Common Loon Numbers in Northcentral Minnesota

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ABSTRACT: Common loons were counted from fixed-wing aircraft on 116 lakes in two north-central Minnesota counties in 1985. The unadjusted estimate of the total loon population ($\hat{N}$ ± 95% CI) for the 1,179 lakes in these counties was 1675 ± 358, or 3.88 loons/100 ha of water. Comparison of air and ground counts from 77 lakes in 1986 indicated that 69% of the adults and 45% of the chicks were seen from the air. The adjusted population estimate is 2,609 ± 564 loons. The adjusted density estimate is 6.69 loons/100 ha.

INTRODUCTION

The common loon (Gavia immer), the state bird, is found throughout the forested portion of Minnesota (Janssen 1987; Fig. 1). Loons have high public visibility, and are immensely popular, but populations are subject to a number of threats throughout their range. These include illegal shooting (Taylor 1974), drowning in commercial fishing nets (Bartonek 1965), oil spills (Joensen 1973, Mays 1976), chemical contamination, including acid rain, (Barr 1979, LaBastille 1977), human harassment (Olson and Marshall 1952, Ridgely 1975), and lakeshore development (Valley 1987).

Attempts to count loons over all or part of a state have been made in Wisconsin (Zimmer 1979, Olson 1986), Michigan

(Hill and Janson 1982, Janson 1983), New York (Davis and Davis 1983), New Hampshire (McCoy 1988), and Maine (Major and Bissonette 1983, Lee and Arbuckle 1988). Both air and ground counts have been used, but aerial counts may result in serious undercounting. (Caughley 1974, 1977, Cook and Jacobsen 1979, Bowden 1973, 1987, U.S. Fish and Wildlife Service and Canadian Wildlife Service 1977). Zimmer (1979) estimated that he saw 90% of the adult loons actually present in aerial counts of Wisconsin lakes. DiBello and Bissonette (1984), however, compared aerial and ground counts in Maine (n=4, five replications) and saw 50-75% of the birds present on larger lakes. Aerial counts on the Chippewa National Forest, Minnesota (Mathisen pers. comm.) accounted for 79 and 100% of the adult and young loons, respectively seen from the ground. Ground counts are assumed to be more accurate. Olson (1986), however, found that volunteer ground observers counted only 88% of the adult loons actually present.

Loons are long-lived birds with low adult mortality (McIntyre 1975 and Nilsson 1977). They probably return to the same area each summer. This nesting site fidelity and considerable life span makes loons a good condition indicator for aquatic and riparian habitats. Changes in loon populations may indicate problems in these habitats which need to be addressed. For this reason, and the need to efficiently count loons over their extensive range in Minnesota (Fig. 1), aerial

surveys were considered. Trial aerial counts of four northern counties were completed in 1985 and 1986 (Fig. 1).

METHODS

In 1985 1,179 lakes in Itasca and Aitkin Counties (Fig.1) (IAC) were placed into one of eight size categories (strata). An approximately proportional allocation of 116 lakes was distributed among the eight strata, and surveyed by aircraft from 2-14 August 1985 (Table 1).

During the spring and summer of 1986 loons were counted from the ground on lakes in the Minnesota loon range by Project Loon Watch (PLW) volunteers. The PLW lakes counted were not selected at random or with regard to stratification, but rather on the basis of willing volunteers and a previous count history. A total of 77 lakes in Itasca, Aitkin, Cass and Beltrami Counties were counted by volunteers. These same lakes were surveyed for loons from the air from 1-15 August 1986. Thus, air and ground count data could be compared.

All flights were made using a Cessna 185 equipped with a Stoll-Robertson conversion kit. Weather conditions were usually clear to partly cloudy with winds 0-24 km/h. Both passenger and pilot counted loons by repeatedly circling at altitudes between 150-300 m.

The total loon population for the IAC was estimated by a weighted arithmetic mean---the weights being the proportion of lakes in each stratum (Table 1). The air/ground count data

were evaluated by direct comparison of the total number of birds reported by each method.

RESULTS AND DISCUSSION

The 1985 IAC counts took 24.3 hours of flying at a cost of $1,100.00 for the pilot and aircraft. Search time per lake averaged (X) 29 minutes per 100 ha of water (Table 1).

