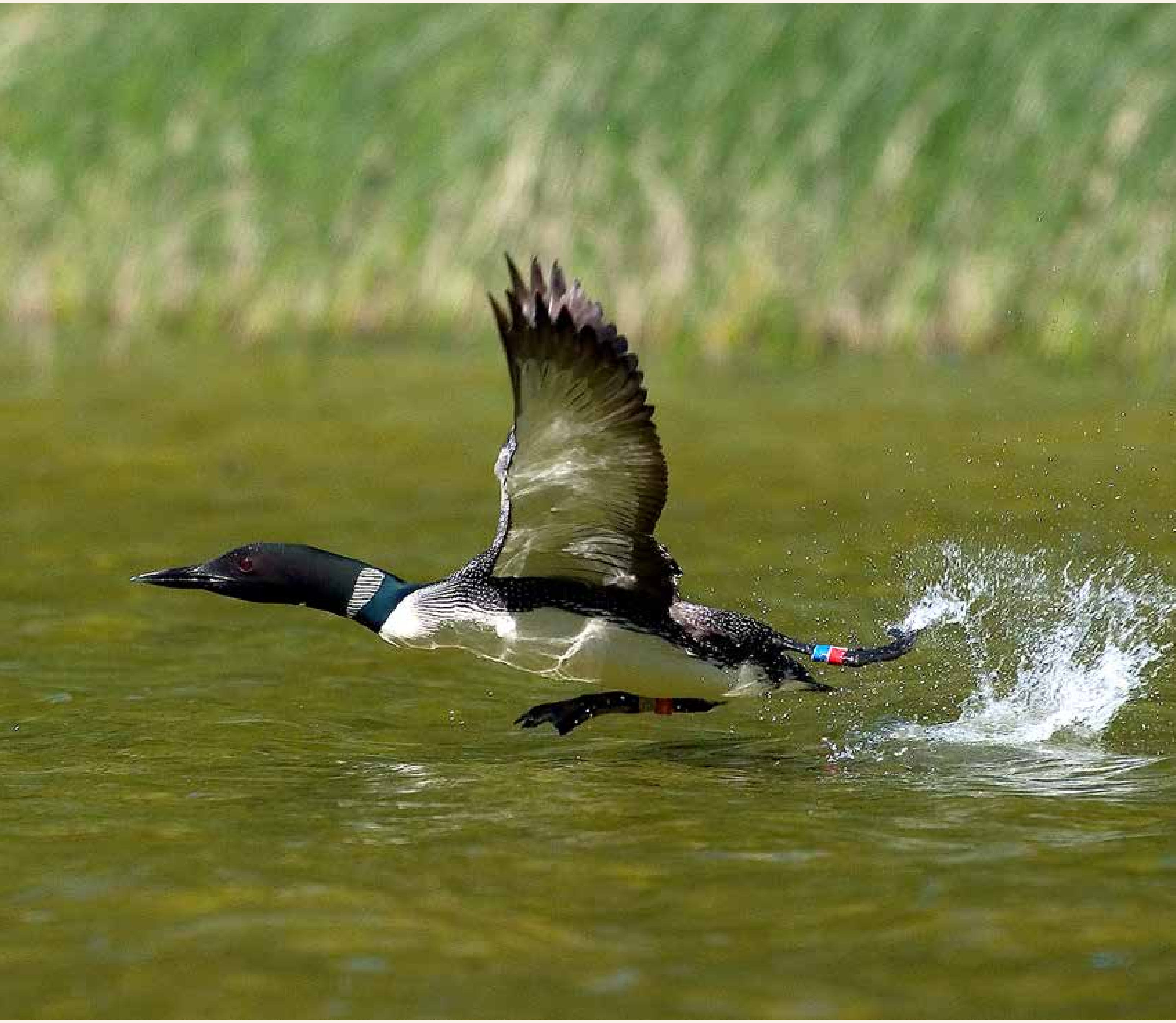
Common Loon Status Report 2021

MASSACHUSETTS



A Series Publication of BRI's Center for Waterbird Studies

Status of the Breeding Loon Population in Massachusetts

The loon is a key biosentinel of aquatic integrity for lakes and nearshore marine ecosystems across North America. Initially supported by a grant from the Ricketts Conservation Foundation, Biodiversity Research Institute (BRI) continues the largest restoration effort for the Common Loon.

