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DIET, POPULATION SIZE, AND HIGH-USE AREAS OF BALD EAGLES WINTERING AT GRAND LAKE, OKLAHOMA

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INTRODUCTION

Grand Lake (Lake O' the Cherokees) in Ottawa and Delaware counties has long been recognized as an important wintering area for Bald Eagles (*Haliaeetus leucocephalus*) in Oklahoma. The first systematic observations of Bald Eagles in this area were made by Cooksey (1962). He investigated the ecology, behavior, and roosting habits of eagles at a communal night roost during a five month period from 1 November 1960 to 1 April 1961. During four winters from 1968 through 1971, Lish (1973) studied eagles in the upper Grand Lake area just down river from Twin Bridges State Park. That study focused on food habits and diurnal behavior. Lish (1975) made further observations of Bald Eagles on Grand Lake as part of a statewide study and estimated the population size on 11 February 1974. He concluded that approximately 50 Bald Eagles wintered at Grand Lake that year.

The study presented here represents the most detailed research to date of wintering Bald Eagles at Grand Lake and was conducted from January to March 1987. The primary objective was to identify high-use areas. Two secondary objectives were to estimate the size of the wintering population and identify important prey species. This study differs from all previous studies in the Grand Lake area in its intensive use of aerial surveys and synchronized roost counts. These provided accurate identification of high-use areas and winter population size estimates.

METHODS

The size of the wintering Bald Eagle population at Grand Lake was determined by regularly counting the number of eagles using a large communal night roost near Twin Bridges State Park. Roost counts began at 1500 and continued until dark. A pair of 7 power binoculars and a 15 power spotting scope were used to determine age categories during low light conditions. This roost lies on a small island on the boundary of sections 29 and 30 between SH 60 and the Burlington Northern Railroad in

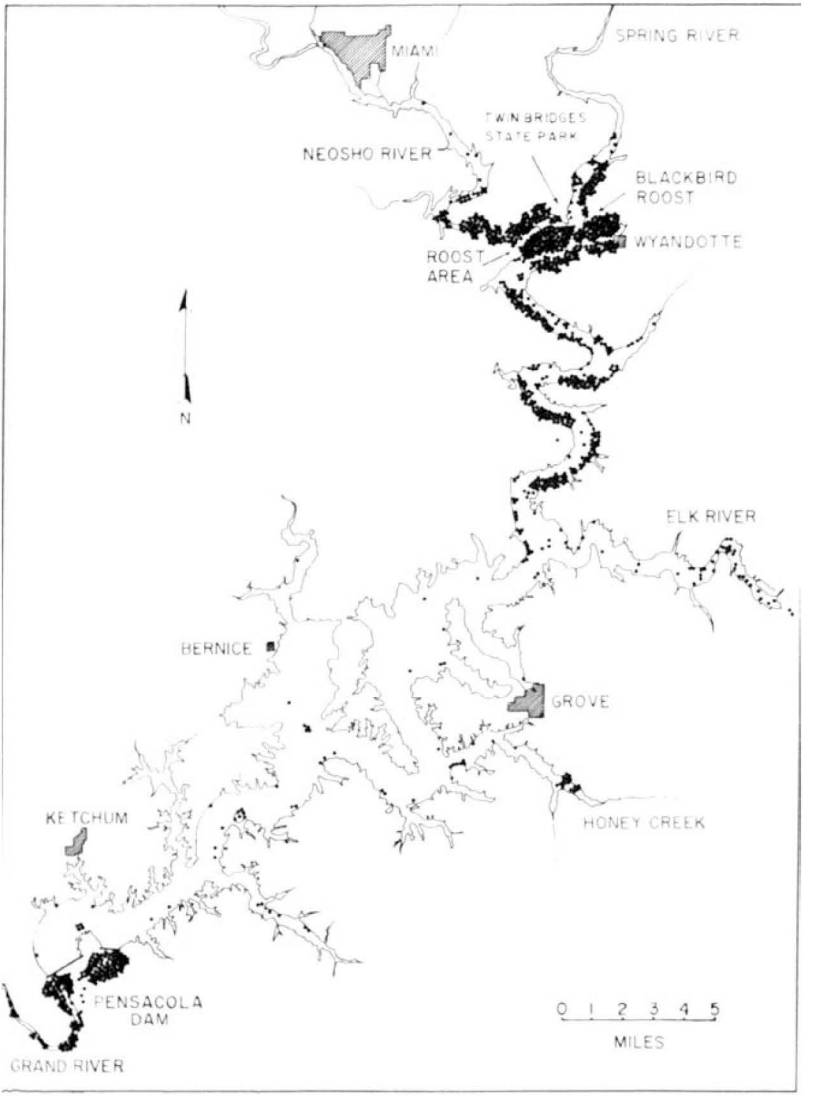

Fig. 1 Distribution of 1056 Bald Eagle sightings during 13 aerial surveys from 19 January to 5 March 1987 at Grand Lake, Oklahoma. Each dot represents one eagle sighting.

Table 1. Number of Bald Eagles counted at the communal night roost at Twin Bridges State Park, 1987.

Date	Adults	Immatures	Age Unknown	Total
19 January	24	29	8	61
20 January	32	39	8	79
23 January	38	26	23	87
30 January	19	17	21	57
2 February	34	39	9	82
9 February	29	27	7	63
16 February	20	24	10	54
19 February	12	17	7	36
21 February	11	18	0	29
24 February	5	7	0	12
27 February	6	2	0	8
2 March	4	1	0	5
5 March	1	0	0	1

Wyandotte Township, Ottawa County.

