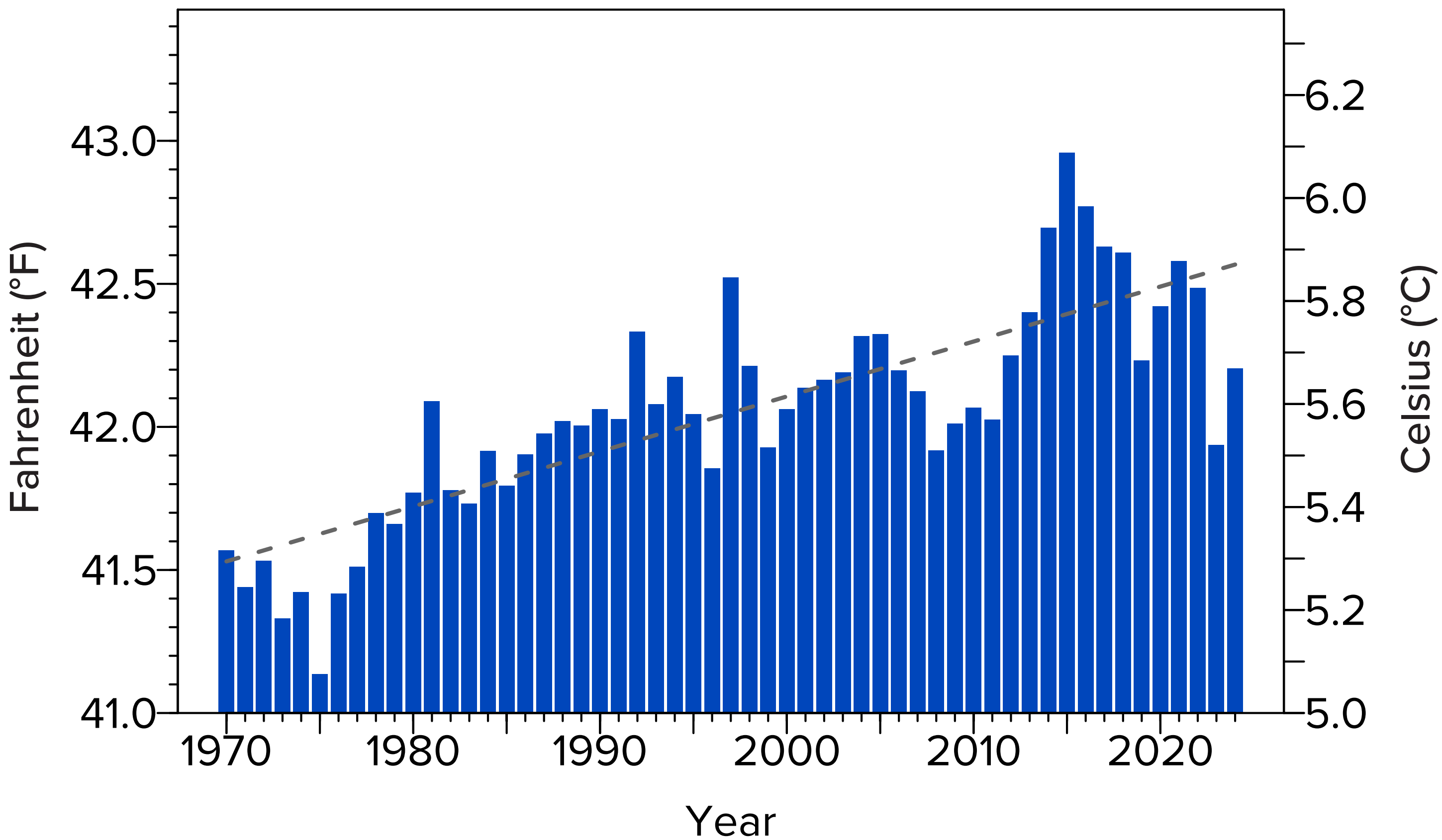


Annual average water temperature

Since 1970

The volume-averaged temperature of the lake for each year since 1970 is shown in the figure below. Under the assumption of a linear relationship, the trend line indicates that water temperature has increased by approximately 1.1 °F (0.6 °C) since 1970. The annual rate of warming is 0.21 °F/decade (0.12 °C/decade). The monthly temperature profile data from the top to the bottom of the lake has been smoothed, and any seasonal influences were removed to best show the long-term trend. The 2024 annual average water temperature of 42.2 °F (5.67 °C) was below the trendline and slightly higher than 2023 (0.3 °F or 0.15 °C).

Data source: TERC lake monitoring.

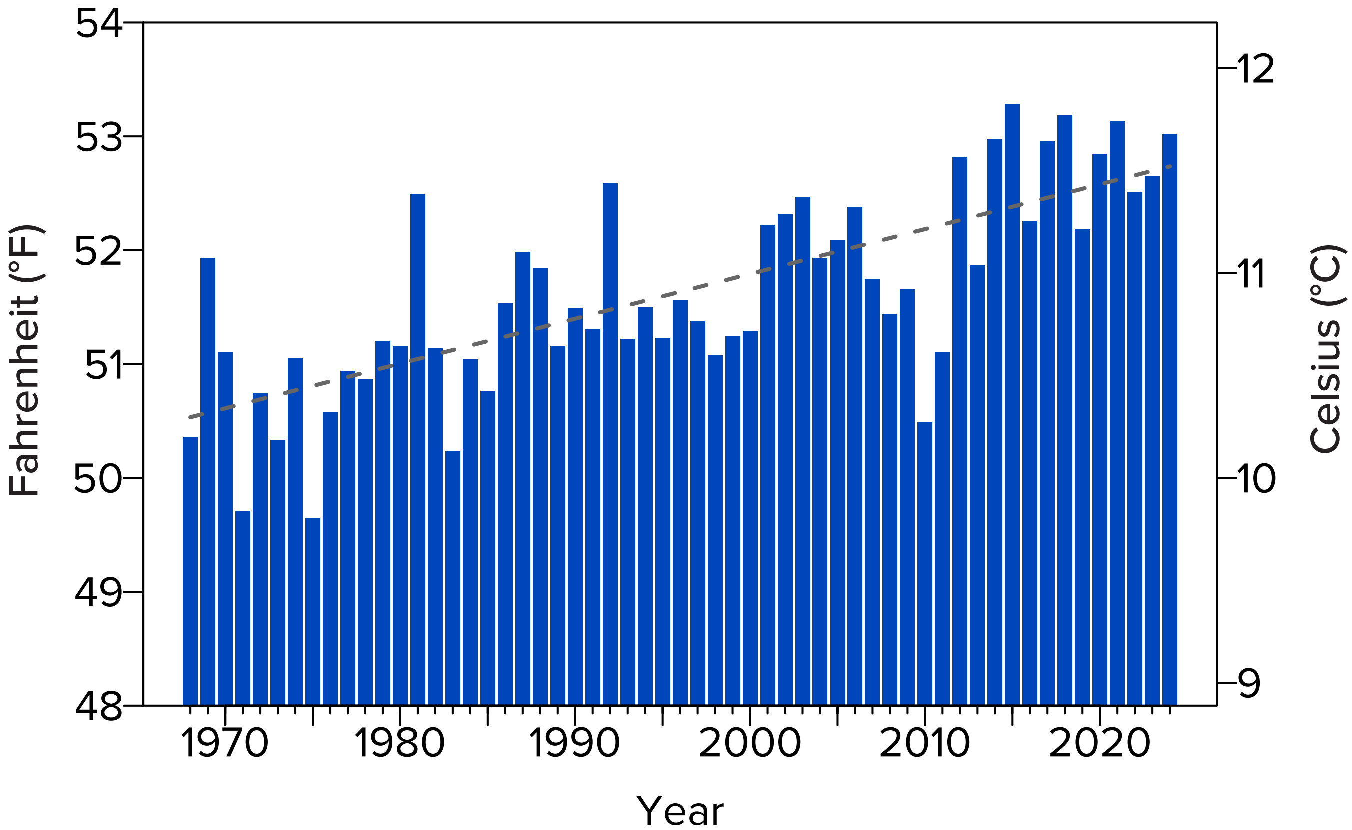


Annual surface water temperature

Yearly since 1968

Surface water temperatures (measured at a depth of 5 feet) have been recorded monthly at the Mid-lake and Index stations from TERC's research vessels since 1968 and from four research buoys since 2007. Despite year-to-year and longer cyclical variability, the annual average surface water temperatures continue to show an increasing trend, which has significant potential implications for the ecology of the lake. The average temperature in 1968 was 50.4 °F (10.2 °C). For 2024, the average surface water temperature was 53.0 °F (11.7 °C), just above the long-term trend, under the assumption of a linear regression. The overall rate of warming given from this regression of the lake surface is 0.39 °F (0.22 °C) per decade.

Data source: TERC lake monitoring.



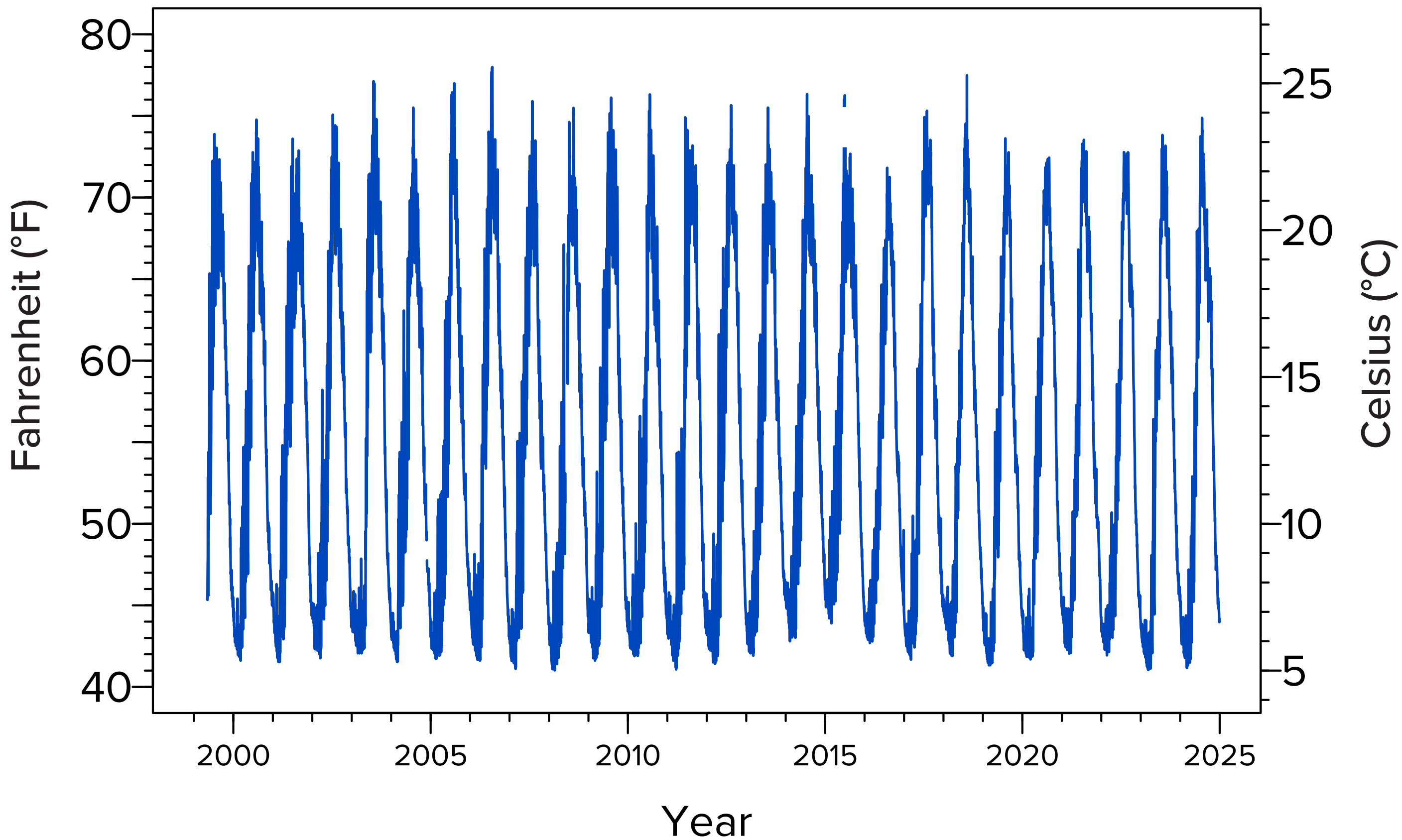
Maximum daily surface water temperature

Surface temperature measured since 1999 every 2 minutes

The maximum daily surface water temperature follows a sinusoidal pattern, with the temperature being in equilibrium with the air temperature and other meteorological variables. In 2024, the highest maximum daily surface water temperature (summer) was 74.9 °F (23.8 °C), recorded on July 22. While these are not the warmest temperatures on record, these are the highest observed values since 2019. The lowest maximum daily surface water temperature (winter) was 41.5 °F (5.1 °C), which was recorded on March 4. This was relatively warm, due in part to the absence of deep mixing.

These data are collected from thermistors at a depth of 5 feet (1.5 m) that are attached to four research buoys located over the deepest parts of the lake. The highest daily value from among the four buoys is considered as the daily maximum.

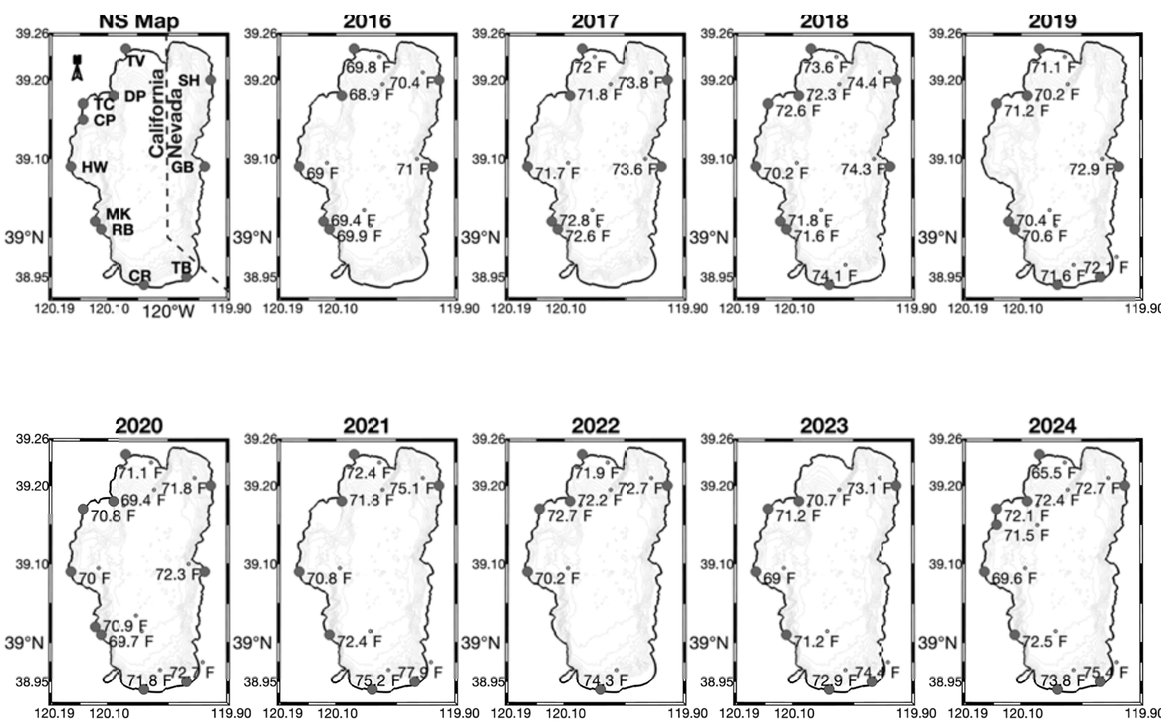
Data source: TERC lake monitoring.

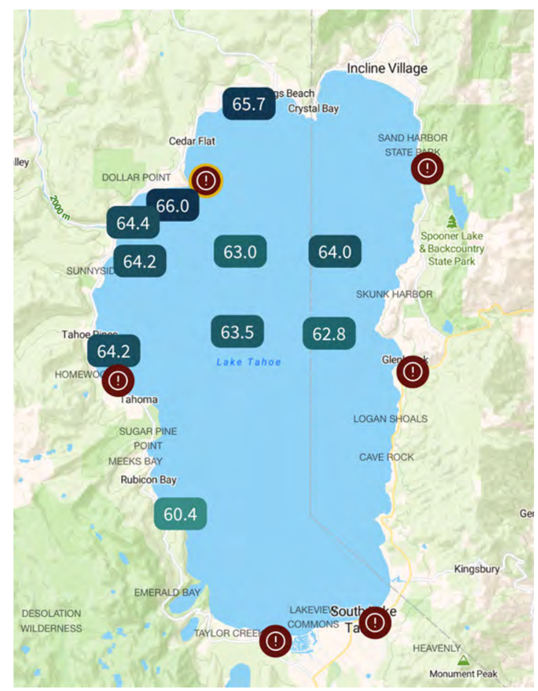


Maximum annual nearshore water temperature

Surface temperature measured by nearshore sensors

In 2014, TERC began installing a network of nearshore water quality monitoring stations around the perimeter of Lake Tahoe. The monitoring program aims to improve understanding of water quality variability in the nearshore zone. In 2024, there were 10 active stations and 1 thermistor chain in Homewood installed around Lake Tahoe, including one 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, dissolved oxygen, along with a Conductivity Temperature Depth (CTD) sensor, measuring conductivity, water temperature, water depth, and wave height. An underwater cable connected to shore power and internet enables a real-time data feed with high resolution data every 30 seconds. Nearshore Sensor Stations (clockwise from top in the figure below): Tahoe Vista (TV), Sand Harbor (SH), Glenbrook (GB), Timbercove (TB), Camp Richardson (CR), Rubicon Bay (RB), Meeks Bay (MK), Homewood (HW), Sunnyside (SS), Tahoe City (TC), and Dollar Point (DP). Data from these stations can be viewed in real-time from (https://tahoe.ucdavis.edu/real-time-conditions). Conditions reported in the middle of the lake are from the moored buoys that also report in real-time (described in the next section). In the second figure, the stations are shown reporting in real-time. Stations shown with an exclamation mark were not reporting the day the data was retrieved (July 7, 2025). Data source: TERC lake monitoring.



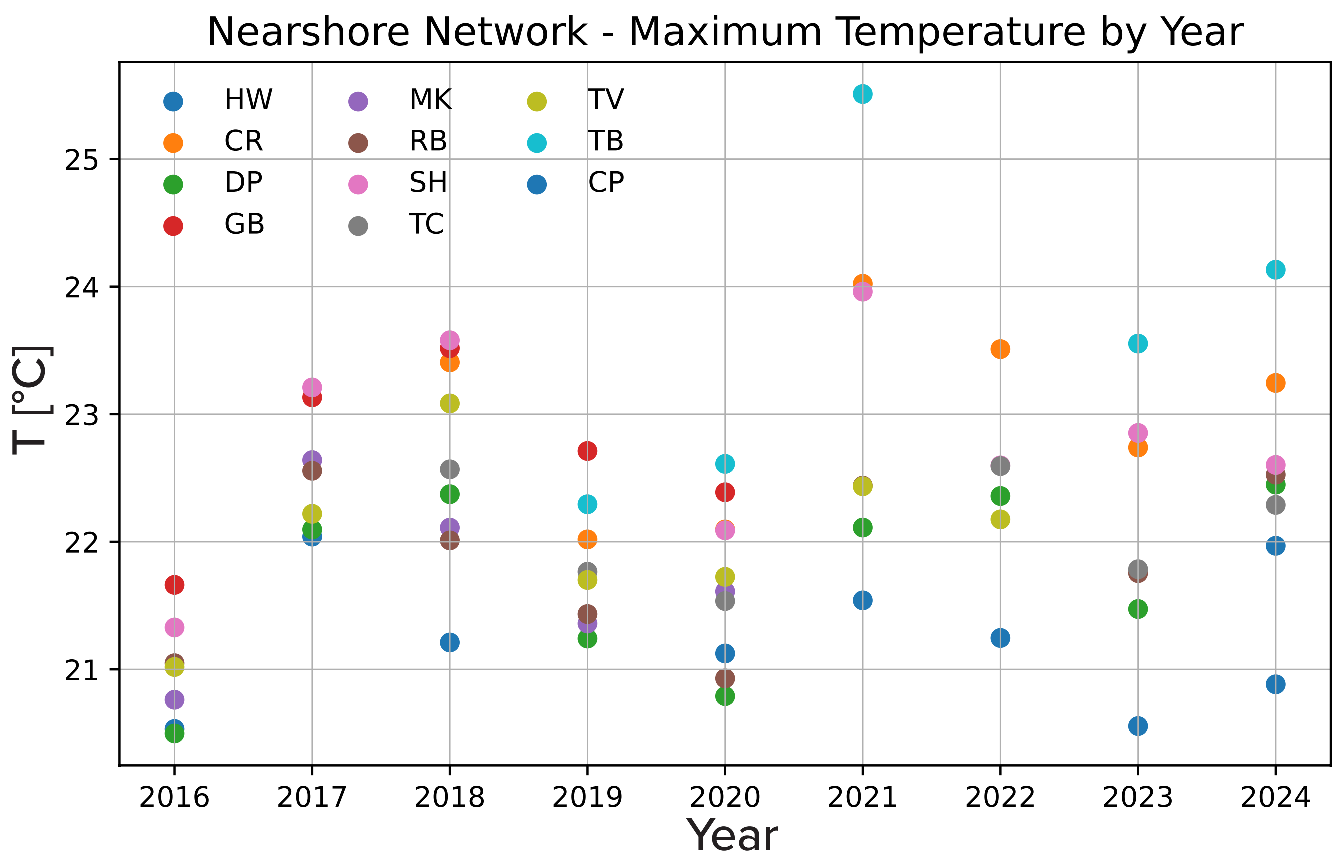


Maximum annual nearshore water temperature, continued

Surface temperature measured by nearshore sensors

The strategic locations of the nearshore sensor network allow us to characterize the spatial heterogeneity of Lake Tahoe's nearshore while identifying the lake locations that tend to exhibit warmer temperatures as well as the locations with the most striking impact from the wind. The figure below shows an evident increase in the water temperature at all sites [Tahoe Vista (TV), Sand Harbor (SH), Glenbrook (GB), Timbercove (TB), Camp Richardson (CR), Rubicon Bay (RB), Meeks Bay (MK), Homewood (HW), Sunnyside (SS), Tahoe City (TC), and Dollar Point (DP)] since 2016. The eastern shore tends to be warmer than the western shore because of the usual southwestern winds (the wind pushes the warmer surface water towards the east). The southern shore is exhibiting a rapid increase in temperature, likely due to the broad sediment shelf and shallow water column.

