




UC DAVIS

TAHOE:
**STATE
OF THE
LAKE**
REPORT
2020

Tahoe Environmental
Research Center

A research vessel is positioned on a calm body of water, likely a lake, with a backdrop of forested mountains under a blue sky with scattered white clouds. The vessel's reflection is clearly visible on the water's surface.

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.

**Editor: S. G. Schladow
Co-Editors: A. Toy, S. Watanabe**

The 2020 Tahoe: State of the Lake Report is dedicated to the 41 years that Scott Hackley worked as a UC Davis researcher at Lake Tahoe, before retiring in June 2020.



Scott went far beyond the call of duty and his job description by measuring streamflows during the peaks of epic storms, gathering water samples across those same streams when concern for personal safety would have cautioned most people to defer to another day, and conducting periphyton samples during winter and spring for decades in a leaky wetsuit. His replacement wetsuit arrived two months before his retirement.

Many of the data points contained in this report and all previous reports were produced by Scott. If you find the report to be too long and to contain too much data, please contact Scott directly. Thank you Scott, for all your years of hard work and meticulous research. We wish you the best in your retirement!

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INTRODUCTION

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

In the UC Davis Tahoe: State of the Lake Report, we summarize how natural variability, long-term change, and human activity are affecting the lake's clarity, physics, chemistry, and biology. We also present a portion of the data collected in 2019—presenting all of it would be a monumental task. While Lake Tahoe is unique, the forces and processes that shape it are the same as 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 the knowledge gained 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 take into account a host of other considerations.

This annual report is intended to inform non-scientists about the variables 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 and those that are

observed over time scales of decades.

An important part of this Report are updates on research taking place independently of the long-term monitoring. These highlight some of the most exciting and promising findings of work that is still in progress. The new insights gained through this research will help keep Lake Tahoe at the cutting edge of science in the years to come. Many of these sections are exploring new ideas and approaches to address the ever evolving challenges to 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 sampling commenced. I would, however, like to acknowledge (in alphabetical order) the contributions of Brant Allen, Jonathan Arthur, Karen Atkins, Kian Bagheri, Brandon Berry, Mike Bruno, Tom Burt, Luciana Cardoso, Sudeep Chandra, Yuan Cheng, Danny Cluck, Bob Coats, Alicia Cortés, Stephanie Coppeto, Ben Daniels, Mark Enders, MJ Farruggia, Alex Forrest, Nick Framsted, Susan Frankel, Charles Goldman, Nick Gomez, Baylee Goodwin, Anne Graham, Scott Hackley, Tina Hammell, Simon Hook, Camille Jensen, Yufang Jin, Kwungwoo Lee, Anne Liston, Kevin Livingston, Patricia Maloney, Elisa Marini, Elise Matera, Jasmin McNerney, Antonina Myshyakova, Jo Myungchul, Holly Oldroyd, John Reuter, Bob Richards, Will Richardson, Gerardo Rivera, Derek Roberts, Steve Sadro, Goloka Sahoo, Heather Segale, Katie Senft, Steven Sesma, Samantha

Sharp, Roland Shaw, David Smith, Sheri Smith, Adrienne Smits, Drew Stang, Erin Suenaga, Jae Sung, Micah Swann, Lidia Tanaka, Raph Townsend, Alison Toy, Sean Trommer, Seung Tae, Sergio Valbuena, Aaron Vanderpool, Shohei Watanabe, Brian Wiebe, Andy Wong, and Carmen Woods to this year's report. In particular, Shohei Watanabe was responsible for the majority of the data analysis and Alison Toy led the compilation and layout of the final report.

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 California Tahoe Conservancy, Lahontan Regional Water Quality Control Board, Tahoe Regional Planning Agency, U.S. Geological Survey, and UC Davis.

Sponsors for current projects include the following: California Department of Fish and Wildlife, the California Tahoe Conservancy, Incline Village General Improvement District, Nevada Department of Tourism and Cultural Affairs, Nevada Division of Environmental Protection, Nevada Division of State Lands, the Parasol Foundation, the Tahoe Fund, and the Tahoe Truckee Community Foundation.

Our monitoring is frequently done in collaboration with other research institutions and agencies. In particular, we would like to acknowledge 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 (USGS), the University of Miami at Ohio, Universidad Austral de Chile, and the University of Nevada, Reno (UNR).

We are very proud to recognize the funding support for the 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, League to Save Lake Tahoe, Parasol, Tahoe Fund, Tahoe Lakefront Owners Association, Tahoe Regional Planning Agency, 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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