Common Loon Status Report 2020

MAINE

A Series Publication of BRI's Center for Waterbird Studies

Status of the Breeding Loon Population in Maine

Distribution and Population Size

The Common Loon's (*Gavia immer*) contemporary range likely followed the retreat of the glaciers about 11,700 years ago. They are historically reported to have bred as far south as northern New Jersey in the eastern United States (Evers et al. 2020). As human settlement increased throughout New England in the 1600s and beyond, Maine loons were initially protected from human disturbance due to their preference for more remote lakes. By the mid-1900s, however, Maine began to experience declines thought to be related to human disturbance (Cross 1979, Sawyer 1979).

Human encroachment on nesting habitat can have numerous deleterious effects, such as adults flushing from their nest (Vermeer 1973, Titus and VanDruff 1981), which leaves eggs vulnerable to predation by Bald Eagles, American Crows, and Common Ravens (Alvo1981, Titus and VanDruff 1981, Alvo and Blancher 2001).

Through time, however, some loons have acclimated to human activity and are able to successfully produce chicks on lakes with heavy recreational use.

Maine's current population estimate of adult loons is comprised of 1,700 territorial pairs, which is equivalent to 3,400 breeding adults and 700 nonbreeding (but oversummering) subadults and adults. This estimate is based on Maine Audubon's ongoing monitoring and volunteer efforts in southern Maine coupled with random aerial surveys in northern Maine by the Maine Department of Inland Fisheries and Wildlife in the 1980s (Figure 1).

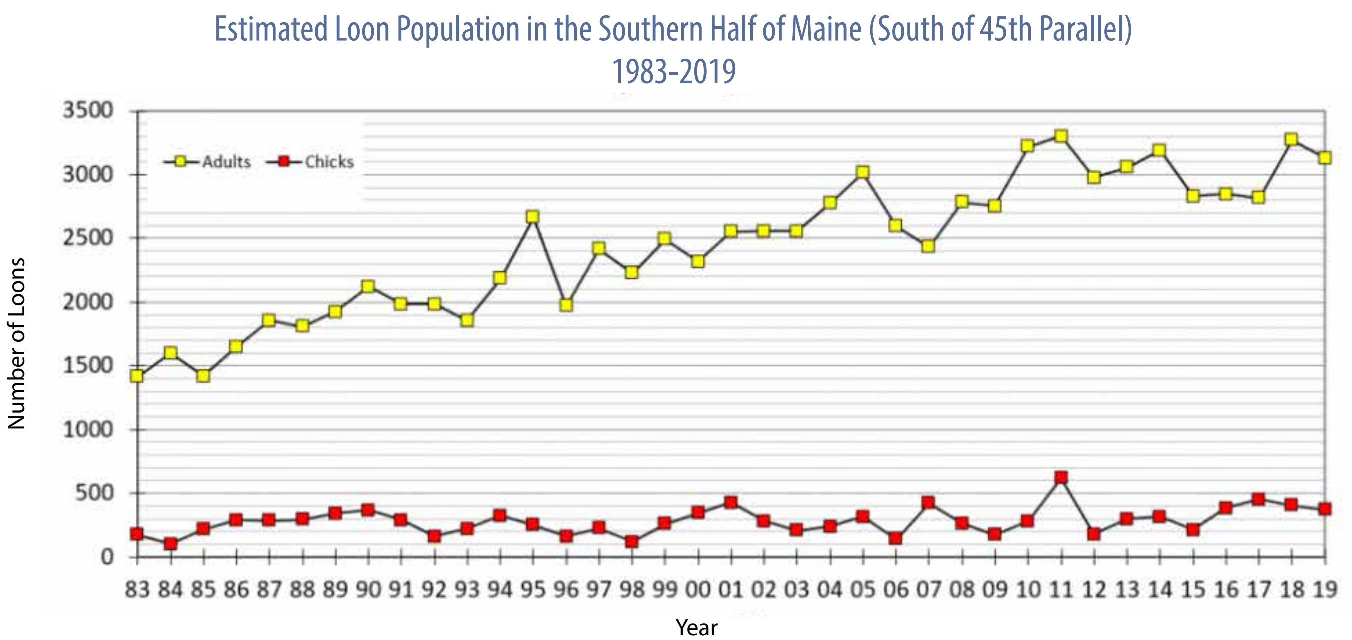
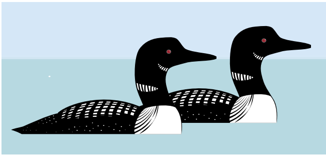


Figure 1. Estimated loon population for the southern half of Maine, 1983-2019. Data provided by Maine Audubon.

Summary of Statewide Banding Effort for Breeding Adults



689	1,700	3,400	20%
Number of Adult Loons Banded (1995-2020)	Total Number of Breeding Pairs	Total Number of Adults	Percent of Breeding Population Banded