Data source: TERC lake monitoring.

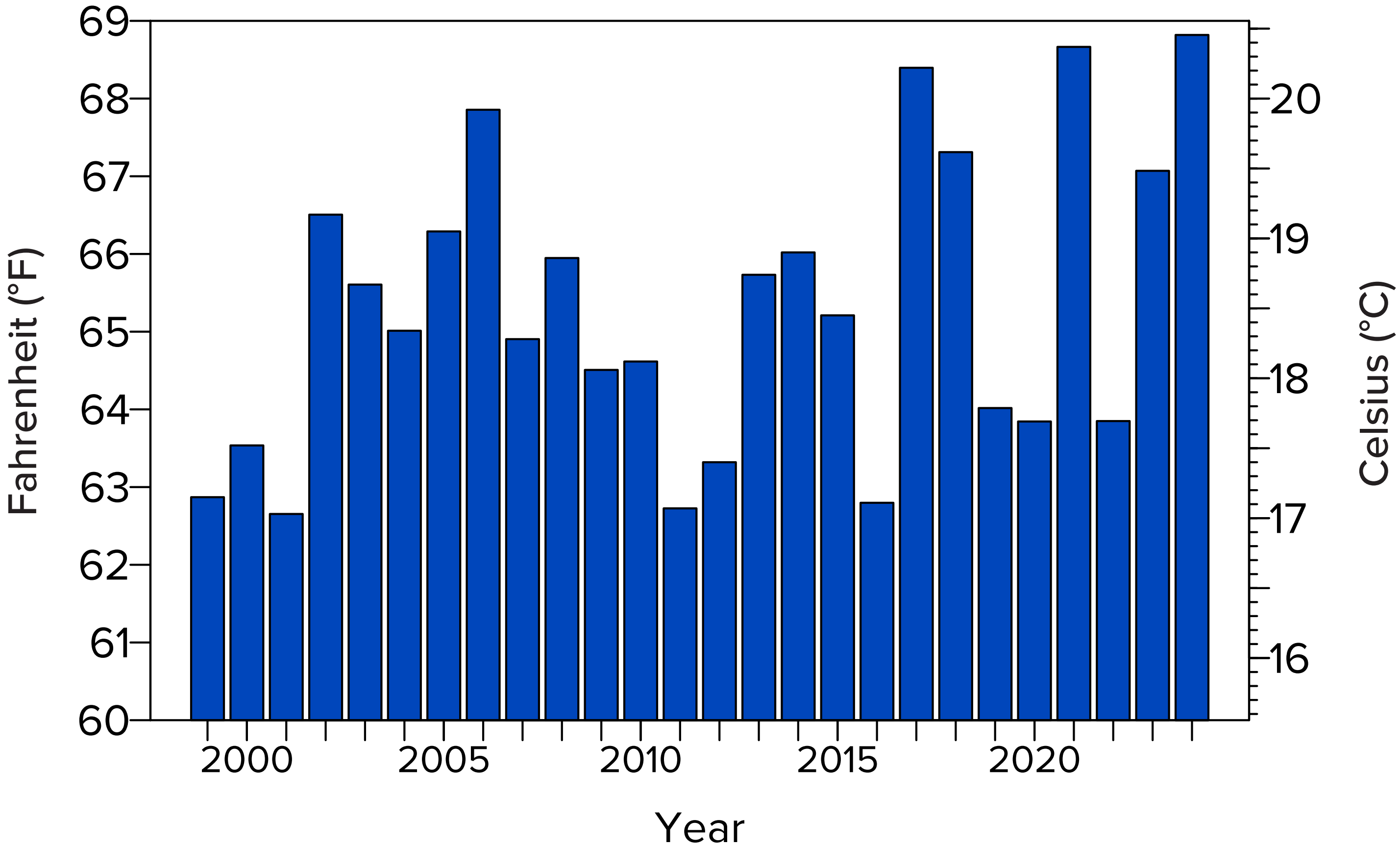


July average surface water temperature

Measured since 1999 every 2 minutes

Surface water temperature has been continuously recorded since 1999 from four NASA/UC Davis buoys in the center of the lake. Shown here are 25 years of average surface water temperatures in the month of July when water temperatures are typically at their warmest and the greatest number of people are recreating on the lake. In 2024, July surface water temperature was relatively warm. It averaged 68.8 °F (20.5 °C). This was increase over the previous year and the warmest year in our observation record. The long-term average is 65.3°F (18.5°C) for the 26-year period of record. These data are collected from thermistors at a depth of 5 feet (1.52 m) that are attached to four buoys located over the deepest portions of the lake. The data can also be accessed from our real-time data page. (https://tahoe.ucdavis.edu/real-time-conditions)

Data source: TERC lake monitoring.



Deep water temperature

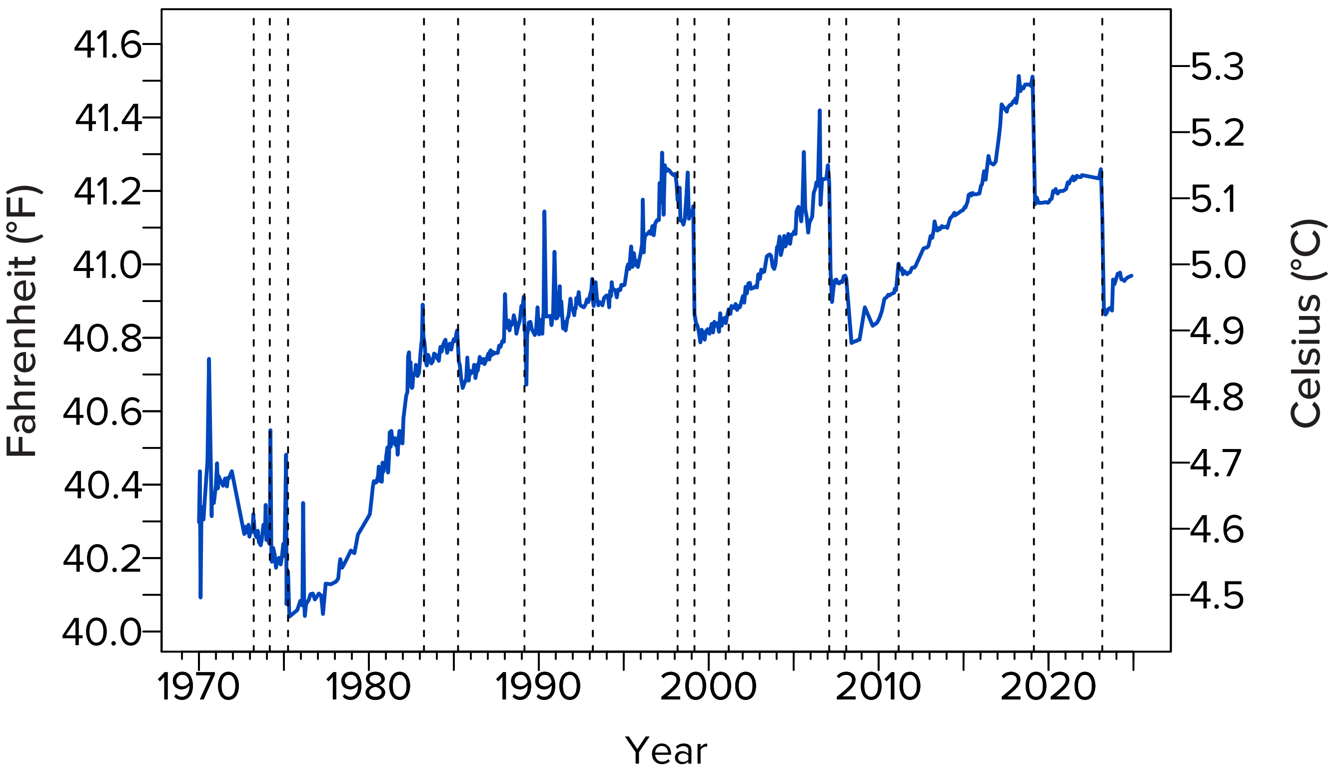
Monthly since 1970

The water temperature at a depth of 1,320 feet (400 m) is indicative of conditions in the deeper waters (hypolimnion) of Lake Tahoe. The deep-water temperatures show a complex pattern of warming and sudden cooling. During deep mixing events (the dashed vertical lines), the temperature can drop "precipitously" over a short period of time, although these drops are generally less than 0.3 °F. The last time one of these deep mixing events occurred was in 2023. The heating of the bottom water along with the fluctuations in temperature when deep mixing does not occur is an area of current research.

In general, bottom temperatures are warming. Complete vertical mixing is an event that allows a large amount of heat to escape from the lake. In 2023, there was deep mixing (see the next figure) and water temperatures dropped by 0.4 °F from 41.26 °F to 40.86 °F. Between the last two deep mixing events in 2011 and 2019, the rate of water warming was 0.07 °F/yr.

In 2024, the deep water temperature ranged from 40.95 °F to 40.98 °F (just under 5 °C).

Data source: TERC lake monitoring.



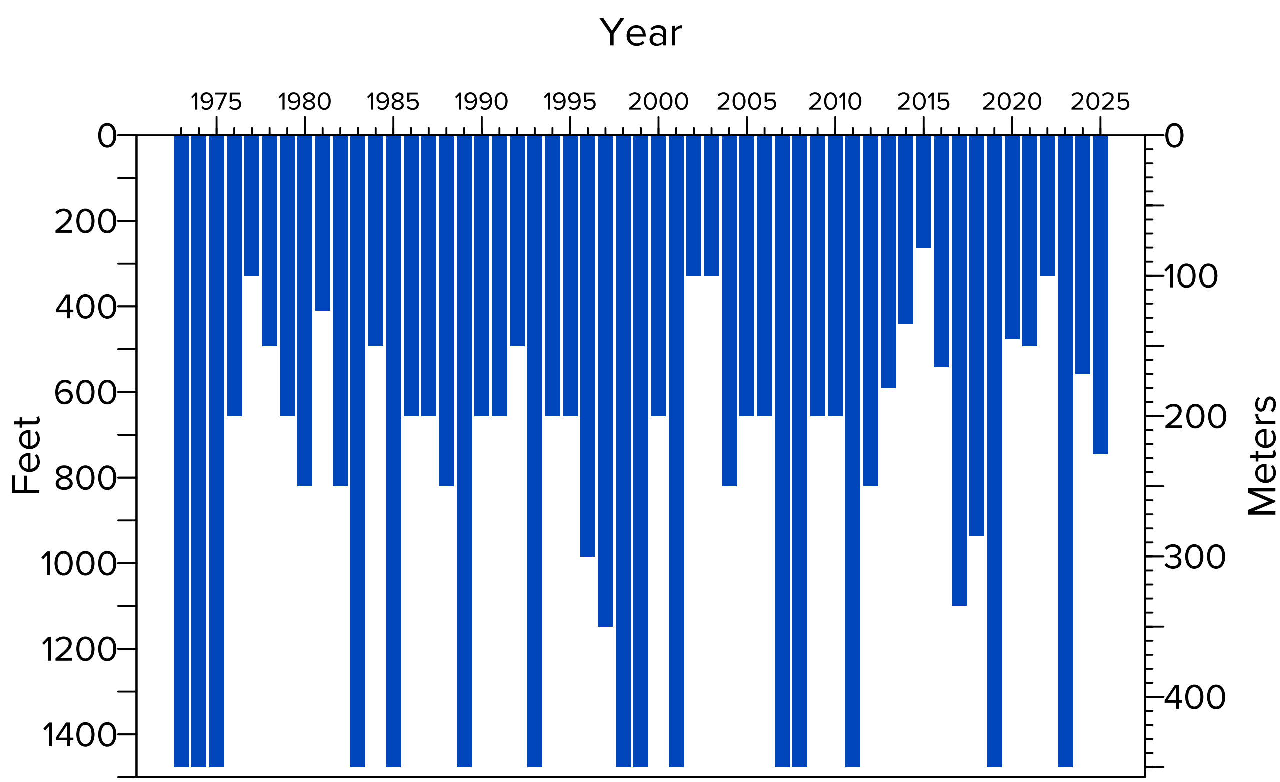
Depth of mixing

Yearly since 1973

The water of Lake Tahoe vertically mixes each winter as surface waters cool and sink downward. In a lake as deep as Tahoe, the intensity of cooling in winter determines how deep the lake mixes vertically with the full mixing event reaching the deepest areas of the lake. Mixing depth has profound impacts on lake ecology and water quality. Deep mixing brings nutrients to the surface, which promote algal growth. It also carries oxygen downward to deep waters, promoting aquatic life throughout the water column.

The deepest mixing typically occurs between February and March. Unlike 2023 when a deep mixing event occurred, 2024 only had a partial mixing event. On March 18, 2024, Lake Tahoe was observed to have mixed fully to a depth of 558 feet (170 m). Deeper mixing did not occur because there wasn't a prolonged enough episode of cooling to trigger a deep mixing event. Continuous temperature measurements off Glenbrook provided additional confirmation data.

Data source: TERC lake monitoring.

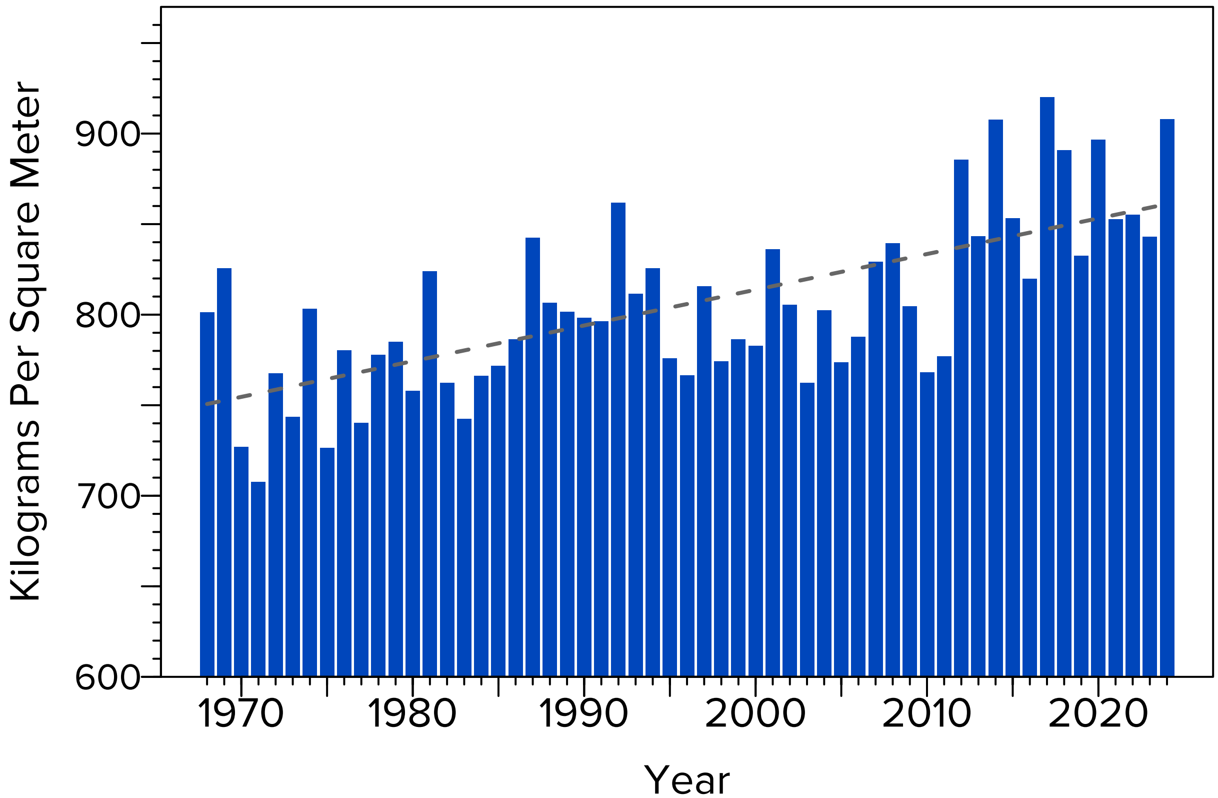


Lake stability index

Since 1968

Increasing stability poses a potential threat to all lakes. When the lake has a vertical distribution of temperature, it has a corresponding distribution of density. Warmer and lighter water remains at the surface (known as the epilimnion) above the colder and denser water below (known as the hypolimnion). As the temperature difference between top and bottom increases, the lake is said to become more stable (e.g. greater resistance to mixing). The stability index is a measure of the energy required to vertically mix the lake when it is density stratified. The average stability index for the upper 330 feet (100 m) of Lake Tahoe is plotted for the period of May through October each year. The values are derived from temperature profiles taken at the Index Station at approximately 10- to 20-day intervals. There has been an overall increase in lake stability by 13.8 percent in the last 56 years. In years where overturn does not take place, oxygen renewal to the hypolimnion will not take place. While not as high as the highest value observed on record (2017), it is the second highest observed.

Data source: TERC lake monitoring.

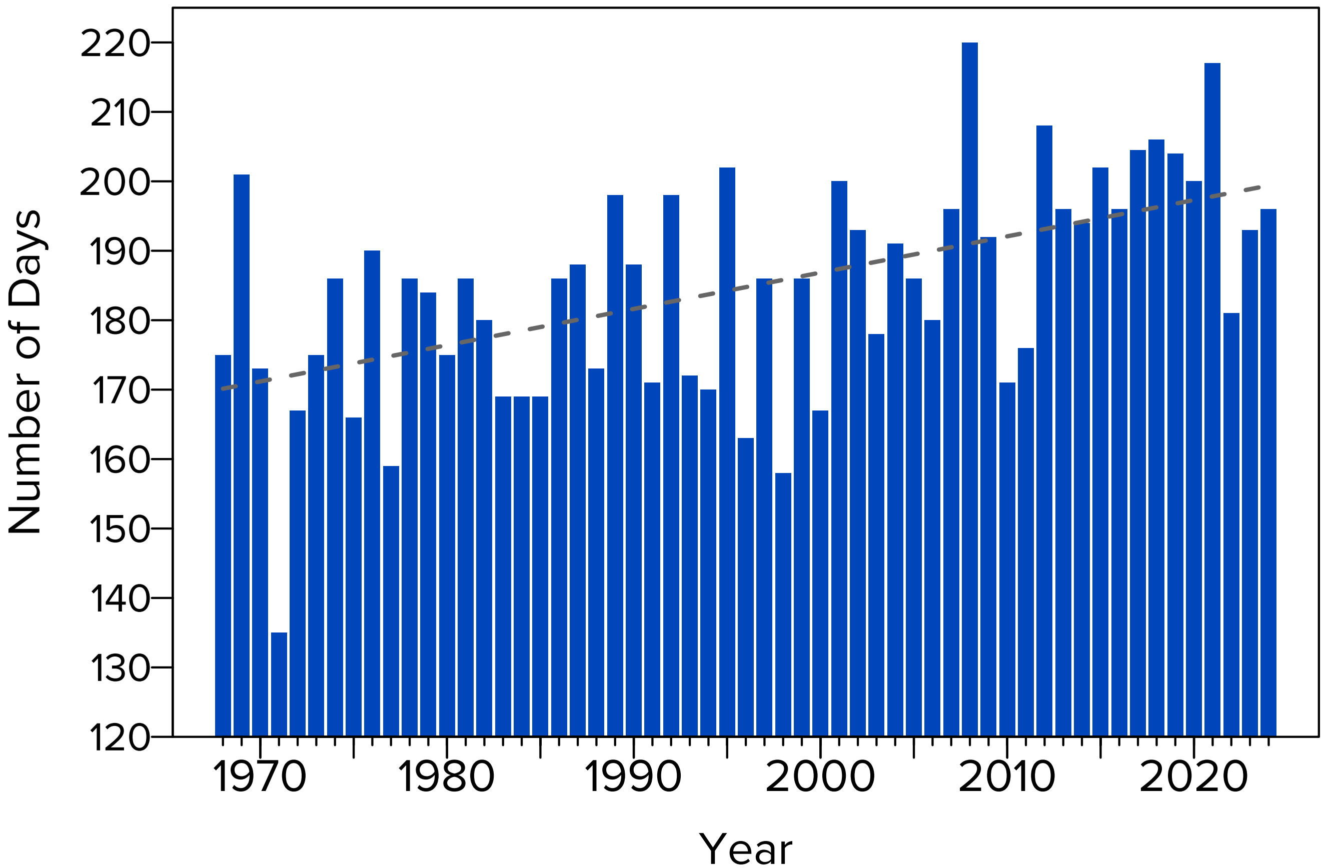


Stratified season length

Since 1968

The stability index is a measure of the energy required to vertically mix the lake that can be evaluated for every day of the year. We define the stratification season as the number of days when the stratification index exceeds a value of 600 kilograms per square meter. Since 1968, the length of the stratification season has increased by 29 days, albeit with considerable year-to-year variation. In 2024, the length of the stratified season was 196 days and just below the long-term linear regression. As the stratification season lengthens, the potential for deep mixing events decreases.

Data source: TERC lake monitoring.



