The Common Loon

Population Status and Fall Migration in Minnesota

Minnesota Ornithologists' Union
Occasional Papers: Number 3

Edited by Peder H. Svingen and Anthony X. Hertzel

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A Survey of Common Loons on Small Lakes in Central Minnesota
Pamela Skoog Perry and Kevin Woizeschke

An Estimate of Minnesota's Summer Population of Adult Common Loons
Paul I. V. Strong and Richard J. Baker

Minnesota Loon Monitoring Program: Six-year Report: 1994–1999
Richard J. Baker

Fall Staging of the Common Loon on Lakes Winnibigoshish and Mille Lacs
Anthony X. Hertzel, Karen R. Sussman, and Peder H. Svingen

Common Loon Migration in the Great Lakes Basin
Peder H. Svingen

The Minnesota Ornithologists' Union

Minneapolis, Minnesota
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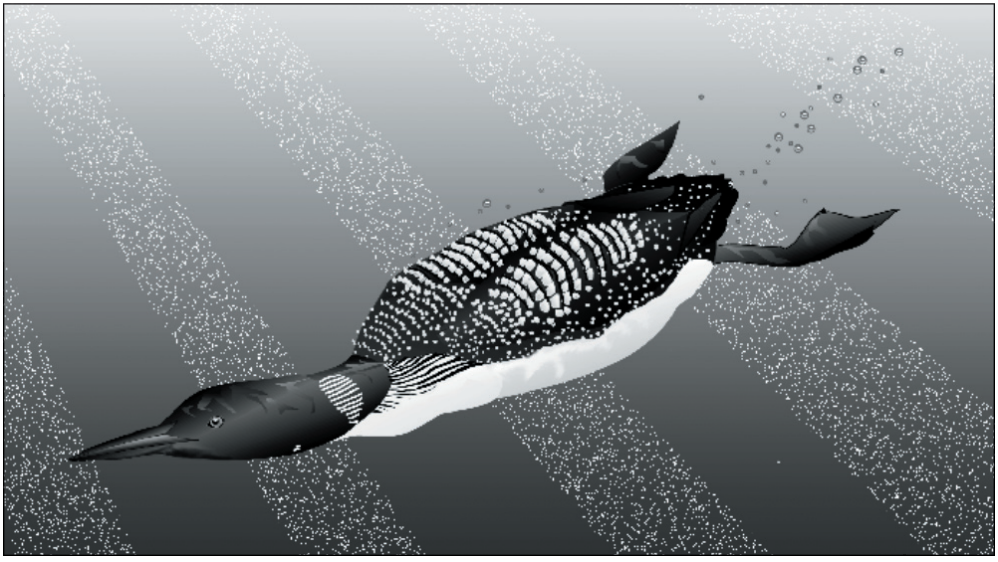
Minnesota Loon Monitoring Program

Six-year Report: 1994–1999

Richard J. Baker
Minnesota Loon Monitoring Program Coordinator
Nongame Wildlife Program
Minnesota Department Of Natural Resources
May 1, 2000

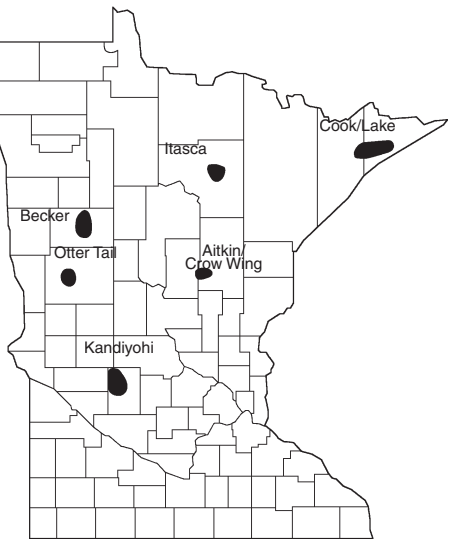


Tom Klein

Summary

The Minnesota Loon Monitoring Program (MLMP) is a long-term project of the Minnesota Department of Natural Resources' Nongame Wildlife Program. Since 1994, nearly 1000 volunteer observers have annually gathered information about Common Loons in six 100-lake regions, or "index areas" of the state. The data these generous citizens collect provide the Nongame Wildlife Program with an early warning system for detecting changes in the numbers of these birds and the health of their lake habitats in Minnesota. In addition to reporting information about loons and habitat quality, observers also report on the presence of Canada geese on the lakes they survey.