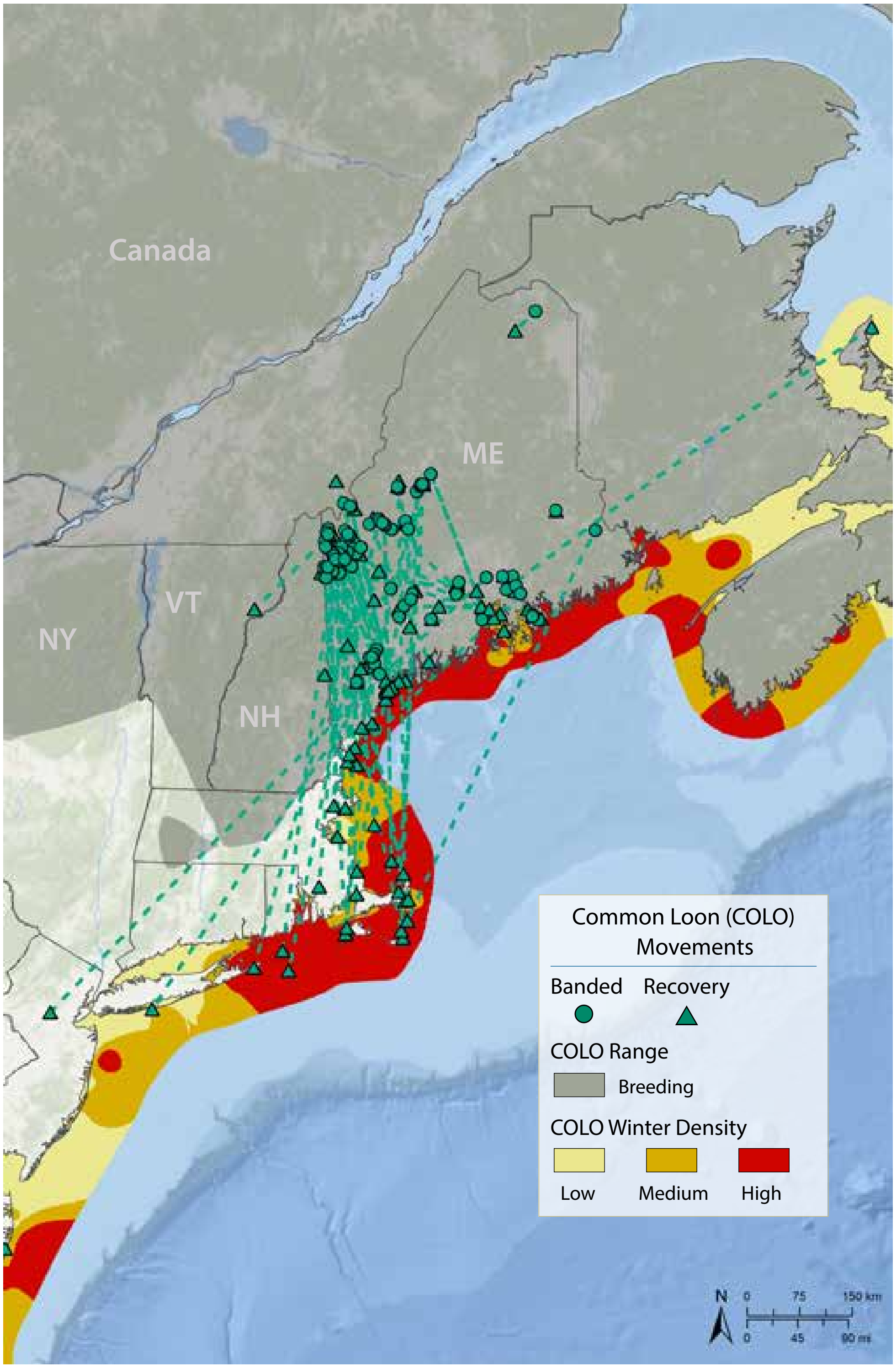


Figure 2. Migratory movements of Maine's Common Loon population, 1996-2020. Movements of loons are based on recoveries and observations of individual Maine loons banded by BRI (n=129). Common Loon density data from Christmas Bird Counts organized by the National Audubon Society.

20-350

Number of miles Common Loons migrate from coastal areas to breeding territories in Maine.

Movements

Loons migrate from their breeding lakes to the ocean in the late fall. Maine's proximity to the ocean allows loons to remain on their breeding grounds much later into the fall than their mid-continent counterparts.

Adults depart before juveniles, thus young birds arrive on the ocean without guidance, prior knowledge, or experience.

Band recoveries indicate that the majority of Maine loons overwinter along the coasts of Maine, Massachusetts, New Hampshire, and Rhode Island; however, individuals have been found south of Long Island, New York (Figure 2).

Rangeley Lakes Region Loon Demographic Study

BRI's Rangeley Lakes study is the longest running monitoring effort of a uniquely color-marked loon population in North America. Shoreline nest placement and the loon's limited mobility on land make loon nests vulnerable to failure caused by water level fluctuations. Due to this sensitivity, the U.S. Fish and Wildlife Service (USFWS), the Maine Department of Inland Fisheries and Wildlife, and other wildlife agencies identified Common Loons as a species to be monitored in response to the Federal Energy Regulatory Commission (FERC) relicensing requirements for reservoirs.

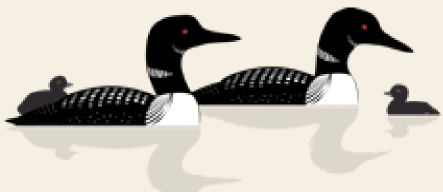
Project Overview

Partnered with Brookfield Renewable Energy and in cooperation with New Hampshire's Loon Preservation Committee (LPC), BRI monitors nearly 200 territorial breeding pairs of Common Loons in northeastern New Hampshire and western Maine.

BRI biologists use artificial nesting islands (rafts) as the primary management tool in mitigating the impacts of water level fluctuations on nesting loons. Current efforts characterize and monitor the demographics of the breeding population, environmental exposure and effects of mercury and lead, incidence of diseases (e.g., avian influenza), and ecological impacts from reservoir operations.

