Lake Tahoe Clarity Report for 2021
Past 20 Years of Data Indicate Evolving Threats for Lake Tahoe

The cobalt blue waters of Lake Tahoe were about as clear in 2021 as they were in 2020. But a broader look at clarity measurements shows there is no pattern of consistent clarity improvement over the past 20 years. The lake also has not fully recovered from a spike of fine particles that flowed into its waters after the extremely wet year of 2017.

That’s according to the data collected through 2021 by the UC Davis Tahoe Environmental Research Center. UC Davis has measured clarity and other health indicators at Lake Tahoe since 1968, helping to inform policymakers and stakeholders on strategies to protect the lake and stabilize the decline in clarity that dates back to the region’s development boom in the 1960s.

Recent years have presented evolving and new threats to Lake Tahoe as climate warming, floods, droughts, and wildfires impact the lake in ways that are not fully understood.

“The lake itself is changing internally, and the external inputs that impact clarity and lake health are changing at the same time,” said Geoffrey Schladow, director of the UC Davis Tahoe Environmental Research Center. “We are working with other researchers at Lake Tahoe and with agency partners to not only keep track of clarity, but to adapt management approaches for improving clarity in future years.”
A perplexing pattern
Lake Tahoe’s average annual clarity in 2021 was 61 feet compared to 63 feet in 2020. Summer measurements were 54.8 feet, while winter averages were 71.9 feet.

While clarity in winter months are invariably better than during the summer, the trend from the past two decades indicate that neither summer nor winter clarity levels are improving over time.
Particle problems
Decades of research led to the development of the Lake Tahoe Total Maximum Daily Load (TMDL), the science-based plan to restore the lake’s historic clarity. TMDL science identified fine particles and tiny algae as playing a large role in determining lake clarity. Currently, these are responsible for up to 70% of clarity loss.

Public and private investments in water quality improvements over the past 25 years have significantly reduced fine particles and algae-feeding nutrients entering Lake Tahoe, and TMDL pollutant load reduction targets are being met.

However, fine particles have remained elevated since 2017, when unprecedented winter storms contributed to the worst clarity on record at Tahoe. Fine particles in Tahoe’s streams increased by four-fold that year and have remained above the historic mean since that time. Fine particles in the lake have similarly increased and have yet to return to their earlier concentrations.

Schladow notes that some of the lake particle readings were likely influenced by smoke deposition from the past several years of wildfires that have blanketed the basin. The precise role of wildfires on lake clarity and overall lake health is the subject of an on-going, Tahoe Science Advisory Council and multi-institutional study, the results of which are expected later this year.
“Extreme weather events and changing lake dynamics are making our investments in water quality even more important,” Tahoe Regional Planning Agency Interim Executive Director John Hester said. “With strong partnerships in the Tahoe science community, we will continue to increase our understanding of how climate-driven changes could be impacting the plan to restore lake clarity.”

A clear history
Clarity is measured as the depth to which a 10-inch white disk, called a Secchi disk, remains visible when lowered into the water. In 2021, UC Davis scientists took 22 individual readings at Lake Tahoe’s long-term index station. View the historic clarity readings from 1968-2021 at tahoe.ucdavis.edu.

Using a range of technologies beyond the Secchi disk, researchers continue to refine their understanding of the interactions of lake physics and ecology to determine the evolving causes of clarity change. In 2021, underwater autonomous gliders were added to the instruments now focusing on clarity changes in the lake.

The states of California and Nevada, which share a border at Lake Tahoe, are actively working to restore lake clarity to its historic 97.4 feet.

More than 80 organizations, including government agencies, nonprofits, and research institutions, are working collaboratively with scientists to improve Lake Tahoe’s water clarity and ecological health under the Lake Tahoe Environmental Improvement Program, or EIP, which is one of the most comprehensive, landscape-scale restoration programs in the nation. EIP partners are helping meet TMDL reduction targets by reducing pollution through improved roadway maintenance and erosion control on roadways and private properties.

Science partners will continue to research climate and clarity changes in Lake Tahoe and to inform policymakers of strategies to restore the lake’s historic clarity. The Tahoe Science Advisory Council, an independent group of research institutions, including UC Davis Tahoe Environmental Research Center, also conducts an annual analysis of lake clarity. The Council’s report on 2021 clarity conditions is available at tahoesciencecouncil.org.

Media Resources:
• Geoffrey Schladow, UC Davis Tahoe Environmental Research Center, 530-902-2272, gschladow@ucdavis.edu
• Kat Kerlin, UC Davis News and Media Relations, 530-750-9195, kekerlin@ucdavis.edu
• Jeff Cowen, Tahoe Regional Planning Agency, 775-589-5278, jcowen@trpa.gov

Press kit of figures and photos.