This important work establishes new breeding populations of Common Loons in southern and western Massachusetts through our *Restore the Call: New England* effort. State working groups and associated conservation plans have been developed in partnership with the Massachusetts Department of Conservation and Recreation, Massachusetts Division of Fisheries and Wildlife, and the U.S. Fish and Wildlife Service.

As a result of human activities such as sport hunting and shoreline development, breeding loons in Massachusetts were extirpated in the early 20th century (Forbush 1925). By the time the Federal Migratory Bird Treaty Act of 1918 was enacted, Common Loons (*Gavia immer*) had already disappeared from the state. In 1975, a nesting pair was discovered on Quabbin Reservoir (Clark 1975; Blodgett and Lyons 1988). However, recolonization is slow for Common Loons—breeding populations take a decade to double (Figure 1). They are currently designated as a Species of Special Concern in Massachusetts.

Distribution and Movements

In New England, nearly 2,000 territorial pairs of Common Loons currently breed in Maine, New Hampshire, and Vermont (Paruk et al. 2020). In Massachusetts, a peripheral breeding population exists (Figure 2) and is recovering in the state. Since 1985, this population has increased nearly **seven-fold**; by 2020, 48 territorial pairs were found on 25 lakes (Figure 1). While the population has increased, overall productivity—chicks surviving per territorial pair (CS/TP)—has slowed since the late 1990s.

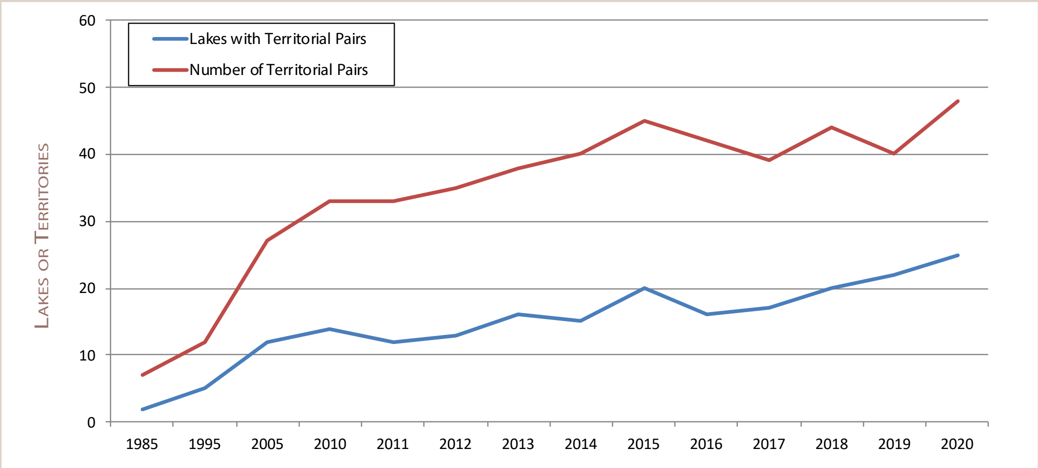
In 15 of the last 22 years, the productivity rates in Massachusetts have been below sustainable levels (0.48 CS/TP; Figure 3).

The carrying capacity for Massachusetts is estimated to be about 300 pairs based on lake area, depth, and phosphorus concentrations (Spagnuolo 2012). Therefore, a larger breeding population is feasible.

Loons banded in New England and New York during the breeding season have been observed on wintering areas ranging from Canada to Florida. Coastal Maine (36%) and Massachusetts (36%) accounted for 72% of all wintering areas. This was followed by the mid-Atlantic (10%), southern New England (8%), Long Island, New York (6%), and coastal New Hampshire (4%).

Continued banding is needed to better understand seasonal movements (since 1999, 154 loons have been banded).

Long-term monitoring of banded loons provides valuable information about reproductive success, habitat utilization, and behavioral ecology.



	Decades				Annual										
	1975	1985	1995	2005	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Lakes with Territorial Pairs	1	2	5	12	14	12	13	16	15	20	16	17	20	22	25
Number of Territorial Pairs	1	7	12	27	33	33	35	37	40	45	42	39	45	40	48

Figure 1. Number of lakes and territories occupied by loons in Massachusetts.