A total of 153 adult loons and 25 young was seen on the 116 sample lakes (Table 1). The unadjusted total population is estimated at 1,675 ± 358 loons for the 1,179 lakes of the IAC area

The 1986 air/ground observations tallied 145/209 adults and 44/97 young loons, respectively. Thus 69% of the adults and 45% of the young reported by ground observers were seen from the air. Using these figures to adjust the 1985 data yields a total population estimate of 2,609 ± 564 loons on the 1,179 lakes of the IAC. The adjusted estimated production of 0.21 young per adult is similar to results of other studies (Table 2).

The air/ground count data suggest that there is substantial undercounting of loons from the air. Because the air and PLW ground counts were done at different times and intensities, however, the two sets of observations are not exactly comparable. Ideally, both counts should be done during the same time period.

Data from studies like this one can also be used to estimate loon densities. The calculated density (unadjusted) for the IAC is 3.88 adult loons per 100 hectares of water.

Densities calculated from other studies range from 0.46 to 5.63 (Table 2). Exactly what these differences mean is not known, but there is apparently wide variation in loon densities throughout their range. In addition, a standardized unit for expressing density is desirable and we propose that the 100 ha ratio be used in the future for adults and young. These density data also indicate considerable loon use (4.8 loons/100 ha) on lakes less than 12 ha (Table 2). No young were seen in either year on this size lake, suggesting that they are not used for nesting or that nesting is unsuccessful. These small lakes may, however, be important for other unknown reasons.

CONCLUSIONS

1. Counts from fixed wing aircraft are a feasible way of counting loons in northern Minnesota
2. More work is needed to determine the visibility bias for aerial loon counts.
3. Data from the 1985 IAC counts may be used to determine an optimum allocated sample for future aerial counts.

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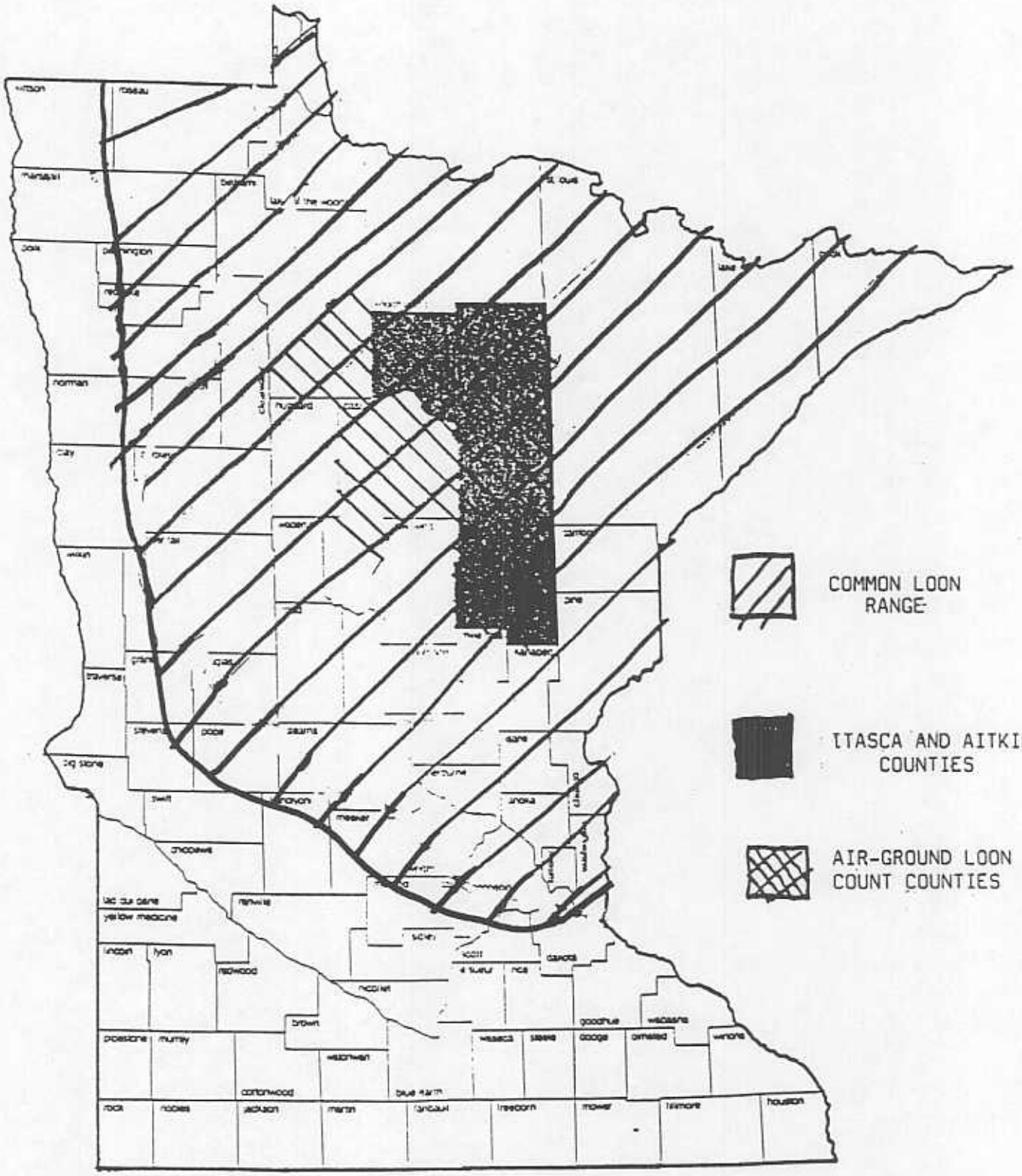

