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## Some Factors Influencing the Abundance of Waterfowl Along the Mississippi River in Iowa

THOMAS J. MORRISSEY

In order to determine some of the factors influencing waterfowl abundance in eastern Iowa, field studies were made of migrating ducks during the years 1940-1945. A study area was selected on the Mississippi River 20 miles north of Davenport, Iowa, and near the town of Princeton, Iowa. The study area, a low-land meadow and marsh, is 5 miles in length and 1½ miles in width. It is known locally as the Princeton Marsh. Additional observations were made at scattered points along the Mississippi from Dubuque south to Keokuk, Iowa; on the Wapsipinicon River for a few miles above its mouth; and on Rock River near Moline, Illinois.

Fourteen species of ducks were studied: mallard, gadwall, baldpate, pintail, green-wing teal, blue-wing teal, shoveller, wood duck, redhead, ring-necked duck, canvas-back, lesser scaup, American golden-eye, and American merganser. Black duck, buffle-head, white-winged scoter, ruddy duck, red-breasted merganser, and hooded merganser were also studied but due to their small numbers and irregular occurrence none of the factors affecting their abundance could be determined.

As a result of field study it became apparent that the local abundance of any species of waterfowl is dependent upon a number of factors. Among these factors food, rest areas, water level, cover, and protection are the most important. The requirements of different species differ considerably, however, and ideal conditions for one species may not be at all suitable for another. Cover, food supply, and protection may vary in amount from year to year or from season to season. Consequently various species of ducks show a seasonal or annual fluctuation in numbers.

Counts were made of the waterfowl on the study area once each week from March 1 to May 15 and from September 1 to December 1 during the years 1940-1945. No counts were made in 1944. The numbers counted each week were totalled. Table 1 summarizes the data obtained.

Mallards show the least seasonal and annual variation in numbers. (Table 1). While mallards show a definite preference in choice of feeding grounds—marshes, corn-fields, and sloughs, in about that order—they are so adaptable within these limits that such conditions as drought, high water, or failure of a food crop do not affect their numbers to the extent that other less adaptable species are affected. Moreover, their autumn food supply of corn is constant

**TABLE 1. Numbers of Ducks on Princeton Marsh and Adjacent Mississippi River**

|                        | 1940   |        | 1941   |        | 1942   |        | 1943   |        | 1945   |        |
|------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
|                        | Spring | Fall   |
| Mallard .....          | 75,000 | 67,000 | 78,000 | 73,000 | 81,000 | 75,000 | 75,000 | 69,000 | 75,000 | 55,000 |
| Pintail .....          | 12,000 | 2,000  | 13,000 | 3,000  | 15,000 | 2,000  | 15,000 | 3,000  | 10,000 | 2,000  |
| Gadwall .....          | 1,000  | .....  | 1,500  | .....  | 1,500  | 100    | 1,000  | 100    | 1,000  | 100    |
| Baldpate .....         | 5,000  | 50     | 6,000  | 75     | 7,000  | .....  | 8,000  | 250    | 6,000  | 100    |
| Green-wing Teal .....  | 2,000  | 200    | 2,500  | 150    | 2,500  | 100    | 1,500  | 100    | 1,500  | 100    |
| Blue-wing Teal .....   | 9,000  | 3,000  | 11,000 | 5,000  | 9,000  | 2,000  | 8,000  | 1,000  | 10,000 | 1,500  |
| Shoveller .....        | 5,000  | 200    | 3,000  | 150    | 2,000  | 150    | 3,000  | 300    | 5,000  | 150    |
| Redhead .....          | 2,000  | .....  | 2,000  | .....  | 2,000  | .....  | 3,000  | .....  | 2,000  | 50     |
| Ring-necked Duck ..... | 6,000  | 3,000  | 6,000  | 4,000  | 7,000  | 6,000  | 7,000  | 5,000  | 5,000  | 3,000  |
| Canvas-back .....      | 3,000  | 2,000  | 3,500  | 2,000  | 4,000  | 2,000  | 4,500  | 2,500  | 3,000  | 1,500  |
| Lesser Scaup .....     | 30,000 | 25,000 | 30,000 | 25,000 | 35,000 | 25,000 | 35,000 | 25,000 | 30,000 | 20,000 |

and their habit of feeding in cornfields in early morning and late evening affords them considerable protection.

