

# Climate change disrupting natural cycles at drier Lake Tahoe

October 23 2021, by Scott Sonner

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Water flows have slowed to a trickle on the Truckee River flowing out of Lake Tahoe from Tahoe City, Calif. a few miles upstream from Truckee, Calif. Wednesday, Oct. 20, 2021. Drought fueled by climate change has dropped Lake Tahoe below its natural rim and halted flows into the Truckee River, an historically cyclical event that's occurring sooner and more often than it used to -- raising fears about what might be in store for the famed alpine lake. (AP

Photo/Scott Sonner).

Drought fueled by climate change has dropped Lake Tahoe below its natural rim and halted flows into the Truckee River, an historically cyclical event that's occurring sooner and more often than it used to—raising fears about what might be in store for the famed alpine lake.

Scientists are concerned that the growing frequency of low-water extremes may become the new normal.

They point to seasonal shifts in weather patterns causing precipitation that historically falls as snow to arrive in the form of rain atop the Sierra along the California-Nevada state line.

"Our summers are lasting longer. Springs are coming sooner," said Gregory Schladow, a water resource and environmental engineering professor who is the founding director of the UC Davis Tahoe Environmental Research Center.

"The water level has always gone up and down," he said this week. "It's always occasionally gone below the rim. But the frequency of the changes is increasing."

Over the past century, the amount of precipitation falling as snow has declined from 52% in 1910 to 33% in 2020 and is projected to drop below 20% by the end of the century, according to experts at the research center in Incline Village, Nevada.

Rain runs off the mountains instead of piling up as snow on mountaintops for safe storage until it is most needed in late spring and summer—the high Sierra equivalent of somebody leaving the freezer



door open at the top of the refrigerator.



A pier and dock sits above Lake Tahoe's receding shoreline Wednesday, Oct. 20, 2021 in Tahoe City, Calif. Drought fueled by climate change has dropped Lake Tahoe below its natural rim and halted flows into the Truckee River, an historically cyclical event that's occurring sooner and more often than it used to -- raising fears about what might be in store for the famed alpine lake. (AP Photo/Scott Sonner).

Since summer, boat ramps have been closed. Docks sit precariously above the receding [lake](#)'s dry bottom. Boat and kayaking rentals have

fallen, and river rafting operations on the Truckee River had to end early.

"Our season was short, and we fear there may not be one next summer," said Toni Rudnick of the Truckee River Raft Company.

"It all depends on the snowpack," she said. "In 2015, didn't open at all when the Truckee River was a series of puddles ... In 2016, we had a 15-day season."

The U.S. Forest Service canceled this month's annual kokanee salmon festival at South Lake Tahoe because low water levels have all but cut off their migration route to spawn in Taylor Creek.

Deborah Grant Hanna is no scientist, but she's witnessed decades of ups and downs in [water levels](#) during 42 years at the lake. She manages the Gatekeeper Museum/Gift Store next to the dam in Tahoe City where the dry lake bed now extends 200 yards (183 meters) off the normal shoreline.





The gates are open at the dam on Lake Tahoe but no water is flowing into the mouth of the Truckee River Wednesday, Oct. 20, 2021 in Tahoe City, Calif. Drought fueled by climate change has dropped Lake Tahoe below its natural rim and halted flows into the Truckee River, an historically cyclical event that's occurring sooner and more often than it used to -- raising fears about what might be in store for the famed alpine lake. (AP Photo/Scott Sonner).

"The water usually gets the lowest in mid-November. It was lower than now in 2015-16," she said. "The problem with the rain now is it goes away from the mountain and causes flooding rather than storing snowpack. And as far as the local economy goes, the rain falls on the snow at the ski resorts."

The lake dropped below the natural rim at an elevation of 6,223 feet (1,897 meters) twice in the 1920s after the dam was completed in 1913 and created the capacity to store up to 6 feet (1.8 meters) of water above the lake's natural surface.

The level fell below the rim a half dozen times during the Dust Bowl in the 1930s, but not again until 1961, followed by 1977 and 1988. Since then, it's happened nine times—six since 2004.

Sarah Muskopf, a Forest Service aquatics biologist, said the drop in water occurs every year, but with varying degrees of intensity.





A woman walks with her dog on the dry lake bed that extends 200 yards from Lake Tahoe's normal shoreline Wednesday, Oct. 20, 2021 at Tahoe City, Calif. Drought fueled by climate change has dropped Lake Tahoe below its natural rim and halted flows into the Truckee River, an historically cyclical event that's occurring sooner and more often than it used to -- raising fears about what might be in store for the famed alpine lake. (AP Photo/Scott Sonner).

