

PSU scientists examine human impact on Waldo Lake

Study | The Forest Service is interested in protecting water quality and clarity, which rivals Crater Lake's

By **BEN LARSON**
THE OREGONIAN

Not much lives in Waldo Lake's crystal-clear waters, and the U.S. Forest Service wants to keep it that way.

As part of a program to ensure that the pristine

lake in the high Cascades can weather the heavy human use the popular area gets, Portland State University scientists are conducting federally funded research at the lake this week.

Over the decades, people have diverted its water for irrigation and hydropower, stocked the lake with non-native fish, camped along its shoreline and boated on its placid surface.

"A lot of the funds connected with the work that PSU has been doing came out of monitoring work that the Forest Service was doing, through consul-

tants primarily, that indicated the water quality of the lake may be changing," said Al Johnson, a Forest Service hydrologist. "Because the data was inconsistent over the years, we needed to have a more focused look to determine what the status of the lake is right now."

Use of the lake for hydropower and irrigation was halted in the 1930s. But fish stocking has been far more extensive, dating to 1889, when fish were hand-delivered. According to his diary, Judge John

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Waldo Lake's relative isolation in Oregon's high Cascades makes it an ideal laboratory for scientists studying a variety of natural processes.

RICH MILLER

Waldo:

Gas engines will be banned in lake in '09

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Waldo, the lake's namesake, hauled a bucket of fish from a neighboring lake and dumped it into Waldo Lake.

Commercial fish stocking was discontinued in 1990. Recreational boating is still allowed, but the Forest Service plans to ban the use of gasoline engines in and around the lake beginning in 2009. Electric boat motors would continue to be allowed.

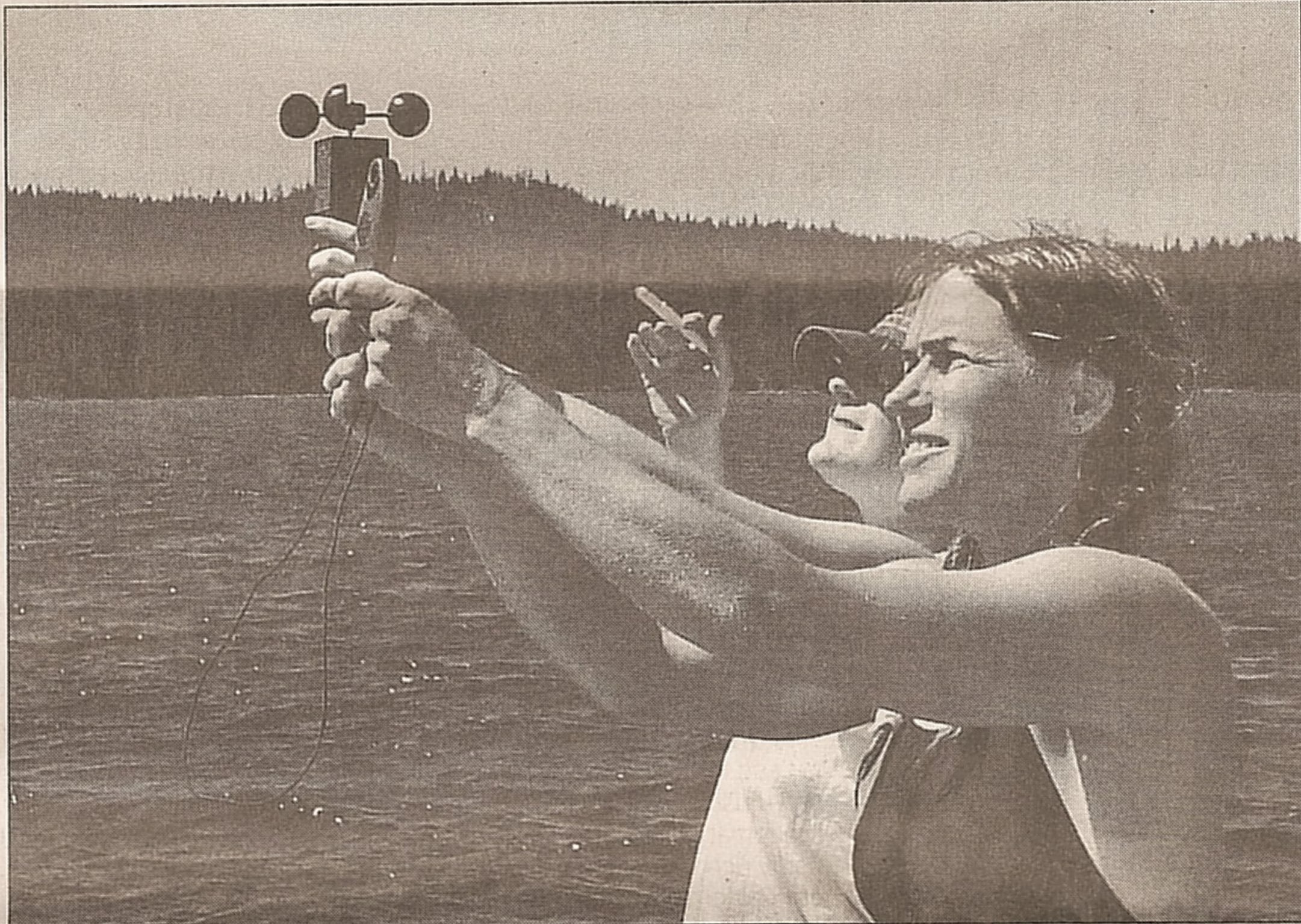
"The Forest Service is interested in long-term management strategies for the lake and protecting its water quality," said Rob Annear, a Portland State hydrologist who has developed a computer model of the lake as part of the research program.

