Common Loon

Gavia immer

Federal Listing	N/A
State Listing	T
Global Rank	G5
State Rank	S2
Regional Status	Very High

Photo by Pamela Hunt

Justification (Reason for Concern in NH)

Common loons are an iconic bird on the lakes of NH. Common Loons have declined or are absent from much of their historical breeding range in North America. Between 1978 and 2014, Loon Preservation Committee (LPC) activities promoted increases in numbers of territorial loon pairs, nesting pairs, successful nests, and fledged young. However, monitoring also revealed a significant variability in loon reproductive success from 1982 on. Negative trends in loon breeding success have resulted in more than 5 years of serious declines in successfully reproducing pairs on the largest lakes in NH, while other lakes are successfully raising chicks to fledging. In addition, there are more pairs on smaller lakes. In the last 10 years, territorial pairs increased from 204 pairs to 289 pairs, and the number of chicks fledging increased from 112 to 154. However, productivity on the three biggest lakes, Squam, Umbagog and Winnipesaukee, and in the eastern Lakes Region remain low, with an exception of 2014, where reproductive success was up (all population data is LPC unpublished data). The reproductive rate, expressed as # chicks surviving until August per territorial pair, remains above the .48 level required for a sustainable population on all but the largest lakes, however it has declined in some regions (LPC unpublished data of 5 year averages). The overall reproductive success rate for the past 5 years (2009-2014) is just above the minimum rate. The limited dispersal, low population densities, and low reproductive potential of loons mean that increasing population size is a slow process. Intensive management by LPC has been important in allowing this to happen. However, recent increases in the intensity of managed sites have not increased the rate of population increase, and needs to be evaluated. As a species with delayed breeding, low fecundity and naturally low adult mortality, loon populations are particularly susceptible to stressors impacting adult survival; even small declines in adult loon survival rates impact loon population fitness (Grear et al. 2009). Anthropogenic mortality has averaged 1.5% of New Hampshire's adult loon population per year over the most recent ten years of data (2004-2013).

Distribution

Loons are widely distributed in freshwater lakes and large rivers in New Hampshire north and south of the White Mountains. Populations are less dense in western parts of Sullivan and Cheshire counties, as well as in Hillsborough county and eastern parts of Strafford and Rockingham counties.

Migration occurs on a wide front throughout New Hampshire, and fall migration is more protracted than spring arrival (Evers 2004). Staging primarily occurs on larger lakes, such as Lake Winnipesaukee, Squam Lake, Lake Sunapee, and Newfound Lake (LPC, unpublished data) before migration to the ocean. Loons from New England winter off the Atlantic coast from Maine south along coastal Massachusetts into Long Island Sound (LPC, unpublished data, BioDiversity Research Institute,

unpublished data).

Habitat

Breeding and Nesting Habitat: Loons nest on lakes greater than 6.5 ha (16 ac) but prefer lakes smaller than 24 ha (60 ac) with clear water, small islands, and an irregular shoreline that creates coves. They are also found on major rivers. Lake size and configuration are important determinates for loon density.

Loons nest in close proximity to the water's edge and prefer the lee side of small islands, floating bog mats, and hummocks in marshes (Christenson 1981, Titus and VanDruff 1981, Yonge 1981, Dahmer 1986). Islands can provide the widest range of visibility for loons on the territory and afford better protection from mammalian predators. Marsh and mainland sites are less preferred and are most likely used in response to shoreline development (Alvo 1981, Christenson 1981, McIntyre 1988) and high conspecific densities.