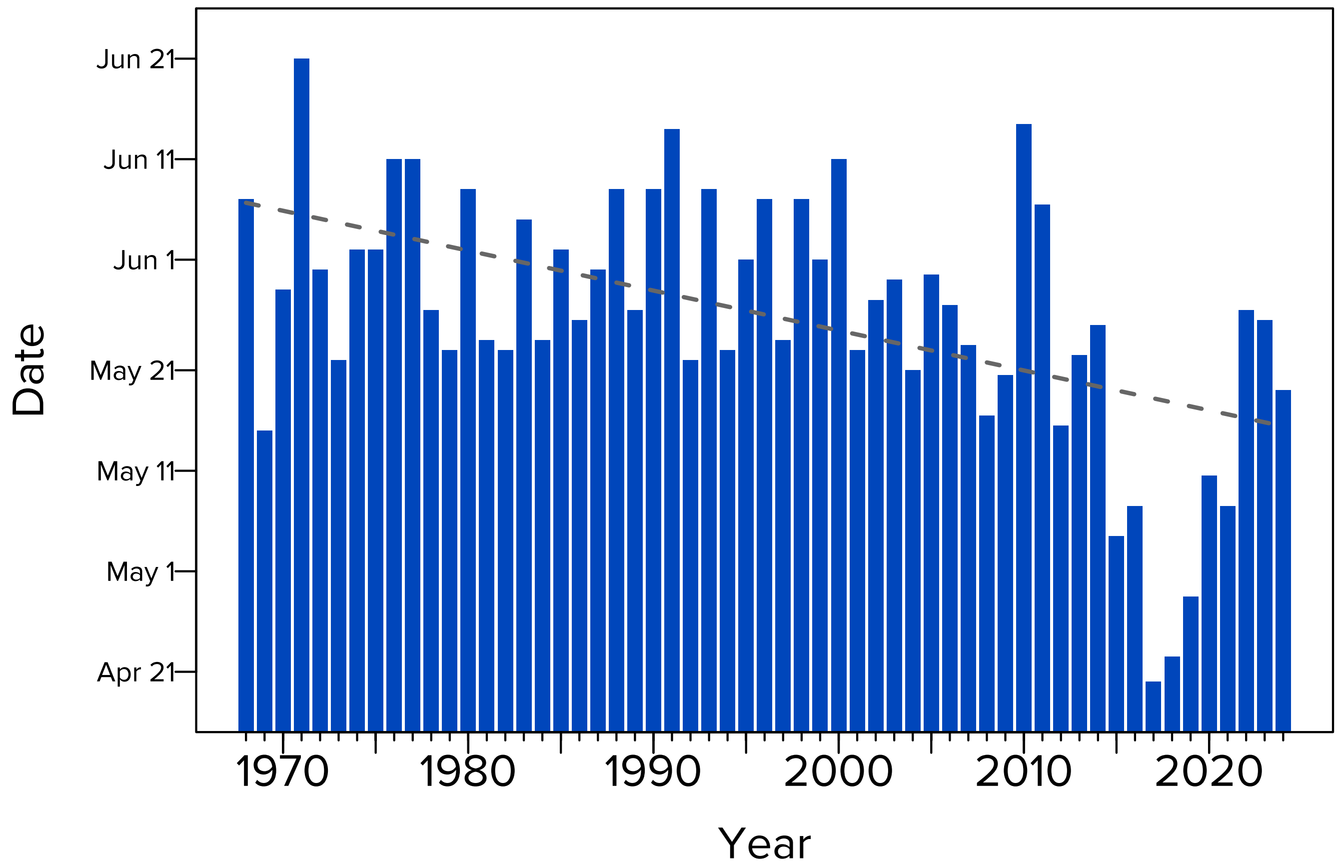
Beginning of the stratification season

Since 1968

The amount of time that Lake Tahoe is stratified has been increasing since 1968. One reason for this is the increasingly early arrival of spring as evidenced by the earlier commencement of stratification.

In 2024, the stratification commenced relatively late, on May 18 (Day 139). This was slightly later two weeks later than the long-term trend line would have suggested. The timing of the start of stratification and how it interacts with the snow melt run-off is important for the water clarity of the lake.

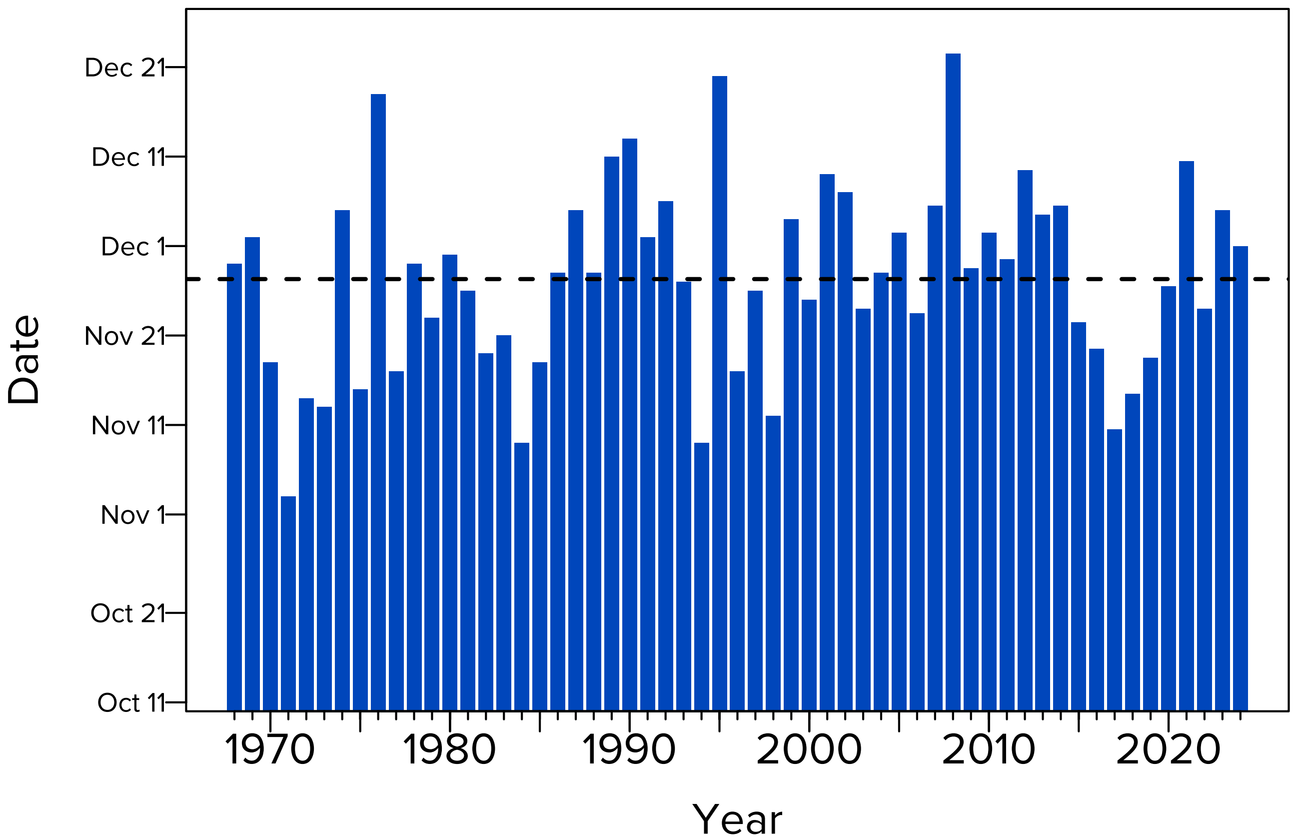
Data source: TERC lake monitoring.



End of stratification season

Since 1968

The amount of time that Lake Tahoe is stratified appears to have increased by almost a month since 1968 (described in the previous figure). The end of the stratification season has been extended, but not as much as the onset of stratification. Over the 56-year record, the end of stratification appears to have been extended by approximately one week. Although the trend is not statistically significant, extended duration of stratification can have important implications for lake mixing and water quality, such as the buildup of nitrate at the bottom of the lake and the timing of deep-water mixing events. The dashed black line indicates the long-term mean for the end of stratification date. In 2024, the end of stratification closely matched the long-term mean.
Data source: TERC lake monitoring.

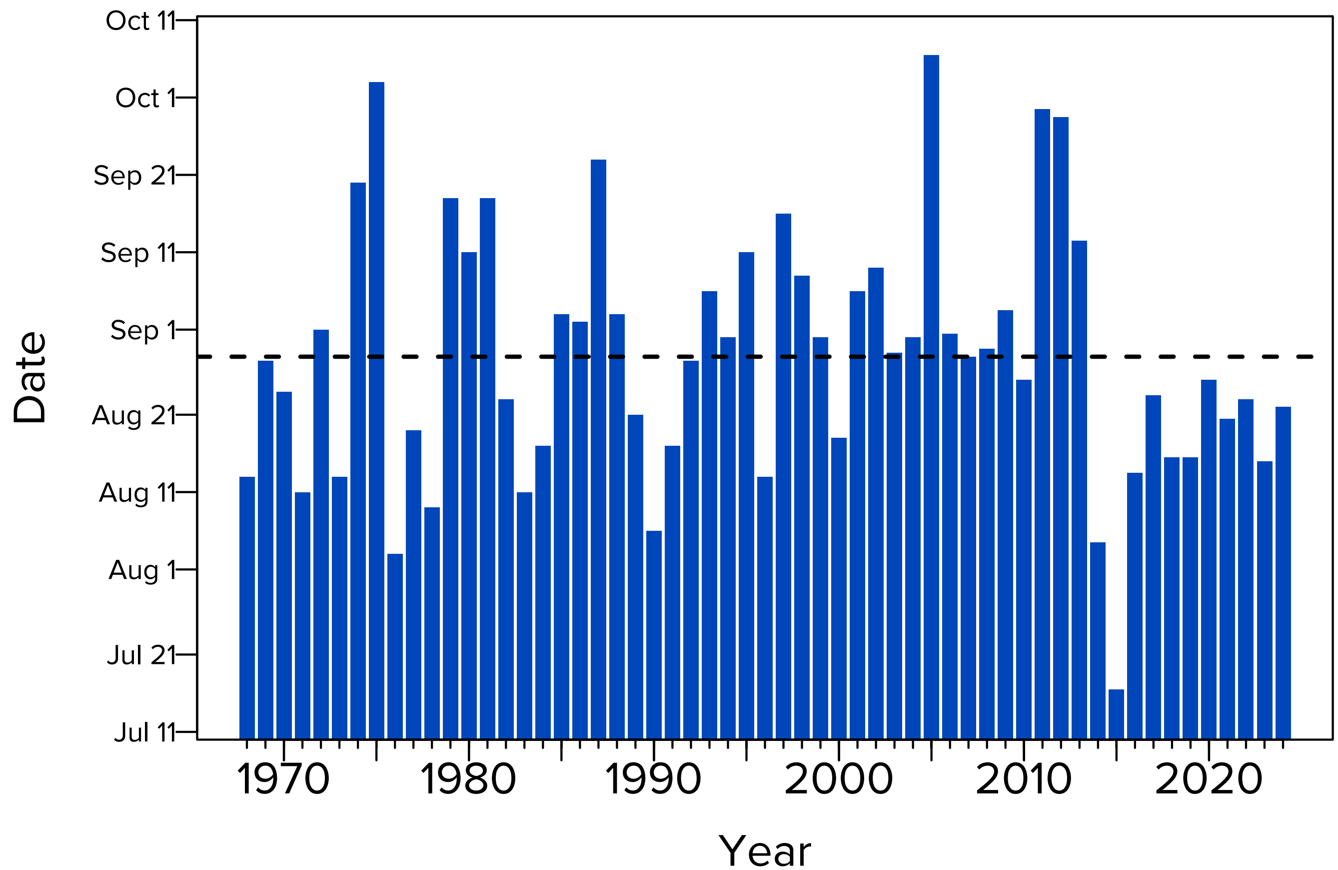


Peak of stratification season

Since 1968

Over the last eleven years the occurrence of the peak of stratification has been earlier than the long term mean date. The day of the year when lake stratification reaches its maximum value is the peak of stratification season. There is considerable year-to-year variation, but over time there has been no statistically significant change in when the peak occurs. The dashed line shows the long-term mean. In 2024, the peak occurred on August 21.

Data source: TERC lake monitoring.

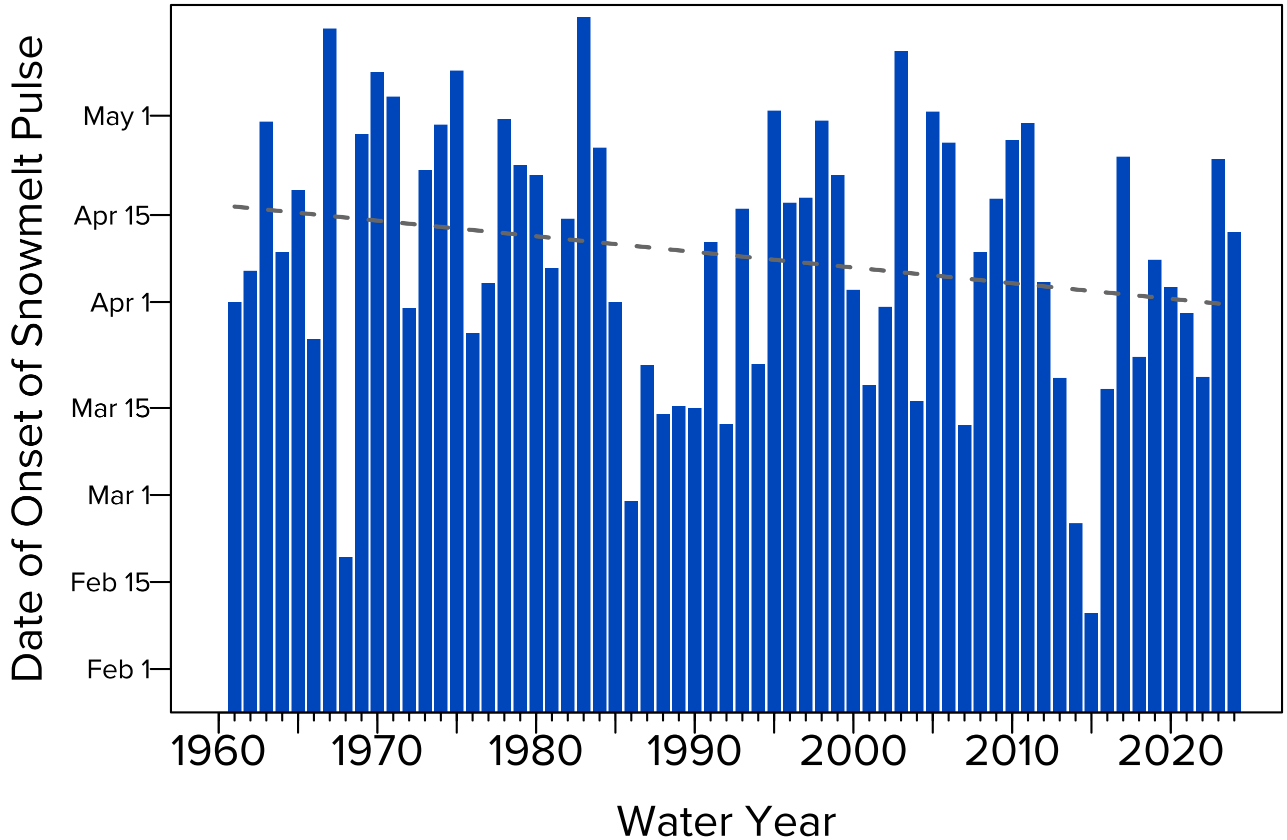


Onset of snowmelt pulse

Yearly since 1961

Although the date on which the onset of snowmelt commences varies from year to year, since 1961 it has shifted earlier by an average of over 16 days. The snowmelt pulse is calculated and averaged for five streams—the Upper Truckee River, Trout Creek, Ward Creek, Blackwood Creek, and Third Creek. This shift is statistically significant and is one effect of climate change at Lake Tahoe. In 2024, the onset of snowmelt pulse occurred on April 11, twelve days after the predicted regression line. According to the regression line, since 1961, the onset of the snowmelt pulse has occurred earlier by 17 days than it did in 1961. The onset of the pulse is calculated as the mean flow for the period January 1 to July 15. In the past, the peak of the stream hydrograph was used to estimate this metric. The later snowmelt pulses arrive, the more likely the receiving water will be stratified and prevent the water from reaching the hypolimnion.

Data source: U.S. Geological Survey stream monitoring.

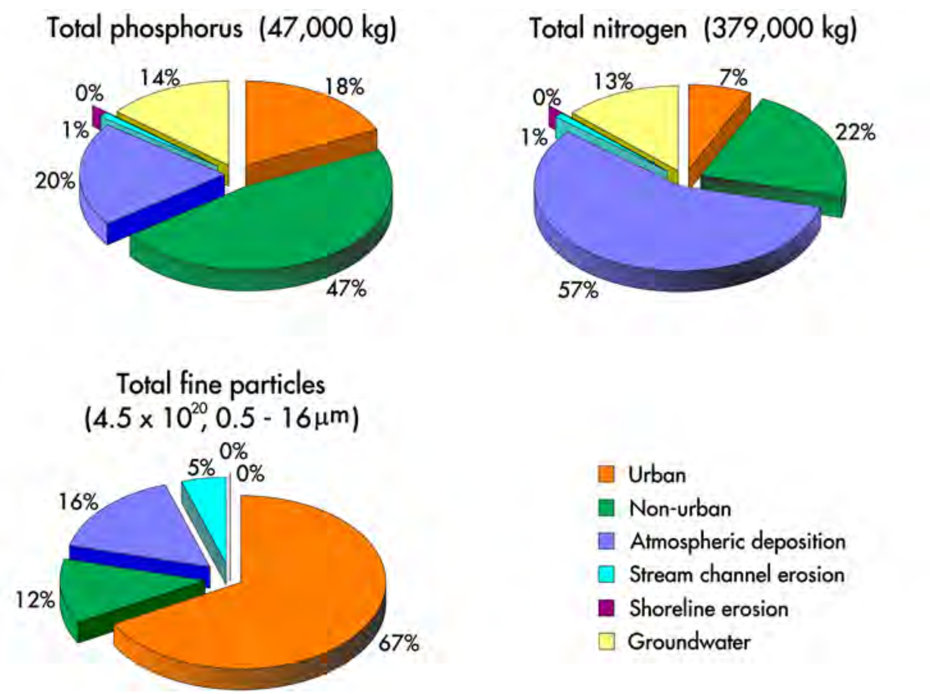


TAHOE:
STATE OF THE LAKE
REPORT
2025

NUTRIENTS AND PARTICLES

Sources of clarity-reducing and blueness-reducing pollutants

Research has quantified the primary sources of nutrients (nitrogen and phosphorus) and fine particulate material that are contributing to Lake Tahoe losing clarity and blueness in its upper waters. One of the primary contributors to clarity decline is extremely fine particles (in the size range of approximately 1–6 µm) in stormwater that originate from both the urbanized watersheds and the streams that drain the majority of the basin's land area. For nitrogen, atmospheric deposition is the major source (57%). Phosphorus is primarily introduced by the urban (18%) and non-urban (47%) watersheds. These categories of pollutant sources form the basis of a strategy to restore Lake Tahoe's open-water clarity by management agencies, known as the Lake Tahoe Total Maximum Daily Load (TMDL) Program.



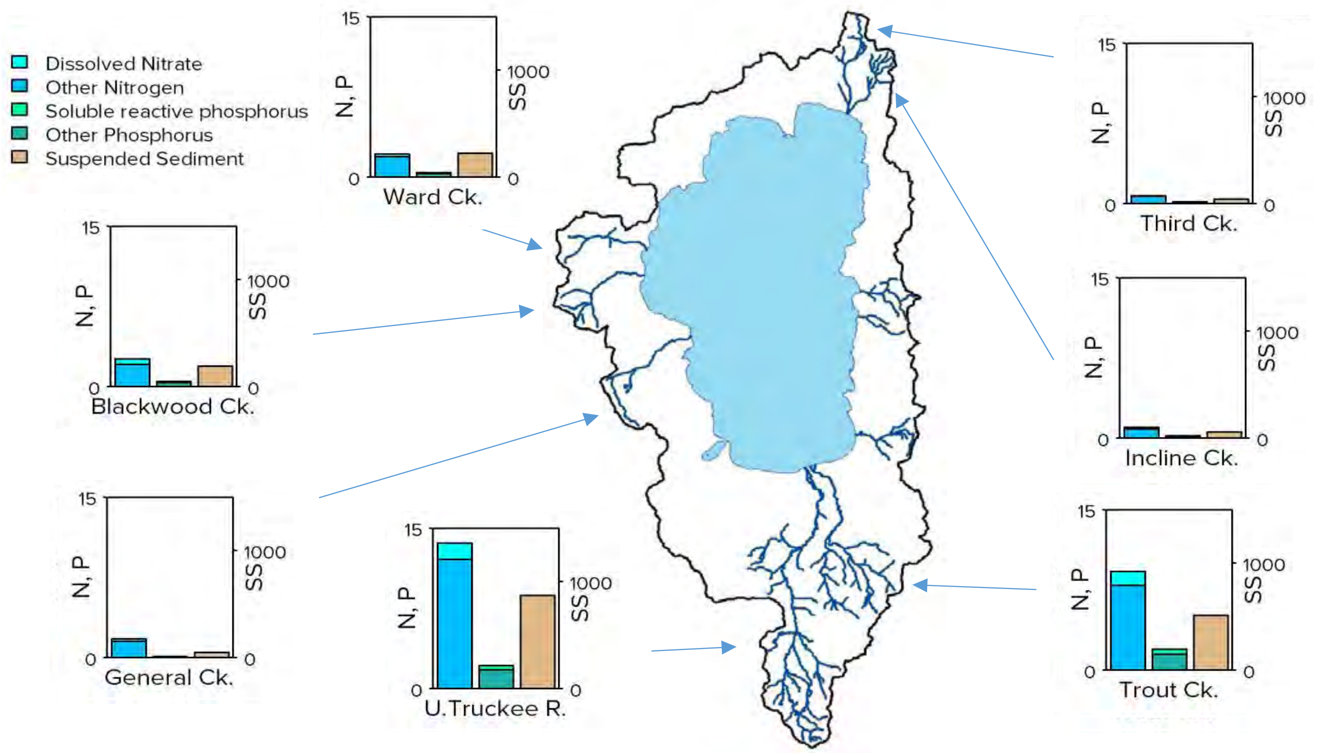
Pollutant loads from seven watersheds

In 2024

The Lake Tahoe Interagency Monitoring Program (LTIMP) measures nutrient and sediment input from seven of the 63 watershed streams and inflows. The streams and inflows are the Upper Truckee River, Trout Creek, Incline Creek, Third Creek, Ward Creek, Blackwood Creek, and General Creek. In 2024, the majority of stream phosphorus and nitrogen, as well as suspended sediments, came from the Upper Truckee River. This is often the case, but in some years, smaller streams, such as Ward Creek and Blackwood Creek, can also be significant contributors and is generally well correlated with the amount of flow in the streams.

It should be noted that suspended sediments, as represented in these data, include all sediment sizes and is measured by weight. For clarity, numbers observed in the lake, it is the number of fine particles (in the range of 1–6 µm) that is important. These particles make up a very small fraction of the suspended sediment, but largely control lake clarity.

The LTIMP stream water quality program is supported by the Lahontan Regional Water Quality Control Board, the Tahoe Regional Planning Agency, the U.S. Geological Survey, and UC Davis TERC. TERC and the U.S. Geological Survey jointly collect and analyze the stream data.

