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Movements and Mortality of American White Pelicans Banded at Marsh Lake, Minnesota

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ABSTRACT

We analyzed 687 recovery records for American White Pelicans (*Pelecanus erythrorhynchos*) banded as nestlings at Marsh Lake, Minnesota, between 1972 and 1998 to determine mortality, migration, and dispersal patterns. About 84% of the recoveries were in the United States, 12% in Mexico, 3% in Canada, and 1% in Cuba, Guatemala, Honduras, and Nicaragua. Recoveries included 404 bands from birds reported as found dead or shot and 283 bands from birds due to other miscellaneous causes. Median age at recovery was 1.0 year. The mean distance from the banding site to a recovery location was 1240 km. Pelicans from Marsh Lake migrated through the Great Plains and along the Mississippi River and spent winters in the lower Mississippi River Valley and along the Gulf of Mexico. Band recoveries of pelicans near aquaculture areas in Arkansas, Louisiana, and Mississippi increased 18-fold since 1985; the rapid expansion of the industry indicating that aquaculture may provide an important food source for wintering and migrating pelicans. Further research is needed to clarify the extent of utilization and importance of aquaculture to American White Pelicans.

INTRODUCTION

The American White Pelican (*Pelecanus erythrorhynchos*) colony located at Marsh Lake, Minnesota, has had a continuous banding program since 1972. Causes of mortality and movements of pelicans have been documented for colonies in North Dakota, Saskatchewan, British Columbia, Nevada, and Colorado (Kriger 1960, Houston
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1972, Strait and Sloan 1975, Vermeer 1977, Ryder 1981), but not from Marsh Lake. In recent years pelicans have come into conflict with the aquaculture industry in the southeastern United States (King 1997 and 1998), and information about their life history and migratory movements has become increasingly important for managing these conflicts. The objective of this study was to determine the mortality, migration, and dispersal patterns for pelicans banded as nestlings at Marsh Lake.

METHODS

Band recovery data were provided by the Bird Banding Laboratory, Biological Resources Division, Laurel, MD. Only recoveries of nestlings banded by Dr. A.H. Grewe, Jr. at the Marsh Lake, MN, colony (45.167 N, 96.167 W) from 1972 - 1998 were analyzed. Recovery data were tabulated and locations were plotted using ArcView 3.1 (Environmental Systems Research Institute 1998). Recoveries ≥ 13 km from the colony were considered to be from fledged birds and were used in calculating distances moved and age at recovery. We determined the mean distance from banding to recovery locations for all birds and for birds in the age groups < 1 yr, 1 - 2 yrs, and ≥ 3 yrs. We analyzed the recovery distance from Marsh Lake between age groups using a 2-factor ANOVA ($P < 0.05$) and used Duncan's Multiple Range Test to compare means (PROC GLM, SAS Institute, 1996). We also determined the median age at recovery for fledged birds. A chi-square (PROC FREQ, SAS Institute, 1996) analysis was used to compare recoveries near aquaculture areas between years.