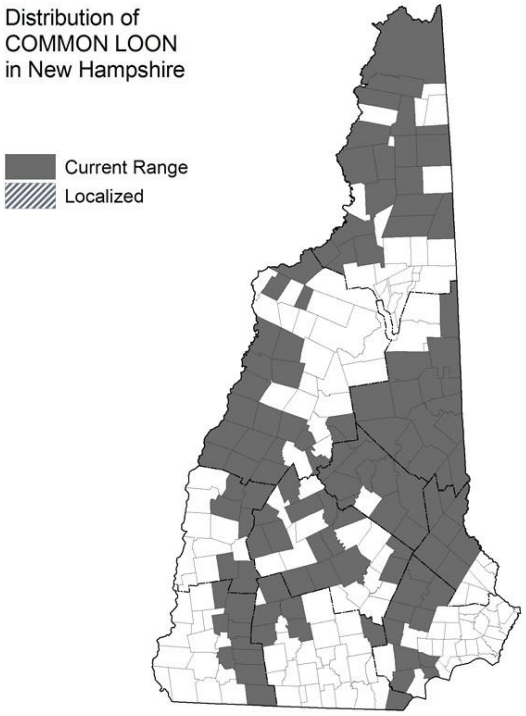
Nest sites generally are within 1 m from the shoreline (Sutcliffe 1980). Available submerged and emergent vegetation is used for nest structures. Extent of the nest bowl diameter varies (27 to 38 cm), and use of depressions, or "scrape" bowls is common (Sutcliffe 1980, Loon Preservation Committee (LPC), unpublished data). Mainland nest sites are more likely to be structures as opposed to scrapes or hummocks (Sutcliffe 1980). Some loons use sites with steep drop-offs that allow for underwater approaches and exits (Olson and Marshall 1952, Christenson 1981, McIntyre 1988), though this is not a predictor of site location (Sutcliffe 1980, Valley 1987). Strong (1987) found between-year reuse of nest sites by Common Loons to be 78-88%. Changes in nest locations were more frequent after nest failures and reuse in subsequent years occurred more often after successful nests (McIntyre 1988).

Chick Rearing Habitat: Chick rearing areas are typically in shallow water close to shore, having prey size classes suitable for feeding young, and experience less prevailing wind and waves that can separate chicks from adults. Chicks have been observed to hide among shoreline vegetation in response to threats or when left unattended (Yonge 1981, Strong and Bissonette 1987).

Winter Habitat: Near-shore coastal waters including bays, channels and inlets serve as winter habitat. Wintering loons generally use more placid waters less than 20 m in depth within 100 km from shore (Haney 1990, Jodice 1992). Band recoveries show NH loons overwinter along the coast from the east end of Long Island Sound to the mid-Maine coast, and that at least some return to the same overwintering area each year (LPC unpublished data).

NH Wildlife Action Plan Habitats

- Lakes and Ponds with Coldwater Habitat
- Warmwater Lakes and Ponds
- Large Warmwater Rivers
- Warmwater Rivers and Streams



Distribution Map

Current Species and Habitat Condition in New Hampshire

In the past 10 years, the populations of loons in all regions of the state have increased except for the Monadnock Region, and lakes Umbagog and Squam. However, the number of chicks fledged in each region has declined in all large lakes (Umbagog, Squam Massabesic and Winnipesaukee) and the Monadnock region. Even worse, based on a 5 year average, reproductive success has declined in all regions except Sunapee. And the success rate, expressed as chicks surviving into August per territorial pair, declined below the sustainable rate of .48 in all the large lakes and the North Country. The other regions still have healthy success rates.

Population Management Status

Populations are managed through a variety of activities to enhance nesting success. Artificial floating nesting platforms are floated to provide safer nesting locations on lakes and ponds that are controlled by dams, and where the water level thus fluctuates more than on natural lakes and ponds. Nest sites and sometimes chick brooding areas are marked with signs, and sometimes roped off, to reduce the impact of humans in boats. LPC has more than doubled the numbers of both techniques used. More chicks are hatched from managed sites however overall nesting success rate has declined. These techniques need to be reevaluated.

Regulatory Protection (for explanations, see Appendix I)

- Endangered Species Conservation Act (RSA 212-A)

- Migratory Bird Treaty Act (1918)

Quality of Habitat

Loons are more likely to nest on lakes that are clear (lower phosphorus and sediment), include islands, are located at higher elevations, have lower road densities and are further away from human population centers and are near lakes that also have loons nesting (Kuhn et al 2011). New Hampshire has many lakes that fit these criteria, although road density and development has increased around many lakes over the last 30 years. There are slight differences in preferences in the three loon subpopulations (White Mountains and north, eastern and western south of the White Mountains) (Kuhn 2011). Loons are successfully nesting on a greater number of lakes each year, so there is still good quality habitat for loons. Protection of suitable sites is still critical.

