STATUS AND REPRODUCTIVE SUCCESS IN 1988 OF COMMON TERNS AND RING-BILLED GULLS AT LEECH LAKE, CASS COUNTY, MINNESOTA

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INTRODUCTION

Invasions and population explosions of Ring-billed Gulls (*Larus delewarensis*) in Common Tern (*Sterna hirundo*) nesting colonies in Minnesota have resulted in concern about the future of terns throughout the state (Davis & Niemi 1980, Cuthbert & McKearnan 1985, Miller 1987). The Leech Lake larid colony has been monitored since the summer of 1976 by Miller. This site has apparently been the largest and stablest colony of Common Terns in Minnesota at least since the 1920's and 30's. Miller's research suggests that the reproductive future of Common Terns in this colony is in serious jeopardy because of intruding Ring-billed Gulls. Since 1976 gull numbers have increased dramatically from less than 100 nests during the entire season to over 500 nests on 14 June 1986. During the same period tern numbers have declined, and as much as 50% of the space previously occupied by terns has been used by gulls (Miller 1987).

The major problem to terns in this colony is loss of suitable nesting space. Terns are very aggressive and are able to defend nesting territories from gulls; however, they rarely seem to be able to evict gulls from gull territories. Because gulls begin nesting several weeks earlier than terns, terns have been steadily losing prime nesting space to gulls (Miller 1987). Consequently, it may be necessary to manage this colony to prevent further losses, if not the complete disappearance of terns from the colony.

This study was conducted to provide additional background data for a possible project in which gull nests would be removed from preferred tern habitat to determine if the colony can be effectively managed to favor Common Terns. The objectives for the 1988 breeding season were to: (1) continue monitoring population trends in the Leech Lake colony by conducting a colonywide census, (2) to measure

reproductive success of terns and gulls in an area where an egg removal project would be conducted in the future, and (3) monitor the nesting chronology of Leech Lake larids. This report summarizes the results of our study.

METHODS AND MATERIALS

Study Site

This research was conducted in a mixed breeding colony containing Ring-billed Gulls, Common Terns, and a few Herring Gulls. The colony is located on Gull Island, Leech Lake, Cass County, Minnesota, approximately 7 km north of Whipholt. A complete description of the colony is presented in Miller (1987).

Estimation of Reproductive Success

Three 1" mesh chicken wire enclosures approximately 50m^2 in area were established early in the breeding season (May 13, 1988) in order to study reproductive success. These were erected in the colony in (1) an area traditionally used by terns in 1987 and earlier, (2) an area historically used by terns but used by ring-bills between 1985-87, and (3) an area used by ring-bills for most of the last ten years.

Reproductive success was estimated in the enclosures by first marking and counting eggs followed by banding of hatchlings on subsequent visits. Fledging was estimated based on the number of banded chicks from the enclosures which were later found dead inside the enclosure. It was assumed that those not recovered had successfully fledged. Although this technique most likely overestimates success, it was considered the most practical, yet

effective, technique when colony visits are irregular, as in this study.

Schedule of Activities

Five visits were made to the Gull Island breeding colony between May 13 and 22 July, 1988. Activities during these visits included setup of wire enclosures described above; counting of nests, eggs, and chicks in the enclosures; searches for dead young which had been previously banded; and complete colony censuses. The dates of visits and schedule of activities are presented in table 1.

Table 1. Schedule of research activities during the 1988 breeding season.

Date	Activites
May 13-14	Setup of enclosures Nest census
May 21-22	Nest and egg counts
Jun 19-20	Complete colony census Banding of chicks in enclosures Marking of remaining eggs
Jul 2-3	Chick census in enclosures Chick Banding Tern nest census
Jul 22	Search for dead banded chicks Tern nest census

RESULTS AND DISCUSSION

Breeding Phenology

Past study has shown that Gull Island ring-bills begin nesting earlier than terns (Miller 1987). During the first visit to the colony on 13 May 1988, when enclosures were erected, there were 176 ring-bill nests (all in the rocky perimeter of the island) and no Common Tern nests, although terns were performing courtship flights in the area. The high number of gull nests at this time indicates earlier nest initiation than in previous years, perhaps because of an early, mild spring. It should be noted that 8 Common Tern nests with eggs were found on Little Pipe Island (10m^2) about 6 km away and 35 nests on a sand spit of Little Pelican Island <1km away. Both areas are marginal habitat at best.