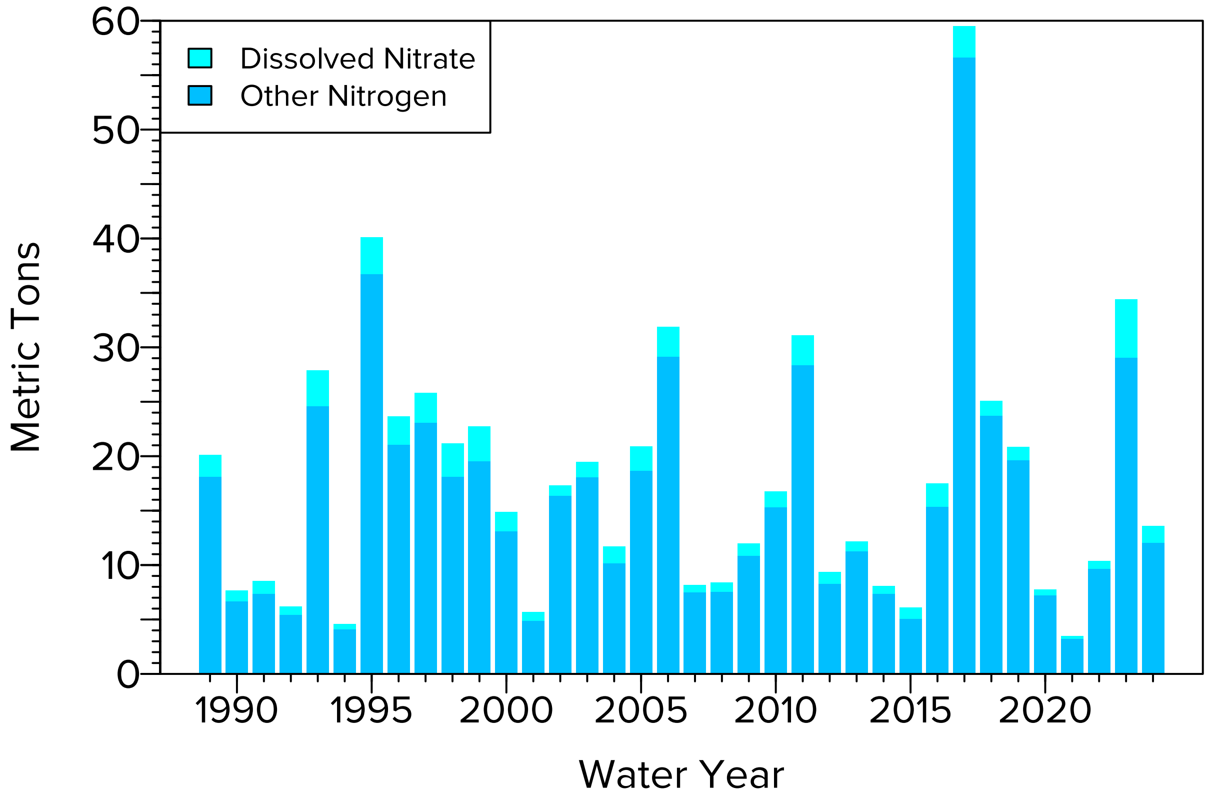


Nitrogen contribution by Upper Truckee River

Yearly since 1989

Nitrogen (N) is important because it, along with phosphorus (P), stimulates algal growth. The Upper Truckee River is the largest of 63 streams and inflows that flow into Lake Tahoe, contributing about 25 percent of the inflowing water. The river's estimated contribution of dissolved nitrate and the remainder of the total nitrogen load are shown below. Over the 34 years of record, the percentage of nitrate to total nitrogen has been in the range of 5–14 percent. The year-to-year variations primarily reflect changes in precipitation. For example, 1994 had 16.6 inches of precipitation and a low total nitrogen load of 4.6 MT, while 2017 had 68.9 inches of precipitation and a record high total nitrogen load of 59.5 MT.
In 2024, there were 29.0 inches of precipitation and the total nitrogen load from the Upper Truckee River of 13.6 MT. Nitrate load was estimated at 1.5 MT which is close to the long-term average. The long-term mean annual total nitrogen load is 17.8 MT/yr while for nitrate it is 1.7 MT. (One metric ton (MT) = 2,205 pounds.).

Data source: TERC and U.S. Geological Survey stream monitoring.

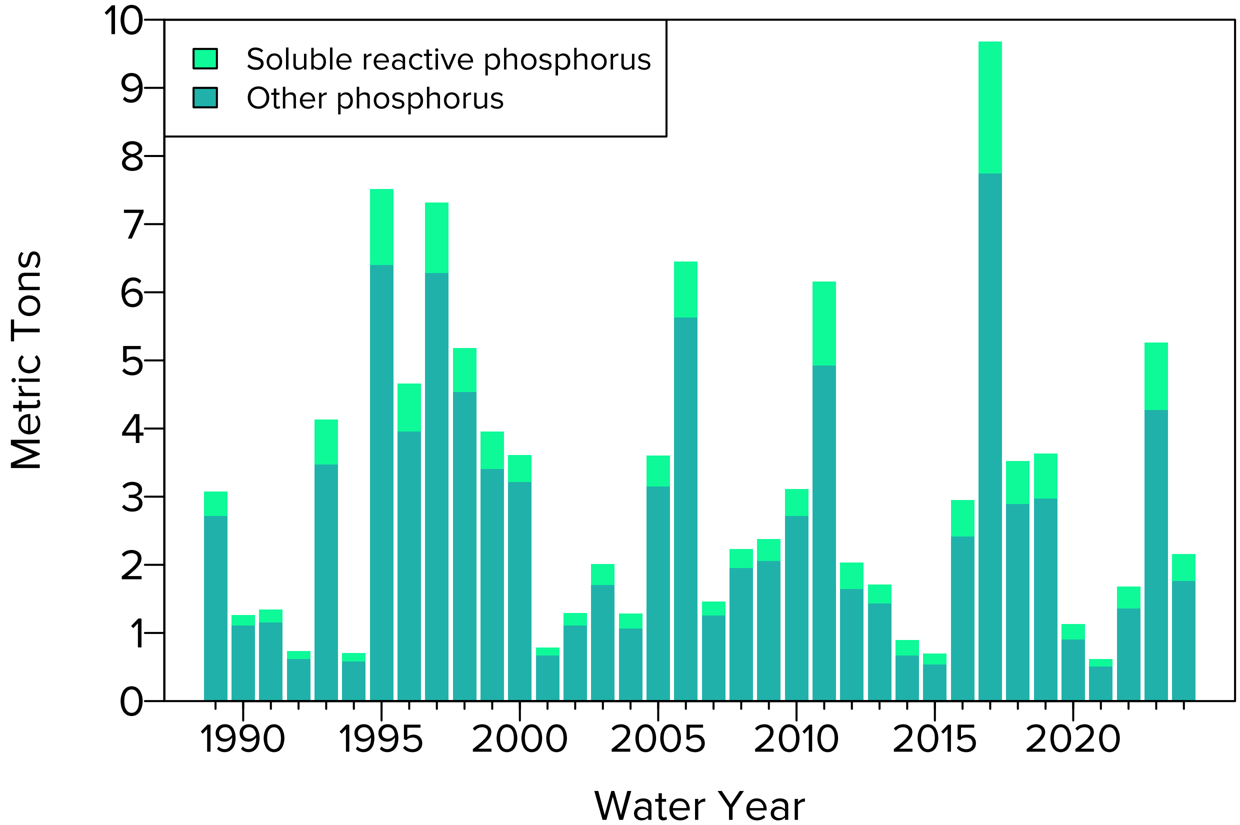


Phosphorus contribution by Upper Truckee River

Yearly since 1989

Soluble reactive phosphorus (SRP) is the fraction of total phosphorus immediately available for algal growth. As with nitrogen (Fig. 9.3), the year-to-year variation in estimated loads largely reflects the changes in precipitation. Average precipitation in 2024 resulted in above-average values for total phosphorus load of 2.15 MT and an SRP load of 0.39 MT. These compare with the long-term averages of 3.09 and 0.48 MT respectively. Over the 35 years of record, the percentage of SRP to total phosphorus load has been in the range of 11–25 percent. Decreasing nutrient inputs are fundamental to restoring Lake Tahoe's iconic blueness. Total phosphorus is the sum of SRP and other phosphorus, which includes organic phosphorus and phosphorus associated with particles. (One metric ton (MT) = 2,205 pounds.).

Data source: TERC and U.S. Geological Survey stream monitoring.

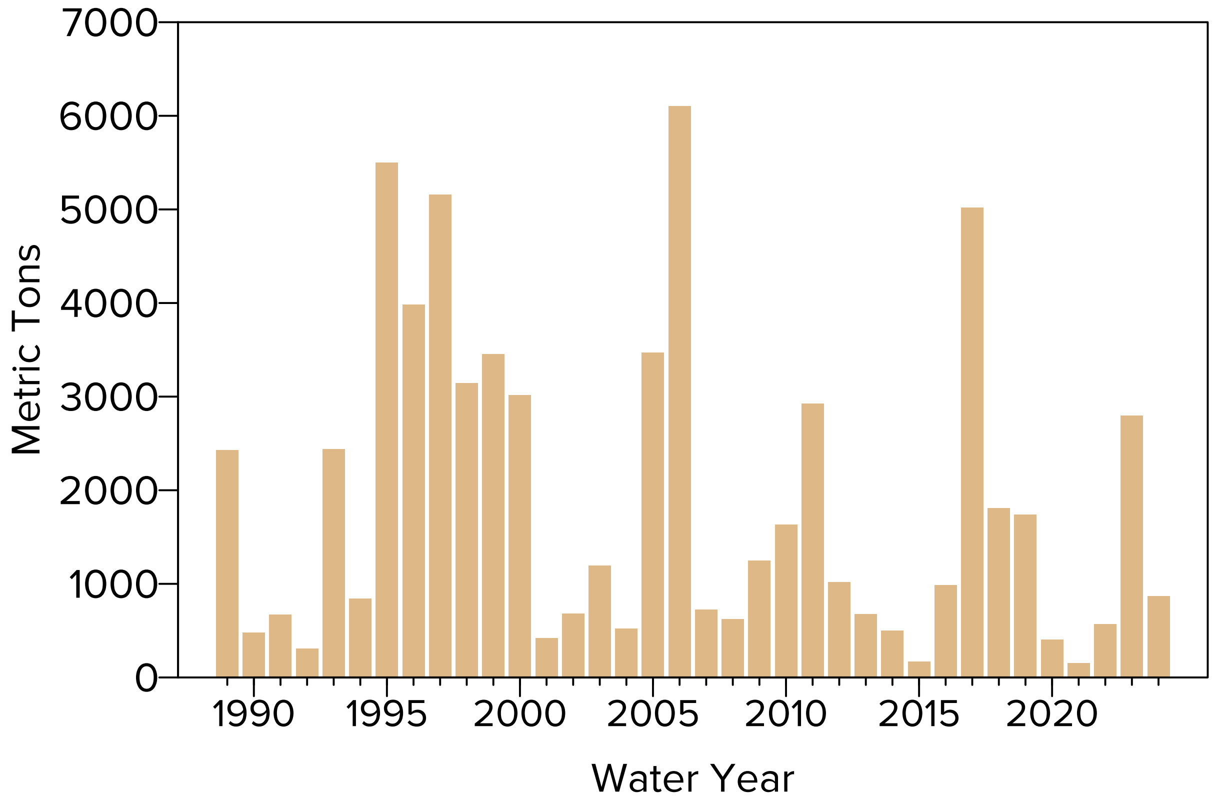


Suspended sediment contribution by Upper Truckee River

Yearly since 1989

Similar to the nutrient loading of phosphorus and nitrogen, the load of total suspended sediment delivered to the lake by the Upper Truckee River is related to landscape condition and erosion as well as to precipitation and stream flow. Inter-annual variation in sediment load over shorter time scales is more related to the latter. Plans to restore lake clarity emphasize reducing loads of very fine suspended sediment (in the size range of 1–6 microns in diameter) from urbanized areas. By contrast, efforts to restore natural stream function, watershed condition, and restoration of habitat for plants and wildlife, focus on reducing loads of total sediment regardless of size. In 2024, the estimated suspended sediment load from the Upper Truckee River was 879 MT. The highest load ever recorded was 6,100 MT in 2006. The average annual load is 1,909 MT. (One metric ton (MT) = 2,205 pounds.).

Data source: TERC and U.S. Geological Survey stream monitoring.

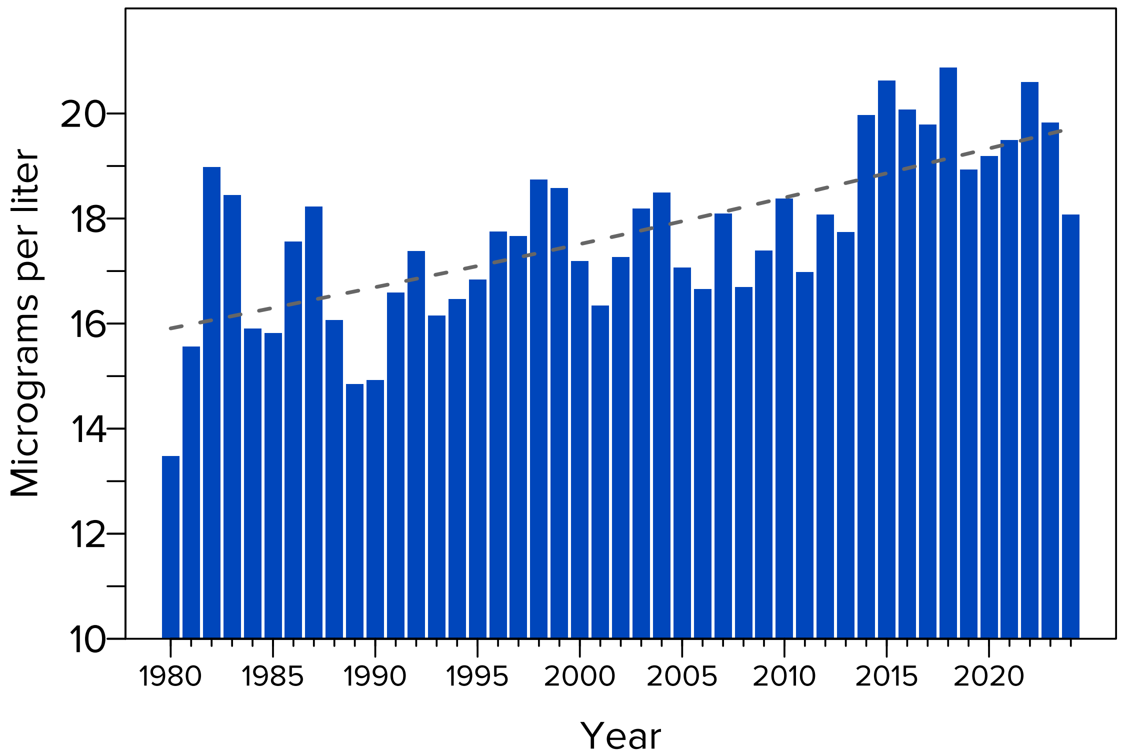


Lake nitrate concentration

Yearly since 1980

Until 2012, the volume-weighted annual average concentration of nitrate-nitrogen had remained relatively constant year-to-year, ranging between 13–19 micrograms per liter. However, since 2014, the lake's nitrate concentration has been increasing, as evident in the trend line produced with a Generalized Additive Model (GAM). In 2024, the volume-weighted annual average concentration of nitrate-nitrogen was 18.1 micrograms per liter. This is a reduction from 2023 and below the predicted GAM results and closer in line with pre-2014 levels. There is not enough data at this point to understand if this is a return to a long-term trend or an anomaly. In years with only shallow mixing, nitrate recommences accumulating and results in the increasing in-lake nitrate concentration. Another factor in the last several years is the additional atmospheric nutrient loading due to wildfire smoke engulfing the region. The impact of the 2021 Caldor wildfires is the subject of a continuing analysis but it has been well documented that ash and smoke deposition contribute to nitrogen deposition in natural water bodies.

Data source: TERC lake monitoring. Water samples are taken at the Mid-lake station at 13 depths from the surface to 1,480 feet.



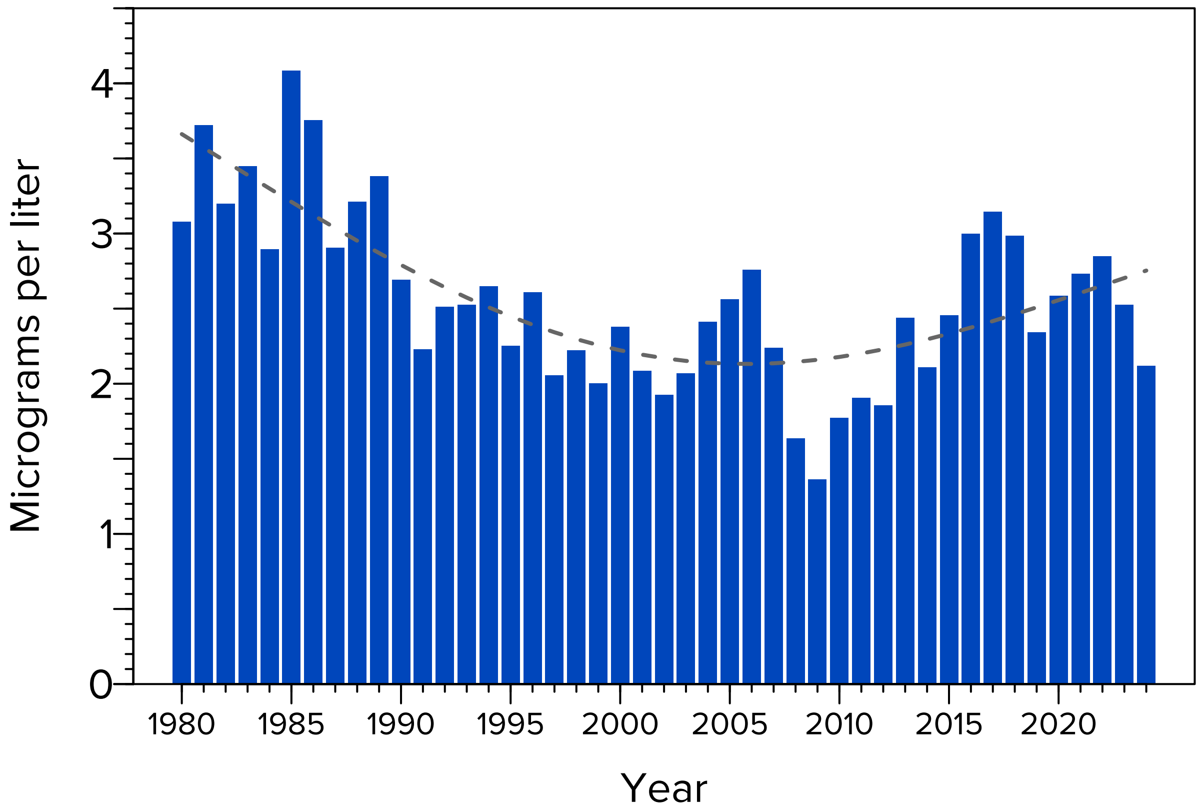
Lake total hydrolyzable phosphorus concentration

Yearly since 1980

Phosphorus naturally occurs in Tahoe Basin soils, and soils in general, enter the lake from soil disturbance and erosion. Total hydrolyzable phosphorus (THP) is a measure of the fraction of phosphorus that algae can use to grow. It is similar to the SRP that is measured in the streams and the difference between the two is based on historical approaches. Since 1980, THP has declined, although in the last 18 years the values have been increasing with a similar trend observed in the nitrate values since 2014.

In 2024, the volume-weighted annual average concentration of THP was 2.12 micrograms per liter. As the lake is a naturally phosphorus limited system, this parameter is one of the major controlling variables for the system. The efforts taken through the TMDL program play a critical role in bringing the numbers down from their early highs of >4 mg/l observed in the 1980s.

Data source: TERC lake monitoring. Water samples are taken at the Mid-lake station at 13 depths from the surface to 1,480 feet.

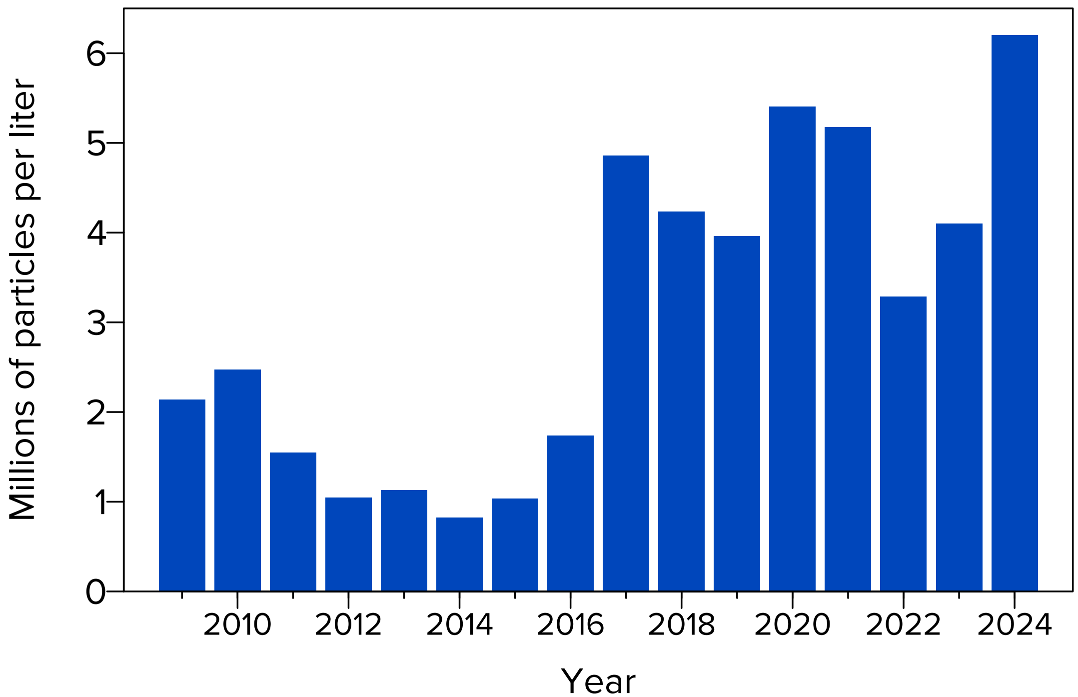


Lake fine particle concentration

Yearly since 2009

Fine particles in the size range of approximately 1–6 microns in the upper 50 m are principally responsible for the attenuation of visible light and the consequent loss of lake clarity. These particles can be inorganic (clay and silt) or organic (phytoplankton). As particles in this size range settle slowly, their removal from the lake depends in large part on their aggregation into larger particles. The settling rate of a particle depends on the square of its diameter. Larger, aggregated particles will settle disproportionately faster.
`2017 was an extremely wet year, there was a large increase in fine particles delivered to Lake Tahoe from the streams in the watershed. This would account for the step change in concentration evident between 2016 and 2017. The continued high average concentration since that time is difficult to explain. 2020 and 2021, both of which were low precipitation years, displayed an increase in particle concentration beyond the 2017 level. In 2024, observed values greater than 6 million particles per liter were the highest that have been measure on record. The causes of these increases are an ongoing source of research as the conditions were relatively average during this time and loading of particles from wildfires and streams were lower in 2024. A preliminary analysis comparing rates of aggregation of lake particles, suggests that aggregation rates have not changed significantly over the period of the record. Understanding the aggregation rates at different depths in the lake is a source of ongoing research

Data source: TERC lake monitoring. Water samples are taken at the Mid-lake station at 13 depths from the surface to 1,480 feet.