Overall Study Goals

- Maintain nearly 80 artificial nesting rafts for Common Loons on reservoirs in the Rangeley Lakes region and monitor egg laying rates and hatching success.
- Capture and color-band adult and juvenile loons (373 adults and 111 chicks, for a total of 484 loons from this area have been banded to date).
- Monitor breeding territories on a weekly basis for overall breeding success, site fidelity, and individual performance of uniquely color-banded adult loons.
- Determine local and long-distance movements of breeding loons.
- Develop a long-term baseline for methylmercury availability and monitor the relationship of mercury body burdens and effects of mercury on physiology, behavior, productivity, and survival.



BRI Banded Common Loons

895

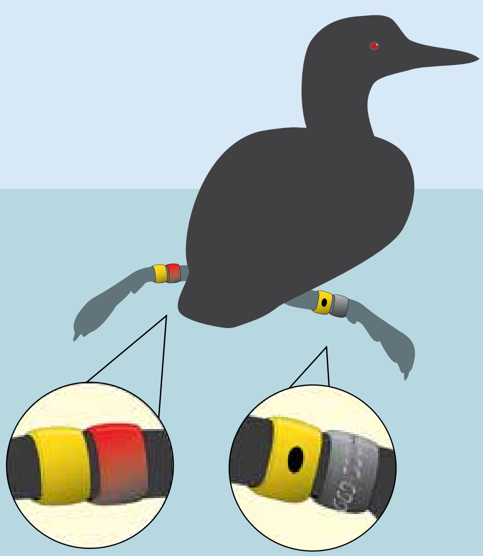
Adults and Chicks
Maine
(since 1995)

1,934

New England & New York
(since 1993)

5,699

North America
(since 1989)



Capture and color-marking programs are necessary for careful tracking of individuals and provide invaluable information on loon life history. Tracking banded loons has increased our knowledge of territory fidelity, mate fidelity, initial age of breeding, dispersal within the breeding area, and migratory movements.

Leg bands enable researchers to identify individual loons from a distance in the field. Plastic color bands are used in unique combinations (left leg) and metal bands are engraved with a unique I.D. number (right leg).

Common Loon Territories

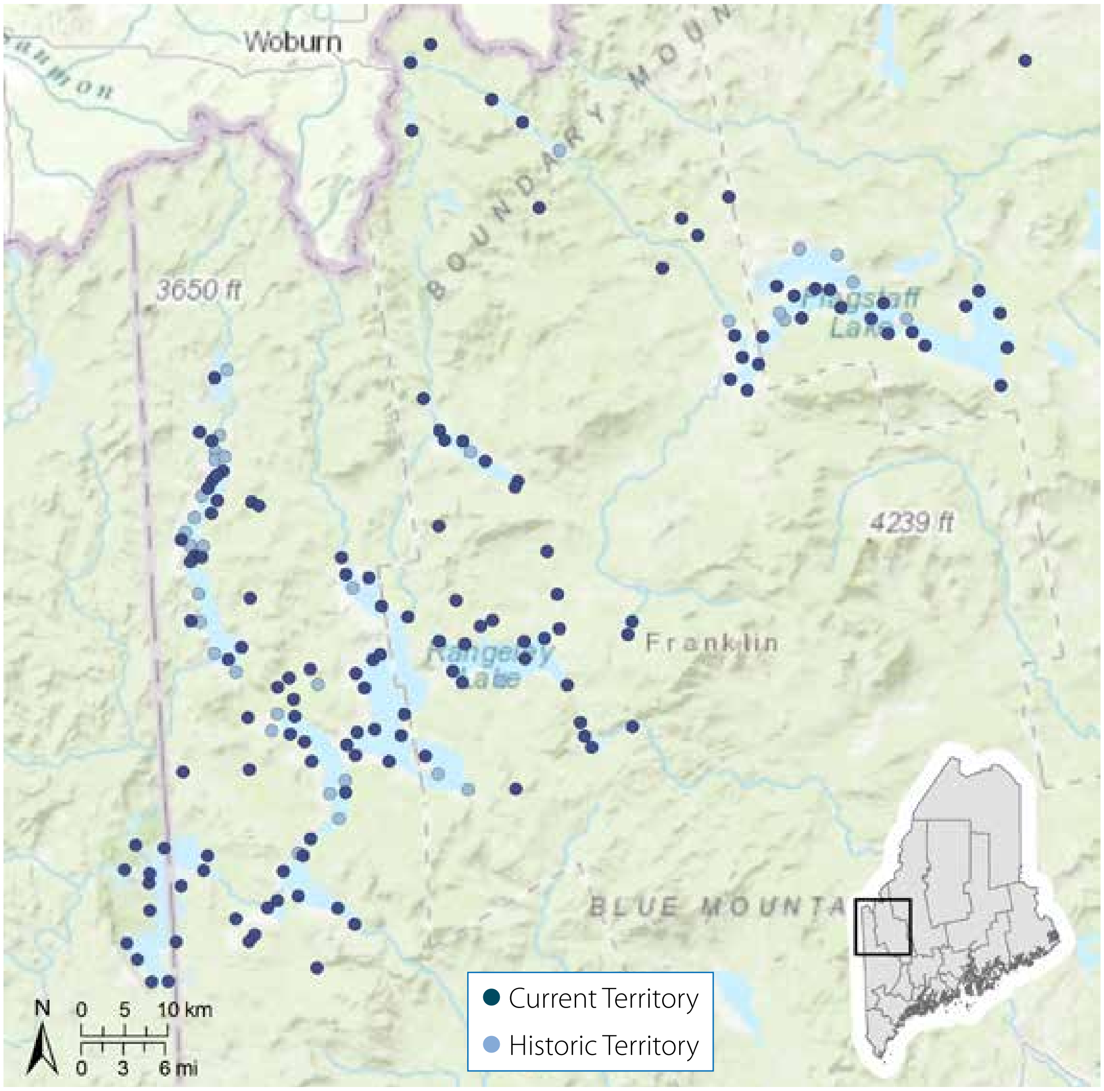
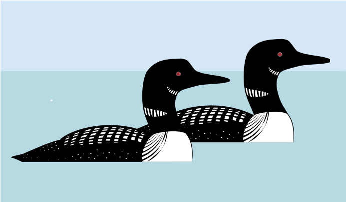


Figure 3. Current (as of 2019 breeding season) and historic Common Loon territories in the greater Rangeley Lakes Region of Maine (inset).