Underwater sensors

The researchers at Waldo Lake will recover an anchored cable lined with sensors that have been measuring water temperature at half-hour intervals over the past year. The readings will be used to adjust Annear's computer model.

The model uses weather data collected at a nearby station, measurements of precipitation and snowmelt, and information about the depth and shape of the lake to try to reproduce temperature as measured by the sensors. A match indicates that scientists have a good understanding of the lake's hydrodynamics.

"There wasn't much to adjust in the model to match the temperature observations," Annear said of the calibration effort in 2003 and 2004. He eventually wants to beef up his model so it also can predict changes in water quality.



JOHN SALINAS

Kathleen Salinas (front) of the Cascade Research Group and Laura Johnson, a Portland State University graduate student, check wind gauge readings against each other. PSU hydrologists use wind speed, precipitation and other weather data in a computer model that predicts temperature, which can then be checked against readings from sensors in the lake.

Precipitation and snowmelt are the only sources of water to the lake, and the only outflow is a narrow channel from the northwest corner that forms the headwaters of the Middle Fork of the Willamette River. Waldo's relative isolation makes it the ideal laboratory to study other natural processes.

"There's a lot of things I think we could learn from Waldo Lake that are applicable to the whole West Coast, like changes in atmospheric deposition," Annear said. "If you were to see some kind of trend in changes at Waldo, is that a canary in the coal mine or a bellwether for other places which might be more stressed by man's influence?"

Waste disposal shift

In addition to its financial support of research on the health of the lake, the Forest

Service has taken steps to reduce the impact of recreational use around the lake. For example, after reviewing the septic system used for disposal of human waste, the agency decided to switch to composting toilets.

"They had to use dynamite to blast through the bedrock to put these leach fields in, which suggests anything that goes in the ground is rolling right into the lake," said John Salinas, whose company, Cascade Research Group in Grants Pass, measures water quality in the lake. "So the Forest Service pulled out dump stations and spent millions of dollars putting in composting toilets up there."

Salinas said his measurements have never shown any contamination from the toilets.

Even with all the human activity, the clarity of the lake is still among the highest in the world. In fact, a regional rivalry pits

Waldo Lake and Crater Lake against each other for the honor of the clearest lake.

Scientists regularly compare the depth to which a black and white disk can be lowered into the water before disappearing from view.

"This year, oh, they were so excited at Crater, and they said, 'Man, we got a 42!' The record at Crater is 44 meters. I came back from Waldo, and I had gotten a 47," said Salinas with undisguised pride.

Ending fish stocking probably has helped improve water quality through a ripple effect in the food web.

"Without fish on Waldo Lake, the little animals called zooplankton, the grazers, are taking off, and they're chomping down on the algae, and this is what I think is causing the lake to be more and more clear," Salinas said. "Every year I go back, it's clearer and clearer and clearer."