Lake fine particle concentration

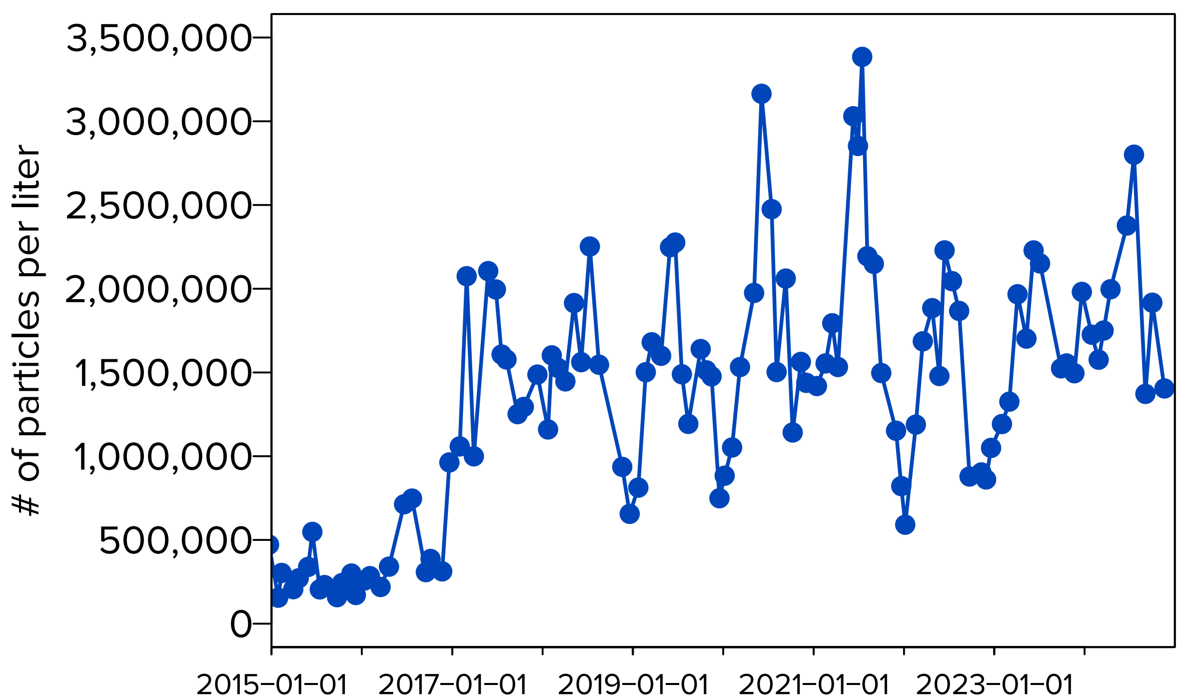
Monthly since 2015

Fine particles in the size range of approximately 1–6 microns in the upper 50 meters are principally responsible for the attenuation of visible light and the consequent loss of lake clarity. These particles can be inorganic (clay and silt) or organic (phytoplankton).

The data indicate the annual increase of fine particles at mid-year were due to a combination of particle influx from spring snowmelt and a consequent algal bloom. In 2017, an extremely wet year, there was a large increase in fine particles delivered to Lake Tahoe from the streams in the watershed. This would account for the step change in concentration evident between 2016 and 2017. The continued high average concentration since that time is difficult to explain. According to the UC Berkeley Central Sierra Snow Lab, 2022-23 had the second greatest amount of snowfall that was recorded since 1946. This large amount of snow potentially resulted in an astonishing large particle concentration that is twice the amount that has ever been since 2009. In 2024, with average precipitation rates, the values are nearly the highest that have been observed on record with fine particle concentrations peaking in June and July 2024. This is a source of ongoing research.

Water samples are taken monthly at the MLTP (mid-lake) station at 13 depths from the surface to 1,480 feet. Here, data from 0 m, 10 m and 50 m were utilized.

Data source: TERC lake monitoring.



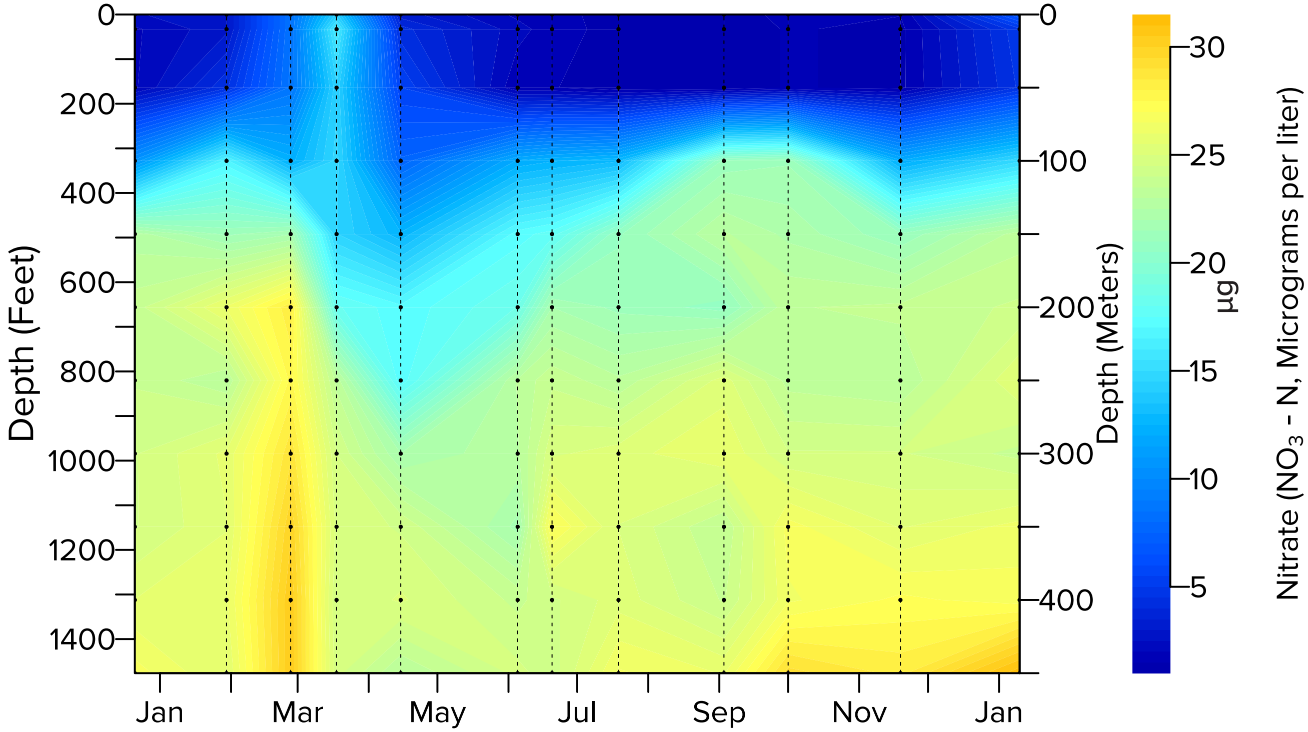
Nitrate distribution

In 2024

Water samples are collected approximately every month (on dates indicated by the dashed lines) at 11 depths (indicated by the dots) at the MLTP station in the middle of the lake. These samples are then processed and analyzed in the TERC laboratory for nutrient concentrations. Here the nitrate concentration is shown in the form of color contours.

Relatively uniform annual conditions are observed with low concentrations in the surface waters and higher concentrations in the bottom waters. In later winter/early spring, a redistribution of the nutrients can be observed during the period when the lake mixed to the deepest depth for the year. Although most of the "new" nitrate enters at the surface through atmospheric deposition, it is rapidly taken up by the algae and surface concentrations remain generally low. As algae sink and decompose, the nitrate they consumed reappears deep in the lake. At these depths, however, there is insufficient light for algae to grow and to use these nutrients.

Data source: TERC lake monitoring.



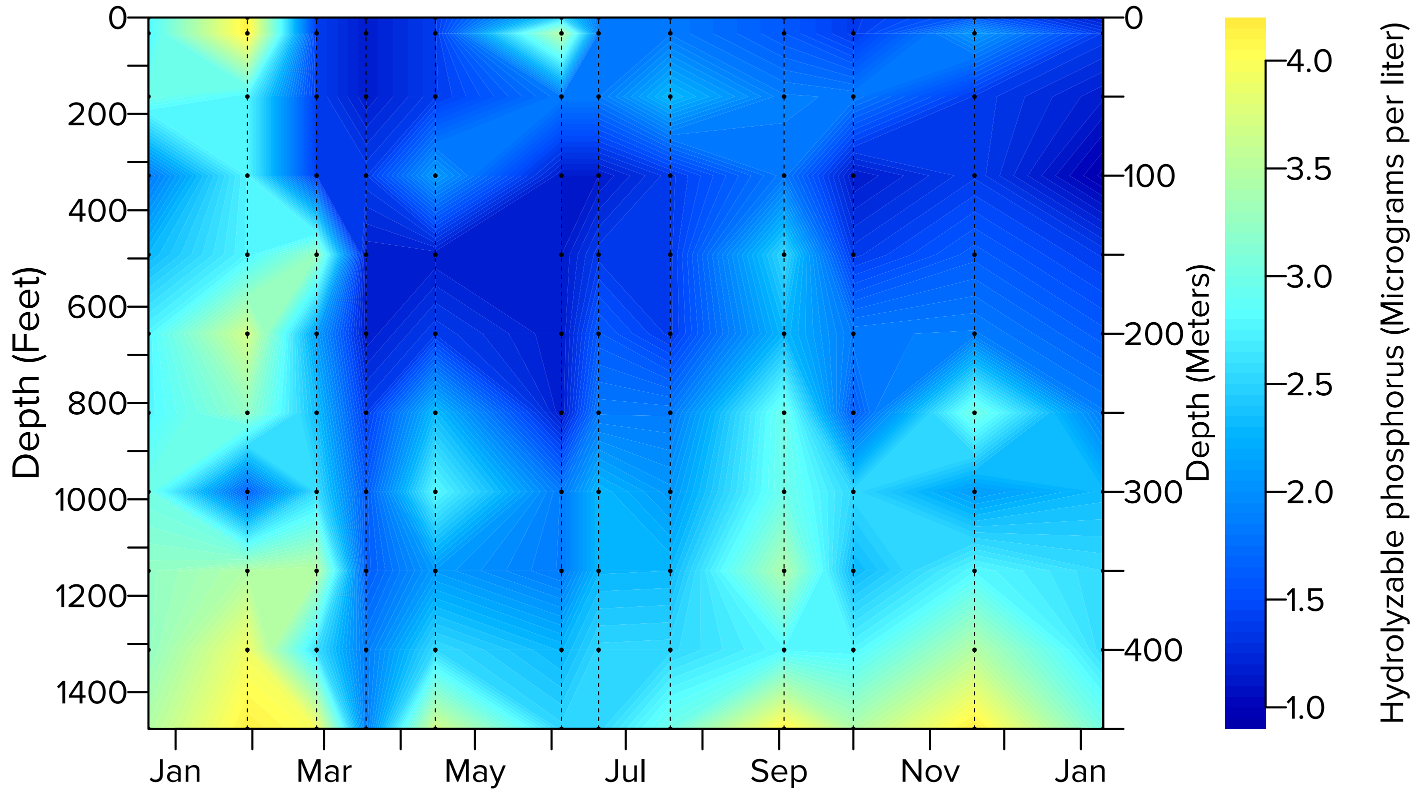
Total hydrolyzable phosphorus distribution

In 2024

Water samples are collected approximately every month (on dates indicated by the dashed lines) at 11 depths (indicated by the dots) at the MLTP station in the middle of the lake and analyzed in the TERC laboratory for nutrient concentrations. Here the total hydrolysable phosphorus (THP) concentration, the fraction of phosphorus that can be readily used by algae, is shown in the form of color contours.

Phosphorus mainly entered the lake in association with fine particles during runoff events in May through June. This runoff can carry water down to depth which is one source of THP in the bottom waters. Another source is the re-release of sediment bound phosphorus which gradually accumulates in the hypolimnion. This phosphorus then gets redistributed in later winter/early spring as observed in March 2024.

Data source: TERC lake monitoring.



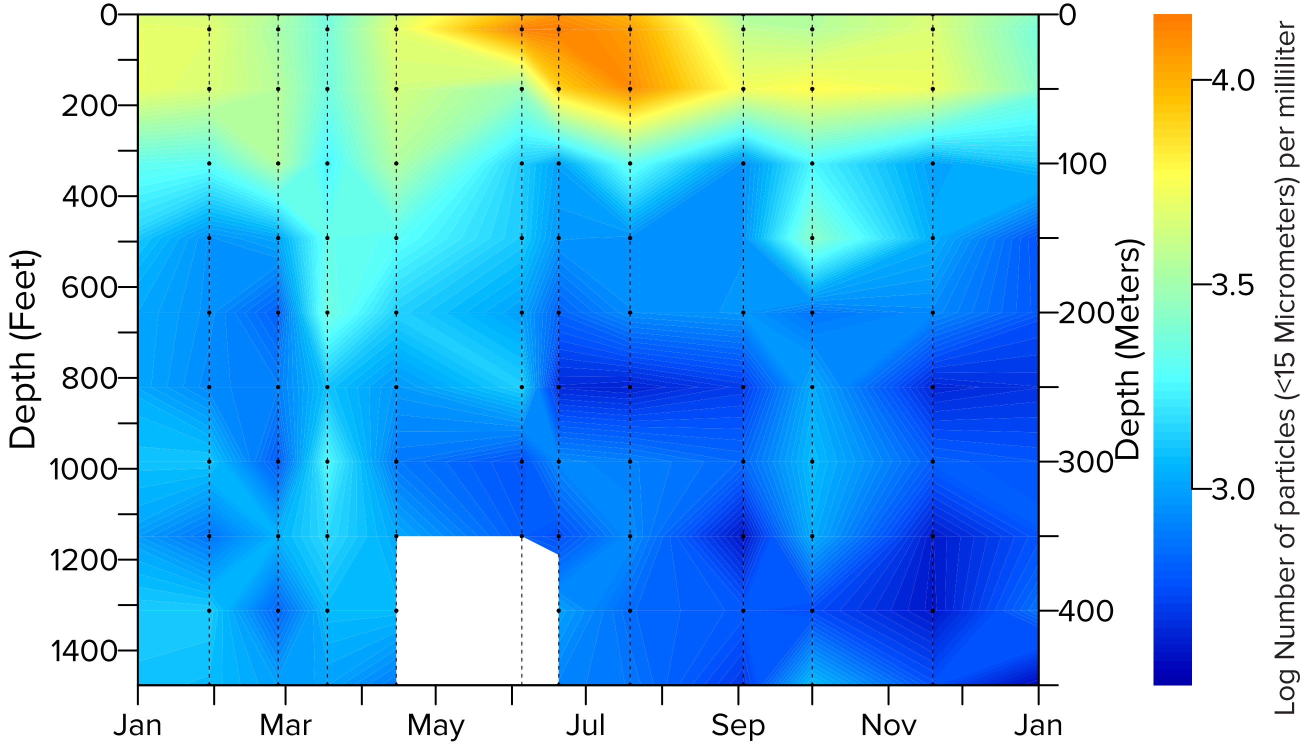
Fine particle distribution

In 2024

Water samples are collected approximately monthly (on dates indicated by the dashed lines) at 13 depths (indicated by the dots) at the MLTP station. These samples are analyzed in the TERC laboratory for concentrations of fine particles in 15 different bin sizes. The distributions of fine particles (in the size range of 1–6 microns) are shown in the form of color contours. Particles can be inorganic particles such as clay or silt or organic particles such as very small algal diatom particles.

Unlike the nutrients in Figures 9.9 and 9.10, fine particles are in low concentrations deep in the lake throughout the year. The entry of particles in the upper part of the lake (above 300 ft) associated with spring snowmelt is evident in late May through August. In 2024, increases in fine particles continued to increase during the summer months even though winter values appear to have plateaued and is a source of ongoing research. The particles do not decrease in the upper layer in the same way as nitrogen or phosphorus, as they are not taken up by algal growth. Instead, fine inorganic particles gradually clump together (aggregate) which allows them to settle to the lake bottom more rapidly. Additionally, they can be removed by zooplankton grazing.

Data source: TERC lake monitoring.



TAHOE: STATE OF THE LAKE REPORT 2025

BIOLOGY

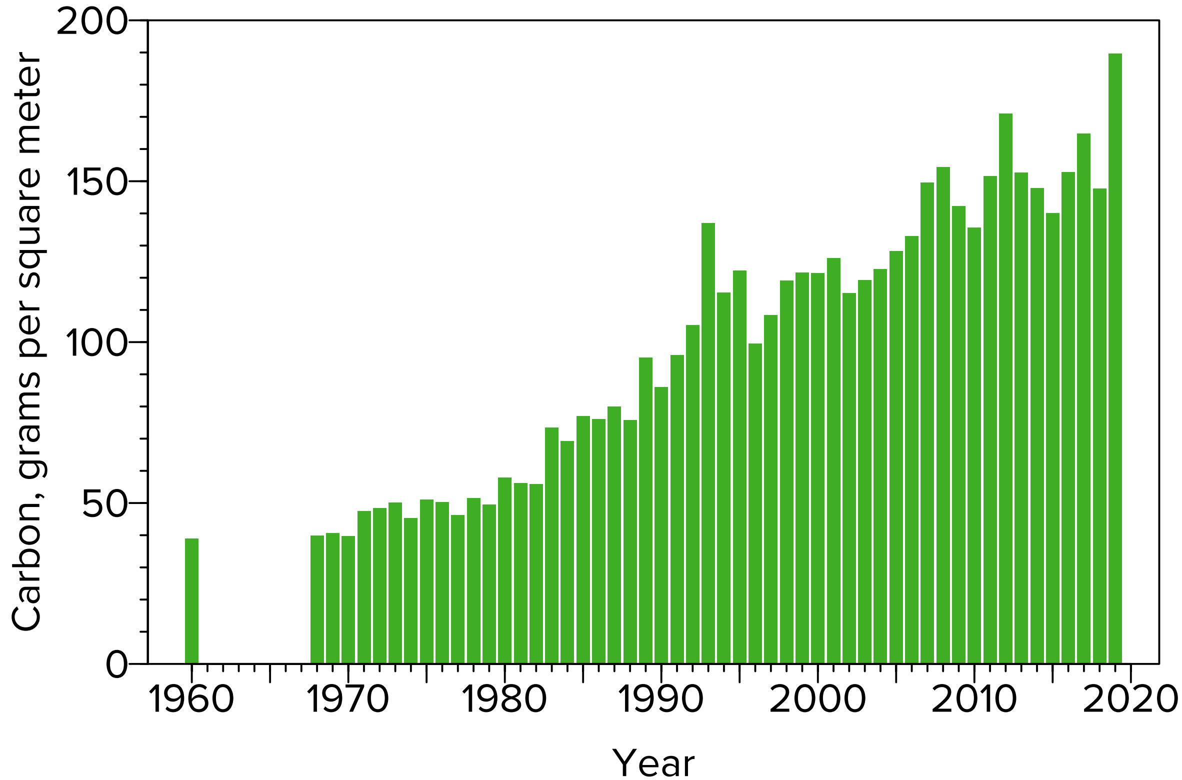
UC DAVIS
Tahoe Environmental Research Center

Algae growth (primary productivity)

Yearly since 1959

Primary productivity is a measure of the rate at which algae produce biomass (carbon) through photosynthesis. It was first measured at Lake Tahoe in 1959 and has been measured continuously since 1968. Supported by complex interactions of many factors such as nutrient loading into the lake, regenerated nutrients, changes in the underwater light environment, variability in thermal conditions (stratification and circulation) and the succession of algal species, the long-term trend shows that primary productivity has increased substantially over this long period. After a comprehensive review of changes in the methodologies used for this complex measurement over time, the dataset has been substantially revised. While the long-term increasing trend has not changed following this revision, the magnitude of the annual averages was reduced by an average of 32% relative to our previous reports. We are still carefully troubleshooting the methodological challenges for the most recent years such that those data are not yet available.

Data source: TERC lake monitoring.