FIGURE 1. MINNESOTA LOON RANGE AND SAMPLE COUNTIES

Table 1. Unadjusted aerial loon count data for Itasca-Aitkin County area Minnesota, 1985

Lake Size (stratum) ha	Population of Lakes (N)	Proportion of Lakes (P)	Number of Sample Lakes (n)	Number of Loons Seen		Loons/Lake ($\bar{x}$-s)		Loons/100 ha		Search time Minutes/100 ha $\bar{x}$
				Adults	Young	Adults	Young	Adults	Young	
< 12	484	0.41	47.000	16	0	0.34-0.67	0	4.8	0	51
12.4-20	165	0.14	15.000	11	2	0.73-0.80	0.13-0.52	4.1	0.7	17
20.4-40	207	0.18	23.000	26	10	1.13-0.92	0.43-0.79	4.0	1.5	13
40.4-80	144	0.12	12.000	25	5	2.08-1.56	0.42-0.67	3.2	0.6	8
80.4-200	114	0.1	11.000	33	3	3.00-3.10	0.27-0.65	2.1	0.2	11
201.4-800	45	0.04	4.000	7	0	1.75-1.26	0	0.5	0	5
801.4-1600	13	0.01	2.000	29	5	14.00-7.07	2.50-0.71	1.4	0.2	3
>1600	7	0.005	2.000	7	0	3.50-3.53	0	0.02	0	4
TOTALS	1,179		116	153	25					

Table 2. Comparison of adult loon densities and production of young from various areas.

Location	Source	Count Method	Adults Loons/ 100 ha	Young per Adult	Comments
New Hampshire	Loon Preservation Committee (1979)	ground	0.537	0.210	4 year average
Northern Wisconsin	Zimmer (1979)	aerial & ground	0.600	0.200	entire loon range
Northern Wisconsin	Olson (1986)	ground	1.020	0.210	entire loon range
Northern Maine	Major and Bissonette (1983)	aerial	0.537		---
Southern Maine	Lee and Arbuckle (1988)	ground	1.215		---
Voyageurs National Park, Minnesota	Reiser (1984)	ground	0.465	0.170	5 year average
Whitefish Chain of Lakes Minnesota	Valley (1987)	ground	1.140		---
IAC, Minnesota	This study	aerial aerial	3.880 5.630	0.160 0.210	unadjusted adjusted
BWCAW, Minnesota	Olson and Marshall (1950)	ground	2.490	0.190	---
Itasca State Park, Minnesota	McIntyre (1978)	ground	2.770	0.120	2 year average
BWCAW, Minnesota	Mooty and Goodermote (1985)	ground	3.160	0.180	---
BWCAW, Minnesota	Titus and VanDruff (1981)	ground	2.850	0.210	---
Chippewa National Forest, Minnesota	Mathisen (pers. comm.)	aerial ground	2.860 4.080	0.280 0.250	lakes 20-200 ha counted lakes 20-200 ha counted
Adirondack Forest Preserve, New York	Parker and Miller (1988)	ground	0.870	0.410	2 year average
East Central Saskatchewan	Yonge (unpub)	---	4.850	0.260	2 year average