An analysis of six years of MLMP data indicates that Minnesota's Common Loon population remains healthy in both number of adults and number of juveniles observed within the index areas. Indeed, data from the Becker index area indicate a slight, but significant increase in that area's loon population. The abundance of loons varies greatly across the state, and is lowest in the southwestern (Kandiyohi and Otter Tail) and northeastern (Cook/Lake) index areas, and highest in the north central (Itasca) index area. The number of juveniles per two adults seen, a measure of reproductive success,



Locations Of MLMP Index Areas.

also varies among index areas, but appears to be highest in the southwestern (Kandiyohi) index area and lowest in the northeastern (Cook/Lake) index area. Finally, data on Canada Goose abundance illustrate a dramatic increase in the southwestern (Kandiyohi and Otter Tail) index areas, but stable populations elsewhere.

The value of MLMP data is widely recognized by Minnesota's biologists and planners, and its results have been incorporated into several summaries of statewide ecological health, including Minnesota Milestones, Minnesota Environmental Indicators Initiative, and Water Management 2000. The Nongame Wildlife Program hopes to continue this effort into the future.

Why We Monitor The Health Of Minnesota's Loon Population

The Common Loon (*Gavia immer*) is Minnesota's state bird, and a source of pleasure to the thousands of lake dwellers and visitors who enjoy its enchanting sights and sounds. A statewide survey conducted by the Nongame Wildlife Program in 1989 found that Minnesota is the summer home to roughly 12,000 adult loons, more than in all other states combined, excluding Alaska. As with the Bald Eagle and grey wolf, Minnesotans are responsible for the stewardship of one of the nations' largest loon populations. The DNR uses the MLMP to track the health of the state's loons and lakes, and to help insure that this bird will grace Minnesota far into the future.

Loons have several characteristics that make them a valuable "indicator" of the health of the state's lakes. As diving birds that use sight to hunt their fish prey, they thrive in clear lakes with healthy fish populations. Also, loons only nest on undisturbed shorelines or islands with plenty of natural vegetation. Because loons nest at the waters' edge, they are easily disturbed by excessive boat traffic and wakes, and are displaced by human residential activity. Loon chicks venture onto the lake soon after hatching, and can be injured or killed by careless boaters. Finally, like other animals that eat carnivorous fish, loons will accumulate health-threatening pollutants in their bodies if their habitat is contaminated. This can in turn reduce the birds' survival and reproductive success.

Index Areas

Because it would be far too difficult to collect loon data from all 12,000 of Minnesota's lakes each year, the MLMP is designed to measure the health of loon populations within six 100-lake "index areas." These areas have been selected because they are typical of larger portions of the state in ways that matter to loons. For example, we know that loons can be adversely affected by shoreline development. To help us detect problems that may stem from loss of shoreline habitat, the MLMP index areas are divided between those likely to experience rapid human population growth (e.g., Aitkin/Crow Wing and Kandiyohi index areas) and those in which human populations and their impacts are likely to change more slowly in the near future (e.g., Becker, Cook/Lake,

Itasca, and Otter Tail index areas). The six index areas are similarly divided between those where acid rain sensitivity, public or private land ownership, or road density are expected to increase or to stay the same. The index areas are named for the counties in which they are located. The characteristics of each index area are detailed at the end of this report.

Volunteer Observers

The Nongame Wildlife Program does not have enough staff to collect data at 600 lakes each year. Instead, hundreds of generous volunteers visit their assigned lakes on one morning during a ten-day period in early July. Depending on the size of the lake they survey, the volunteers' survey styles vary widely, with some using boats or canoes, and others surveying from the shore. Similarly, some use binoculars or spotting scopes, and others don't. However, Nongame Wildlife Program staff try to standardize methods by providing survey guidelines to all volunteers. In addition to the numbers of loons and geese seen, observers are asked to report on such things as weather and shoreline conditions. Data forms are returned to the Nongame Wildlife Program for compilation and analysis.