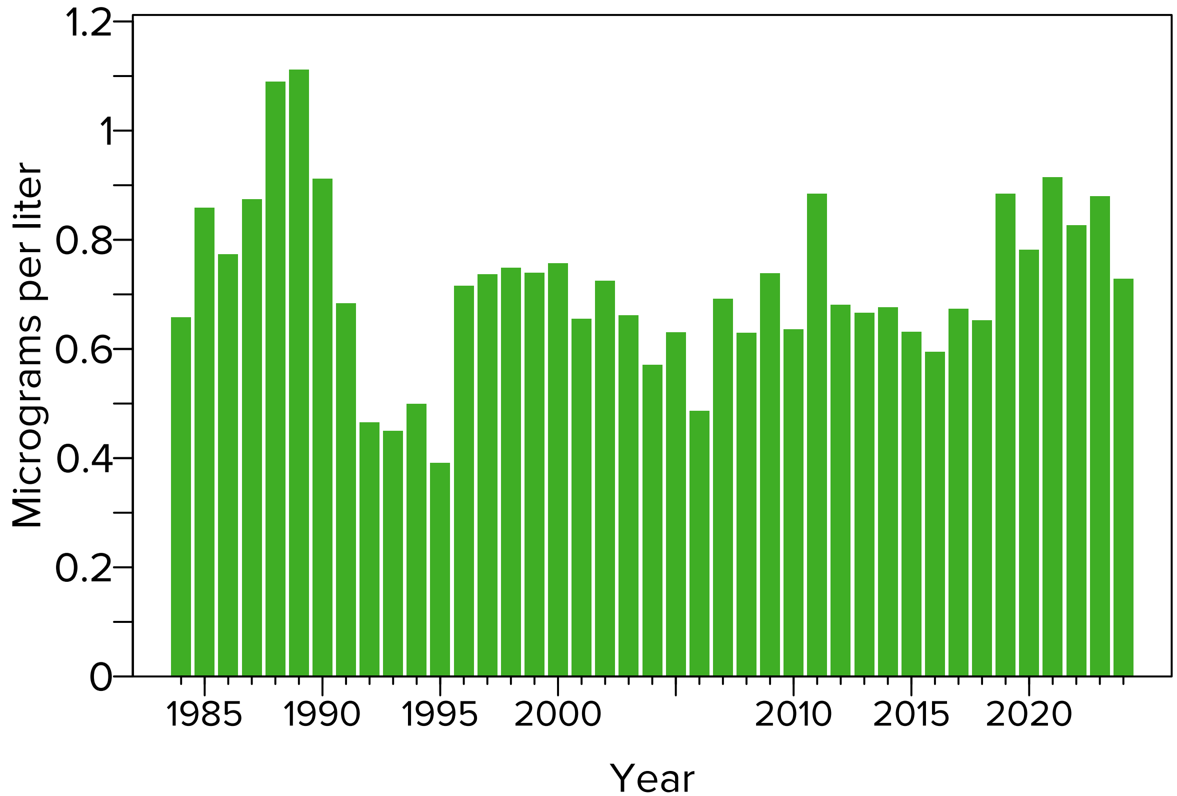


Phytoplankton chlorophyll annually

Yearly since 1984

Phytoplankton, or free-floating microalgae (and cyanobacteria), form the foundation of the Lake Tahoe food web and are essential to the health of the entire ecosystem. Like land plants, phytoplankton use chlorophyll-*a* to convert sunlight into energy, and its presence is typically used as an indicator of algal biomass in lakes and the ocean. As is the case for many tools used over long periods in science, limnologists increasingly recognize that chlorophyll-*a* can be more variable in its relationship with algal biomass than initially thought but it remains useful in its ease of use and for comparison with historical values. Over the four decades of record, the average concentration has maintained relatively stable chlorophyll-*a* concentrations and 2024 continued this trend. From 1984 to 2024, the long-term average annual chlorophyll-*a* concentration in Lake Tahoe was 0.72 micrograms per liter. The average annual concentration for 2024 was 0.73 micrograms of chlorophyll-*a* per liter, similar to the long-term mean.

Data source: TERC lake monitoring.

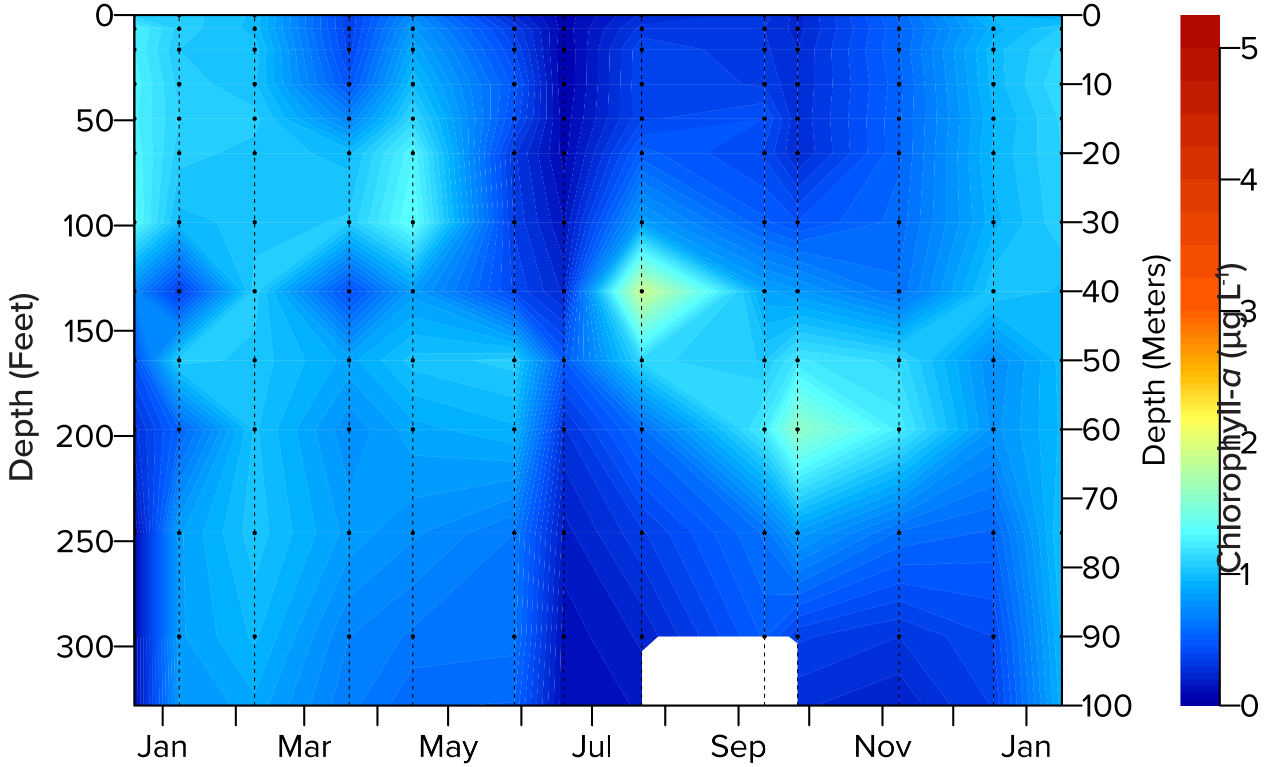


Chlorophyll-*a* spatial distribution

In 2024

The spatial and temporal distribution of chlorophyll-*a* in Lake Tahoe is typically found at the euphotic zone, which extends to a depth of 350 feet (107 m). Below this depth, chlorophyll-*a* concentrations approach near zero due to light limitation. In the summer months, Lake Tahoe often exhibits a distinct deep chlorophyll maximum (DCM) typically between 150 to 300 feet (45–90 m), well below the thermocline.

In 2024, chlorophyll-*a* concentrations in Lake Tahoe's water column ranged from 0.05 to 1.91 µg/L, with a less pronounced DCM compared to typical years. Chlorophyll-*a* was broadly distributed from the surface to approximately 200 feet (60 m), with elevated concentrations in late spring (May) and mid-summer (July). These peaks at depths between 65–150 feet (20–45 m) likely reflect enhanced phytoplankton productivity following nutrient redistribution during spring mixing and subsequent stabilization of the water column. A late fall (November) peak developed again, extending from 100 to 200 feet (30–60 m) suggesting a modest post-stratification growth. Notably, chlorophyll-*a* remained low throughout the year below 250 feet (75 meter), potentially due to reduced light and nutrient availability.

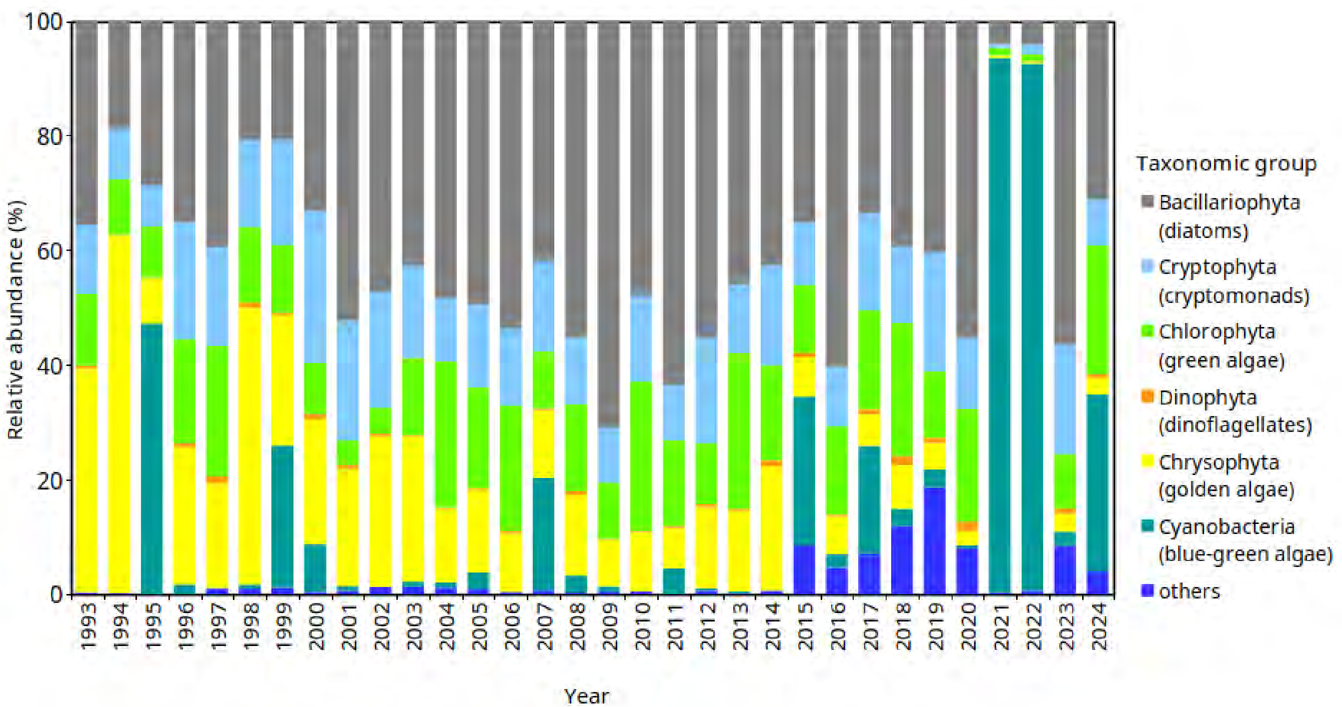


Distribution of algal groups

Yearly since 1993

The taxonomic composition of phytoplankton in 2024 was broadly consistent with long-term patterns, characterized by a relatively even distribution among several groups and no single taxon dominating the community. *Bacillariophyta* (diatoms) clearly dominate the relative abundance across most years, though their relative proportion in 2024 was lower than observed in earlier decades. *Cyanobacteria* (blue-green algae) represented in dark teal, exhibited a strong presence and this number is consistent with spikes seen occasionally in the past but is not at the extreme level of the numbers seen in 2021–2022 that were likely linked to the Caldor Fire. It is worth noting due to the small cell size of these blue-green algae, they may be numerous but they contribute relatively little to totalbiovolume. *Cryptophyta* and *Chlorophyta* remained present at moderate levels of 7.9% and 22%, respectively, while *Chrysophyta*, *Dinoflagellates* (Dinophyta), and others contributed minimally. The proportion of the major algal groups show a degree of consistency from year-to-year, yet the resurgence of cyanobacteria highlights the importance of ongoing monitoring, as their proliferation may indicate shifting nutrient conditions or climate-driven changes in lake dynamics.

Data source: TERC lake monitoring.

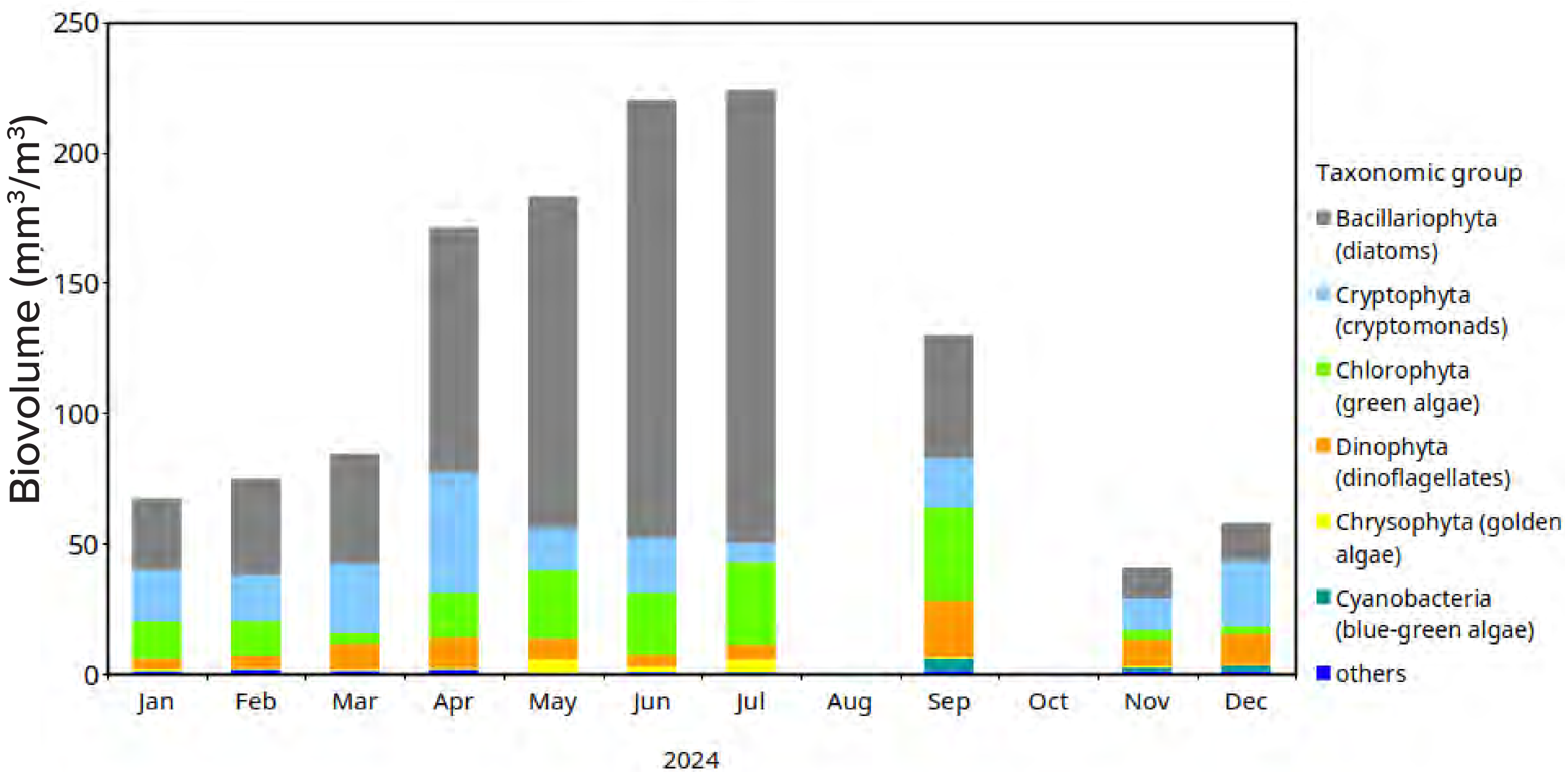


Algal groups as a fraction of total biovolume

Monthly in 2024

The biovolume of algal populations usually vary seasonally as well as year to year. In 2024, phytoplankton biovolume in Lake Tahoe showed seasonal variation in both abundance and community composition. *Bacillariophyta* (diatoms) were the most abundant group and a major contributor to algal biomass (biovolume) throughout the year. Their presence was especially strong beginning in the winter and early spring (January-April), with a peak in mid-summer (July). *Cryptophyta* maintained a consistent presence across most of the year, particularly from January through April and again in November-December, contributing notably to the overall biovolume. The absence of data from August and October limits the full resolution of late-summer dynamics, but overall, the season succession of algal groups in 2024 was consistent with long-term patterns, and characteristic of Lake Tahoe baseline conditions.

Data source: TERC lake monitoring.

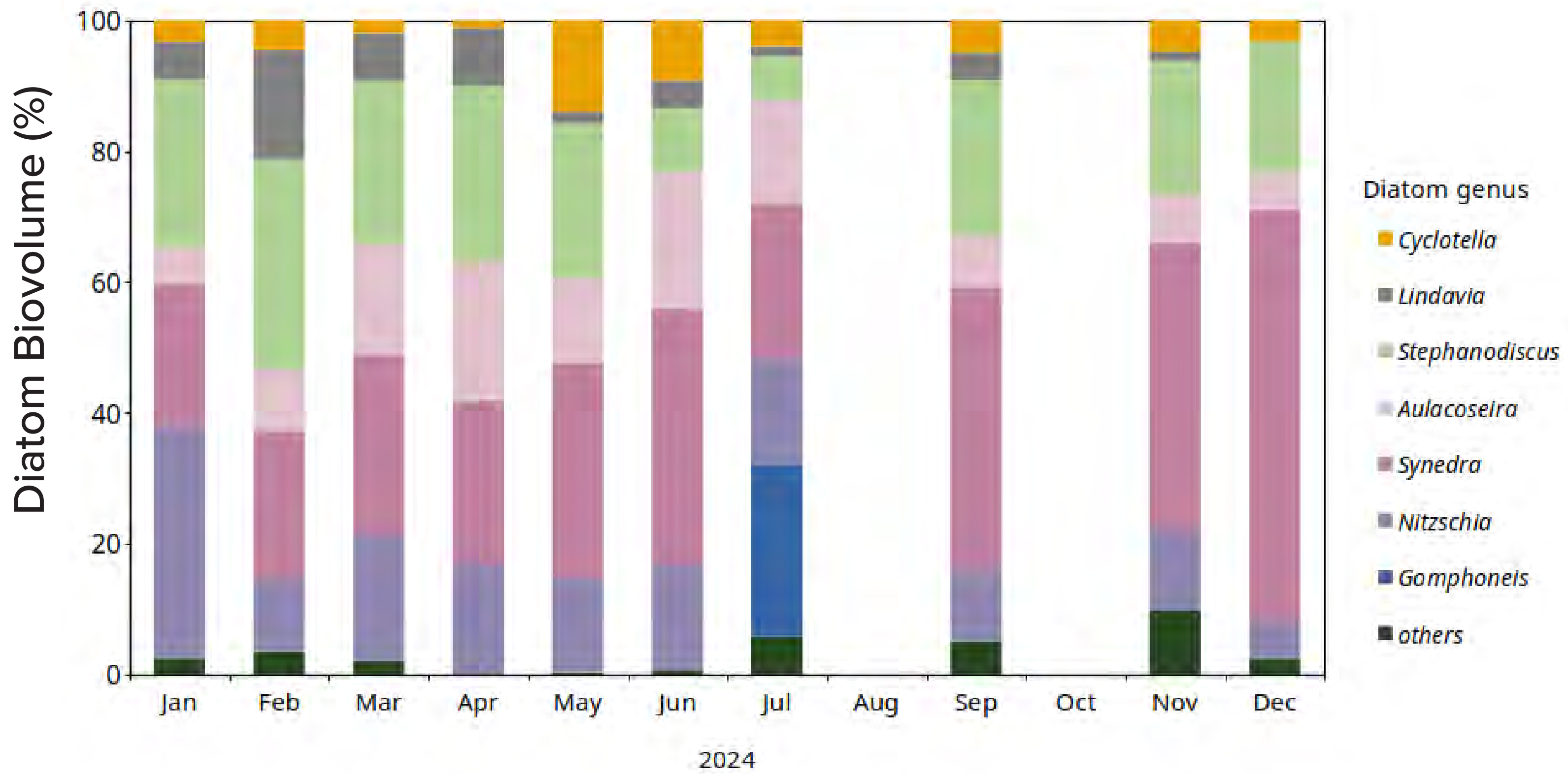


Abundance of dominant diatom species

Monthly in 2024

Diatoms are unique among algae in that they have a rigid cell wall made of silica, called a frustule. Diatoms have been the dominant algal group at Lake Tahoe for all but a few years, and it has been important to take a closer look at the size and identity of diatoms due to their effects on the food web and water clarity as well as their usefulness as indicators of lake dynamics. The diatom community composition in 2024 exhibited dominance by a few key genera, with seasonal variation in their relative contributions. *Stephanodiscus* and *Aulacoseira* are relatively large diatoms; they were the most consistently abundant throughout the year. The genus *Gomphoneis* is typically found in benthic environments, not floating with other plankton, but it was one of the major components of the diatom community in July. Its presence can be an indication of processes that connect nearshore and pelagic habitats. The much smaller diatom *Cyclotella*, known to negatively impact Lake Tahoe's clarity, was a minor constituent of the community. It is worth noting that in terms of cell counts, larger forms may be less abundant than smaller ones, but their biovolume may have higher contribution to the total biomass.

Data source: TERC lake monitoring.

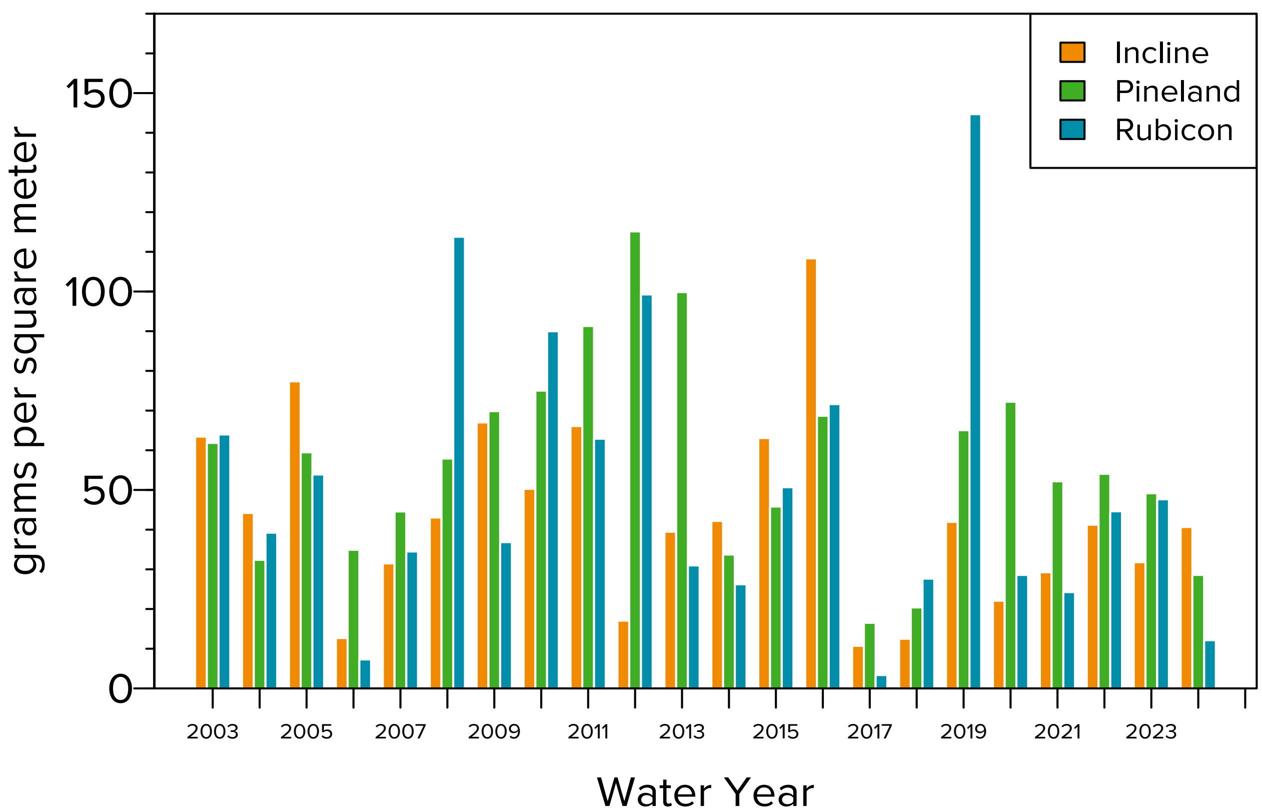


Peak shoreline algae concentrations

Yearly since 2003

Periphyton, or attached algae, makes rocks around the shoreline of Lake Tahoe green and slimy, or they sometimes form a very plush white carpet after being sun-bleached. This graph shows the maximum biomass measured at 1.5 feet (0.5 m) below the surface at three sites from January to June. In 2024, concentrations at the Incline, Pineland, and Rubicon sites were all below their long-term average. Site-specific biomass measurements do not capture the critically important spatial extent of periphyton blooms, but they do maintain a long-term record for comparison with the much larger dataset currently being collected.