One week later a few tern nests were present on Gull Island, but none were within the enclosure in the area that had been used by terns since at least 1976. In fact, terns never occupied any of the enclosures during the entire season because they were inhabited by gulls. This represents important loss of preferred tern habitat to gulls. It was felt that moving an enclosure to include terns would cause serious disruption of tern breeding activities. Therefore, tern reproduction was only monitored in an unenclosed area.

By 20 June most gulls had hatched on Gull Island, but no tern chicks were found. Some terns had hatched at both Little Pipe and Little Pelican spit where no gull interference existed. Only four tern chicks were found during the entire season: 2 hatched about 1 July, and 2 hatched between 20-22 July. These data suggest that gull presence may have retarded nest initiation by Gull Island terns.

All gull eggs within enclosures had either hatched or been lost by 2 July and young had fledged or died by 22 July. In previous years tern hatching began before the end of June and fledging was nearly complete by the end of July (Miller 1987). Obviously, 1988 was an anomalous year for terns with serious implications for the future of the colony.

Census Results

Census data are presented in table 2. Ring-billed Gull nests were counted on 13 May and 20 June. The 20 June census underestimated the total number of gull nests because many had already hatched by that time, about one week earlier than most years (pers. obs.). Common Tern nests were counted on four visits during the season. As seen in table 2, tern numbers varied little during the entire season which supports our observations of virtually no hatching.

Table 2. Gull Island nest censuses during the 1988 breeding season.

Date	Common Tern	Ring-billed Gull	Herring Gull
14 May	0	176	6
20 Jun	142	269	1 (9 chicks)
02 Jul	130	-	-
22 Jul	143	-	-

The 20 June census was considered to be important for comparison to previous years because it coincided with the timing of censuses conducted since 1976. As shown in table 3 ring-bill numbers appeared to be down from previous years. However, this is probably a result of earlier hatching mentioned above. There were certainly not less adults than in previous years (pers. obs.). The tern estimates should represent a better comparison because the censuses were performed around normal hatching time when few, if any, nest territories have been vacated. These data show that tern numbers have been declining and the nesting population in 1988 was nearly 50% less than in 1987. It should also be noted that the terns in 1988 occupied a smaller portion of the island than in previous years. Furthermore, the quality of habitat was judged to be poorer because of the lack of cover for hatchlings and the potential threat of washout during storms.

Table 3. A summary of population counts and estimates for Ring-billed Gulls and Common Terns of the Gull Island colony, Leech Lake, Minnesota, since 1976.

YEAR	RING-BILLED GULL	COMMON TERN
1976	82 nests marked, 07June and 08July	676 nests marked, 08 and 21 June
1977	92 nests marked between 11 May and 9 August	566 nests on 15 June
1978	58 nests marked during breeding season	410 pairs on 21 June
1979	No estimates	No estimates
1980	No estimates	No estimates
1981	Many adults with 200+ chicks on 26 June	150+ nests on 26 June[1]
1982	200+ nests on 29 June	150+ nests on 29 June
1983	291 active nests on 18 June	375 active nests on 18 June
1984	279 active nests on 19 June	459 active nests on 19 June
1985	110 active nests on 02 July	219 active nests on 02 July
1986	501 active nests on 14 June	242 active nests on 14 June
1987	321 active nests on 20 June	276 active nests on 20 June
1988	269 active nests on 20 June	142 active nests on 20 June

[1]The 1979 and 1980 values are estimates, not counts.

