

ADAPTABILITY OF BIRDS TO CHANGED ENVIRONMENT<sup>1</sup>

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*Plate 3*

DURING recent years much has been written and spoken concerning the conservation, preservation, and perpetuation of many species of wildlife, particularly waterfowl. In the waterfowl-breeding areas of Iowa many remedies have been suggested to convert the remaining marshes into more habitable environment for marsh-dwelling birds. The most common, and perhaps the most logical idea put forth was that the State or Federal Governments purchase large tracts of marsh and tilled upland and let them revert to pre-agricultural conditions. Much of the drained land surrounding the Iowa marshes, however, is of a high type of corn-producing soil. From the standpoint of economics, thirty to forty bushels of corn to an acre may mean more to the welfare of the State than one duck's nest to an acre. Thus in a highly agricultural region the ecologist who is interested in the perpetuation of wildlife is immediately confronted with a number of conflicting economic and aesthetic viewpoints. So far as some of the prairie and marsh birds are concerned, just what has happened in tall-grass-prairie-marsh country that has become highly agricultural?

From 1932 to 1937, inclusive, the senior writer spent several months each year in Clay and Palo Alto Counties (Text-fig. 1), in the vicinity of Ruthven, Iowa. The junior author made periodic visits to the area from 1924 to 1937. That section, within the Wisconsin glaciation, represents the remnant of the southernmost tip of a series of lakes and marshes extending south from eastern South Dakota and western Minnesota. Each year during the period of observations (1932-37), exhaustive data were collected on the nesting and migration of the birds. In 1914, A. D. Tinker recorded a number of birds found in that region by the Michigan-Walker expedition during the summer of 1907.

Many changes have occurred there since 1907. At that time about fifteen per cent of the upland was native prairie; in 1937 only two small patches of prairie were found, one of three acres and another of one acre. The margins of nearly all marshes, potholes, and lakes have been grazed, mowed, or cultivated since 1907. The dominant vegetation in the unplowed margins is bluegrass (*Poa pratensis*). In the wet meadows sloughgrass (*Spartina Michauxiana*) still persists. Since 1907, trees around the water areas—bur oak (*Quercus macrocarpa*), ash (*Fraxinus pennsylvanica lan-*

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FIG. 1.—ELBOW LAKE IN 1907. (Reproduced from Tinker's article.)

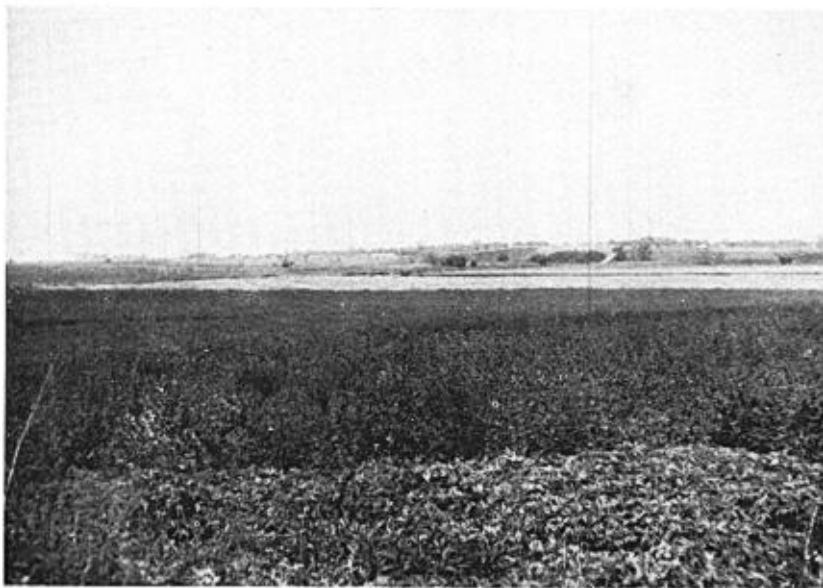


FIG. 2.—ELBOW LAKE IN 1937.

The light area in the background is a ripe oat field, and not water.



or mowed from 1932 to 1937. This section did not suffer so severely from drought conditions between 1932 and 1937 as did areas several hundred miles west of it. Differences between the environment of 1907 and that of 1937 are shown in the following paragraphs, in which the 1907 evaluation is taken directly from Tinker's (1914) paper:

## UPLAND

1907

*Upland Prairie.* Uncultivated areas, covered by the original vegetation of grasses and herbs, are still to be found on some of the ridges. These areas are, however, becoming fewer in number yearly, as more land is placed under cultivation."

*Grain Fields.* The greater part of the higher land has, within the past thirty years, been placed under cultivation, and this has been mostly at the expense of the upland prairie areas."