Data source: TERC lake monitoring.



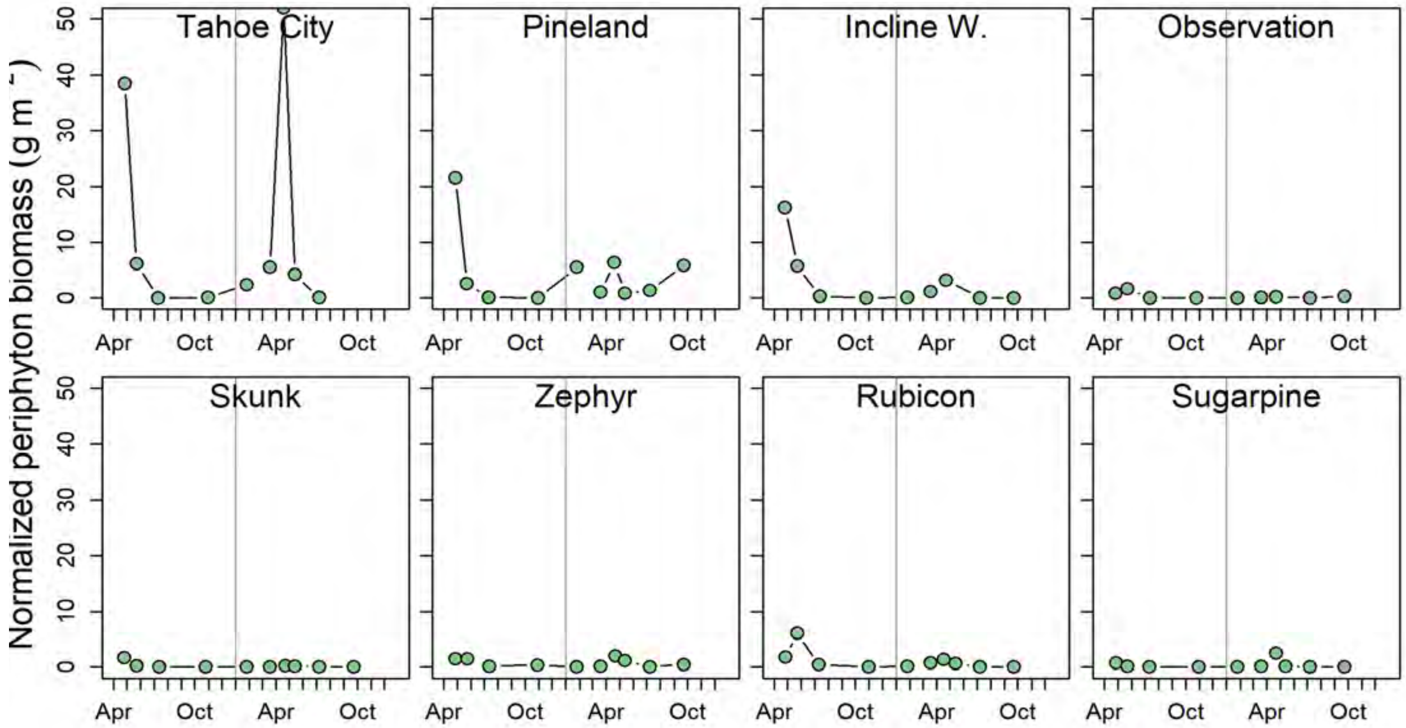
Shoreline algae distribution

In 2024

In 2024, periphyton biomass and areal extent were surveyed monthly from January – May, July, and August, at 8 sites strategically located around the nearshore of Tahoe. The goal of this monitoring is to track periphyton growth both spatially and temporally throughout the year. Periphyton is surveyed most frequently in winter and spring as this is when periphyton is usually at its annual maximum. Periphyton biomass measurements are collected by divers in 1.5 feet (0.5 m) of water in the nearshore around the lake. The areal extent of periphyton growth at each site is measured by analyzing images captured during drone flights. Biomass and areal extent are combined into a normalized biomass metric. Normalized ash-free dry weight (AFDW x periphyton area/total site area) is a metric that accounts for both biomass density and areal extent of growth. In 2024, normalized periphyton biomass peaked in April and May, and was highest at west shore (Tahoe City and Pineland) and northwest shore (Incline West) sites. The east shore sites had relatively low periphyton growth.

While TERC is unable to take measurements continuously around the entire 72-mile shoreline of Lake Tahoe, site-specific measurements are a good estimate of algae growth. Still, there may be areas of variability within each section of shoreline.

Data source: TERC lake monitoring.

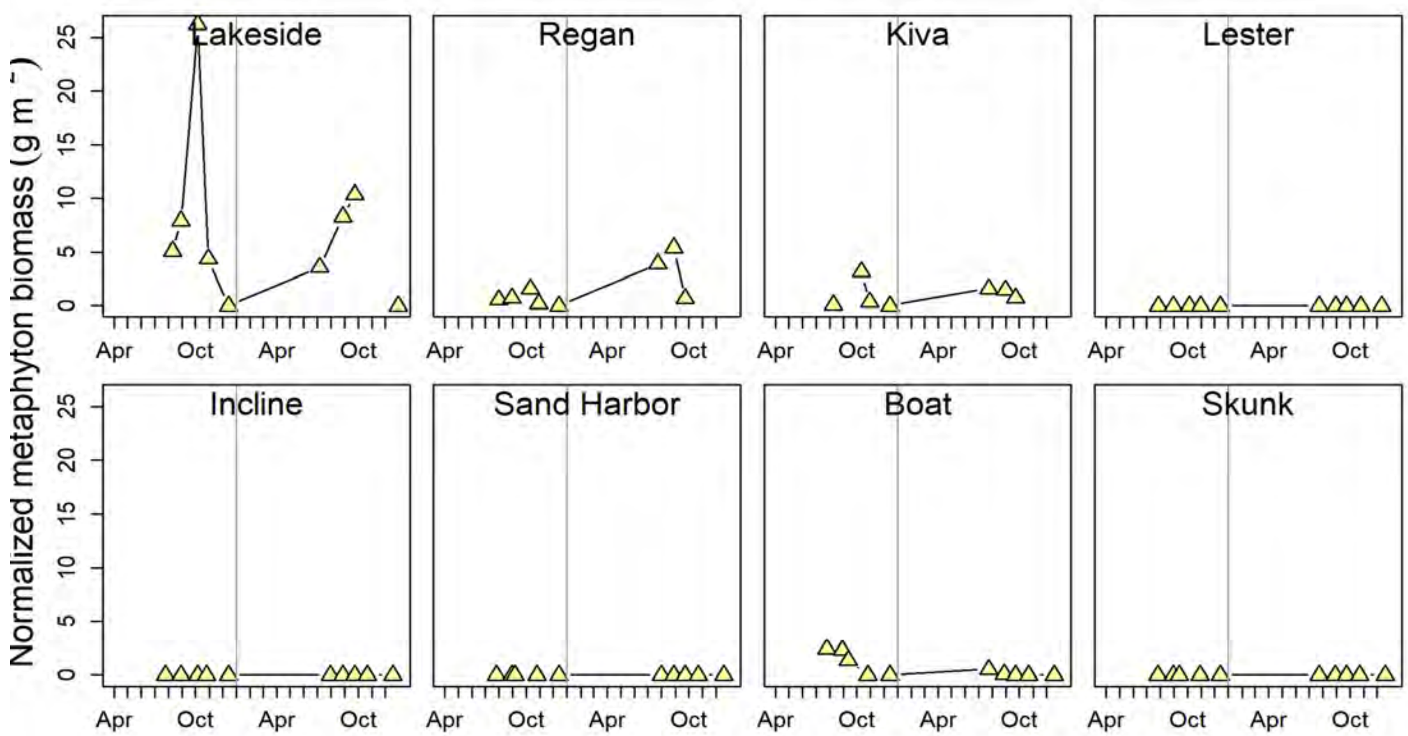


Metaphyton distribution

In 2024

Metaphyton, or unattached nearshore algae, can form bright green carpets above sandy substrate in Lake Tahoe, and can wash ashore when lake levels are low. In 2024, metaphyton growth was surveyed at 8 sites in July, August, September, October, and December. Monitoring is prioritized during summer and autumn, when metaphyton algal growth tends to peak. Similar to periphyton, TERC collects biomass measurements and conducts drone flights at each metaphyton site to estimate normalized biomass. In 2024, normalized metaphyton biomass peaked in August and September and was highest at the sites along the south shore (Lakeside, Regan, and Kiva Beach) and southeast shore (Boat Beach) and was extremely low or not detected elsewhere.

Data source: TERC lake monitoring.

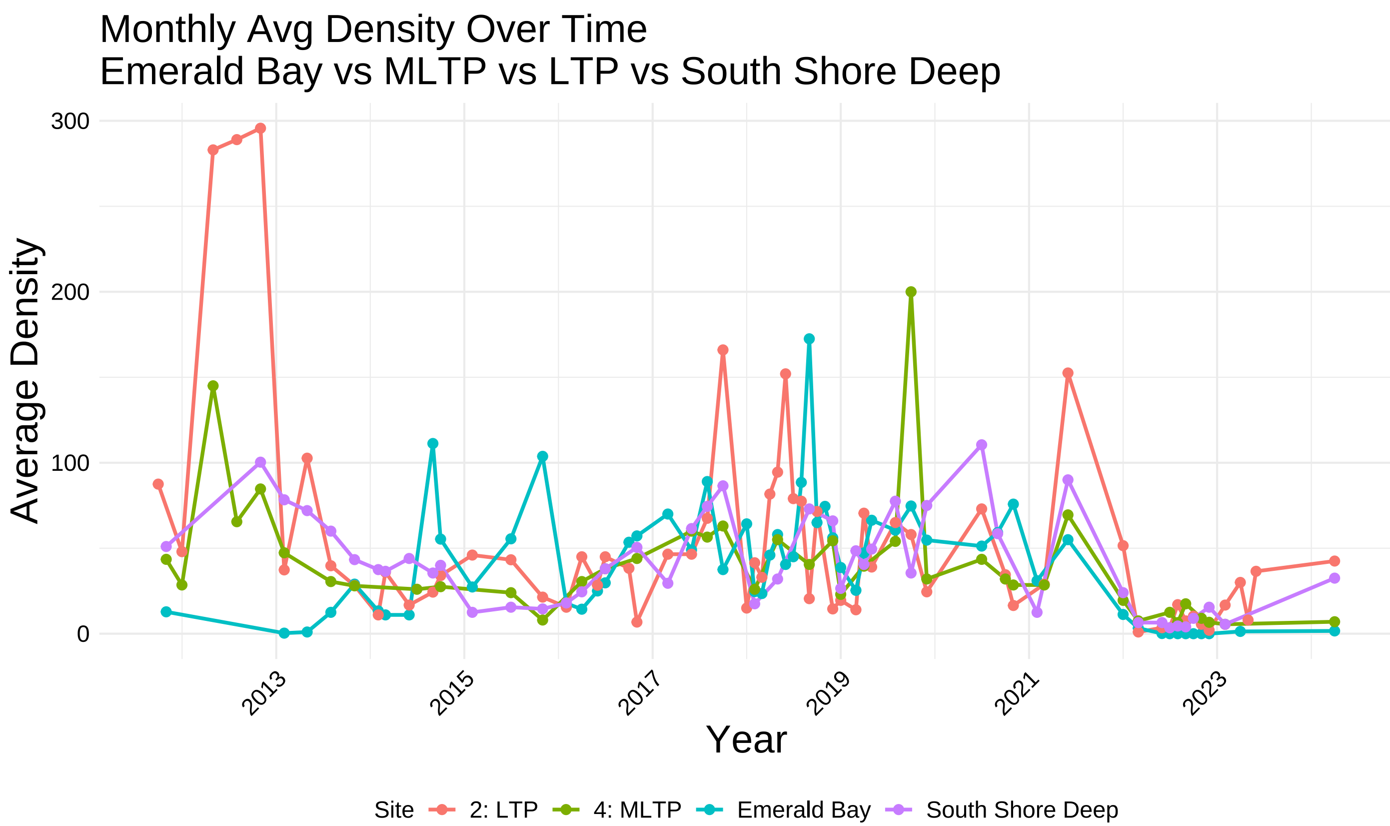


Mysis population

Since 2012

Mysis shrimp were introduced to Lake Tahoe in the 1960s in an attempt to improve the size of game fish in the lake. The intended result did not occur and instead the *Mysis* upset the existing lake food web. Within four years of their introduction, they had decimated the populations of the native cladocerans (*Daphnia* and *Bosmina*) and since that time, these zooplankton are rarely observed. *Daphnia* and *Bosmina* were once an important food source for native minnows, which in turn provided food for kokanee salmon and rainbow trout. Little data collection on mysids occurred from the 1980s until 2012 when TERC has recommenced regular surveys of Lake Tahoe and Emerald Bay. Sampling has been done at South Shore Deep (200 m), LTP Index (100 m), MLTP Index (200 m), and Emerald Bay (60 m). The *Mysis* densities (number of individuals collected divided by the net opening area) in Lake Tahoe show considerable variability but have been relatively low since 2022.

Data source: TERC lake monitoring.

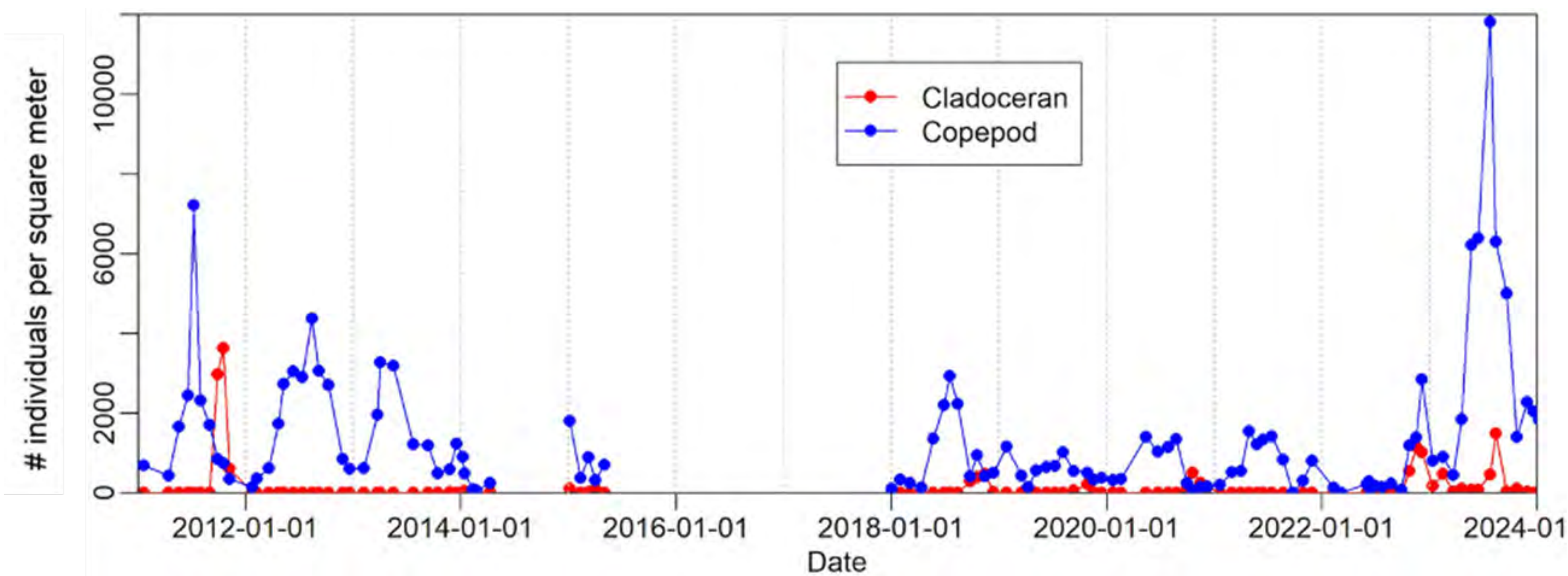


Zooplankton populations

Since 2012

The zooplankton populations in Lake Tahoe have been monitored episodically since the 1960s, but due to a lack of funding there are many data gaps, and 2024 sampling could not be carried out. Since 2012, TERC has sought to re-establish monitoring, given their importance in the food web as a link between phytoplankton and upper trophic levels such as mysids and fish. The data shown below are from the LTP site, where zooplankton were collected with replicate vertical trawls from a depth of 150 meters (492 ft) to the surface during the middle of the day. The figure shows the abundance of two groups of zooplankton — cladocerans (*Daphnia* and *Bosmina*) and copepods (*Epischura* and *Diaptomus*). The cladocerans are typically at very low values, a feature that first occurred after the introduction of *Mysis* shrimp in the 1960s.

Data source: TERC lake monitoring.



TAHOE: STATE OF THE LAKE REPORT 2025

CLARITY

UC DAVIS
Tahoe Environmental Research Center

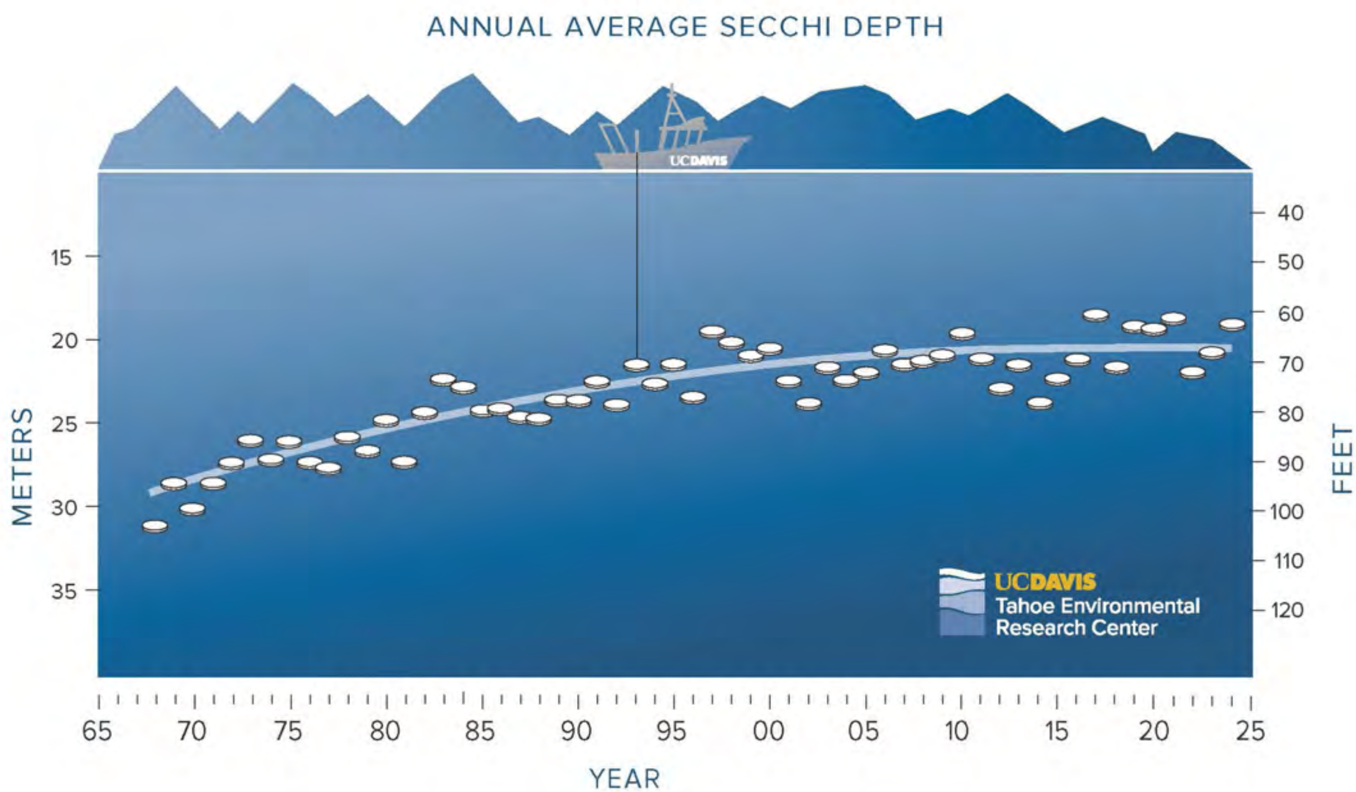
Annual average Secchi depth

Yearly since 1968

The Secchi depth is the depth at which a 10-inch white disk, called a Secchi disk, remains visible when lowered into the water. In 2024, Lake Tahoe's annual average Secchi depth was 62.3 feet (19.0 m) based on 27 readings at Lake Tahoe's long-term index station and 12 readings from the mid-lake index station taken throughout the year. This is a decline from the 2023 average of 68.2 feet. The clearest reading occurred on February 1, reaching 103 feet (31.4 m), likely due to deep winter mixing that brings low-particle, ultra-clear water to the surface. The lowest reading of the year was 41.2 feet (12.6 m) was recorded on July 24 likely due to the accumulation of algae and fine particles in the upper surface waters during summer stratification.

While year-to-year fluctuations in clarity are expected due to natural variability, the long-term trend over the past two decades suggests that lake clarity is neither significantly improving nor declining. The system appears to be in a relatively stable state, but is still far from the clarity restoration target of an annual Secchi depth of 97.4 feet (29.7 m) set by federal and state agencies.

Data source: TERC lake monitoring.



