Waterfowl Production on Grand Lake and Associated Wetlands in Northeastern Oklahoma

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We censused breeding waterfowl on Grand Lake and associated wetlands in northeastern Oklahoma during April - July 1987 by boat and road surveys. Mallard (*Anas platyrhynchos)* production was limited to developed areas (i.e., recreational homes, marinas, etc.) on the reservoir, and breeding individuals were likely urban or semi-wild. Most wood duck (*Aix sponsa*) production occurred on tributary creeks and rivers. Factors that likely limit waterfowl production on Grand Lake and associated wetlands and management recommendations are discussed.

INTRODUCTION

Information on the status of breeding waterfowl in Oklahoma is sparse, inconclusive, and somewhat contradictory. Logan (1) noted that flood prevention lakes in western Oklahoma were used to a limited extent by breeding waterfowl. Wallace (2) verified widespread wood duck nesting along major river bottoms in eastern Oklahoma. Heitmeyer (3) concluded that most wood duck production occurred along natural drainages and semipermanent wetlands in southeastern Oklahoma. However, Prokop (4) concluded that the greatest proportion of Oklahoma's wood duck production occurred along rivers and creeks in northeastern Oklahoma and contended that the differences between Heitmeyer's (3) results and his were due to the type of habitats that they surveyed. Although the majority of surface water in Oklahoma is contained in large reservoirs (5), little research has been conducted on their value as waterfowl production areas.

Our objectives were to determine species composition and abundance of breeding waterfowl on Grand Lake and surrounding wetlands in northeastern Oklahoma and to evaluate factors that might limit waterfowl production.

STUDY AREA

Grand Lake is an 18,800-ha reservoir (4) that resulted from the completion of Pensacola Dam in 1940 and subsequent impoundment of the Grand River in northeastern Oklahoma (36°28' N, 95°02' W). Grand Lake is managed by the Grand River Dam Authority (GRDA) and provides hydropower, flood control, recreational opportunities, and habitats for fish and wildlife. Since 1982, GRDA has attempted to maintain the lake between elevations 226 and 227 m; however, lake levels fluctuated between 225 and 228 m during our study, largely as a function of precipitation in the watershed.

Terrestrial habitats on the eastern side of Grand Lake constituted part of the Ozark Plateau (6) and were dominated by oak (*Quercus* spp.) and hickory (*Carya* spp.) (7). The western side constituted part of the Cuestea Plains (6) and was dominated by tall grasses (8). Associated bottomlands were dominated by eastern cottonwood (*Populus deltoides*), sycamore (*Platanus occidentalis*), willow (*Salix* spp.), elm (*Ulmus* spp.), and maple (*Acer* spp.) (7). Limited stands of oak and pecan (*C. illinoensis*) occurred in bottomland areas that were not subjected to extended periods of inundation (8). Prior to

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the construction of the reservoir, all woody vegetation around the perimeter and below 227 m was removed; therefore, trees now occurring below that elevation developed since 1940.

METHODS

We censused waterfowl broods in the Grand Lake area from April to July 1987 by power boat, canoe, and road surveys. The power boat and road surveys were conducted during 3 equally spaced censuses/month, but only 2 canoe surveys were conducted in May and July. Because Grand Lake is large, we developed separate survey routes in the northern and southern parts of the reservoir (Fig. 1).

