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Research

Common Loons Struggle on a Lake That Should Be Perfect for Them

Tiffany Grade, the Squam Lakes program biologist for the Loon Preservation Committee (LPC) in New Hampshire, steers her small boat into a cove on Big Squam Lake, where a pair of common loons had mysteriously abandoned their nest and its eggs a few days earlier. This nest had been established on a human-made structure, surrounded by artificial vegetation. These structures help loons avoid predators and find safe water's-edge habitat. The empty platform is a mournful sight.

Common loons, *Gavia immer*, a federally threatened species, migrate each spring to the two Squam lakes, Big Squam and Little Squam, and to several other northern lakes for the breeding season. Encounters with Squam boats and shoreline development so threatened them that, in 1975, a concerned resident started the LPC. The LPC has conducted research and public education ever since, and today its senior biologist and executive director, Harry Vogel, guides a staff that surveys loon nests, rescues injured birds, conducts field research, and teaches the public about the birds from its headquarters, based in Moultonborough. The LPC has tried to teach all who spend time on New Hampshire lakes not to chase loons or disturb shore nests.

But the loons' problems go deeper than ensuring they have nesting space. Scientists, such as Grade, who focuses on Squam Lake in central New Hampshire, conduct field work that includes protecting loons from mortal danger. Each spring and summer Grade becomes intimately acquainted with each loon living on Squam. She and her colleagues have banded several of the birds, allowing the researchers to follow the loons' actions year to year. She knows their behavioral quirks and has watched their territorial battles and struggles against predators and other hazards. Her goal is to ensure the loons don't die prematurely but, when they do, to understand why.

She leans out of the bow of her boat, detaching rope and a sign that had warned boaters away from the abandoned nest. She cares about each of these loons. A few days later, she will learn that another male loon who had previously bred with the female arrived at the nest and initiated a fight. Such sparring often leads to nest abandonment while the two males fight it out. A study published in 2006 by Cornell University and Chapman University scientists found that male loons fight more around artificial platforms than

near natural shoreline. Since then, Grade says, scientists have learned to place the platforms judiciously. Loons are fiercely territorial everywhere they nest—on natural shoreline and on platforms—and they remember their breeding partners from year to year.

Loons typically live as long as 30 years, they dive deep, and they stay submerged for many minutes while finding food. They are excellent parents. Males and females share nest-sitting and feeding duties. They have all these traits in their favor.

So much else works against their survival. They don't mate every year, and when they do mate, the female lays only two eggs. Bald eagles, raccoons, ring-necked gulls, crows, and foxes snatch and eat eggs. The developed shoreline removes many possible nesting sites. Loons like to nest right on the water because their bones are very dense, their legs set far back on their bodies, and they can't walk more than a few steps on land. The LPC and other groups around North America have erected structures that are tiny floating islands on which loons can build nests. Many of the loons do nest on these structures, which keep the eggs a bit removed from some predators.

From the 1970s, when the LPC began its work, until about fifteen years ago, loons on Squam Lake had seemed to be stabilizing. People became more sensitive to the birds' unusual habits and needs. Their survival as a population depends on long lives and slow, steady breeding. Many people have given time counting and reporting problems they see with loons. On a census in July 2019, 520 volunteers surveying 104 lakes and ponds in New Hampshire counted 430 adult loons, 79 chicks, and 6 immature loons.

Very few of those loons live on the Squam lakes, even though Big Squam is larger and wilder than many New Hampshire lakes. Starting in 2005, Squam loons suffered a dramatic



Biologist Tiffany Grade removes ropes and a sign after a pair of loons abandoned their floating nest in a territory dispute last June. CHRISTINE WOODSIDE

decline in their already low breeding productivity, Grade says, with only nine breeding pairs, down from the previous year's sixteen. On average, seven to eight loon chicks survive on Squam in a season. In productive years, thirteen to fifteen chicks have hatched and made it out of infancy on Squam. (These numbers reflect loons' fierce territorial instinct; a lake can support only so many.) But in recent years the numbers have been especially low: for example, one chick in 2007, one in 2013, one in 2015. In 2019, four chicks survived into mid-August on Squam.