Habitat Protection Status

The Comprehensive Shoreland Protection Act RSA 483-B was created in 1994 to protect against activities affecting water quality by setting minimum standards and requirements for the use of land within 250 feet of the water's edge. This law was revised and renamed in in 2008 (Shoreland Water Quality Protection Act) and removed some of the protections in the earlier law, particularly as regards to natural vegetation removal. Loon nests on protected shoreline remain vulnerable to development along the shoreline, docks and recreational use of public waters. There are few nests that are protected by fee ownership or easement.

Habitat Management Status

Some lakes with hydroelectric dams that are licensed by FERC have restrictions on water level changes during the nesting season. LPC has worked with the NH Dams Bureau and some private dam operators to voluntarily keep water levels stable during the nesting season. As described under population management, artificial floating nesting platforms are used to enhance nesting habitat.

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Mortality from lead toxicity from ingesting ammunition and tackle (Threat Rank: High)

Lead poisoning from ingested lead fishing tackle is by far the leading cause of adult loon mortality on New Hampshire lakes, accounting for 45% of collected adult loon mortalities from 1989-2013 (LPC, unpublished data). As a K-selected species, loon populations are particularly susceptible to stressors impacting adult survival; even small declines in adult loon survival rates negatively impact loon population fitness (Grear et al. 2009). Ingested lead fishing tackle is known to have caused the death of an average of at least 1.1% of the total New Hampshire adult loon population from 1989-2013, which exceeds the maximum sustainable level of all human-caused mortalities for related threatened species with similar life history characteristics (Dillingham and Fletcher 2008). Mortality from lead fishing tackle is the greatest quantifiable threat negatively impacting New Hampshire's loon population (LPC, unpublished data). There is no effective treatment for lead poisoning in loons unless

the tackle can be flushed out prior to the lead being absorbed into the bloodstream, but lead poisoning is difficult to detect in loons prior to absorption. The ingestion of a single lead sinker or jig can be fatal in loons within 2-4 weeks (M. Pokras, pers. comm.).

The majority of ingested lead tackle in lead-poisoned loons in New Hampshire results from current fishing activity (LPC, unpublished data), in which loons ingest a fish with attached tackle or by striking at tackle or a fish being retrieved through the water. As such, cessation of the use of lead fishing tackle would have immediate benefits to New Hampshire's loon population. In 2000, legislation took effect in New Hampshire to restrict the use in lakes and ponds of lead sinkers weighing one ounce or less and lead-headed jigs measuring less than one inch in total length (including the hook). Subsequent legislation to restrict the use of these tackle in all freshwater in New Hampshire took effect in 2005, and the sale of these tackle was restricted beginning in 2006. Although the rate of lead fishing tackle mortalities in New Hampshire loons fell slightly subsequent to these restrictions (LPC, unpublished data), this reduction was not large enough to protect the loon population; and the majority of the loons that had ingested lead tackle subsequent to 2000 died of ingested lead jigs longer than 1 inch (LPC, unpublished data). In 2013, legislation was passed restricting the sale and use of jigs weighing one ounce or less. This law takes effect June 1, 2016.

Habitat degradation from late-season large storm floods that impacts nests (Threat Rank: Medium)

Loons nest in close proximity to the water's edge and prefer the lee side of small islands, floating bog mats, and hummocks in marshes (Christenson 1981, Titus and VanDruff 1981, Yonge 1981, Dahmer 1986). The nests, situated 6-12 inches above the water surface, are subject to flooding due to water fluctuations (Younge 1981). Increased storms in the late spring and early summer, when loons nest, can flood existing nests. In addition, and early drought which lowers lake levels in the spring, flowed by early summer rains can also flood nests (LPC unpublished data). Although loons can renest, they do not always do so, resulting in overall lowered reproductive success in the population.

