

Lake Tahoe's famed clarity getting substantially murkier

By Katherine E. Hill

Lake Tahoe's world-renowned water clarity dropped 3.7 feet in 2010 from 68.1 feet to 64.4 feet, the second-lowest clarity level ever recorded.

The drop in clarity is the result of climate change and increased algae growth, according to the UC Davis Tahoe Environmental Research Center in the annual State of the Lake Report released Friday.

Lake Tahoe's famed clarity can increase or decrease based on any number of factors such as fine articles, algae growth, sediment runoff, snowmelt and others. Researchers say the decrease between 2009 and 2010 in clarity is the result of climate change that may have allowed for the growth of a tiny, free-floating algae named *Cyclotella*. These tiny algae, which proliferate in warmer temperatures, have grown significantly in recent years.



The Secchi disc is lowered into Lake Tahoe for one of several readings.

Photos/TERC

“This year, in particular, these single-cell algae were concentrated very close to the surface, strongly scattering light and thereby impacting lake clarity,” said John Reuter, associate director of TERC in a release about the decline in clarity.

The State of the Lake report also calls for continued joint efforts by California and Nevada to manage the health of Lake Tahoe. The Nevada Legislature passed a bill in June to pull out of the Tahoe Regional Planning Agency Compact by 2015 unless the Regional Plan is amended.

“While land use activities, resource management activities and policy can be controlled to conform to geopolitical boundaries, the waters of Lake Tahoe are not constrained by these human boundaries,” the report states. “What happens in the waters of Lake Tahoe is a direct reflection of activities in both states. If a concrete example of why Lake Tahoe needs to be managed jointly by the two states is needed, then this is one.”

Optimism despite decline

The clarity report also reports a trend in increased clarity during the winter months, with decreased clarity occurring during the warmer, summer months. Researchers stated in the report that improvements in winter clarity measurements may be due to recent efforts to reduce urban stormwater flows, but that those gains are being lost in the summer, which sees higher than normal temperatures due to climate change.

“There is every reason to believe that if it were not for the decades of watershed management, development policy and water quality restoration projects, the lake’s transparency would be worse than it is today,” Geoffrey Schladow, TERC’s director, said in the release.

Despite the drop in clarity, researchers remain positive about the overall health of the lake. The lake clarity chart shows

the measurement through the years.

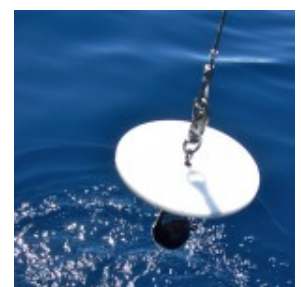
“Taken alone, that decline in clarity is unusual, but it is within the range of normal fluctuations,” Schladow said.

For the first time, researchers also have gleaned a bigger picture of Lake Tahoe’s clarity using remote sensing to record data from around the lake. Most notable in the remote sensing findings is that clarity on the East Shore is lower than the West Shore for most of the year, according to the report. As well, clarity generally improves 1 mile off the shoreline than at points closer to the shore.

How clarity is defined

Lake clarity is measured by several scientific means, but it has been continuously measured since 1968 using a Secchi disc, a 10-inch white disc that is lowered into Lake Tahoe throughout the year to come up with a yearly average. The Secchi measurements are the longest continuous measure of Lake Tahoe’s water clarity.

The Secchi disc was developed in 1865 for use by ships to measure the depths of harbors, but has been used in modern times to measure the clarity of water.



The Secchi disc is the main means to measuring lake clarity.

The Secchi disc measurements are taken by researchers every 10 days at solar noon at the same two locations – off the Tahoe City shelf and off Homewood toward the middle of the lake, according to Heather Segale, TERC's Education and Outreach director.

The disc is lowered from the boat by a metered wheel and the researcher marks the point on the wheel at which the disc disappears from view, Segale explained, and then marks the point at which the disc reappears as it is raised. The distance between these two points is averaged for the day's reading.

Since the researchers rely on their eyesight to mark the points at which the disc disappears and reappears, they are required to have their eyesight checked regularly, cannot wear sunglasses, and measurements are performed only during smooth waters, according to Segale. The annual clarity measurement is an average of about 20 to 25 measurements; about 10 are thrown out due to anomalies such as inclement weather, wind and other factors.

While the Secchi disc measurements represent the longest study of the lake's clarity, researchers also rely on other measurements to gauge clarity. Researchers use several high-tech instruments mounted on a Seabird profiler: a transmissometer that measures how much light of a certain wavelength is received over a fix path; an optical backscatter sensor that measures how much light from a LED is scattered backward by particles; a photosynthetically active radiation sensor that measures solar radiation; and a turbidimeter that measures the cloudiness of water.

In addition to the annual clarity report, the State of the Lake report also addresses efforts to control aquatic invasive species, such as the Asian clam that were first reported in Lake Tahoe in 2002. The report also addresses the impact of climate change on precipitation, changes in the lake's water

temperature and effect of lake warming on circulation.

To view the report, go online.