

Yellowstone Lake Shore Changing; UA Scientists Investigating Causes

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A University of Arkansas researcher has found that, in the past 50 years, the shoreline on a segment of Yellowstone Lake has been changing in complex ways that are not completely understood.

Barbara Pickup, graduate student in the environmental dynamics program at the University of Arkansas, presented her findings at a recent meeting of the Geological Society of America.

To look at erosion processes over time, Pickup and geosciences professor Steve Boss used aerial photographs taken of the shoreline in the West Thumb basin at Yellowstone Lake in Yellowstone National Park between 1954 and 2002. Pickup used a photo taken in 1994, which had been geographically corrected using Geographic Information Systems to pinpoint the exact location of each pixel, to calibrate the other photographs. She then measured the shoreline in each photograph at 20-meter intervals to determine the net change from photo to photo. When she and Boss examined the data, they found that overall the shoreline has receded. However, they also found something unexpected.

"We're seeing substantial change along the shoreline and it's not uniform around the basin," Pickup said. Normally, a lake shoreline would advance or recede much like the water in a bathtub -- evenly around the whole tub, Boss said. However, the data from Pickup's study show one side of the basin receding while other parts remain stable or advance -- and later the processes reverse.

The West Thumb basin is located within the Yellowstone caldera, a

crater formed by violent volcanic eruptions that still actively inflates and deflates due to different geological processes. Boss said it's possible that the shoreline effect reflects changes in the caldera. However, other processes such as variation in lake level or redistribution of sediment along the lakeshore also could be responsible. Determining which combination of these factors causes the shoreline to change is the focus of Pickup's dissertation.

The National Park Service has an interest in better understanding shoreline erosion, because it may affect archeological sites or park infrastructure along Yellowstone Lake.

"The lake has been used by humans over the last 10,000 years, and continues to be a popular spot for present-day tourists," Pickup said.

Pickup and Boss spent three weeks at Yellowstone Lake this summer, using high-resolution computer equipment to scan and measure the shoreline studied in the aerial photographs. They intend to return this summer to re-scan the same locations to determine what changes have taken place over the course of a year.

"Using this scanning equipment, you can see individual pebbles along the shoreline," Pickup said. "If something changes, we're going to see it."

"We hope results of Barb's research will inform Yellowstone National Park policies for many years," Boss said.

Source: University of Arkansas

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