Results Of Data Analysis

On the following pages, the results of data analysis are presented for each index area. Because of the way the MLMP is designed, the analyses must evaluate the data from each index area separately. Furthermore, conclusions reached about populations within the six index areas do not precisely describe the status of the state's entire loon population. Taken together, however, conclusions regarding loon populations within the six index areas do provide an overall picture of the status of loons in Minnesota.

Data generated by the MLMP were analyzed in two ways: 1) Within each index area, we looked for trends that indicate population changes occurring over time; 2) Among the index areas, we compared data to learn how loons and geese respond to different environmental conditions that exist in the various areas. Three analyses of loon data and one analysis of goose data are described below, and are presented in detail at the end of this report.

Loon Abundance: Adult Loons Seen Per 100 Acres Of Lake Surface Within An Index Area

Within an index area, abundance measures such as *total number of loons seen* or *average number of loons seen per lake* can be compared from year to year. However, since average lake size varies among index areas, we have converted these to the *average number of adult loons seen per 100 acres of lake surface* so that we can also make comparisons among index areas. During the six years studied, no statistically significant changes in adult loon abundance have been observed within any of the six index areas. Although slight differences between years can be seen in the figures found at the end of this report, these are probably due to normal fluctuations that occur in all natural populations.

Loon abundance ranged from 0.5 – 0.8 adult loons per 100 acres of lake surface in the Kandiyohi index area to 3.2 – 3.8 in the Itasca index area. These differences among index areas confirm previous observations that in Minnesota, loons are most abundant in the central lakes region, and least abundant in the southwest agricultural region, where the species is at the very southern edge of its current distributional range in North America.

Loon Occupancy: Percent Of Lakes In An Index Area With Any Adult Loons

Occupancy can be thought of as the *likelihood of seeing a loon on a lake*. A small,

but statistically significant increase in occupancy was detected within the Becker index area. Occupancy in all other index areas remained stable during the six years, but fluctuations up to 10% were observed in several areas. Occupancy was calculated as 65% – 73% in the Aitkin/Crow Wing index area, 59% – 73% in the Becker index area, 44% - 54% in the Cook/Lake index area, 69% – 76% in the Itasca index area, 24% – 32% in the Kandiyohi index area, and 48% – 58% in the Otter Tail index area, again consistent with previous observations regarding the distribution of loons within Minnesota.

Loon Reproductive Success: Juvenile Loons For Every Two Adult Loons On A Lake

Measures of reproductive success are particularly important in monitoring the health of wildlife populations. Especially with long-lived species like the loon, focusing only on adult abundance or occupancy might cause biologists to miss less obvious problems. For example, adults might be present on a lake every year, but fail to raise young year after year. Eventually, this could result in the disappearance of loons from the lake (unless other adults moved in), although this might not occur for many years. Because it is the young of a species that keeps the population going after the adults die, it is critical that a population reproduce successfully.

In this analysis, we calculated the *average number of juvenile loons seen for every two adult loons seen*. Since a healthy pair of loons typically produce a two-egg clutch each year, this ratio would equal 1.0 in the ideal world. However, rarely in any wildlife population do all young survive. To maintain a population, each pair of adults need to raise only two young to breeding age during the course of their lives. Although species that only reproduce in one year must raise their young in that one year, loons may nest for many years, and so can afford to be less successful in any one year. Consequently, a low reproductive success in a single year is not necessarily a concern.

During the study period, no statistically significant changes in reproductive success were observed within any of the six index areas. This ratio fluctuates between years in all index areas, but given the smaller sample size than was used for other measures (since lakes with fewer than 2 loons were dropped from the analysis) and the fact that juvenile loons are more likely than adults to be missed by observers, this measure may be less precise than those using only adult data.