Mortality from motorboats that hit adults and chicks and mortality and disturbance from non-motorized boats. (Threat Rank: Medium)

Non-motorized watercrafts, such as canoes and kayaks, have access to shallow water near loon nesting and brood sites, which can lead to nest abandonment. Additionally, canoeists and kayakers are more apt to use remote areas and have a greater ability for stealth. This type of activity is most detrimental during early incubation when egg investment is lowest and the likelihood of nest abandonment is highest. Disturbance from sailboats and windsurfing has not been quantified. Anecdotal and behavioral evidence suggests a sail can be perceived as a visual threat, and therefore has the potential to disrupt nesting and brooding activity, even in areas of high recreational use (LPC, unpublished data).

Loons can habituate to moderate use of motorboats. Recreational motor boating represents a greater disturbance and risk to loon adults and young in open water than to those nesting and foraging in shallow water. Habituation to boating activity can dull response times in loons, making them more susceptible to collisions (LPC, unpublished data). Personal watercraft can cause significant damage since they have a shallow draft and are able to closely approach nests and shorelines at high speeds. Repeated travel of personal watercraft near nest sites or loon families for extended periods of time can disrupt incubation, expose eggs to predators, or impede parental care of young (Burger 1998).

Excessive angler use of shallow, vegetated areas of lakes through wading and boating can disturb nesting and foraging activity (Titus 1978, Titus and VanDruff 1981, Christenson 1981, Kelly 1992). The increased popularity of fishing tournaments offering substantial prizes can create an unfortunate incentive for improper practices. In New Hampshire and Maine, vulnerable nesting pairs are vigorously monitored during bass tournaments, as a few participants disregard posted and cordoned-off nest exclosures (LPC, unpublished data.).

Species impacts (reduced fitness) from mercury toxicity (Threat Rank: Medium)

Mercury is a result of anthropogenic sources such as municipal and medical waste incinerators and coal-fired power plants (Swain et al. 1992, USEPA 1997, NESCAUM 1998). Mercury is a highly mobile contaminant with the ability to cycle through land, air, and water. One of its organic forms, methylmercury, bioaccumulates in upper trophic level wildlife, including loons and other piscivorous birds (see Meyer et al. 1995, Evers et al. 1998, 2003, 2005).

Mercury deposition models developed by the USEPA (1997) indicate the northeastern United States to be at particular risk to elevated levels of mercury deposition. Nearly fifty percent of this deposition is from sources within the region. One of the highest exposure areas predicted in these models is the southeastern corner of New Hampshire.

Concentrations of mercury in loon eggs and in adult loons, and the accumulation of mercury in individual loons over time, suggest that current levels of mercury emissions are high enough to pose a threat to loons and other wildlife in New Hampshire. Ever et al (2008) determined that loons with high mercury levels produced 19% fewer eggs and 41% fewer fledged chicks. Nesting loons spent less time incubating (as low as 86% versus a norm of 99%) and showed lethargic behavior including less foraging.

The Common Loon has been nationally identified by a USEPA-led working group as one of the best indicators of persistent bioaccumulative toxins, including mercury, in lakes (Wolfe et al. 2004, Evers et al. 2005).

List of Lower Ranking Threats:

Species impacts (reduced fitness) and mortality from entanglement in monofilament fishing line

Mortality and impacts (reduced fitness) from emerging diseases

Species impacts from persistent organic pollutants that reduce reproduction (egg failure)

Mortality and impacts (reduced fitness) from oil

Species impacts (reduced fitness) from nutrient run-off that causes reduction in water quality

Species impacts from acidity that causes a reduction in prey

Habitat degradation from shoreline development that impacts nesting (including docks)

Actions to benefit this Species or Habitat in NH

Strengthen shoreline protections

Primary Threat Addressed: Habitat degradation from shoreline development that impacts nesting (including docks)

Specific Threat (IUCN Threat Levels): Residential & commercial development

Objective:
Strengthen shoreline protections to prevent degradation of natural shoreline vegetation in developed and undeveloped areas, control development, and protect existing shoreline nesting habitat.

General Strategy:
Work with DES to strengthen the rules protecting shorelines to include stricter regulations on docks and boat houses and any other alteration of shore habitat. Target land protection on known nest sites and high value habitat.

Political Location: **Watershed Location:**

Manage water level fluctuations above dams.

Primary Threat Addressed: Habitat degradation from late-season large storm floods that impacts nests

Specific Threat (IUCN Threat Levels): Climate change & severe weather

Objective:
Work with dam operators to hold water levels stable during the loon nesting season.