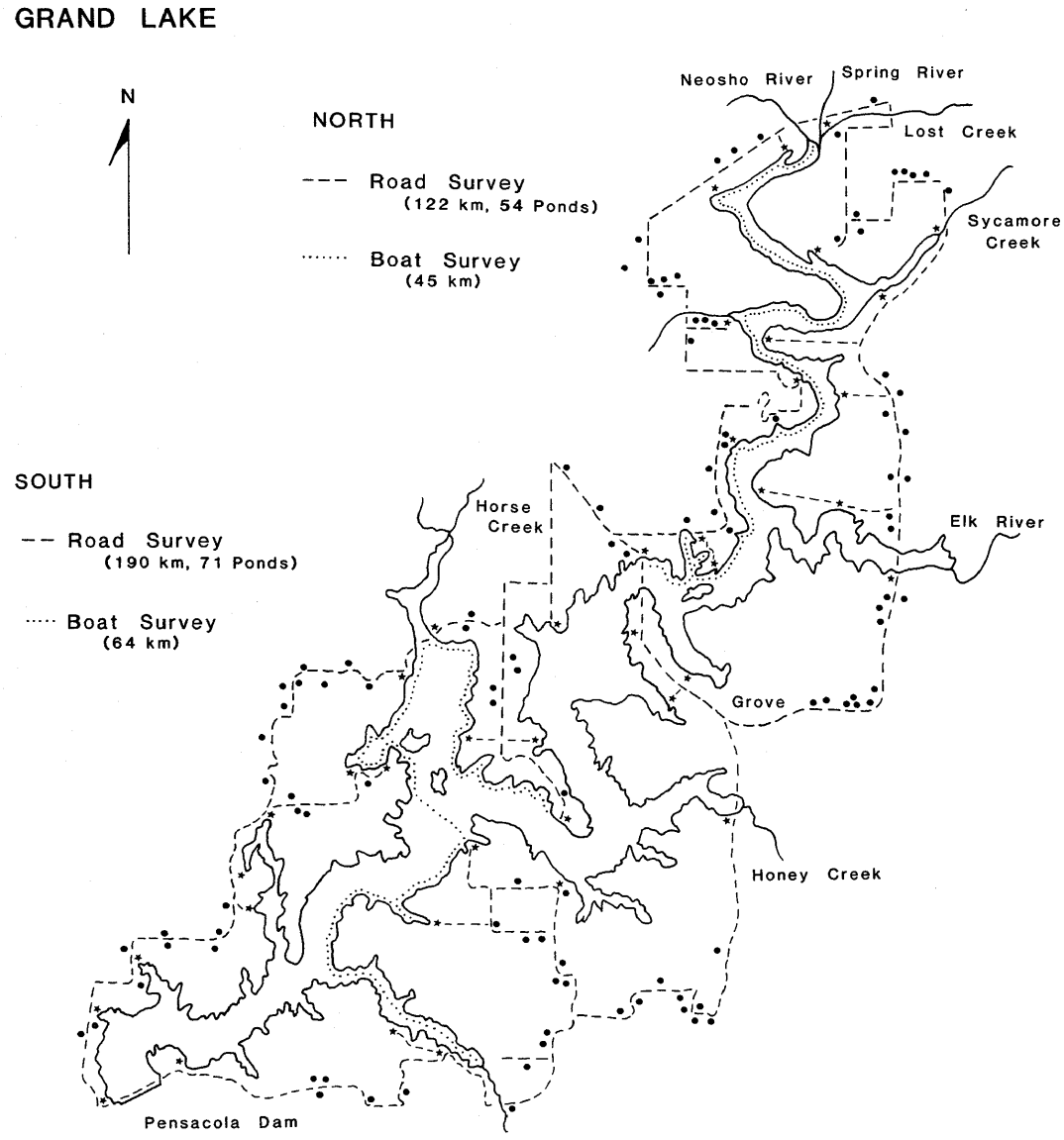

FIGURE 1. Location of power boat and road surveys used to census waterfowl production in the northern and southern (Grove, Oklahoma was the dividing point) parts of Grand Lake, Oklahoma (solid circles represent pond locations and stars represent lake sites censused during the road surveys). Labelled creeks and rivers were surveyed in a canoe or on foot.

We surveyed 109 km of reservoir shoreline (64 km in the southern area; 45 km in the northern area; Fig. 1) (approx. 11% of the total shoreline) by driving a 5-m power boat approximately 100 m from the shoreline at 10-15 km/hr. The road survey was 312 km (190 km in the south; 122 km in the north) and included 125 ponds and 1 permanent wetland (Fig. 1). Route direction and survey sequence were alternated for each 3-day census. Our canoe surveys encompassed 42 km of 7 tributary creeks and rivers that flowed into Grand Lake (Fig. 1). Because headwaters of some creeks were intermittent, surveys of upper reaches often were conducted on foot.

All brood sightings were recorded on a topographic map with the following information: date, species, number of ducklings in the brood, age class of ducklings (9), location, and habitat type. These data allowed us to differentiate between individual broods and when possible, estimate fledgling rates via multiple sightings.

To determine the extent of upland nesting waterfowl, 3 1,000-m^2 areas were surveyed for nests by chaining (10) with a 33-m rope held between two field personnel. All suitable cavities (11) that were noted on our survey routes from March through May were checked for evidence of nesting.