Statewide, each breeding pair produces one chick every other year. But on Squam Lake, the average per pair is one every *four* years. Grade says that's too low to sustain a loon population long-term.

Two deadly killing forces, both human-caused, could be partly responsible.

One is fishing with lead tackle. The other is leaking chemicals outlawed years ago but still used to kill insects that humans find irritating.

Squam Lake's public boat launch was rebuilt and upgraded in 2001, giving more fishing boats access. This seems to correlate with the increase in deaths from lead tackle, Grade says. In a 2018 article for the *Journal of Wildlife Management*, Grade and Vogel, both of the LPC; Eric M. Laflamme of Plymouth State University; and Mark Pokras of Tufts University found that when loons ingest lead fishing tackle (which might be attached to fish they eat or otherwise appear to be edible), it was "the leading cause of mortality in adult common loons."

Almost 49 percent of known loon deaths in the study were due to lead toxicosis from swallowing lead tackle. The researchers were able to deduce from the timing of the deaths that most casualties came from lead tackle used in the year the loons ingested it, rather than tackle that might have been lying on lake bottoms. "We estimated that lead tackle mortality reduced the population growth rate by 1.4 percent and the statewide population by 43 percent during the years of the study," the scientists wrote.*

In 2013, the state of New Hampshire passed a law banning the sale of lead fishing tackle. Loons were shot in apparent protest by fishers in spring 2014. The lead tackle ban went into effect in 2016. But so far scientists have not documented a decline in loon deaths from lead tackle. Many still use lead tackle, often from caches that pre-date the 2013 law. So, the LPC worked

* Tiffany Grade et al., "Population-Level Effects of Lead Fishing Tackle on Common Loons," *The Journal of Wildlife Management*, 82(1), pages 155–164, 2018; DOI: 10.1002/jwmg.21348.

with New Hampshire Fish and Game to give fishers who turn in lead tackle vouchers to buy new gear made of nontoxic materials.

“We’re not asking people to stop fishing,” Vogel told Robin Young of WBUR in July 2019. “We’re just asking them to get rid of their old lead tackle and replace it with new, nontoxic, wildlife-safe tackle.”

The second ominous human-caused problem that likely hurts or kills loons was discovered a few years ago. Between 2005 and 2007, the same time fewer loons were breeding, loons disappeared from the northeastern part of Squam Lake, near the town of Sandwich. Scientists began to question the water quality.

They tested crayfish in tributaries and then tested sediment. By 2015 and 2016 scientists at the LPC had documented contaminated sediments in three places on the lake: They found polychlorinated biphenyls (PCBs) and dioxins near Sandwich in Kesumpe Pond; they found DDT in lake sediment at the Moultonborough–Sandwich border; and they found DDT in the brook that empties into Bennett Cove, in Holderness. The test results were delivered



Loon fights can be violent and even fatal: Two males fight over a female mate and breeding territory on a New Hampshire lake. KITTIE WILSON

to the New Hampshire Department of Environmental Services, which expressed concern, although the agency lacked funding to continue testing. The Squam Lakes Association and Plymouth State University have taken up the sediment testing.

The effects of the warming climate on loons occupy scientists around the continent. Birds can fight off viruses and pests, but if new viruses and new pests migrate north and attack them, the loons must spend all of their energy simply surviving. In early July, a female loon died on Squam just days before the eggs she was incubating were set to hatch. The necropsy revealed a shocking diagnosis: avian malaria. This was only the second avian malaria case documented in North America. The first was in 2015, on Lake Umbagog, which straddles the New Hampshire–Maine border. Within weeks, two more loons—one on another lake in New Hampshire, the other in Maine—died of this mosquito-borne illness. “This may be a new, emerging threat to loons in New Hampshire,” Grade reports in a newsletter dispatch.

Even those pests long established can severely hurt loons. Grade notes that one species of black fly feeds only on loons, and in 2019 these flies were so tenacious that some loons were jumping off nests they were incubating and into the water for relief from the painful bites.

Squam Lake should be the ideal habitat for loons. But in recent years its breeding productivity is about half what it should be to sustain itself. “There’s a lot going on,” Grade says, in a major understatement.

—*Christine Woodside*