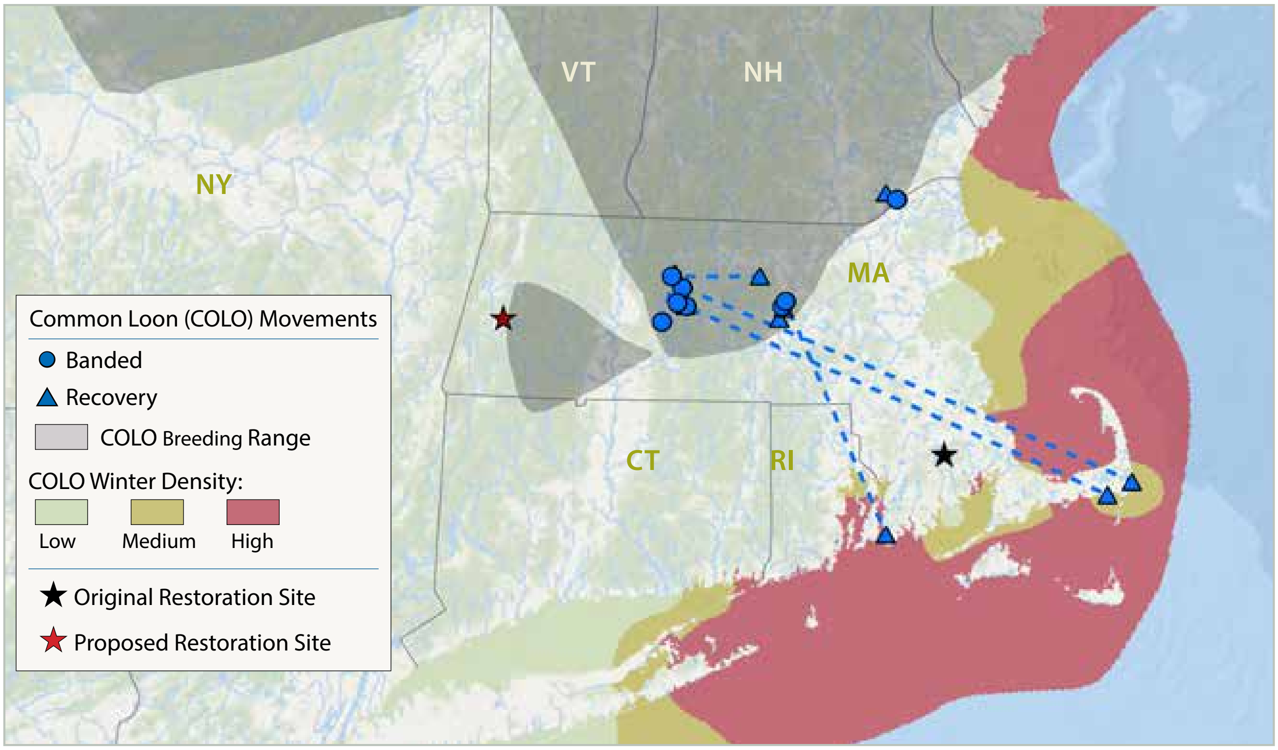
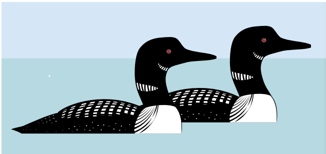


Figure 2. Distribution of Common Loon breeding range, winter concentration, and band recovery.

Summary of Statewide Banding Effort for Breeding Adults



154	**48**	**99**	**53%**
Number of Loons Banded (1999-2020)	Total Number of Breeding Pairs	Total Number of Adults	Percent of Breeding Population Banded