Total Number of Territorial Pairs



200*
Rangeley Lakes Maine

2,159
New England

258,000*
North America

*Approximate

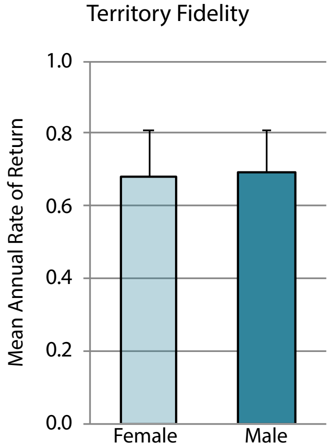


Figure 4. Male (n = 106) versus female (n = 181) site fidelity in Rangeley Lakes region of Maine, 1994-2013.

Site Fidelity in Western Maine

Common Loons have strong breeding site fidelity, which means that they return to the same lakes to breed each year. Larger lakes are often broken up into numerous territories—those areas of the lake the loon utilizes and defends.

More than 200 territorial pairs of loons are annually monitored in the Rangeley Lakes Regtion. Surveys began in 1993; by the year 2000, the surveys fully covered the area (Figure 3).

Researchers have also maintained a major, parallel effort to color band adult and juvenile loons each year. Re-observation of color-banded individuals provides important information about site and pair fidelity (Figure 4), local movements, migratory paths, and wintering areas.

Nesting Rafts as a Conservation Management Tool

Federal Regulations

The Federal Energy Regulatory Commission oversees the licensing of dams in the United States and issues new licenses every 20-25 years. The renewal of FERC licenses in the past decade has taken place within the context of negotiated settlement agreements arrived at by the dam licensees, state and federal agencies, and nongovernmental organizations. The International Joint Commission (IJC) plays a similar role to FERC for reservoirs that cross the U.S./Canadian border; Canada does not have a legal entity that corresponds to FERC.

Increased interest in recreational and environmental resources associated with these reservoirs, including breeding loons, has generated new considerations for reservoir management. Fluctuating water levels during the nesting season can have deleterious effects on loon nesting success. Increasing water levels easily inundate nests while lowering water levels strand nests, increasing the difficulty of incubation exchanges and enhancing predation (Figure 5).

A study on three lakes in Voyageurs National Park (Rainy, Namakan, and Kabetogama Lakes) during the 1980s found an average of 60 to 70 percent of loon nests failed due to water level fluctuations. Based on a BRI-led study, the IJC in 2000 instituted new water level management guidelines for these water bodies in order to minimize the impact on loon nesting success, which is a good example for similar situations in Maine (Windels et al. 2013).

For the past 25 years, the FERC relicensing process has also implemented reservoir management schemes that minimize impacts to nesting loons in the Rangeley Lakes region. The general guidelines recommend maintaining water levels within a 6-inch rise and 12- inch drop during the primary loon nesting period, or the implementation of artificial loon nesting rafts to enhance nesting success.