Aerial surveys were used to identify areas used by Bald Eagles for feeding and perching during the day. At least one aerial survey of the entire lake was conducted each week, but sometimes surveys were done up to three times per week. A total of 13 aerial surveys were accomplished. Surveys were conducted in the mornings, usually between 0800 and 1130. A small two-seated light aircraft was used. Only one person counted during each survey. The lake was surveyed from the north end on the Neosho River side south to Pensacola Dam. The area immediately below the dam was searched, and on the return trip the opposite side of the lake was covered. Each survey took approximately 3.5 h. The Neosho River was surveyed starting at Miami, Oklahoma and the Spring River arm to approximately 2 km north of Twin Bridges State Park. The locations of all eagles sighted were plotted on lake maps, and the high-use areas were identified. We did aerial surveys as often as weather and funding permitted.

No single method is entirely satisfactory for determining the food habits of birds of prey (Errington 1932). Pellet castings, for example, are not always reliable because some prey items (such as fish) do not show up consistently in pellets. Collecting prey remains at feeding perches is subject to error because some remains are difficult to find, and others are carried off by scavengers. Direct observations of feeding also have problems such as the difficulty in identifying certain prey remains at a dis-

Table 2. Prey items of Bald Eagles identified from direct observation, remains from beneath perches, and pellet castings at Grand Lake during January, February, and March, 1987.

Direct Observations

Species	Number	Percentage
Blackbirds*	26	47.3
Gizzard shad	20	36.4
White crappie	3	5.4
Freshwater drum	3	5.4
Carp	1	1.8
Unidentified fish	2	3.6

Remains

Species	Number	Percentage
Freshwater drum	6	33.3
Carp	5	27.8
Blackbirds*	3	16.7
Gizzard shad	2	11.1
White bass	1	5.6
Unidentified duck	1	5.6

Pellets

Species	Number	Percentage
Blackbirds*	11	100

*Includes Red-winged Blackbird *(Agelaius phoeniceus)*, Brown-headed Cowbird *(Molothrus ater)*, Common Grackle *(Quiscalus quiscula)*, and Brewer's Blackbird *(Euphagus cyanocephalus)*.

tance. Because of the potential error in each method, we used all three methods to determine the main prey species. Observations of feeding eagles were made from a vehicle using a 15 power spotting scope. Most eagles observed feeding were within 0.5 km from the observer.

RESULTS

As with wintering Bald Eagle populations in most areas of similar latitude, the population at Grand Lake exhibited fluctuations throughout the winter (Table 1). The highest number of eagles recorded at the roost was 87 on 23 January. Counts from aerial surveys were not considered reliable indicators of population size because of error caused by double counting. However, the number of eagles counted during most aerial surveys approximated the number at the night roost. Most of the Bald Eagles wintering at Grand Lake were apparently using this roost during January 1987.

I made a total of 1056 Bald Eagle sightings between 19 January and 5 March (Fig. 1). The most important high-use area on Grand Lake during

that time period was at Twin Bridges State Park near the confluence of the Neosho and Spring Rivers and along Grand River south to its confluence with Elk River. Moderate use occurred along the Elk River arm of the lake and the White River cove on Honey Creek. With the exception of the latter two locations, Bald Eagle use of the main body of the lake was low. Another area of high-use occurred just below the main spillway of the Pensacola Dam and the east spillway.

Food habit analysis of wintering Bald Eagles at Grand Lake shows a high frequency of occurrence of blackbirds (Table 2). They comprised 47.3 and 100% of the samples taken by direct observations and pellets, respectively. Fish comprised 52.7 and 77.8% by frequency of the samples taken by direct observation and prey remains, respectively (Table 2). Gizzard shad (*Dorosoma cepedianum*), carp (*Cyprinus carpio*), freshwater drum (*Aplodinotus grunniens*), white crappie (*Pomoxis annularis*), and white bass (*Morone chrysops*) are the most important species used by eagles. It is important to note that these percentages are based on the frequency–not mass–of the prey recorded. Large fish probably provide more food value than smaller species that may have occurred at higher frequencies.

DISCUSSION

There is little doubt about the importance of Twin Bridges State Park as a communal roosting and feeding area for Bald Eagles at Grand Lake. Communal night roosts do not occur in all areas of North America where Bald Eagles winter (Steenhof 1978). They typically form only near a stable food source such as the blackbird roost and the favored fishing areas near Twin Bridges State Park. However, the exact function of communal roosting in Bald Eagles is not well understood. We noted that the eagles roosting and feeding in the Twin Bridges area showed tolerance for human activity, but during weekends when human activity was high, eagles did not utilize the area for feeding or roosting. When human activity declined, eagles returned to the area. Most of the high-use areas on the main body of Grand Lake are used primarily for resting and soaring during the daylight hours. These areas (Fig. 1) occur primarily along high bluffs on the outside curves of the river. At Grand Lake and at most man-made lakes, the area directly below the spillway is an important feeding area because of the availability of fish which are either injured or disoriented after passing through the turbines in the dam and are thus easily captured.

A large blackbird roost near Twin Bridges State Park provided an important source of food for Bald Eagles. Several million blackbirds probably used the roost, but exact numbers have not been determined.

Blackbirds began arriving from several directions at approximately 1530 and continued until dark. The columns of birds arriving at the roost were up to 1 km wide and extended from the roost to the horizon. The blackbird roost was at least a kilometer long and was situated in the riparian zone on the east side of Spring River. It was used only in the winter months. Based on direct observations of eagles capturing blackbirds at Twin Bridges, it was evident that crippled or dead birds were most often taken. These birds were ones shot by local residents at the roost in the evenings. We could not determine if blackbirds would have been a significant food source for eagles without shooting at the roost.

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