

Climate change taking toll on Lake Tahoe

By Linda Fine Conaboy

INCLINE VILLAGE – Despite all its beauty, Lake Tahoe is sick.

Climate change is the overriding factor for warming water, dying trees and the proliferation of invasive species. It's an uphill battle for scientists trying to keep the balance or even tip the scale into the healthy realm.

Geoff Schladow, director of the Tahoe Environmental Research Center, on July 27 presented the annual State of the Lake, touching on factors vital to Lake Tahoe's clarity.

Schladow gave a snapshot of the lake's health in 2016 using just-released data from TERC and the Tahoe Regional Planning Agency. He added humor to a fairly dismal look back, interjecting some of Shakespeare's droll quotes and riffing off the Bard's more waggish side.

Although the audience appreciated a nod to the humor of Shakespeare, Schladow's talk was a serious one not dissimilar from his 2015 review.



Scientists hope the sun has not set on their ability to combat the impact of climate change on Lake Tahoe. Photo/Kathryn Reed

Water temperatures continue marching upward, not good for a pristine high-elevation lake, he said. “This is climate change. Since 1968, the days of stratified water (warm water above cold water) has increased by 26 days.”

In layman’s terms, this stratification precludes the normal deep mixing of the lake’s waters, a process vital to Lake Tahoe—it’s the way the lake renews itself. The absence of a deep mixing of nutrients leads to warming water, contributing to a build-up of nutrients at the lake’s bottom. According to Schladow, deep mixing has not taken place for at least six years.

“Normally the deep mix occurs in March, but it’s still not happening. The nutrient levels are going up, nothing is moving them. Every day, the bottom of the lake is losing air,” he said.

Some organisms find this state of the lake favorable; these, Schladow calls bad hombres. For example, *Cyclotella gordensis* is flourishing, cloning itself in vast numbers, especially in 2016.

“As soon as it starts increasing, algae starts growing and clarity goes down. This is not the first time this has happened,” Schladow said. However, he added, the good news is for many years there have been no new destructive species introduced to the waters of Tahoe.

However, those that are here now are not good, he said, citing an invasion of Asian clams in Marla Bay, discovered by what he calls, “citizen scientists.”

Asian clams can relocate themselves to other areas via circulation cells within the lake, and are now located in Zephyr Cove and even Sand Harbor, where the thinking is that they arrived there by boat.

Schladow posed the questions: Is it a big deal to have clams in Lake Tahoe? What will happen if nothing is done?

Clams will reproduce, laying at the lake’s bottom, causing algae to grow, which litters the shore. Clams then eat the algae, sluffing off nutrients in their waste, which causes more algae to grow, causing the lake to turn green instead remaining blue.

Asian clams are succumbing in large numbers due to rubber mats placed on the lake’s sandy bottom. These are incredibly effective, Schladow said. In areas overtaken by destructive milfoil weeds, **herbicide usage** is under discussion and **ultraviolet light** is being tested as a means of eradication.

“The collaboration that exists between the science community and the various Tahoe agencies is probably at an all-time high. This is important at this point in time when we are entering a period when we can no longer rely on what has

worked in the past,” Schladow told *Lake Tahoe News*. “The past is in the past, and the future as far as climate, hydrology and ecology are concerned is far from understood. Scientists are helping to keep agencies informed, and at the same time the agencies are letting the science community know what their major questions are.”

A never-ending circle of destruction it seems, Schladow said, adding that Lake Baikal in Russia currently is facing its own algae invasion with huge amounts of the stuff on its shoreline. Baikal and Tahoe are like twin lakes in many ways.

“Suffice it to say, water temperatures are warming at the bottom of the lake, because of a lack of mixing,” he said.

On Tahoe’s shores, Schladow said tree mortality has doubled from 35,000 dead trees in the basin in 2015 to more than 72,000 in 2016. Drought and beetles are vying for first and second place as the leading causes for the die off.

In an effort to combat this situation, TERC and NASA are collaborating to measure plant stress from space at different times of the day, while helicopters and drones are surveying the entire shoreline to glean data.

There is some good news. While average water temperatures have continued to warm, in July 2016, they fell by 2.9 degrees due to increased winds and cooler than usual temperatures.

“The improvement in winter clarity was very encouraging of the agency efforts, and helps justify the expenditures that have been made to date,” he said.

In addition, the lake level rose by more than 20 inches, bringing it back above its natural rim and allowing it to flow into the Truckee River during the epic 2016-17 winter. And the Upper Truckee River floodplain is doing what it should be doing now by effectively accommodating the huge runoff from the recent blockbuster winter.

“We have come a long way in the last 15 years in instrumenting the lake. What this means is that we have made a lot of the investments needed to ensure that the right types of data are being collected,” Schladow told *LTN*. “These are critical to understanding how the lake is changing.”