

Lake water temperature

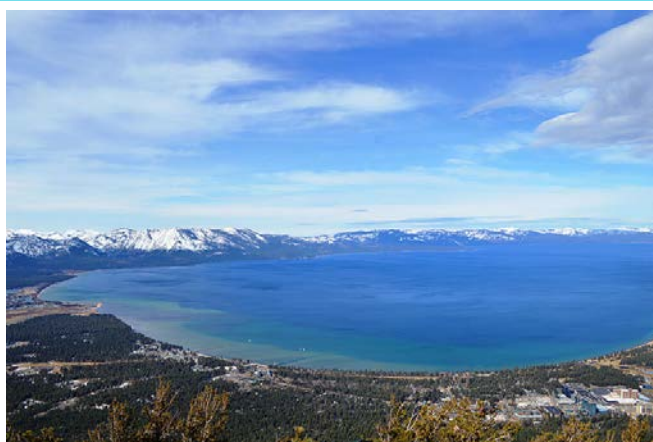
Lake Tahoe waters are warming in response to warming air temperatures in the Sierra Nevada.



Water temperatures have risen at Lake Tahoe since the 1970s. Air temperature, humidity, ice cover, wind and other climate-related conditions are among the factors affecting lake water temperatures. Hence, lakes serve as good sentinels for climate change. Around the world, lake waters have warmed significantly at a rate consistent with the increase in air and ocean surface temperatures.

Warming waters can disrupt important processes that support a healthy lake ecosystem. At Lake Tahoe, these disruptions are occurring alongside

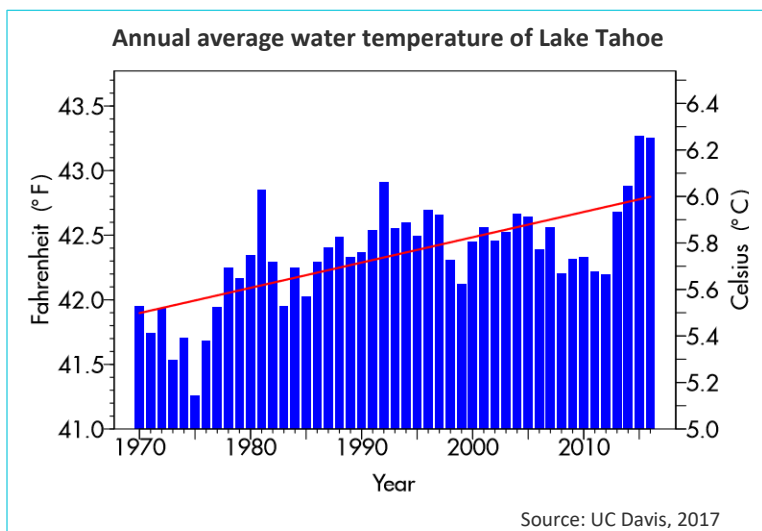
other stressors such as inputs of nutrients from fertilizer use and sediment. Collectively, these stressors have degraded water clarity, a commonly used visual indicator of a lake's ecological health. Lake Tahoe's world famous clarity and the many recreational opportunities it offers, draw visitors from all over the world, generating an estimated \$4.7 billion each year. Reduced water clarity, and the decline in ecosystem health that it indicates, could jeopardize the lake's attraction as a major tourist destination.



Lake Tahoe is the second deepest lake in the United States. Considered one of the jewels of the Sierra Nevada, it is renowned for its scenic beauty and the clearest waters among the world's large lakes.

What does the indicator show?

Average water temperatures in Lake Tahoe – derived from measurements from the bottom to the surface of the lake — have gone up by nearly a full degree Fahrenheit (°F) since 1970, at an average rate of 0.02°F each year. In the last four years, Lake Tahoe's waters warmed at a rate about 10 times faster than the long-term rate. This rapid warming is of special concern, because Lake Tahoe's enormous volume should make it less vulnerable to change.



The surface of Lake Tahoe warmed about twice as much as the lake's overall temperatures over the same time period, at about 0.04°F per year (not shown). In 2015, the average surface water temperature was the warmest on record.





Why is this indicator important?

Even seemingly small increases in water temperature can significantly affect key physical and biological processes in lakes. Fish and other aquatic species often do best within a certain range of water temperatures. As water temperatures rise, native populations of fish and other species might not thrive, while introduced species that previously would not survive in the lake are able to do so. Populations of non-native species, often unchecked due to the absence of their usual predators, compete with native species and alter the habitat.

Warmer temperatures have influenced deep mixing, a natural process whereby cool surface waters sink downward, while deeper waters rise to the top. This process plays a critical role in supplying nutrients to the surface to support the food web and distributing heat and oxygen throughout the lake. In the past five years, however, the lake has not mixed to its full depth. The lack of mixing can reduce clarity in different ways, such as by promoting the growth of small, free-floating algae that block sunlight. With increased warming, deep mixing in Lake Tahoe will become less frequent, and fundamental processes that support a healthy lake ecosystem will be disrupted.

The resulting physical and biological changes associated with continued warming, in concert with other stressors, could threaten Lake Tahoe's ecology and beauty, which are vital to the economies of its nearby communities.



Lake Tahoe is a major tourist destination, attracting 4.5 million people each year with its stunning beauty and opportunities for swimming, fishing, kayaking, skiing and boating.

Photo: Lake Tahoe Visitors Bureau

For more information about this and other climate change indicators, visit:

<https://oehha.ca.gov/climate-change/report/2018-report-indicators-climate-change-california>