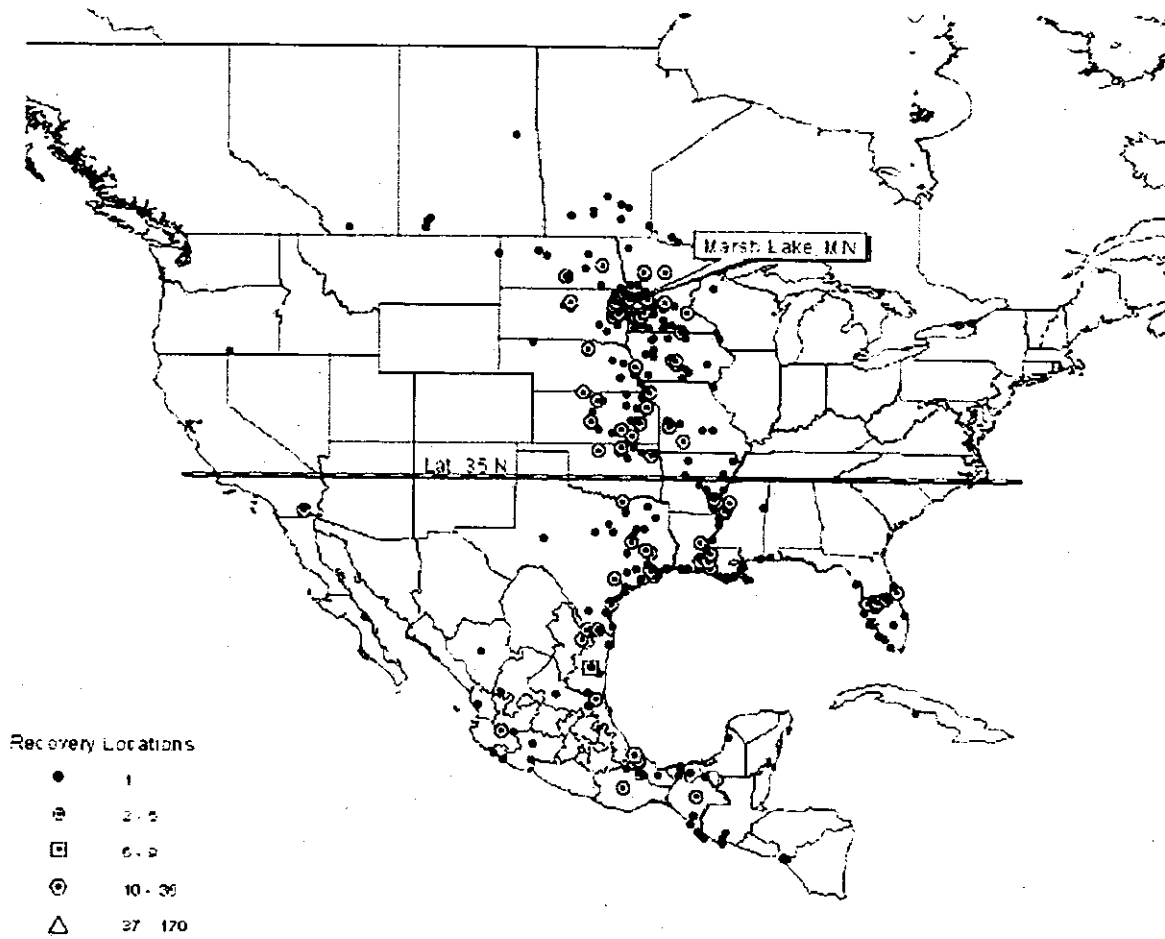


Fig. 1. Recovery locations of American White Pelicans banded as fledglings at Marsh Lake, Minnesota, from 1972 through 1998.