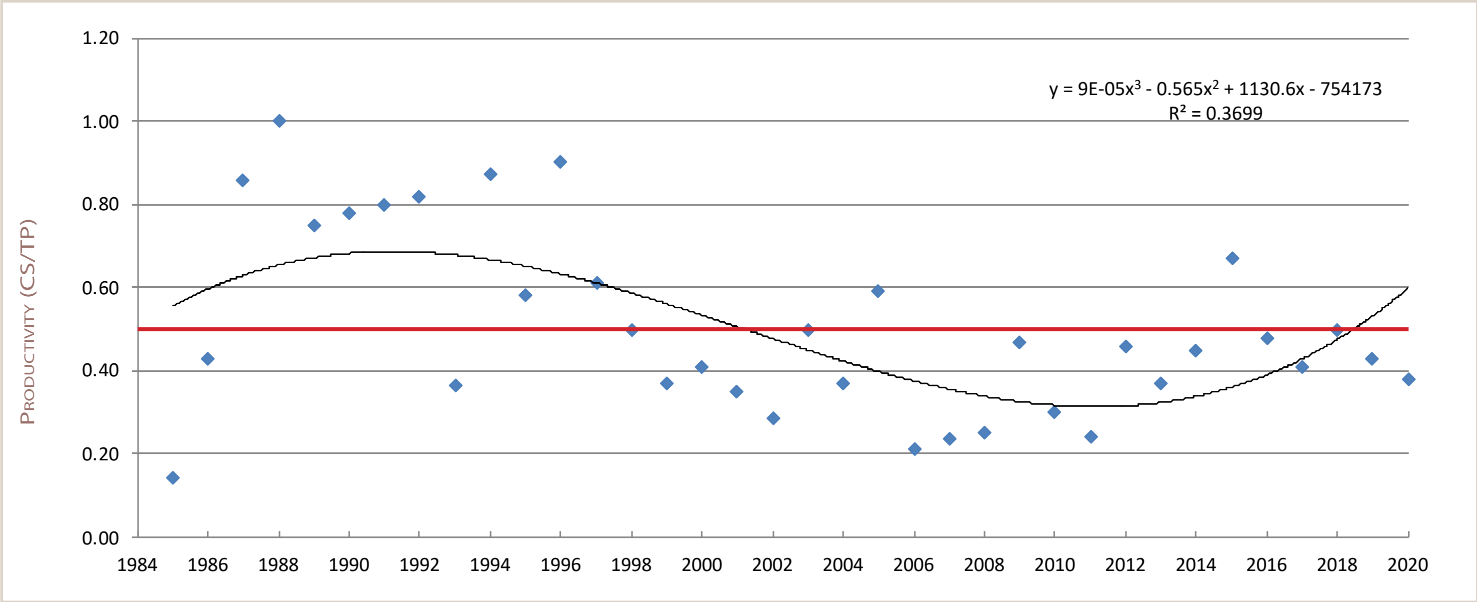


Figure 3. Overall productivity of Common Loons. Red line depicts the number of CS/TP needed to sustain a breeding population.

The Concern for Loons in Massachusetts

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 4).

Mercury, when ingested, can have a wide range of effects on an animal. Survival, reproduction, immune response, song, and endocrine function are all aspects of avian ecology that may be adversely affected by elevated blood mercury levels (Evers et al. 2018), especially in loons (Burgess and Meyer 2008; Evers et al. 2008, 2011).

High mercury levels in loons are most common in four scenarios: 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.