The abundance of wood ducks in this area is largely dependent upon available cover since the food supply (duck weed, acorns, insect larvae, etc.) remains fairly constant. Closely connected with its cover requirements, is this species' need for protection during the migratory season. Only a very small proportion of the Princeton Marsh is heavily wooded swamp and therefore good cover for wood ducks. Prior to 1943 about 600 wood ducks were counted each fall on the study area and about 300 were counted there each spring, the lesser number probably being due to a wider dispersion of the birds in connection with the spring floods. In 1943 hunting regulations which had given complete protection to the wood duck were relaxed to permit the inclusion of one duck of this species in the bag limit. Nearly all hunters made an effort to get the one bird allowed them.

In the fall of 1943 only 75 wood ducks were counted on the Princeton Marsh although the numbers of this species in the spring of 1943 and the following spring of 1944 were normal. The combination of heavy hunting pressure and lack of adequate cover drove most of the birds from this area. In other areas having a greater acreage of flooded woodland, numbers of wood ducks remained the same despite hunting.

Baldpate, pintail, gadwall, green-wing teal, blue-wing teal, and shoveller show a great seasonal variation in numbers. (Table 1). On the Princeton Marsh the chief food of these species is smartweed and includes the species *Polygonum pennsylvanicum*, *P. hydropiperoides* and *P. Muhlenbergi*. Bellrose and Anderson (1943) give these plants a fairly high preferential rating as duck food in the Illinois River Valley and they are of even greater importance in this area where other desirable food plants are absent. Smartweeds grow up quickly on any recently flooded land and form dense beds many acres in extent. In August and September the plants produce abundant hard seeds.

This source of food is not available to ducks, however, unless the beds of *Polygonum* are shallowly flooded. From 6 to 24 inches of water seems to be the optimum depth of flooding but as little as 1 inch is sufficient to attract many ducks. On the Princeton Marsh, spring floods made ideal feeding grounds. In autumn, however, water levels are stabilized by dam at Clinton and LeClaire, Iowa. Consequently the beds of smartweed are not suitable for feeding purposes until the high water of the following spring and the 6 species of ducks which are almost entirely dependent on this source of food are correspondingly uncommon in fall and common in spring.

Control of water levels to provide shallow flooding of marshes during the autumn migratory season as recommended by Bellrose (1941) would increase considerably the fall numbers of pintail, baldpate, gadwall, green-wing teal, blue-wing teal, and shoveller.

Redhead, ring-necked duck, canvas-back, and lesser scaup show

a seasonal variation in numbers which, except in the case of the readhead, is more apparent than real. In spring migration these species are abundant and conspicuous due to their habit of forming in large "rafts" on favorite feeding grounds. During fall migration large flocks are soon dispersed by hunters. Small flocks of these species are naturally less conspicuous and because of hunting, the ducks are more retiring. The factors combine to produce the impression of an abundance of these diving ducks in spring and a sharp reduction in their fall numbers. Actually the number of birds in small, widely dispersed flocks is about equal to that of the large spring concentrations (Table 1). The increased steamboat traffic on the Mississippi River also prevents any fall concentrations. Prior to 1942 very large flocks could be found above the dams at Davenport, Muscatine, and Keokuk where the ducks were safe from hunters but recently traffic has increased to such an extent that any large flocks are soon driven away.

Redheads show a seasonal variation in numbers which the present studies were unable to explain. (Table 1). It has been suggested that a large proportion of the migrants of this species which use the Mississippi Valley route in spring migrate via the Missouri Valley or routes farther west in fall.

American golden-eye and American mergansers are important chiefly as winter residents, although the two species occur from November to April. Their abundance is determined by the amount of open water on the Mississippi during the time the river is largely ice-bound. Unlike the lesser scaup and canvas-back which are occasional winter residents, golden-eye and merganser are intolerant of crowding on their feeding and resting grounds. A pool which may support 100 lesser scaup through the winter will usually support only  $\frac{1}{2}$  to  $\frac{1}{3}$  that number American golden-eye and even fewer American mergansers although these species may be much commoner in the area than the scaup. However, no competition has been observed between these species for the limited amount of open water.

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