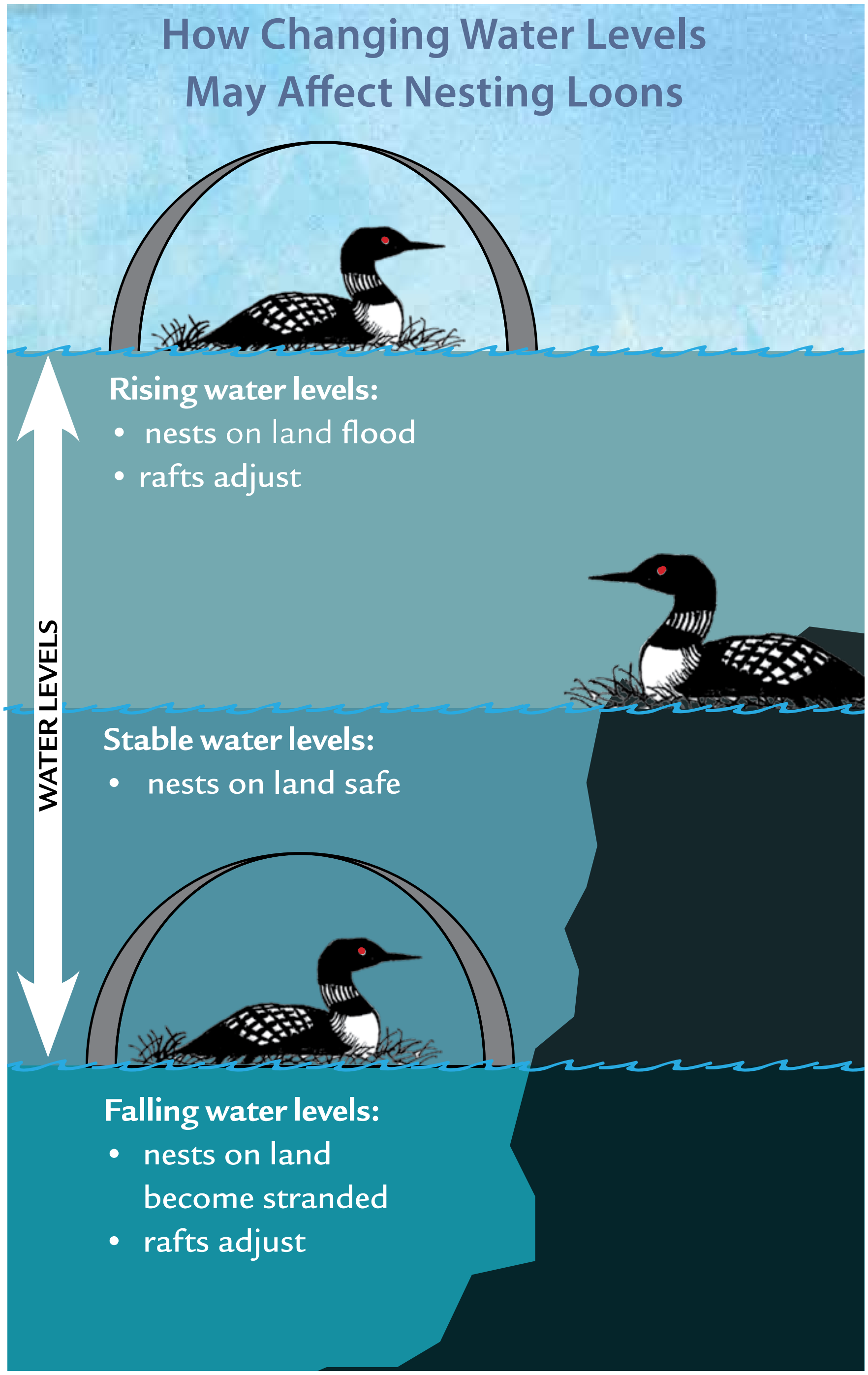


Figure 5. Loons build nests at the water's edge. Typically, a 6-inch increase or a 12-inch decrease in the water level will likely cause significant nest loss. Fluctuations in natural lakes can vary widely depending on geographic and climate conditions. Reservoirs can be managed so that water drawdowns are timed to be sensitive to nesting and egg hatching. Rafts have proven an effective management tool to enhance loon reproductive success (DeSorbo et al. 2007).

Monitoring Mercury in Common Loons

Mercury's Impact in the Environment

Humans and wildlife are exposed to mercury pollution mainly through the consumption of contaminated fish and other aquatic organisms. Wildlife directly linked to aquatic ecosystems have an increased exposure risk to mercury compared to species living independent of aquatic food webs because the conversion of mercury to methylmercury is enhanced in wet soils that are low in oxygen (Figure 6).

When ingested, mercury can have a wide range of effects on an animal. Survival, reproduction, immune response, song, and endocrine function may be adversely affected by elevated blood mercury levels, especially in loons (Burgess and Meyer 2008; Evers et al. 2008, 2011).

High mercury levels in loons are most common: 1) where water chemistry is sensitive to mercury input; 2) when summertime lake level fluctuations are greater than six feet; 3) where large mercury point sources exist; and 4) where shoreline wetlands are common.

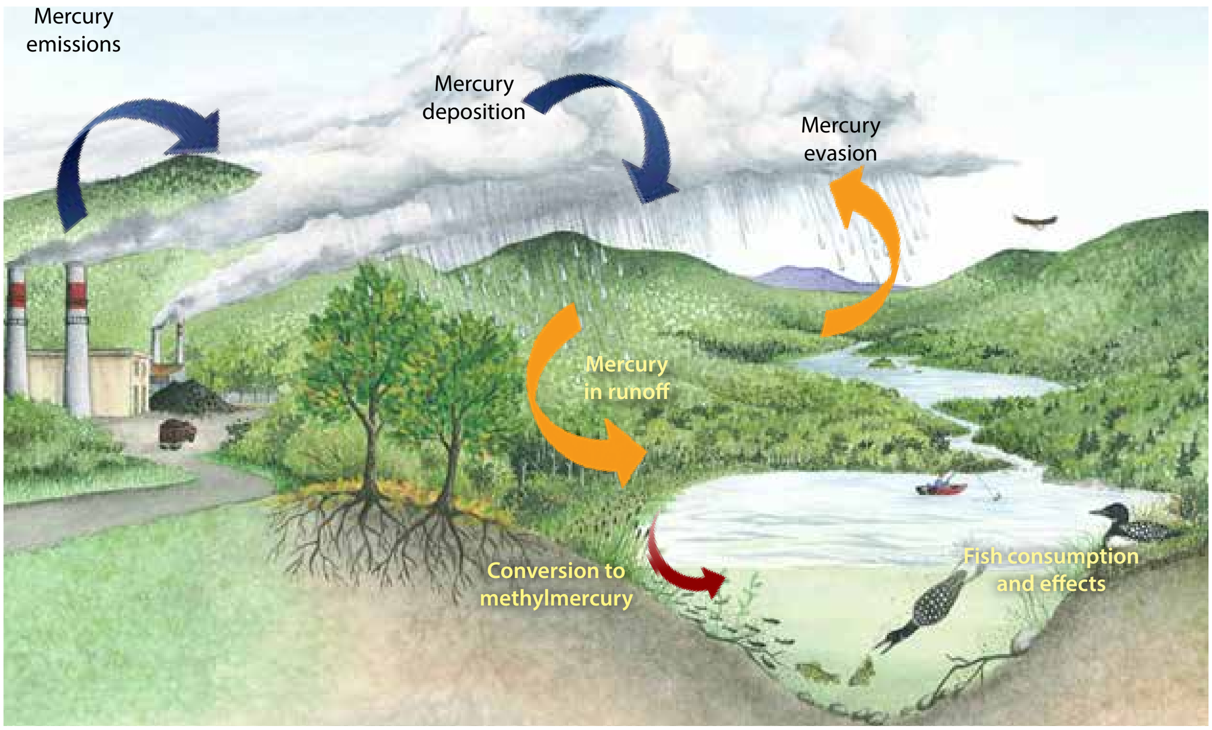
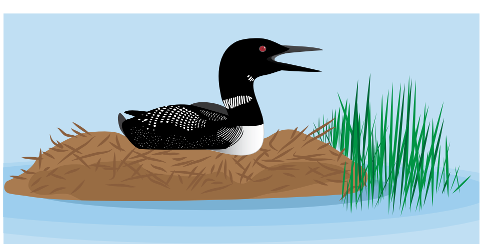