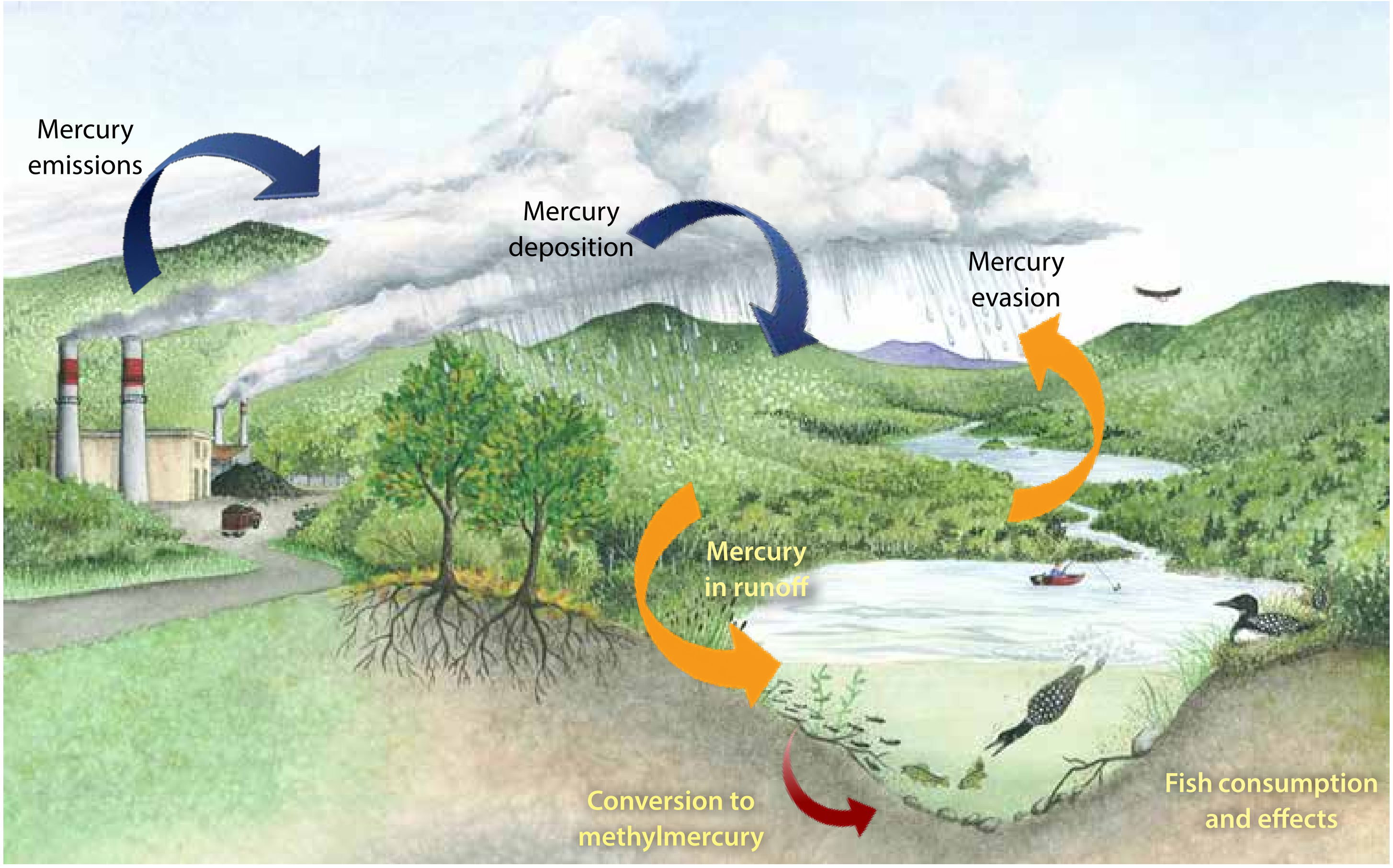


Figure 4. This simple version of the mercury cycle illustrates how mercury enters and moves through an ecosystem. Sources of mercury in Massachusetts are varied. Coal-fired power plants (particularly those in the Ohio River Valley) are a major source of air emissions. Recent reductions in air emissions 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.

Loons Help Us Monitor Mercury in the Environment

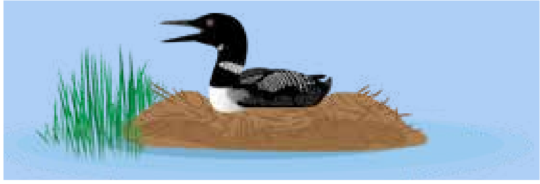
Recent levels of available methylmercury in aquatic ecosystems in the Northeast pose significant risks to human and ecological health.

Loons—large, long-lived birds that feed exclusively on fish—generally bioaccumulate more mercury than other bird species. Loons are therefore widely recognized as the key avian indicator for lakes in North America (Evers 2006).

Continental trends in mercury pollution indicate a significant increasing gradient—west to east with the highest blood and egg mercury levels in the Northeast (Evers et al. 1998). As such, this region contains **biological mercury hotspots.** North-central Massachusetts is one area of concern. Blood samples from 128 adults taken between 1999 and 2020 ranged from 0.67 to 6.58 parts per million (ppm) with a mean of 2.37 ± 1.21 (ppm, wet weight [ww]; Savoy 2021).

Extensive research across North America has determined male loons contain higher mercury concentrations than females from the same lake. This difference in mercury concentrations is due to male loons being larger than females, and therefore targeting larger fish prey. A formula has been developed to standardize adult loon blood mercury concentrations to a single comparable unit, the female loon unit (FLU; Evers et al. 2011).

Mercury Exposure and Risk for Breeding Population in Massachusetts



221
Total Number of Samples

23
Number of Years Sampled (1998-2020)

47%
Percent Above Reproductive Harm (>1.5 ppm)

Mercury and Air Toxic Standards

In April 2015, the US EPA Mercury and Air Toxics Standards rule went into effect. The rule limits emissions of toxic air pollutants, including mercury and other heavy metals. The requirement, as of 2017, was for industry standards to meet a 91% reduction of mercury emissions.

