# Use of an Old Multipurpose Reservoir by Migrating and Wintering Non-dabbling Ducks

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Received: 1994 Mar 15; Revised: 1994 Jul 15

**We censused non-dabbling ducks (Tribes Aythyini, Mergini, and Oxyurini) on Grand Lake in northeastern Oklahoma from January through December 1987. Non-dabbling ducks were most common on Grand Lake from January through early May and mid-October through December. Pochards (Aythyini) were most abundant during migration in fall and early winter, and sea ducks (Mergini) were most abundant during late winter. The most numerous species of non-dabbling waterfowl in order of abundance were: common merganser (*Mergus merganser*), lesser scaup *(Aythya affinis*), and common goldeneye *(Bucephala clangula*). Overall, dabbling ducks (Tribes Anatini and Cairinini) were more abundant (74.8%) than non-dabbling ducks (25.2%). The importance of old multipurpose reservoirs to migratory and wintering waterfowl, particularly non-dabbling ducks, is discussed.**

## INTRODUCTION

As continental waterfowl populations remain low relative to historic levels (*1*) and natural wetlands continue to be lost to agriculture, urban development, and impoundments (*2, 3*), it is critical to manage existing reservoirs, regardless of age, to maximize their suitability to waterfowl. Managed reservoirs can be particularly useful to migrating and wintering waterfowl in the south-central Great Plains (*4, 5*), where natural wetlands are relatively rare and highly perturbed by humans (*6, 7*) and man-made multipurpose reservoirs are common. Little published information exists on waterfowl use of old multipurpose reservoirs (*4, 8, 9*), perhaps because the value of reservoirs to waterfowl is greatest after initial inundation and generally declines as they age (*10*). Nevertheless, Leslie and Stancill (*4*) noted that an old multipurpose reservoir in northeastern Oklahoma could be managed to enhance migrating and wintering habitat for dabbling or surface-feeding ducks (Tribe Anatini), particularly mallard (*Anas platyrhynchos*).

We examined abundances of non-dabbling ducks (i.e., pochards or diving ducks, Tribe Aythyini; sea ducks, Mergini; and stiff-tailed ducks, Oxyurini) on an old, highly modified reservoir and compared them to similar observations of dabbling ducks (*4,11-13*).

## METHODS

We censused non-dabbling ducks on Grand Lake, formally known as Lake O' the Cherokees, in northeastern Oklahoma (36°28'N, 95°02'W) from January through December 1987. The 18,800-ha reservoir was created when Pensacola Dam impounded Grand River in 1940. About 17% of the reservoir's irregular 998-km shoreline has been developed for recreational purposes, such as summer homes, marinas, and resorts (*13*). Grand Lake originally was constructed for hydropower generation but also is used for flood control, water supply, recreation, and fisheries and wildlife conservation. The reservoir lies in the ecotone of the Ozark Plateau and the oak (*Quercus* spp.)-hickory (*Carya* spp.)-bluestem *(Andropogon* spp.*)* parkland (*14*).

Census methodology was described by Leslie and Stancill (*4*). Three equally spaced aerial surveys per month were flown from a two-seated Cessna 152 airplane following the reservoir's shoreline at an elevation of ~100 m and a speed <145 km/hr. Each aerial survey was conducted between 0730 and 1200 hr and lasted for about 3.5 hr. The

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TABLE 1. Seasonal non-dabbling duck abundances on Grand Lake, Oklahoma, in 1987.