"Obviously, the changing climate is making this a more serious problem as aquatic habitat starts the season with less water, the system dries earlier, and water temperatures reach levels that do not support life cycle needs annually and earlier depending the water year," she explained.

Tahoe's [water](#) last reached its peak level in July 2019, but since then has generally fallen. The usual increase due to snowmelt in May and June was largely absent in 2021, the Tahoe Environmental Research Center said in a bulletin update this month.

Winter likely will arrive in the next few months and the lake will rise above the natural rim again, it said.

"But if the 2021-22 winter turns out to be below average"—as most models predict—"next year the lake will fall below the natural rim much sooner and likely stay there for most of 2022," it said.



The shoreline is receding at Emerald Bay on the southwest corner of Lake Tahoe Wednesday, Oct. 20, 2021 east of South Lake Tahoe, Calif. Drought fueled by climate change has dropped Lake Tahoe below its natural rim and halted flows into the Truckee River. Scientists worry that continued drought could cause silt to build up at the mouth of Emerald Bay, cutting it off from the rest of the lake for the first time in recorded history. (AP Photo/Scott Sonner).

"This will impact recreation in 2022, as many docks and boat ramps will be further away for the shoreline. The growth and the washing up of filamentous algae on the very wide beaches will increase," it said.

In the southwest corner of the lake, silt could build up across the mouth



of the 12-foot (3-meter) deep Emerald Bay, cutting it off from the lake itself for the first time in recorded history, the center said. The same might happen at the mouths of many streams, "cutting off access to spawning kokanee salmon next fall."

Researchers at Lake Tahoe are better armed than most with scientific knowledge since then-President Bill Clinton and Vice President Al Gore hosted an environmental summit at the lake in 1997. It paved the way for hundreds of millions of dollars of investment in new studies there over the next two decades.



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Tahoe below its natural rim and halted flows into the Truckee River, an historically cyclical event that's occurring sooner and more often than it used to raising fears about what might be in store for the famed alpine lake. (AP Photo/Scott Sonner).







Water flows have slowed to a trickle through the dam at Lake Tahoe at the mouth of the Truckee River in Wednesday, Oct. 20, 2021 at Tahoe City, Calif.. Drought fueled by climate change has dropped Lake Tahoe below its natural rim and halted flows into the Truckee River, an historically cyclical event that's occurring sooner and more often than it used to raising fears about what might be in store for the famed alpine lake. (AP Photo/Scott Sonner).



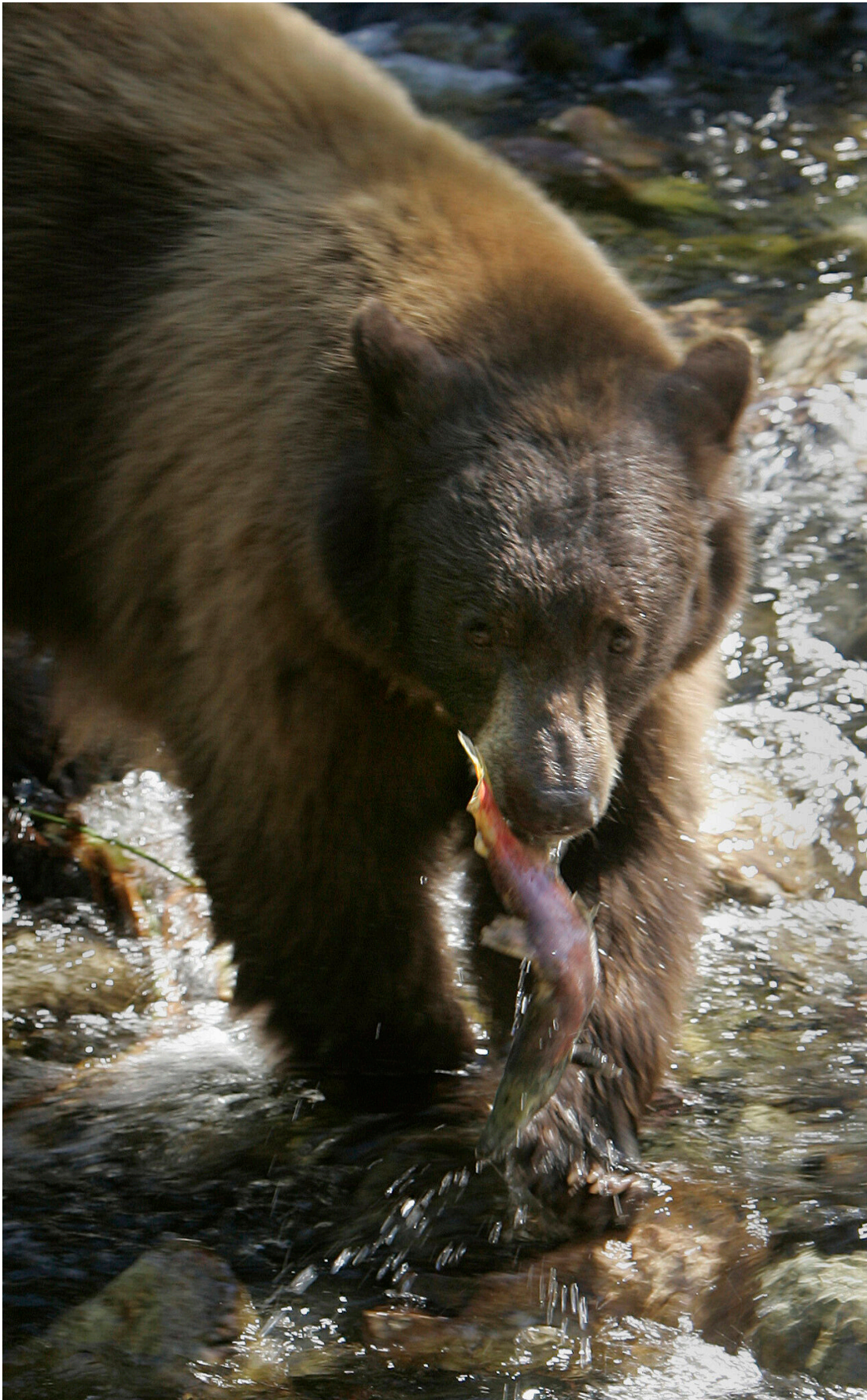
Kayaks and rafts are stacked along Lake Tahoe's receding shoreline Wednesday, Oct. 20, 2021 at Tahoe City, Calif. Drought fueled by climate change has dropped Lake Tahoe below its natural rim and halted flows into the Truckee River, an historically cyclical event that's occurring sooner and more often than it used to raising fears about what might be in store for the famed alpine lake. (AP Photo/Scott Sonner).