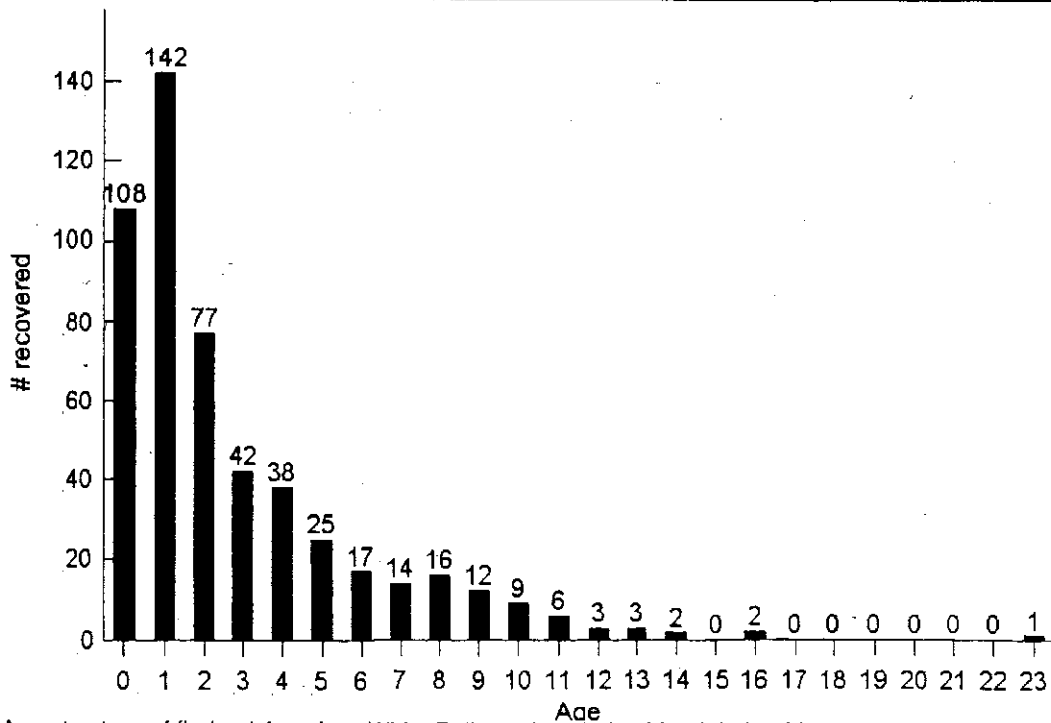


Fig. 2. Age structure of fledged American White Pelicans banded at Marsh Lake, Minnesota, from 1972 through 1998.

RESULTS

Recoveries of 687 pelicans with location information were reported out of 29,509 banded through December 1998, resulting in an overall recovery rate of 2.3%. Five hundred seventy-nine (84.3%) of the recoveries were in the United States, 82 (11.9%) in Mexico, 17 (2.5%) in Canada, and 9 (1.3%) in Cuba, Guatemala, Honduras, and Nicaragua. Only four (0.6%) recoveries were made west of the Rocky Mountains in the United States. Marsh Lake pelicans migrated primarily through the Great Plains and along the Mississippi River to the lower Mississippi River Valley and the Gulf Coast (Fig. 1).

The median age at recovery (Fig. 2) of fledged pelicans banded at Marsh Lake was 1.0 yr (range 0 - 23, $n = 517$). The mean distance pelicans moved from the colony to their respective recovery locations was 1240 km (± 46 SE, range 13 - 3719, $n = 517$). There were differences in the distances moved from the colony to a recovery location between age groups ($F_2 = 59.51$; $P = 0.0001$). Pelicans <1 yr old were recovered closer to the colony than older birds (mean 795 km ± 68 SE, range 13 - 3697, $n = 160$), and pelicans 1 - 2 yrs old were recovered further from the colony (mean 1857 km ± 68 SE, range 13 - 3719, $n = 179$) than birds <1 yr old and ≥ 3 yrs old (mean = 1019 km ± 79 SE, range 13 - 3466, $n = 178$).

About 404 (59%) of the birds were either reported as found dead (unknown cause of death) or shot. In the United States and Canada, 56% of the recoveries were found dead and 2% were shot. In Mexico, Central America, and Cuba, 19% were found dead and 46% were shot (Table 1).

Only 24 (3.5%) of the bands recovered during December, January, and February were from north of Latitude 35° N. We, therefore, assumed all 248 (36%) recoveries from south of 35° N to be winter recoveries. Through 1985 only 33% of these bands were recovered south of 35° N. After 1985, 67% were recovered south of 35° N (a two-fold increase). In comparison, recoveries around aquaculture areas in the Mississippi River flood plain of Arkansas, Louisiana, and Mississippi increased from 3 (5%) through 1985 to 54 (95%) after 1985 (an 18-fold increase; $X^2 = 25.26$, $P = 0.001$).

