Salt's Impact on Mountain Lakes Studied

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LAKE PLACID, N.Y. - Scientists are researching the long-term environmental effects of winter road maintenance, using the Cascade Lakes near Lake Placid as a laboratory.

While many studies have been done around the country on the negative impacts of road salt, this one stands out because it's so comprehensive, said Clarkson University biologist Tom Langen, who heads the study.

"We're looking at all aspects of environmental degradation at one site, looking at the past, present, and future," Langen said.

An added incentive to study the Cascade lakes is that they contain round whitefish, an endangered species in New York.

On the far side of the Cascade Lakes, paper birches cling to the craggy flank of Cascade Mountain, rising steeply from the water's edge.

The bright white trees once lined the near side of the lakes, too, making a lacy curtain between the water and the highway winding through the Adirondack mountain pass. Over the past 30 years, the birches have dwindled, until only a few gnarled trees remain.

Environmental groups blame road salt for killing the birches. So much salt washes into the narrow lakes from the bordering two-mile stretch of highway that a newspaper cartoonist once depicted a deep-sea fisherman hauling a marlin — a salt-water game fish — from the water. Locals joke about putting out lobster pots.

The deep, clear, cold lakes are wedged into a pass between Cascade and Pitchoff mountains in the High Peaks region of the Adirondacks, about 100 miles north of Albany. Bordered by Route 73, the main highway to the year-round resort town of Lake Placid, the scenic lakes are popular with picnickers and anglers.

The pass is notorious as a funnel for fearsome weather. Drivers may go from sunshine to whiteout in moments. Tongues of ice often stretch over the curvy road where rivulets trickle from rocky Pitchoff.

To ensure safety, the state Department of Transportation dumps an average of 210 tons of salt on the two miles of highway along the lakes per year, Langen said. Much of it ends up in the lakes. By comparison, plows drop an average of 48 tons of salt per mile of road every winter in New York.

Scientists have found chloride concentrations more than 100 times higher than expected in typical Adirondack lakes, and the level is increasing.

"We'd expect a concentration of one to three parts per million of chloride here," said Clarkson biology professor Michael Twiss, as he prepared to launch a rowboat to take water samples on a snowy morning. "In Lower Cascade Lake, the level gets as high as 150 parts per million."

Twiss and Langen have been collecting water samples from specific depths of the lakes every month for two years, ending next June. In winter they chop through ice 2 feet thick. They track chloride levels, dissolved oxygen, temperature, changes in algae and other aquatic life, and other environmental indicators.

To document long-term changes in the lakes, Curt Staiger of Paul Smith's College has collected sediment cores from the bottom of the lakes. The columns of layered soil going back 200 years reveal changes in microorganisms called diatoms since salting started.

"Each species favors specific chemical conditions and temperature, so they're useful as an indicator of changes in water quality," Langen said.

A lab experiment gradually increasing salt in water from the lakes showed that the overall number of algae declined until the salt level hit a certain point, then went back up.

"What happens is that as the salt level goes up, the more salt tolerant types of algae dominate," Twiss said. "You might also lose some fish species that depend on certain organisms."

It was the birches that prompted public concern about salt.

"There has been a very dramatic decline over the past 20 to 30 years," Langen said. "The finger was pointed at road salt as the cause, but skeptics said birches naturally age and die in that time span."

That's true. But normally, saplings sprout to replace the old trees. That's not happening here.

"The lack of regeneration is more significant than the dying trees," Twiss said. "That's likely due to a combination of things, including the runoff of both sand and salt as well as the severe climate."

Concern over the dying trees led the Transportation Department to cut back on salting in 1989, recalls local resident Tony Goodwin. "Three weeks later, there was a fatal accident by the lakes," he said. "There was a flurry of letters to the newspaper, and DOT went back to salting as heavily as before."

Clarkson engineering professor Kerop Janoyan is studying ways to reduce the need for salt. Because alternative chemicals also have negative side-effects, he's focusing on non-chemical solutions. He's planning feasibility studies on technology that warms the road using conductive materials in the concrete mix. That technology is now being tested on a highway bridge near Lincoln, Neb.

Another possibility is to build a tunnel covering the highway, Janoyan said, although he acknowledged that that's not likely to be favored in such a picturesque area.

"You could do a lot with strategically placed snow fences," Janoyan said. The wind roaring through the pass could thus be recruited to blow snow away from the highway.

The simplest solution is one that's not popular with motorists who've come to expect bare pavement so they can drive fast.

"They could reduce the speed limit," Twiss said. "If you drive 60 miles per hour on this road, you need salt. But if you drive 20, you don't."

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What is the main issue?

How long is the stretch of highway?

How much salt is dumped on that stretch?

How much salt is used on the average NY Highway?

How are the lakes affected?

What happens to algae populations as salt concentrations increase?

Why might the loss of trees be natural? What isn't happening to the trees along the road that one would expect to happen over time?

Describe two alternatives to using so much salt.