*Groves.* In many places groves of soft maple, cottonwood, willow, and box-elder have been planted on the uplands. These are so open, however, as to have no appreciable effect on the terrestrial vertebrate fauna, with the exception of the birds, the local distribution of which they are profoundly modifying."

1937

*Upland Prairie.* Practically all the upland is under cultivation. In 1937 only two patches of native prairie were found, one of three acres and another of one acre.

*Grain Fields.* The grain fields have extended into all the upland prairie areas. Those tracts too steep for cultivation are used for pasture, and as a result bluegrass is the dominant plant.

*Groves.* The only remaining groves in 1937 were those around farm buildings. Practically no under cover exists in these groves because of grazing.

## LOWLAND

1907

*Lowland Prairie (Meadows).* The low, generally poorly drained, areas have in many instances been reserved for hayland or pasture. In some places the original vegetation has been supplanted by tame grasses; in other places it remains undisturbed. The original vegetation consists of a dense growth of tall grasses and herbaceous forms."

*Swamps (Sloughs).* The swamps are mostly devoid of trees and filled with rank growths of grasses and sedges. The vegetation grows principally in clumps and on hummocks composed of roots and decaying vegetation. They are mostly uninfluenced by man, except as they are drained."

1937

*Lowland Prairie.* Bluegrass has invaded about half of the lowland acreage because of grazing. In the overgrazed parts squirrel-tail grass is the dominant plant. The vegetation on the remaining half of the lowland is composed almost wholly of sloughgrass. Years of mowing have eliminated many of the herbaceous plants in the sloughgrass tracts.

*Swamps (Sloughs).* The vegetation of the swamps is primarily the same as that found in 1907. About one-third of the swamp areas have been drained since that time.

LOWLAND (cont.)

1907

"*Shores of Lakes and Streams* (Marginal Forests). This habitat supports the only natural timber in the region, and, where undisturbed, there is always a comparatively dense growth along the shores of the streams and larger lakes. The timber zones are, however, much narrower, and the trees more scrubby, than in the southern parts of the State. In most places at the present time this timber has been largely removed."

1937

*Shores of Lakes and Streams* (Marginal Forests). Bur oak and haw trees are found on the high uplands immediately adjacent to the larger water areas. Willows and cottonwoods are the dominant trees found bordering the marshy areas. Many of the trees are larger and more mature than those observed in 1907.

AQUATIC

1907

"The aquatic life is found in the lakes, ponds, sloughs and streams. The conditions in these habitats are very similar, as the lakes are for the most part shallow and the streams slow-flowing."

1937

The aquatic life in the existing water areas consists primarily of the same forms as found in 1907. The aquatic flora has changed much less than has the flora of the upland and the lowland.

WATER AREAS<sup>1</sup>

1907

Green's Slough	250 acres
Lost Island Lake	1,260 acres
Trumbull Lake	1,190 acres
Smith's Slough	200 acres
Mud Lake	1,702 acres
Barringer's Slough	1,430 acres
Brown's Slough	200 acres
Elbow Lake (Pl. 3, fig. 1)	700 acres
Rossacher Slough	681 acres
Whitford Slough	193 acres
Virgin Lake	200 acres
Elk Lake	261 acres
Several hundred potholes	

1937

Shallower. <sup>2</sup>
8 feet shallower.
4 feet shallower.
One-fourth drained. <sup>3</sup>
Shallower, one-third drained.
One-fifth drained.
2 feet shallower.
Drained (Pl. 3, fig. 2).
Four-fifths drained.
Four-fifths drained.
About the same.
3 feet shallower.
About three-fourths of them drained.

With these changes in environment one would expect a great change in the status of the breeding birds. In the region as a whole, however, from 1932 to 1937 were found the same species as had bred there thirty years before. The number of individuals was no doubt less, but the number of species was greater in 1937. Tinker (1914) records 86 species observed; the present writers have records of 193. There are listed below data on the breeding birds in the region. The writers took only those records of birds from Tinker's list that he recorded as having nests or young. The limited

<sup>1</sup> Evaluation of the water areas for both periods was made by the present writers.

<sup>2</sup> Shallowness caused primarily by siltation.

<sup>3</sup> Drainage by ditches and tile conduits.