| | | Season[a] | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Late Winter | | Spring | | Fall[b] | | Early Winter | |
| Tribe | Species | *n* | % | *n* | % | *n* | % | *n* | % |
| Pochards | Lesser Scaup | 3 | <0.1 | 329 | 51.0 | 4,325 | 83.1 | 639 | 36.6 |
| | Ring-necked Duck | 0 | | 0 | | 20 | 0.3 | 140 | 8.1 |
| | Redhead | 0 | | 75 | 11.4 | 225 | 4.3 | 125 | 7.1 |
| | Canvasback | 0 | | 0 | | 0 | | 25 | 1.4 |
| Total for Tribe | | 3 | <0.1 | 404 | 61.4 | 4,570 | 87.8 | 929 | 53.2 |
| Sea Ducks | Common Merganser | 5,261 | 77.3 | 95 | 14.4 | 0 | | 0 | |
| | Hooded Merganser | 70 | 1.0 | 0 | | 10 | 0.2 | 329 | 18.8 |
| | Common Goldeneye | 1,420 | 20.9 | 0 | | 0 | | 329 | 18.8 |
| | Bufflehead | 36 | 0.5 | 0 | | 175 | 3.4 | 135 | 7.7 |
| Total for Tribe | | 6,787 | 99.8 | 95 | 14.4 | 185 | 3.5 | 793 | 54.5 |
| Stiff-tailed Ducks | Ruddy Duck | 12 | 0.2 | 159 | 24.2 | 451 | 8.7 | 25 | 1.4 |
| Total, all Tribes | | 6,802 | | 658 | | 5,206 | | 1,747 | |
| Percent of Total Ducks by Season | | | 47.2 | | 4.6 | | 36.1 | | 12.1 |

[a] Late winter = 15 Jan–27 Feb; spring = 10 Mar–27 Apr; fall = 31 Aug–17 Nov; early winter = 30 Nov–30 Dec; no non-dabbling ducks were observed during summer (27 Apr–30 Aug).
[b] Fall aerial surveys were conducted between 31 Aug and 17 Nov; no non-dabbling ducks were seen until mid-October.

pilot and observer looked for waterfowl, but only the observer identified and enumerated them. We recorded species and abundance of all waterfowl observed. Seasons were delineated around the monthly aerial surveys and based on water levels of the reservoir because of their notable effect on availabilities of shoreline habitats (*4*); they generally coincided with conventional climatic seasons (e.g., fall: 31 Aug - 17 Nov, lake level = 225.8 - 226.2 m above mean sea level [MSL]; early winter: 30 Nov - 30 Dec, 227.1-227.7 MSL; late winter: 15 Jan - 27 Feb, 225.7 - 226.2 MSL; and spring: 10 Mar - 27 Apr, 226.5 - 226.8 MSL [*4*]).

## RESULTS

All of the non-dabbling ducks on Grand Lake were observed from January through the end of April and mid-October through December, 1987. Pochards dominated (87.8% of seasonal observations) fall, or the early migratory period (Table 1). Sea ducks (45.4%) and pochards (53.2%) dominated in early winter, a period of migratory and wintering behavior. Late winter was dominated by sea ducks (99.8%). Spring migration was dominated by pochards (61.4%) and stiff-tailed ducks (24.2%), albeit total spring numbers of all non-dabbling ducks were a small part (4.6%) of the overall total from fall through spring. Overall, non-dabbling ducks were most abundant during late winter (47.2%), and next most during fall migration (36.1%).

Lesser scaup *(Aythya affinis*) were most abundant during migration in fall and early winter and least abundant during late winter (Table 1). It was notable that redheads *(Aythya americana*), a species of concern because of low population levels, used Grand Lake during migration in fall, early winter, and spring. Common mergansers *(Mergus merganser*) and common goldeneye (*Bucephala clangula*) were most abundant in late winter (Table 1). Only lesser scaup and ruddy duck (*Oxyura jamaicensis*) were observed in all four seasonal periods, although numbers of both were low in late winter.

Non-dabbling ducks were more abundant than dabbling ducks (*4*) during late winter and spring; the converse was true during fall and early winter (Table 2). Across all seasons, dabbling ducks ($n$ = 42,864; 74.8%) were more numerous than non-dabbling ducks (14,413; 25.2%). Both classes of waterfowl were uncommon (2.2%) during spring migration (Table 2).