Reproductive Success

The 1988 breeding season was clearly a poor one for Leech Lake Common Terns. Only four eggs were known to have hatched by 22 July. None of the chicks was seen later. The fact that there were still 143 tern nests on 22 July is essentially moot because hatching that late in the season would not allow enough time to raise young before mass departure in August (pers. obs.). Only 5 or 6 fledging-age terns were seen on Little Pipe Island and the nests on Little Pelican spit were lost during a storm on 20 June. Therefore, for all intents and purposes, 1988 was a failed year for Leech Lake terns.

The success of ring-bills is shown by the reproduction data in table 4. Hatching and fledging success were both relatively high. Even when young that died after fledging was taken into account, fledging rate per egg still exceeded 30% for all subgroups sampled. Considering the entire colony, this translates into lots of young for future recruitment into the colony. For terns, on the other hand, the trend of declining numbers and the complete failure in 1988 have serious implications for long term recruitment.

Table 4. Summary of 1988 Ring-billed Gull nesting data.

	Fenced Area			
	North	Middle	South	Total
Number of eggs	99	88	149	239
Chicks banded	77	61	101	239
% Hatched	77.8	69.3	67.8	71.1
Number fledged	65	40	56	161
Fledged/egg	.66	.46	.38	.48
Fledged/hatchling	.84	.66	.55	.76
Recovered dead, post-fledging	9	3	8	20
Best estimate success young/egg	.57	.42	.32	.42

Concerns and Recommendations

The pattern of ring-bill success and tern declines since 1976 raises serious concern for the future of Common Terns in the Leech Lake colony, and perhaps for Minnesota. Effective reproduction by terns in this colony depends on availability of nesting space which is being lost to ring-bills year by year (Miller 1987, pers. obs.). The key to the success of gulls in this colony is based primarily on their ability to occupy territories very early (even before ice-out), whereas terns require open water for feeding and, consequently, nest later. As a result, each year more space has been lost to gulls as the gull population has increased.

In addition to losing space, the quality of habitat remaining for terns has declined. As mentioned above, the portion of the

island occupied by the terns has decreased which may result in greater nest density and higher inter-pair aggression. But in addition, the nests are located nearer the front beach of the island which is an area subject to washout during storms and which has essentially no shelter for chicks.

Although terns have declined in numbers for the past ten years, some production occurred each year that Miller studied them (Miller, pers. obs.). Their reproductive failure in 1988 has serious implications for future recruitment.

Data also suggest that the presence of a large population of gulls negatively, and seriously, influenced the breeding cycle of Common Terns in this colony. Such late onset of nesting and widespread prolongation of incubation have not been observed in this colony before (Miller, pers. obs.). Although it is difficult to implicate ring-bills without more intensive observations, their presence seemed to retard nest initiation and may have resulted in the reduction of hatching success.

Miller's observations since 1976 and data from 1988 suggest that Common Terns are at a crisis stage on Gull Island. Terns can ill afford to lose more nesting habitat to gulls. Furthermore, additional years of reproductive failure could be devastating because the pool of adults for recruitment statewide is probably diminishing (Cuthbert & McKearnan 1985). Therefore, we strongly recommend that intervention on the behalf of Common Terns is needed to ensure their future success in this colony.

We recommend institution of gull control on Gull Island by removing Ring-billed Gull nests early in the season when terns are arriving to establish territories. Terns are probably aggressive

enough to displace gulls if gull nests are disrupted (Miller, pers. obs.). Removal of a large number of gull nests from preferred tern habitat seems to be advisable to provide as much space for terns as possible.

Egg removal should be followed up with observations to determine the success of terns in colonizing formerly lost space. A late June nest census should also be conducted to allow comparison with the long term census data available.

The Gull Island Common Tern is clearly at risk. Numbers are low and producivity in 1988 was virtually zero. Management which will control gull numbers and give the terns a much needed edge appears to be imminent

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