Among index areas, reproductive success was calculated as 0.29 – 0.44 in the Aitkin/Crow Wing index area, 0.35 – 0.63 in the Becker index area, 0.07 – 0.41 in the Cook/Lake index area, 0.28 – 0.54 in the Itasca index area, 0.46 – 0.82 in the Kandiyohi index area, and 0.32 – 0.61 in the Otter Tail index area. These surprising results indicate that although the Kandiyohi index area has the lowest abundance and occupancy, the adults living there are the most successful of any index area at raising young. The reason for this is unclear. The relatively poor reproductive success observed in the Cook/Lake index area may be due to the generally low productivity of lakes in that region of the state, or to heavy metal contamination in some of its waters. Further research would be needed to determine the causes of these patterns.

Thank You!!!

We extend our heartfelt thanks to the hundreds of volunteer observers who continue to make the Minnesota Loon Monitoring Program a success. Without your persistence and hard work, the DNR would be without a means of reporting on the health of Minnesota's state bird. We and the loons appreciate your commitment!

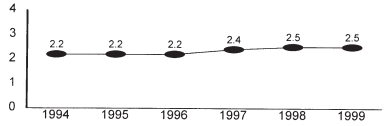
We also acknowledge the assistance of Dr. Douglas Hawkins, University of Minnesota, for statistical analysis, Bill Schuna and Jeremy Kershaw for data management, and Eric Hanson for the initial design and implementation of the MLMP.

AITKIN/CROW WING INDEX AREA

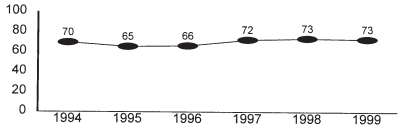
CHARACTERISTICS

LOW ACID RAIN SENSTIVITY
HIGH DENSITY OF HUMANS AND ROADS
RAPID HUMAN POPULATION GROWTH
PREDOMINANTLY PRIVATE LANDS
AVERAGE LAKE SIZE = 193 ACRES

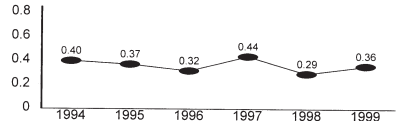
ADULT LOONS PER 100 ACRES OF LAKE



PERCENT OF LAKES WITH ANY ADULT LOONS



LOON JUVENILES PER TWO ADULTS

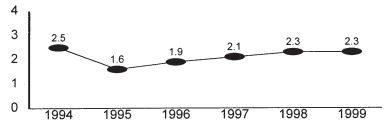


BECKER INDEX AREA

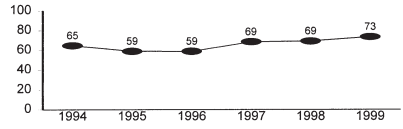
CHARACTERISTICS

LOW ACID RAIN SENSTIVITY
LOW DENSITY OF HUMANS AND ROADS
SLOW HUMAN POPULATION GROWTH
PREDOMINANTLY PUBLIC LANDS
AVERAGE LAKE SIZE = 421 ACRES

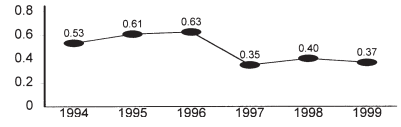
ADULT LOONS PER 100 ACRES OF LAKE



PERCENT OF LAKES WITH ANY ADULT LOONS



LOON JUVENILES PER TWO ADULTS

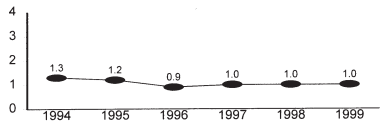


COOK/LAKE INDEX AREA

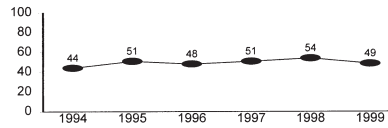
CHARACTERISTICS

HIGH ACID RAIN SENSTIVITY
LOW DENSITY OF HUMANS AND ROADS
SLOW HUMAN POPULATION GROWTH
PREDOMINANTLY PUBLIC LANDS
AVERAGE LAKE SIZE = 213 ACRES