Figure 6. This simple version of the mercury cycle illustrates how mercury enters and moves through an ecosystem.

Recent reductions in air emissions from incinerators have proven effective in rapidly reducing mercury in loons and fish (Evers et al. 2007). Water-borne sources are still not fully known.

Loon Tissues Sampled for Mercury between 1996-2019



728 Egg Samples | **233** Chick Blood Samples | **883** Adult Blood Samples

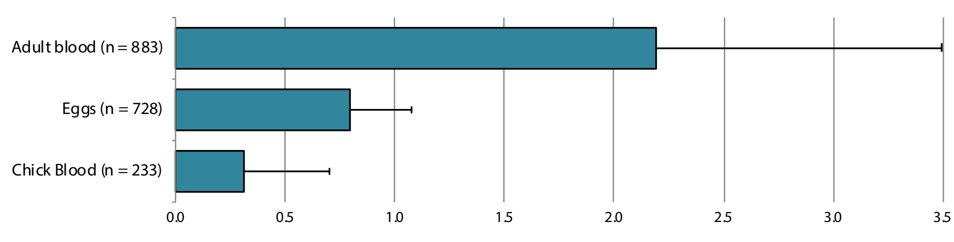


Figure 7. Mercury found in loon tissue samples—total mercury in parts per million (ppm), wet weight (ww).

Translocating Loon Chicks From Maine to Massachusetts

In 2015, in collaboration with the New York State Department of Environmental Conservation and the Massachusetts Division of Fisheries & Wildlife, BRI successfully moved seven chicks from New York's Adirondack Park to a lake in the Assawompsett Pond Complex (APC) in southeastern Massachusetts.

In 2016, BRI translocated nine chicks to the APC (four from New York, five from Maine) with assistance from the Maine Department of Inland Fisheries & Wildlife and Maine Audubon Society. In 2017, eight Maine chicks were translocated to the APC site. Overall, 24 chicks were successfully translocated to Massachusetts.

As of summer 2020, nine adult loons (five of these from Maine) returned to the lakes in Massachusetts to which they were translocated and captive-reared, and then from which they fledged. Their return marks a major milestone in the efforts to translocate Common Loons. Of the two territorial pairs on site now, one pair produced a chick—the first in the region in over a century.

See BRI publication: *Loon Translocation: A Summary of Methods and Strategies for the Translocation of Common Loons* at:

www.briloon.org/translocation

BRI staff developed methods for captive rearing loon chicks in aquatic pens. When able to forage on their own, the loons are released and carefully monitored until they fledge (Kneeland et. al 2020).

Table 1. List of loon chicks translocated to the APC. (Methods: CR=captive reared; DR=direct release).

Release Year	Band #	Color Band Combo		Source State	Sex	Method	Date Returned	Return Lake	Re-observation
		Left Leg	Right Leg						
2015	1118-15210	silver	blue vertical stripe	NY	M	CR	June 2018	Assaswompset Pond	
2015	1118-15202	silver	red 2/blue 2	NY	M	CR			
2015	1118-15208	silver	green 3/blue 3	NY	M	CR	April 2020	North Pocksha Pond	
2015*	1118-15977	silver	orange 4/blue 4	NY	M	CR	June 2018, 2019	North Pocksha	2019 Pocksha 2020 Copicut Res.
2015	1118-15203	silver	white 5/blue 5	NY	M	CR	May 2019	Copicut Reservoir	
2015	1118-15201	silver	yellow 6/blue 6	NY	M	CR			
2015	1118-15204	silver	blue 7/blue 7	NY	M	DR			
2016	1118-15838	green dot/silver	white/red dot	NY	F	CR			
2016	0938-78833	green dot/silver	red/red	NY	M	CR			
2016	1118-15836	green dot/silver	blue/orange	NY	M	CR			
2016	0938-44493	green dot/silver	green stripe/green	ME	F	CR	June 2018	North Pocksha	June 2020 North Pocksha
2016	0938-78835	green dot/silver	orange stripe/white	ME	M	CR			
2016	1118-15832	green dot/silver	white/white	ME	M	CR	June 2018	North Pocksha	
2016	0938-53072	green dot/silver	yellow stripe/yellow	ME	M	DR	Aug 2017	Assaswompset	June 2019 Tispaquin Pond
2016	0938-78827	green dot/silver	yellow dot/green stripe	ME	M	DR	June 2020	North Pocksha	
2016	1118-15837	green dot/silver	yellow/ blue	NY	F	DR			
2017	0938-44489	red/silver	green/yellow dot	ME	M	CR			
2017	0938-44486	red/silver	yellow/blue dot	ME	F	CR	May 2020	Sampson Pond	
2017	0938-61745	red/silver	green/white stripe	ME	M	CR			
2017	0938-03365	red/silver	orange dot/red	ME	M	DR			
2017	0938-44351	red/silver	blue/red	ME	M	DR			
2017	0938-03364	red/silver	orange/blue	ME	F	DR			
2017	0669-21906	white stripe/silver	orange stripe/red stripe	ME	M	DR			
2017	0938-61725	white stripe/silver	yellow stripe/orange stripe	ME	F	DR			

*This male mated with an unbanded female and in June 2020 was observed with a chick.