DISCUSSION

Marsh Lake pelicans wintering in Mexico appear to concentrate in Tamaulipas and Vera Cruz, like pelicans from Colorado (Ryder 1981), Saskatchewan (Houston 1972), and North Dakota (Strait and Sloan 1975). Similar to the findings of Houston (1972), Ryder (1981), Strait and Sloan (1975), and Vermeer (1977), most Marsh Lake pelicans remained east of the Rocky Mountains. Pelicans from Marsh Lake followed a migration corridor similar to that used by pelicans banded in Saskatchewan (Houston 1972) and North Dakota (Strait and Sloan 1975).

The relative inexperience of younger pelicans may explain the differences in recovery distances from Marsh Lake among age groups. Pelicans <1 yr old are typically more naive than older birds and, therefore, more susceptible to mortality (Vermeer 1977). Although more experienced than <1 yr old birds, pelicans 1 - 2 yrs old may need to travel farther than older pelicans to find adequate food resources.

Table 1. Recovery distribution of American White Pelicans banded at Marsh Lake, MN, by "How Obtained" codes.

"How Obtained" code number	No. of Recoveries (% of Total)			Definition
	All birds (N=687)	U.S. and Canada (N=596)	Other* (N=91)	
0, 45, 50	352 (51)	335 (56)	17 (19)	Found Dead
1	52 (8)	10 (2)	42 (46)	Shot
3, 11, 15, 16, 17, 18, 20, 26, 28, 29, 31, 44, 52, 54, 56, 57, 58, 89, 91, 98	283 (41)	251 (42)	32 (35)	Misc. (e.g., captured, illegally taken, injury, disease, entanglement)

*Other = Mexico, Central America, and Cuba

The percentage of Marsh Lake birds found dead with no reported cause of death (51%) was much higher than birds shot (8%) and was similar to pelicans banded in California, Colorado, and North Dakota (Houston 1972, Strait and Sloan 1975, Vermeer 1977). The differences in percentages of birds "found dead" and "shot" in the United States and Mexico may be due to persons in Mexico and Central America turning in bands expecting a reward, whereas people in the United States may report birds shot as "found dead" to avoid possible prosecution (Strait and Sloan 1975).

The catfish aquaculture industry in the United States began to expand rapidly in 1985 increasing production from 86,917 kg to 255,991 kg live weight of catfish processed in 1998 (USDA 1999). Of the 15 catfish producing states, Arkansas, Louisiana, and Mississippi increased their total area of aquacultural ponds from about 24,000 ha in 1987 to >58,000 ha of ponds in 1999 (USDA 1999). The numbers of pelicans foraging in and loafing near these aquaculture facilities during the late winter and spring migration have also increased during this period (T. King, unpub. data). The large increase of bands recovered near aquaculture facilities in these states since 1985 may indicate that these areas provide an important food source for wintering and migrating pelicans. How much, if any, of this increase is due to pelicans being more likely to be killed or recovered near aquaculture areas is unclear. Further research is needed to clarify the extent of utilization and importance of southeastern aquaculture to American White Pelicans.

ACKNOWLEDGMENTS

We thank the many dedicated volunteers who assisted with the banding effort and the people reporting band recoveries over the years. We are also grateful to B. Dorr, J. Glahn, and R. Minnis for assistance with data analysis, and to R. Dolbeer, B. Dorr, J. Glahn, B. Harrel, M. Tobin, and S. Werner for helpful comments on earlier drafts of this manuscript.

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IN MEMORY...

On 6 January 2001, Alfred H. Grewe, Jr. died in the St. Cloud Hospital, St. Cloud, MN, from bone cancer. Al served as a professor at St. Cloud State University since 1965 teaching numerous ornithology, mammalogy, and wildlife courses. He closely monitored the pelican colony at Marsh Lake beginning with the first nesting pairs in the late 1960s. Starting in 1972 and continuing through the 2000 banding season, Al, his students, and volunteers banded up to 2500 pre-fledged pelicans each year. In December 2000, Al made arrangements for the continuation of the banding project at Marsh Lake. He was a mentor and true friend to those of us privileged to know him. He will be missed.