BREEDING BIRDS	1907	1932-37
<i>Colymbus nigricollis californicus</i>	Not recorded	10-20 nests yearly
<i>Podilymbus podiceps podiceps</i>	Recorded	100-150 nests yearly
<i>Butorides virescens virescens</i>	Recorded	10-20 nests yearly
<i>Nycticorax nycticorax hoactli</i>	Recorded	50 nests, 1937
<i>Botaurus lentiginosus</i>	Recorded	20-30 nests yearly
<i>Ixobrychus exilis exilis</i>	Recorded	100-200 nests yearly
<i>Anas platyrhynchos platyrhynchos</i>	Recorded	50-60 nests yearly
<i>Dafila acuta tzitzihoa</i>	Not recorded	20-30 nests yearly
<i>Querquedula discors</i>	Recorded	200-300 nests yearly
<i>Spatula clypeata</i>	Not recorded	50-75 nests yearly
<i>Nyroca americana</i>	Not recorded	30-40 nests yearly
<i>Nyroca valisineria</i>	Not recorded	One nest, 1934
<i>Nyroca affinis</i>	Not recorded	Four nests, 1937
<i>Erismatura jamaicensis rubida</i>	Not recorded	30-40 nests yearly
<i>Circus hudsonius</i>	Recorded	10-15 nests yearly
<i>Perdix perdix perdix</i>	Not recorded	10-50 nests yearly
<i>Colinus virginianus virginianus</i>	Recorded	Two pairs and young, 1932-1935
<i>Phasianus colchicus torquatus</i>	Not recorded	200-300 nests yearly
<i>Rallus elegans elegans</i>	Not recorded	30-40 nests yearly
<i>Rallus limicola limicola</i>	Recorded	100-150 nests yearly
<i>Porzana carolina</i>	Not recorded	100-150 nests yearly
<i>Gallinula chloropus cachinnans</i>	Recorded	75-100 nests yearly
<i>Fulica americana americana</i>	Recorded	2000-3000 nests yearly
<i>Oxyechus vociferus vociferus</i>	Recorded	200-300 nests yearly
<i>Bartramia longicauda</i>	Recorded	4-6 nests yearly
<i>Actitis macularia</i>	Recorded	20-30 nests yearly
<i>Steganopus tricolor</i>	Not recorded	5-6 nests yearly
<i>Sterna forsteri</i>	Not recorded	100-150 nests yearly
<i>Chlidonias nigra surinamensis</i>	Recorded	200-300 nests yearly
<i>Speotyto cunicularia hypugaea</i>	Not recorded	16 nests, 1934
<i>Asio flammeus flammeus</i>	Not recorded	3-6 nests yearly
<i>Megaceryle alcyon alcyon</i>	Recorded	5-10 nests yearly
<i>Otocoris alpestris praticola</i>	Not recorded	30-40 nests yearly
<i>Telmatodytes palustris dissaepius</i>	Recorded	300-500 nests yearly
<i>Cistothorus stellaris</i>	Not recorded	300-500 nests yearly
<i>Dendroica aestiva aestiva</i>	Recorded	100-150 nests yearly
<i>Geothlypis trichas brachidactyla</i>	Recorded	100-150 nests yearly
<i>Dolichonyx oryzivorus</i>	Recorded	30-50 nests yearly
<i>Sturnella neglecta</i>	Recorded	200-300 nests yearly
<i>Xanthocephalus xanthocephalus</i>	Recorded	300-400 nests yearly
<i>Agelaius phoeniceus arctolegus</i>	Recorded	300-400 nests yearly
<i>Molothrus ater ater</i>	Recorded	100-150 egg-laying females
<i>Spiza americana</i>	Not recorded	30-40 nests yearly
<i>Ammodramus savannarum bimaculatus</i>	Recorded	20-30 nests yearly
<i>Melospiza georgiana</i>	Recorded	200-300 nests yearly

time available to the field workers of the Michigan-Walker Expedition in 1907 (July 1 to September 1) was not adequate for a complete survey of marsh and prairie birds. Thus, no doubt, some or all of the species listed by the present writers but not recorded by Tinker may have been present in 1907. Some of the breeding species not reported in 1907, however, if present, must have been less common than in 1932-37 or they would have been noted.

From the data here presented, it appears that not a single species of marsh-nesting birds has been exterminated in the area. Eighteen species were observed nesting in 1932-37 that were not so recorded in 1907. The Blue-winged Teal and other land-nesting birds, which before the introduction of the white man's methods of agriculture nested in the native grasses, now nest in bluegrass, oats, and alfalfa. Thus from the standpoint of proper land use, perhaps ducks and other marsh and prairie birds can be managed in conjunction with good farming practices, even in a highly agricultural region. Bennett (1938, p. 102) found that a certain degree of grazing under proper conditions was conducive to more favorable nesting conditions for the Blue-winged Teal.

From all indications it seems as though much can be done and learned in evaluating environmental changes in relation to agriculture. It may be that bluegrass provides better nesting cover for the Blue-winged Teal than did the native grasses! We need to learn more about what we have before we try to make changes to produce what we desire in the conservation of birds.

#### LITERATURE CITED

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