RESULTS

Mallard was the only upland nesting waterfowl species that appeared to reproduce on Grand Lake and associated wetlands. Mallard broods were observed exclusively in developed areas (i.e., recreational homes, marinas, etc.) along the lake, and 4 nests were found in the under-side of floating docks. No nests were located in the 3 areas that were chained, and no paired adults, nests, or broods were located on the ponds, creeks and rivers, or the permanent wetland. We observed 31 different mallard broods on the reservoir and estimated that 54 young fledged from the area encompassed by our survey routes (Table 1). By extrapolating that estimate to the entire reservoir, we estimated overall mallard production at 491.

Wood duck was the only cavity-nesting waterfowl species that we observed during our surveys. We observed 3 wood duck broods on the reservoir and liberally estimated production on our survey route at 16 (Table 1), or 145 for the reservoir. We could not estimate total wood duck production on all associated wetlands of Grand Lake, but we did observe 1 brood/4.2 km of shoreline or 1 duckling/0.95 km (Table 1).

We located 14 cavities on the lake and 2 cavities on the creeks and rivers, with an

TABLE 1. Waterfowl production on survey routes on Grand Lake and tributary creeks and rivers during 1987.

Species	No. Broods	No./brood[a] $\bar{x}$	No./brood[a] SE	Production on survey route
GRAND LAKE[b]				
Mallard	31	4.7	1.8	54[c]
Wood duck	3	5.3	2.5	16[d]
CREEKS/RIVERS				
Mallard	0	—	—	—
Wood duck	10	4.4	2.4	44[d]

[a] Initial sighting.
[b] Approx. 11% of the total shoreline.
[c] 37% fledgling rate from multiple sightings of 11 broods.
[d] No multiple sightings; assumes a fledgling rate of 100% of initial brood size.

TABLE 2. Use of nesting cavities by wood ducks on Grand Lake and tributary creeks and rivers during 1987.

Habitat	No. located	No. suitable[a]	No. occupied	Occupancy rate %
Grand Lake	21	14	2	14.3
Creeks/rivers	2	2	0	0.0
Total	23	16	2	12.5

[a] Based on the criteria of Bellrose (1980).

overall occupancy rate of 12.5% (Table 2). Two cavities located on the lake were occupied, but both clutches were depredated before hatching was completed; neither of the cavities located on the creeks and rivers were occupied (Table 2).

We sporadically observed adult northern shovelers (*Spatula clypeata*) and blue-winged teal (*A. discors*) from March to April, but no nest or broods were noted. These individuals were likely late migrants or nonbreeders.

DISCUSSION

No mallard broods were located on any of the associated wetlands. Most ponds were heavily grazed or mowed around the perimeters, which would limit nesting cover for mallards. Ponds also were used to water livestock, which can increase turbidity and reduce aquatic vegetation and associated invertebrate populations that are necessary for young ducklings (12). Mallards were observed courting along the shoreline in areas with suitable nesting cover (11), but fluctuating water levels probably would have destroyed nests, which may explain the absence of nesting waterfowl on upland sites. Because we observed all mallard broods in developed areas, and Oklahoma is south of the major mallard breeding grounds (11), nesting mallards on Grand Lake are likely urban or semi-wild (13). Although they may constitute part of the annual waterfowl harvest (13), attempts to manage or enhance this population are probably impractical.

Most of the wood duck production occurred on associated wetlands; 3 times as many wood duck broods were observed on creeks and rivers than in the reservoir, despite the fact that lake surveys were more intensive. Because wood duck production appeared substantial on the creeks and rivers, our estimates of cavity availability and use for these areas were probably low. Nevertheless, our estimate of wood duck production on the creeks and rivers concurs with that of Prokop (4). Optimal brooding habitat for wood ducks has a ratio of 75% cover to 25% open water (12). Such habitat is rare on the shore of Grand Lake but more common along creeks and rivers that flow into the reservoir. Because our cavity occupancy rate of 14.3% (Table 2) was considerably less than the typical occupancy rate of 40-50% (11), we believe that brooding cover is the limiting factor for wood duck production on Grand Lake. If we are correct, enhancement of brooding cover will be more beneficial to wood duck production than installation of artificial nesting structures.

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