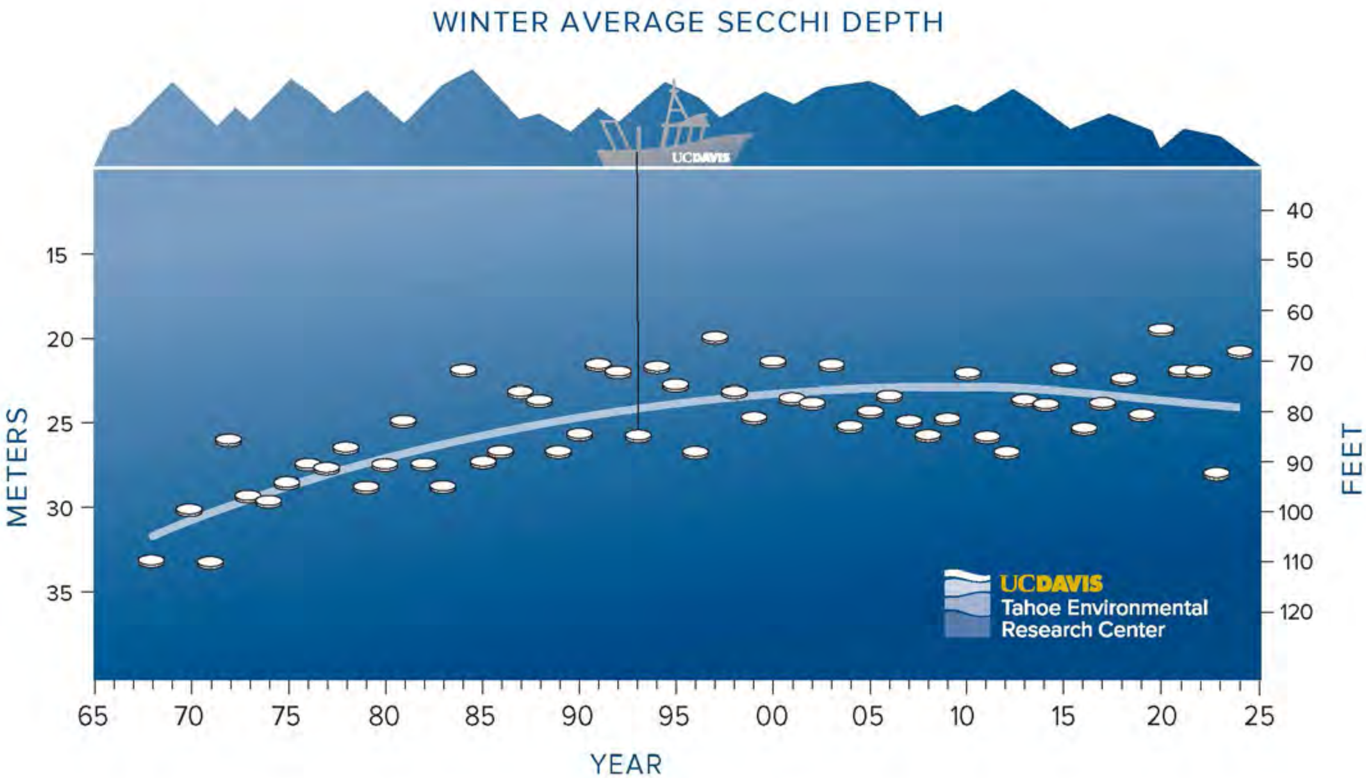
Winter Secchi depth

Yearly since 1968

During the winter clarity period, the average Secchi depth was 68.9 feet (21.0 m), well below the previous winter's exceptional average of 91.9 feet (28.0 m), but still within the typical winter range. The greatest individual reading was 103 feet (31.4 m) recorded on March 7, likely the result of deep winter mixing that brings clear, low-particle water from the depths to the surface. The lowest winter clarity reading was 56.6 feet (17.3 m) on January 4.

Winter clarity continues to be relatively stable, and recent data suggest a slight improving trend over the long-term. This contrasts with the greater variability seen in summer clarity.

Data source: TERC lake monitoring.



Summer Secchi depth

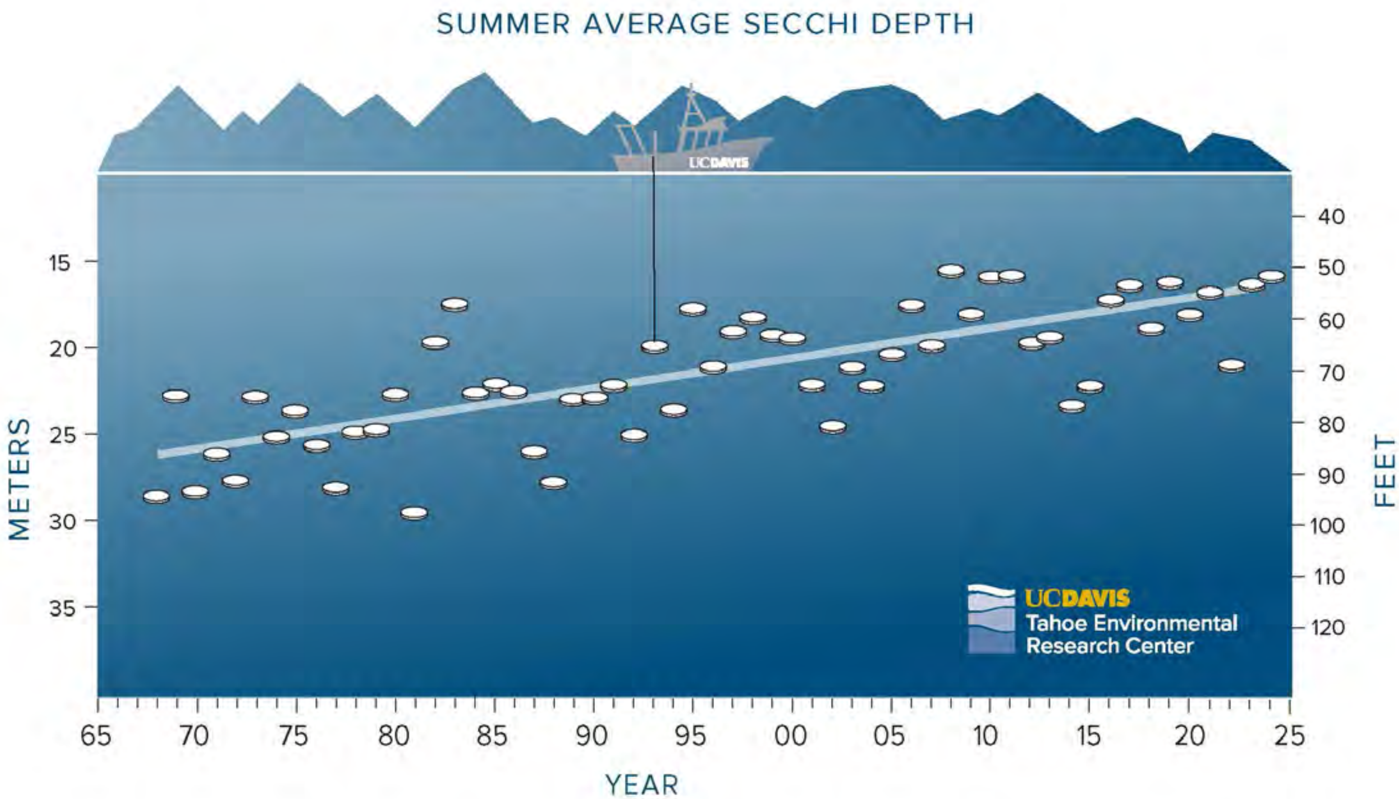
Yearly since 1968

The summer average Secchi depth dropped to 53.4 feet (16.3 m), making it the fifth poorest summer average recorded, with 2019 being 53 feet, 2008 being 51 feet, 2010 and 2011 being 52 feet.

Summer clarity in Lake Tahoe continues to show significant variability and long-term degradation, in contrast to the more stable winter clarity trends. Elevated algal growth and the accumulation of fine particles during warm, stratified months continue to contribute to reduced clarity.

Understanding the role of biological and physical drivers impacting summer clarity will be essential in meeting the clarity restoration target of an annual Secchi depth of 97.4 feet (29.7 m) set by federal and state regulators. This is a goal that agencies and the Tahoe Basin community continue to work toward.

Data source: TERC lake monitoring.



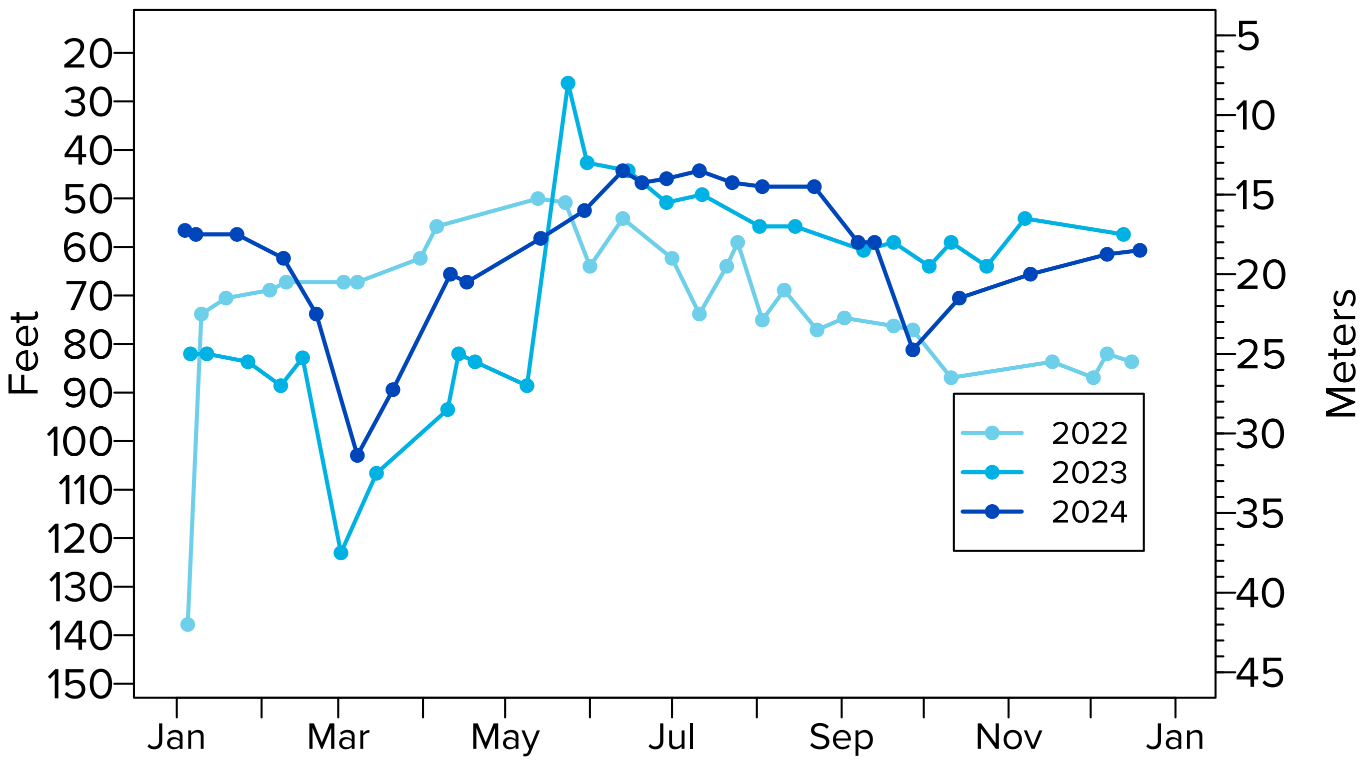
Individual Secchi depths

2022, 2023, and 2024

The individual Secchi depth readings from the Index Station on the west side of the lake for 2022, 2023, and 2024 are plotted. Secchi values can vary significantly over short time intervals due to shifting lake conditions. In 2024, the greatest clarity was observed in early March, when a Secchi depth of 103 feet (31.4 m) was observed. This was likely influence by winter mixing. Conversely, the worst clarity reading occurred twice, once in June and again in July, when the Secchi disk disappeared from view at just 44.3 feet (13.5 m).

These short-term fluctuations emphasize the importance of continued, high-frequency monitoring to distinguish long-term clarity trends from episodic events driven by wind, stratification, or biological processes.

Data source: TERC lake monitoring.



TAHOE: STATE OF THE LAKE REPORT 2025

EDUCATION AND OUTREACH

UC DAVIS
Tahoe Environmental Research Center

tahoe.ucdavis.edu

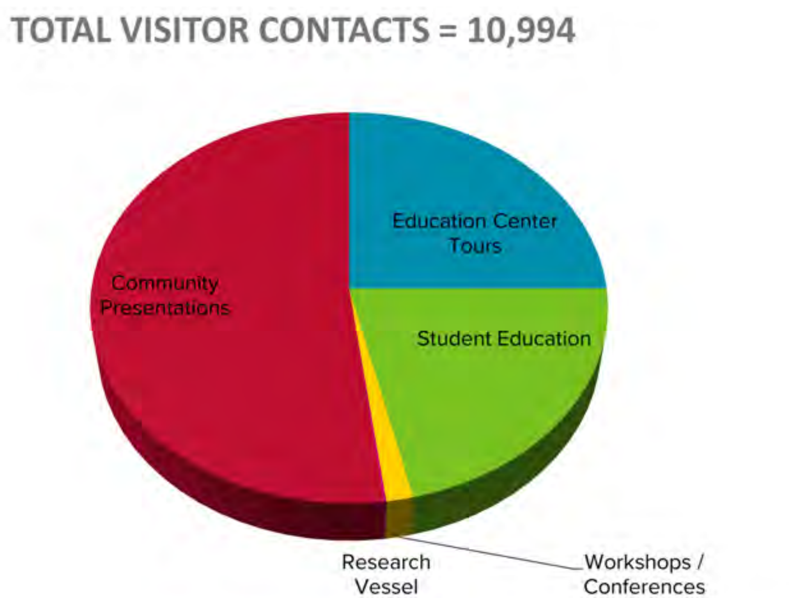
Education and outreach

In 2024

Education and outreach play a complementary role with UC Davis Tahoe Environmental Research Center (TERC) science and research providing access to educational content developed from technical reports, peer-reviewed publications, and ongoing research. Science and research inform tours, school field trips, community programs, exhibits, outreach events, and other educational initiatives. By increasing access to science, TERC aims to cultivate a better-informed local and visiting population and empower people to take meaningful action to protect Lake Tahoe.

In 2024, TERC interacted with 10,994 visitors through tours, school programs, lectures, and community outreach activities. The TERC Education Team provided engaging, place-based learning experiences through 66 field trips for 2,353 students, covering topics focused on lake ecology, climate change, forest health, geology, and microplastics in 2024. TERC educated the public through lectures, community presentations, and outdoor programming. The monthly lecture series continued to be a popular offering, providing science-rich content to 807 community members through 11 lectures featuring researchers from UC Davis and beyond. These programs were made possible by dedicated TERC staff and AmeriCorps members, who maintained TERC's core educational offerings and kept science accessible across the Tahoe basin.

While these numbers reflect continued demand for TERC's educational programming, the recent loss of AmeriCorps funding (May 2025) has had a substantial impact on capacity moving forward. The termination of the 2024-25 AmeriCorps program resulted in the loss of several service members who had been essential to the delivery of school programs, community outreach, and event staffing. Thanks to the generous donations from community members, we were able to hire those AmeriCorps members with new job descriptions that are 50 percent education and 50 percent research and keep them with a living stipend and previously promised education award. As a result, the 2025 engagement numbers will reflect the effort and difficult choices that TERC's education team has made to reduce its community programming footprint and align with the current staffing reality.



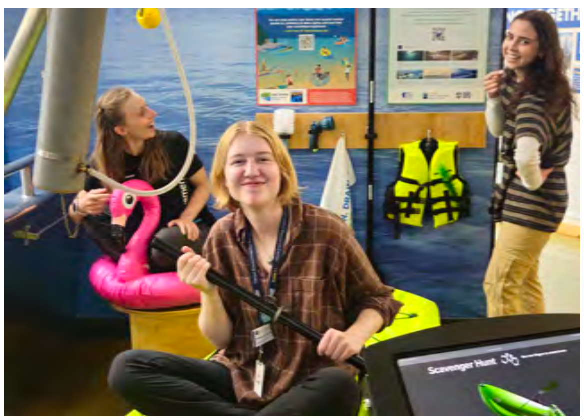
Educational exhibits

In 2025

UC Davis TERC continues to expand its educational offerings through exhibits and public engagement initiatives. In 2025, the League to Save Lake Tahoe's new Education Center in South Lake Tahoe held its grand opening, featuring TERC's research and education content as part of the exhibit experience. A highlight of 2025 is the launch of a new Aquatic Invasive Species (AIS) Prevention exhibit, which combines a physical kayak and paddle set-up with "hidden" scavenger hunt AIS items partnered with an interactive iPad exhibit. Visitors are invited to explore tactile clues and discover how AIS can spread through recreation, reinforcing the importance of the "Clean, Drain, Dry" prevention message.

Another exciting development is the new Little Limnologist activity booklet, created as a younger visitor companion to our Junior Limnologist program. This version introduces early learners to lake science through age-appropriate activities designed to spark curiosity and foundational understanding of freshwater ecosystems.

Additionally, TERC is developing a tree cross-section exhibit from a Ponderosa pine from a Tahoe City tree estimated to be several hundred years old. This exhibit will highlight tree physiology, climate variability, and forest change over time. Work has also begun on a Climate Change exhibit, which will feature community narratives to illustrate the local impacts of climate change and foster connection through shared experiences. Both exhibits are being developed with support from TERC's summer interns and are expected to be unveiled in Fall 2025.



Education staff (left to right) Mahren Hudson, Maggie Anderson, and Soffia Ramsey interact with the Aquatic Invasive Species exhibit. Explore the exhibit by climbing into a kayak, searching for invaders, and, most importantly, learning how to keep non-motorized watercraft Clean, Drain, and Dry. (Alison Toy, UC Davis TERC)

First grade students from Tahoe Expeditionary Academy visited the Tahoe Science Center for a field trip, where they helped beta test the Little Limnologist Challenge. Feedback from the students and their teachers is helping TERC educators better tailor the advanced content to be age-appropriate. (Alison Toy, UC Davis TERC)

Education summer intern Chloe Cervenka points to branch growth in a cross-section of a Ponderosa pine measuring approximately four feet in diameter. She will decipher the tree's life cycle and connect it to key events in Tahoe's history. Once complete, her work will be featured in the Tahoe Science Center. (Heather Segale, UC Davis TERC)

Educational programs

In 2025

TERC education programs continue to engage the public through a wide variety of science opportunities. Eight undergraduates from UC Davis, UCLA, UC Berkeley, University of Utah, and Dartmouth joined TERC for the summer as part of the TERC Internships for Scholars program. The ever-popular TERC Monthly Science Speaks Lecture Series featured a diverse lineup of topics, drawing strong attendance. Topics and themes are chosen for their ability to expand public awareness and knowledge of environmental issues at Lake Tahoe. Highlights included Freshwater on a Changing Planet with new TERC Executive Director, Dr. Stephanie Hampton, Performance Nutrition for the Everyday Athlete with Dr. Dana Lis, Algae Blooms at Lake Tahoe: TERC, Tech, and You with Dr. Samantha Sharp and TERC staff members Brandon Berry and Alison Toy.

2025 also marked the launch of a new winter outreach program, Ski with a Scientist, designed to bring informal science education to the slopes. In this pilot series, TERC researcher gave short, engaging presentations on skis and snowboards at Tahoe Palisades Alpine allowing for casual Q&A sessions on the chairlift. This new program allowed TERC educators and scientists to connect with community members in a place-based education format.

Due to the challenges posed by the termination of the AmeriCorps program, in 2025, for the first time since its inception, the annual Science Expo, typically educating around a thousand local students, was not held. The third Grow Your Own Festival held at the Tahoe City Field Station, still provided education and location-appropriate plants for community members to enjoy.

Despite these challenges, TERC continues to provide engaging, place-based learning experiences through lectures, exhibits, and more.

Forest ecology summer interns Faith Shortridge and Sydney Griscavage show off new skills tracking existing planting sites and testing for soil moisture content. They shared these skills with their fellow interns in the field while monitoring seedlings that were planted 2 to 3 years ago. (Soffia Ramsey, UC Davis TERC)

Staff researcher Aaron Vanderpool leads a fully booked Ski with a Scientist tour. In total, six sessions were held at Palisades Tahoe Alpine, highlighting the interdisciplinary work of TERC through these slopeside presentations by its scientists, staff, and educators.(Alison Toy, UC Davis TERC)

Volunteer and Lake Tahoe Master Gardener Dave Long shares the science behind the humble potato at the Grow Your Own - High Elevation Gardening event at the Tahoe City Field Station. This scaled-down event replaced the original Grow Your Own Festival following the termination of the AmeriCorps program. (Alison Toy, UC Davis TERC)

Educational programs

In 2025

A new and exciting outreach opportunity was presented to TERC in 2025 by the UC Davis Athletics Department. Aggie Athletics has partnered with TERC to celebrate our bold scientific breakthroughs with a bold new color and logo to match. Nine UC Davis athletics teams, including both men's and women's, will wear special Tahoe-themed sports jerseys in several games this upcoming season. The partnership will extend beyond the kits on the field as student-athletes will have opportunities to visit the facilities located on Tahoe's north and west shores for on-site learning and team retreats. Merchandise sporting the new logo is available in the Aggie Sideline Store.

This unique partnership will provide TERC with an opportunity to reach audiences that we would not normally reach, especially during nationally televised football games. This will raise TERC's profile on campus and off, expose more students to research opportunities in the basin, and set us apart from other institutions in the basin.

Student athletes have already had one visit to Lake Tahoe to capture promotional images and video. We look forward to more opportunities to bring athletes to experience the beauty of Lake Tahoe.

UC Davis football players show off their new Lake Tahoe uniforms in the UC Davis Tahoe Science Center in the Kids' Zone. (Heather Segale, UC Davis TERC)

UC Davis mascot Gunrock hams it up in front of the Virtual Research Vessel exhibit at the UC Davis Tahoe Science Center. (Heather Segale, UC Davis TERC)

UC Davis soccer players pose in their new Lake Tahoe uniforms in the theater of the UC Davis Tahoe Science Center. (Cara Hollis, UC Davis TERC)

UC Davis Tahoe Environmental Research Center is dedicated to interdisciplinary research and education to advance the knowledge of aquatic and terrestrial ecosystems and their interactions within natural and developed Earth systems, and to communicate science-informed solutions worldwide.

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