A man gazes into Taylor Creek where low water has all but cut off the kokanee salmon's migration route upstream from Lake Tahoe Wednesday, Oct. 20, 2021 west of South Lake Tahoe, Calif. Drought fueled by climate change has dropped Lake Tahoe below its natural rim and halted flows into the Truckee River, an historically cyclical event that's occurring sooner and more often than it used to raising fears about what might be in store for the famed alpine lake. (AP Photo/Scott Sonner).







In this Wednesday, Oct. 8, 2008 file photo, a black bear comes up with a kokanee salmon while hunting for fish along Taylor Creek near South Lake Tahoe, Calif. Drought fueled by climate change has dropped Lake Tahoe below its natural rim and halted flows into the Truckee River, an historically cyclical event that's occurring sooner and more often than it used to raising fears about what might be in store for the famed alpine lake. Scientists are concerned that the growing frequency of low-water extremes may become the new normal, Friday, Oct. 22, 2021 Credit: AP Photo/Rich Pedroncelli, File



In this Wednesday, Oct. 8, 2008 file photo, a Kokanee salmon swims in Taylor Creek near South Lake Tahoe, Calif. Drought fueled by climate change has dropped Lake Tahoe below its natural rim and halted flows into the Truckee River, an historically cyclical event that's occurring sooner and more often than it used to raising fears about what might be in store for the famed alpine lake. Scientists are concerned that the growing frequency of low-water extremes may become the new normal, Friday, Oct. 22, 2021 Credit: AP Photo/Rich Pedroncelli, File





Low water in Taylor Creek has all but cut off the kokanee salmon's migration route upstream from Lake Tahoe Wednesday, Oct. 20, 2021 west of South Lake Tahoe, Calif. Drought fueled by climate change has dropped Lake Tahoe below its natural rim and halted flows into the Truckee River, an historically cyclical event that's occurring sooner and more often than it used to raising fears about what might be in store for the famed alpine lake. (AP Photo/Scott Sonner).

Back then, the focus was on a decline in Tahoe's famed clarity. Initial concerns centered on air emissions from increased traffic, use of fertilizers and shoreline development that fuels erosion and sends fine



particles into the lake.

Schladow, the research center director, said that was followed by a better understanding of invasive species, like the Mysis shrimp, which were introduced into Tahoe in the 1960s as a food source for native trout but have been devouring the native zooplankton that historically helped keep the lake clear.

"And while all this was happening, the planet was changing," Schladow said. "The dominant processes in the lake are very different than they were 25 years ago. It doesn't mix as often. It starts out warm earlier. Temperatures are at higher levels."

"It's a very complex system—a great analogue for every other lake in the West."

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