Marine Oil Spills: Applying Successful Approaches

Bouchard Barge 120

On April 27, 2003, the Bouchard Barge 120 (B120) struck ground near Cape Cod Canal. Between 22,000 and 98,000 gallons of No. 6 fuel oil spilled into Buzzards Bay.

This event occurred during migration of several bird species including the Common Loon. Approximately 200 dead or moribund loons were collected and a rapid field assessment was coordinated by the USFWS through the LPC and BRI to document the range and fate of dispersing individuals.

Oil Fingerprinting

Dispersed loons with oiled plumage were identified in Maine, Massachusetts, and New Hampshire. A total of five loons were observed with oil in Maine and New Hampshire. One of these loons was identified by its color bands and found on its traditional breeding territory in central New Hampshire.

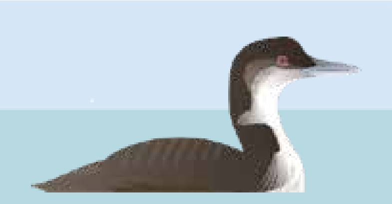
Another loon captured in New Hampshire was tested and found to have been contaminated by the B120 oil spill. This finding and other observations documented that the "footprint" of impact was greater than the immediate Buzzards Bay area. Pre- and post-spill data from monitored breeding loon populations in the Northeast helped identify further potential impacts to reproductive success.

Proven Restoration Strategies

In a precedent-setting 10-year restoration effort for the North Cape Oil Spill in Rhode Island, BRI worked with the USFWS to identify and purchase the best lake shoreline properties for mitigation. We then monitored the protected loon pairs on a weekly basis for two to six years. This long-term approach was successful in replacing the 4,400 loon years lost (adult loons that died from the spill as well as their lost future progeny) through the long-term protection of 75 nesting pairs (Evers et. al 2019). This strategy was used for the B120 spill and settlement funds are now supporting a six-year project for BRI to restore breeding loons to southern and western Massachusetts with chicks originating from Maine and New York.

Bouchard Barge 120 aground near Cape Cod Canal, April 2003. Oil washed ashore for more than two weeks, impacting a variety of natural resources, including wildlife, across more than 90 miles of shoreline.

Comparison of Impacts and Restoration for Two Relevant Oil Spills: North Cape in RI and Buzzard's Bay, MA (B120)



The Common Loon (shown here in winter plumage) overwinters in coastal areas.

	Number of Loon Years Lost	Number of Nests Needed to Recover Loss	Number of Loon Nests Successfully Recovered
North Cape	~ 4,400	70	75
B120	~ 4,200	~ 65	TBD*

*TBD–the number of nests successfully recovered will depend on demographic information collected between 2020-2025.

Loons and Lead: A Lethal Mix

Lead poisoning is the most significant cause of mortality in adult loons

Mortality Statistics

2-3

The number of weeks it takes for loons to die after ingesting lead from fishing tackle. Even a small piece of lead is fatal.

25%

The percentage of deaths due to lead poisoning in Maine's loons between 1990-2016 (MacDonald 2018).