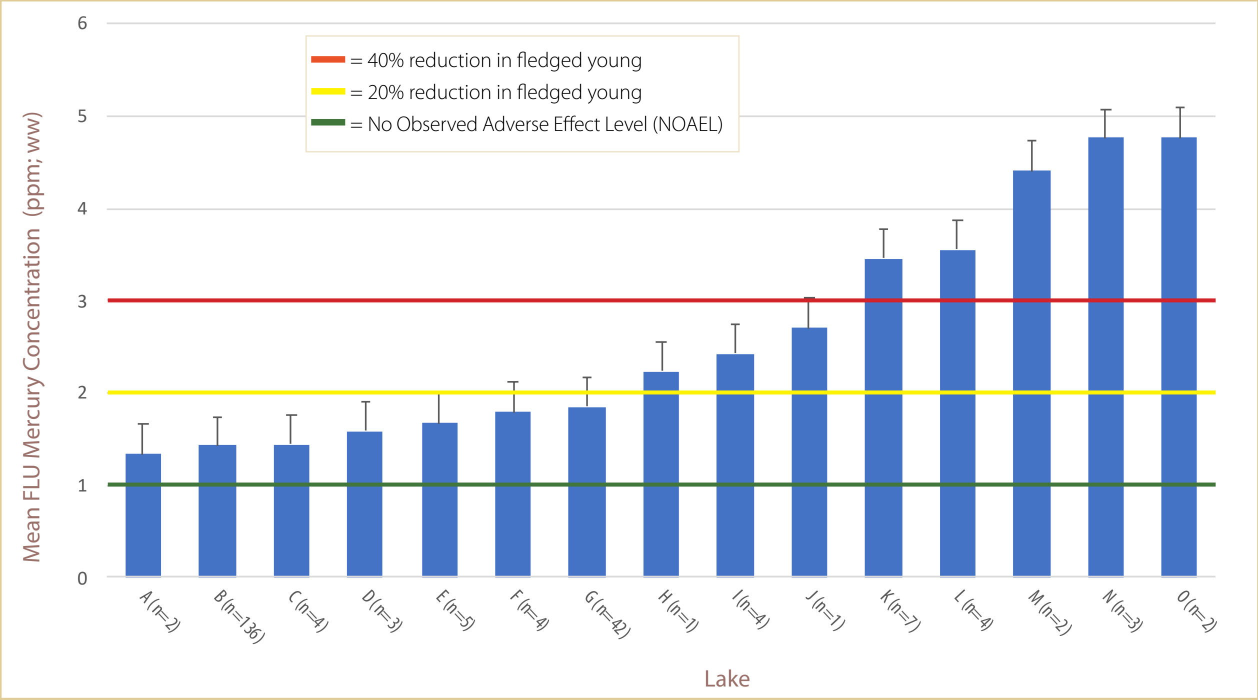


Figure 5. Mean blood and egg concentrations (FLUs) in Common Loons sampled on Massachusetts waterbodies (1998-2020; n=220)

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 U.S. Fish and Wildlife Service (USFWS) through the Loon Preservation Committee (LPC) and BRI to document the range and fate of dispersing individuals (Taylor et al. 2004).

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.

Oil Fingerprinting

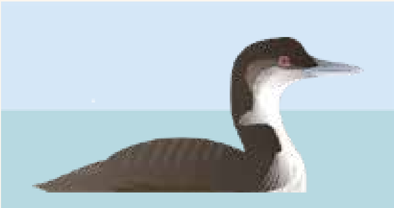
Dispersed loons with oiled plumage were identified in Maine, Massachusetts, and New Hampshire. A total of five loons were observed with oil in Maine and New Hampshire. One of these loons was identified by its color bands and found on its traditional breeding territory in central New Hampshire.

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 is being considered for the B120 spill.

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.

Translocating Loon Chicks 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 chicks were translocated to the APC site. In 2020, 12 chicks were translocated from Maine to the APC site. Overall, 36 chicks were successfully translocated to Massachusetts.

As of spring 2021, ten adult loons 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.

BRI staff developed the 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).

See BRI publication: ***Loon Translocation: A Summary of Methods and Strategies for the Translocation of Common Loons*** at: **www.briwildlife.org/translocation**

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	2021	Sampson Pond	
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	2021	Kezar Lake, Maine	
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.

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Credits

Maps: Mark Burton. **Illustrations:** p 4: Mercury Cycle by Shearon Murphy; Loon illustrations by Iain Stenhouse. **Photography:** Cover: Loon with chick. pp 2-3: Loon nesting © Daniel Poleschook. p. 4: juvenile loon © Daniel Poleschook. pp: 4-5 Loon with chick © Daniel Poleschook. p 6: Oiled Common Loon on beach and Bouchard Barge 120 courtesy NOAA. p. 7: Translocation photos © BRI-Michelle Kneeland.

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