## DISCUSSION

Among the Central Plains states, Oklahoma ranks first in surface area of reservoirs and second, behind North Dakota, in the percentage of that area that is con-

TABLE 2. Comparison of non-dabbling and dabbling duck abundances within seasons on Grand Lake, Oklahoma, 1987.

| | Season[a] | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Late Winter | | Spring | | Fall | | Early Winter | |
| Waterfowl Class | *n* | % | *n* | % | *n* | % | *n* | % |
| Non-dabbling Ducks | 6,802 | 58.1 | 658 | 53.0 | 5,206 | 39.7 | 1,747 | 5.6 |
| Dabbling Ducks[b] | 4,899 | 41.9 | 583 | 47.0 | 7,922 | 60.3 | 29,460 | 94.4 |
| Total Ducks | 11,701 | | 1,241 | | 13,128 | | 31,207 | |
| Percentage of Total Ducks across Seasons | | 20.4 | | 2.2 | | 22.9 | | 54.5 |

[a] Seasons as defined in footnote "a" of Table 1.
[b] From Leslie and Stancill (*4*).

sidered valuable habitat for migrating and wintering waterfowl (*5*). Grand Lake is on the border of the Central and Mississippi flyways, is located in an area considered important to wintering waterfowl (*15*) and is, throughout the year, habitat to a variety of wetland birds (*4,11,13,16*).

Because of differing census methodologies and effort, it is not possible to compare absolute numbers of ducks observed in our study with the numbers observed in other studies. However, non-dabbling ducks generally represented a greater percentage of the overall waterfowl total (25.2%) on Grand Lake in 1987 than was observed on 32 Oklahoma reservoirs (10.6%) from 1963 through 1972 (*10*). Seven species of dabbling ducks used Grand Lake during migration in 1987, but only mallards and relatively small numbers of green-winged teal (*Anas crecca*) and gadwall (*A. strepera*) were observed during the late wintering period (*4*). Similarly, eight of nine species of non-dabbling ducks used Grand Lake during fall and early winter (i.e., migration), but only two of nine species (common merganser and common goldeneye) occurred on the lake in late winter. In concert with our observations, Johnsgard (*15*) and Bellrose (*19*) noted that northeastern Oklahoma was north of major wintering grounds for most waterfowl species, except mallards, common mergansers (*10*), and common goldeneye. Heitmeyer and Vohs (*17,18*) also noted that these three species were regular winter residents on Oklahoma reservoirs.

Pochards, sea ducks, and stiff-tailed ducks show differential preference for wetland habitats; e.g., lesser scaup and ruddy duck prefer submergent vegetation and open water areas (*20*). The primary macrohabitats on Grand Lake, relative to waterfowl use, were: flowing and wide river (both in the north end of the reservoir farthest from the dam [*13*]); protected areas such as bays and coves; and the main lake (i.e., open water) (*4*). Stancill et al. (*13*) reported that pochards and stiff-tailed ducks were observed most frequently in the wide river macrohabitat (presumably favorable foraging areas) and secondarily in the main lake (loafing areas). Sea ducks were most prevalent in open water areas of bays and coves (presumably areas of highest fish availability).

Given the preponderance of dabbling ducks on Grand Lake, particularly in early winter, Leslie and Stancill (*4*) advocated management strategies that would enhance waterfowl foraging habitat on the lake and associated agricultural sites. Additionally, human disturbance (e.g., boating, hunting, etc.) and shoreline development were identified as pernicious to long-term management of Grand Lake for dabbling ducks. Similar constraints exist relative to the management of Grand Lake for non-dabbling ducks. Nevertheless, wide river habitat on Grand Lake (*4,13*) is important to both waterfowl groups, and management options that enhance its suitability for migrating and wintering waterfowl should be a permanent part of long-range planning for this and other old multipurpose reservoirs in Oklahoma.

## ACKNOWLEDGMENTS

Our research was funded by the Grand River Dam Authority through Benham-Holway Power Group, Tulsa, Oklahoma. B. Davenport, S. Haggard, and M. K. Stancill provided valuable assistance with the field work and compiling data, and useful reviews of this manuscript were offered by J. Aldrich and H. Namminga.

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