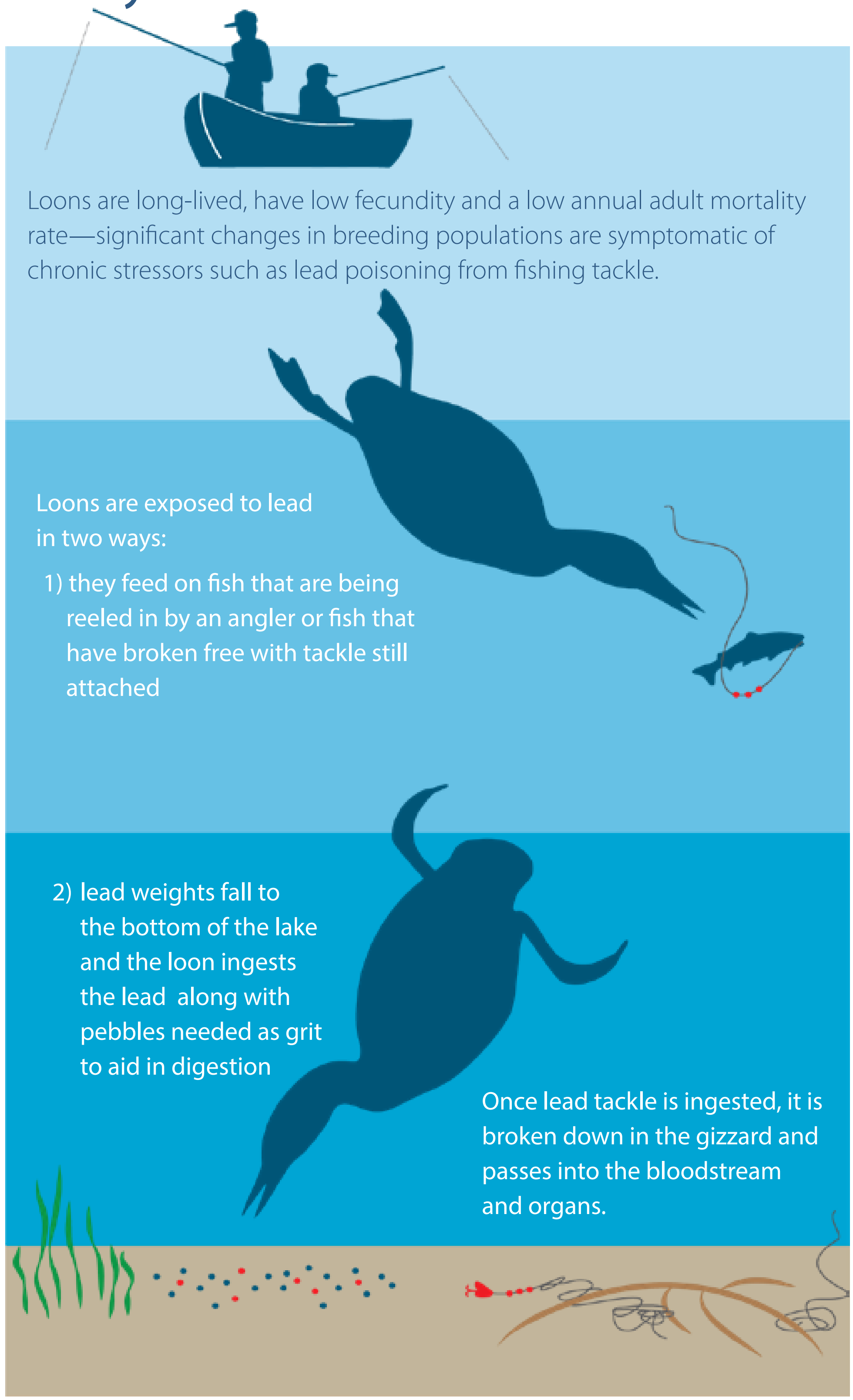
It's easy to save lives

Nonlead fishing tackle is not a novelty product. Ask for it at retailers and shops.

For the Maine angler's guide to lead-free fishing and a list of Maine retailers that carry lead-free tackle, visit:

fishleadfree.org

The cost is minimal to switch from lead to nonlead tackle.



The Importance of Suitable Lake Habitat for Loons

Protection of loon breeding habitat is critical to maintaining the integrity of loon populations and avoiding increased degradation of suitable breeding habitat. Because of its status at the top of the food web, high visibility to people, limited dispersal ability, and relatively slow replacement rate, the loon is widely used as an indicator species for tracking aquatic integrity (Evers 2006, Evers et al. 2020).

Human Disturbance Affects Loons

Human recreational activity has high potential to affect breeding Common Loons. High levels of boat-related disturbance can cause formerly occupied territories to be less attractive to potential new pairs. In some instances, wakes from passing boats can erode nesting habitat and flood existing nests. Additionally, when incubating loons are flushed from a nest by humans, the eggs are left vulnerable to predators and chilling, and therefore may fail to hatch. Human activity may also discourage loons from getting back on the nest, especially if disturbed during the first week of incubation.

Loons, Lead, and Line

Loons and other wildlife occasionally eat a fish that still has fishing tackle and/or line attached after an angler's line breaks. Unfortunately, this can detrimentally impact a loon who swallows a piece of lead fishing tackle or gets tangled in the line dangling from the fish. Lead is poisonous to animals when swallowed, as it breaks down in the acidic fluids in the stomach where it is absorbed, affecting the bird's behavior and organ function, including the gastrointestinal and neurologic systems. A loon that accidentally ingests lead fishing tackle or gets tangled in fishing line will suffer and potentially die over the course of two to three weeks.

Water Quality Affects Loons

Loons breed in a wide variety of freshwater aquatic habitats, however, they prefer lakes larger than 60 acres with clear water, an abundance of small fish, numerous small islands, and an irregular shoreline that creates coves. Lake size and configuration, as well as undisturbed shoreline, are important determinants for loon density. Water quality is an important habitat feature for breeding loon success; loons are visual predators, therefore clear water is crucial for foraging efficiency.

Recommendations for 2020

Evidence of the loon's ability to acclimate suggests that properly designed conservation efforts can be beneficial in many instances (Evers 2007). BRI's research has found the following actions to be successful or have potential for success:

Monitoring

A critical component of monitoring is to determine the cause of nest failure or chick loss. Standardized survey methods are used to collect data about the number of territorial pairs, nesting pairs, location of nests, chicks hatched, and chicks surviving beyond six weeks of age. BRI and Maine Audubon conduct such surveys in focused areas throughout Maine each summer.

Research

Research efforts track individual loons statewide. Through capture and banding, BRI biologists can determine mercury and lead body burdens. Research is conducted with the assistance of Maine Inland Fisheries & Wildlife.

Outreach

A variety of interactive outreach techniques, including exhibits, dioramas, school curricula, social media, and communication pieces (e.g. brochures, videos, and slide presentations, which can be available online), are utilized to create greater awareness of the presence and requirements of loons.

Restoration and Management Plans

Baseline data is utilized to create territory-specific restoration and management plans. Plans should include compensation measures for (1) the loss of nests by water level fluctuations or predation (i.e., nest platforms); (2) loss of nests/chicks from human disturbance (i.e., temporary closures); (3) adverse impacts from changes in prey or predator populations, such as Bald Eagles; and (4) the loss of territorial pairs (i.e., translocating loon chicks).

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Credits

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