General Strategy:
Work with DES Dams Bureau to address water level fluctuations on state-owned dams. Work with private landowners to have them voluntarily keep water levels constant during the loon nesting season.

Political Location: **Watershed Location:**

Educate all lake users on loon behavior and sensitivity to disturbance.

Primary Threat Addressed: Mortality from motorboats that hit adults and chicks and mortality and disturbance from non-motorized boats.

Specific Threat (IUCN Threat Levels): Human intrusions & disturbance

Objective:
Educate both paddlers and motor boat users on the sensitive of loons to nest disturbance, the vulnerability of chicks and the rules regarding loon harassment.

General Strategy:
Provide information on websites and kiosks on the effects of disturbances by boaters on loons. Add language to websites that promote tourism including loon watching on these effects. Work with Marine Patrol and NHFG law enforcement to address issues as they are reported.

Political Location: **Watershed Location:**

Expand education on the ban of lead fishing tackle

Primary Threat Addressed: Mortality from lead toxicity from ingesting ammunition and tackle

Specific Threat (IUCN Threat Levels): Biological resource use

Objective:
Continue to work together with agencies including NHFG and Marine Patrol, lake associations, LPC, other NGOs and angler groups to education anglers about the laws and voluntary recommendations on using lead-free tackle.

General Strategy:
Develop language for pages on websites hosted by all groups that promote the use of lead free tackle, addressing both regulatory requirement and voluntary additional practices. Develop posters or brochures for kiosks, tackle shops, etc. that promote the use of lead-free tackle. Include the risks of entanglement in fishing tackle in these efforts.

Political Location: **Watershed Location:**

Increase enforcement efforts to reduce use of banned lead fishing tackle

Primary Threat Addressed: Mortality from lead toxicity from ingesting ammunition and tackle

Specific Threat (IUCN Threat Levels): Biological resource use

Objective:
Work with NHFG Law Enforcement to assist them in enforcement issues.

General Strategy:
Work with NHFG Law Enforcement to assist them in enforcement issues. Develop easy method to identify lead tackle versus non-lead tackle in the field.

Political Location: **Watershed Location:**

Monitor loon populations

Objective:
Continue efforts to monitor the loon population.

General Strategy:
Continue monitoring loon nesting success and consider the development of protocols to monitor loon nesting through a sampling effort. Use this data to understand the changes in populations over time.

Political Location: **Watershed Location:**

Conduct research into the causes of declines in loon populations on larger lakes.

Objective:
Conduct research into the causes of declines in loon populations on larger lakes to find ways to mitigate the issues causing these declines.

General Strategy:
Research causes such as disturbance, shoreline alteration, toxins, forage quantity and quality, interspecies interaction, and other possibilities. Develop actions to address causes as they are discovered

Political Location: **Watershed Location:**

Review use of rafts, ropes and signs for nest protection

Objective:
Review use of rafts, ropes and signs for nest protection to ensure these management tools are being used most efficiently and effectively

General Strategy:
Review nesting success data on use of artificial nesting rafts including looking at the success of natural nests that have been replaced by rafts, looking at chicks surviving instead of only chick hatched from rafts, and identifying where nest rafts might be encouraging nesting in areas subject to higher nest and/or chick disturbance. Develop decision trees to be used in floating rafts in new locations. Consider the same information in assessing the use of ropes and signs or signs alone.

Political Location: **Watershed Location:**

References, Data Sources and Authors

Data Sources
Information on Common Loon habitat, population distribution, and status is from LPC's database and technical field reports, the Status and Assessment Plan for Common Loons in North America (Evers 2004), and peer-reviewed journals.
Information on habitat patch protection status was obtained from NHDES. Data on rafts, water-level management, and signs were derived from LPC's database.

Data Quality
The Common Loon is one of the most intensively monitored and managed species in New Hampshire. Statewide surveys have been conducted annually by LPC since 1976. Loons are also well studied throughout their range.

2015 Authors:
Emily Preston, NHFG

2005 Authors:
Harry Vogel and Kate Taylor, Loon Preservation Committee

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