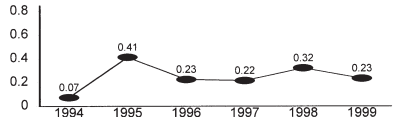
ADULT LOONS PER 100 ACRES OF LAKE



PERCENT OF LAKES WITH ANY ADULT LOONS



LOON JUVENILES PER TWO ADULTS

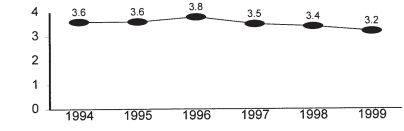


ITASCA INDEX AREA

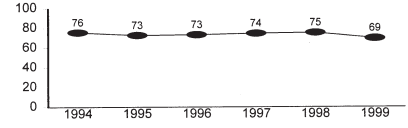
CHARACTERISTICS

HIGH ACID RAIN SENSTIVITY
LOW DENSITY OF HUMANS AND ROADS
SLOW HUMAN POPULATION GROWTH
PREDOMINANTLY PUBLIC LANDS
AVERAGE LAKE SIZE = 199 ACRES

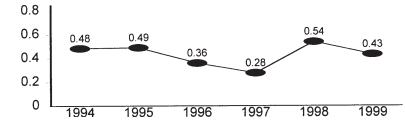
ADULT LOONS PER 100 ACRES OF LAKE

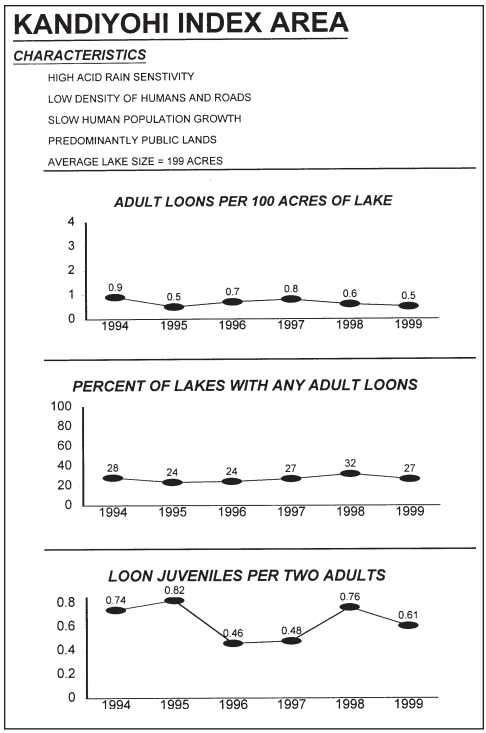


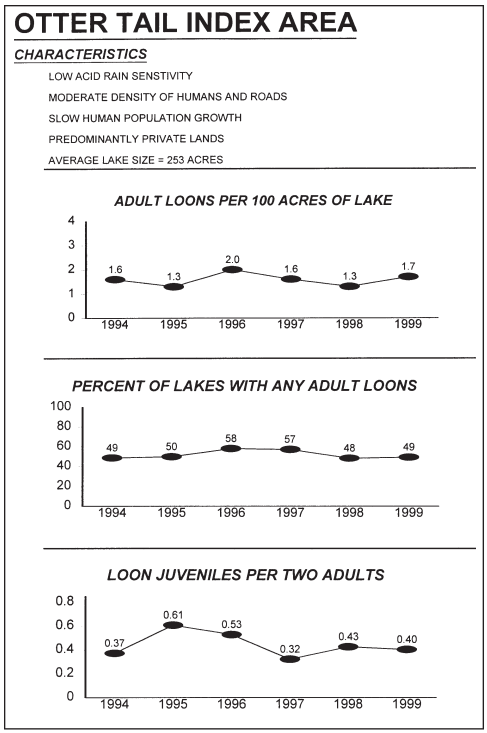
PERCENT OF LAKES WITH ANY ADULT LOONS



LOON JUVENILES PER TWO ADULTS







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