

row being pinkish brown in one case and deep olive green in another. There seems to be no record of the names of the artists who were responsible for these plates.—WITMER STONE, *Academy of Natural Sciences, Philadelphia*.

Observations on the Shifting Range, Migration and Economic Value of the Bobolink.—The inclusion of the Bobolink among the birds protected by the recently consummated treaty with Canada for the protection of migratory birds, resulted in an immediate demand for an investigation of its present-day economic status, which was carried on in the states from New Jersey south to Florida, inclusive, in August to October, 1918. A few points were brought forcibly to the writer's attention which perhaps are not wholly realized by ornithologists in general. First, as to the shifting of breeding grounds by the Bobolink, for to my mind that is what is occurring. The trend of the bird's breeding range to the northwest is unmistakable; for instance in the first edition of the A. O. U. Check-List, the Western limit of the breeding range was given as the Great Plains; in the second edition, 1895, as Nevada, Idaho and Alberta, and in the third edition, 1910, as British Columbia. Now unless there has been a considerable increase in the numbers of the species, the population of eastern breeding grounds must have fallen off, and this latter condition is one of which New England observers in particular complain. Rice growers in the South who have the best opportunity of judging the abundance of the species contend that the bird is less numerous than formerly. Putting these two things together, a vastly extended range and no increase, possibly a decrease in number of individuals, diminution of the Bobolink population somewhere is inevitable. This condition has actually been observed in the northeastern states, completing the cycle of evidence that a shift in range has occurred.

The persistence of birds in maintaining migration routes is particularly exemplified by the Bobolink. After extending its range westward, over hundreds of miles and across two mountain systems, the species with insignificant exceptions returns to the Atlantic Coast before turning to the south. The main fall migration path seems to converge into a funnel not far south of the breeding range through which the birds pour in a narrow stream along the coast of southern North Carolina, South Carolina and Georgia, expanding again so as to cover the whole breadth of peninsular Florida. Even farther north, before this migration stream is definitely formed, the birds are much more abundant near the coast than inland as in the wild rice marshes on tidewater from New Jersey to Virginia. Not only do the vast majority of Bobolinks seek a narrow track along the Atlantic seaboard for their southward migration, but they reach all parts of it almost simultaneously. Florida seems to form an exception to this statement, but in Georgia and South Carolina both the earliest dates (July 13-19) of fall migration and the bulk arrivals (August 15-21) are as early as those for the vicinity of Philadelphia. At a plantation on Goose Creek, South Caro-

lina, where ricebirds are expected in large numbers about August 21, they arrived this year August 1.

The migration of the Bobolink is a long drawn out process. It begins early in July, and whilst at its height in the United States from the middle of August to that of September, the species has been known to arrive in numbers in northern South America, early in September, a date prior to the time great damage is still being done by large flocks in the United States. By the middle of October, often earlier, cold weather has driven the birds out of all of the United States but Florida; there Bobolinks linger and, it is claimed by some, winter.

As a result of this straggling habit of migration no large proportion of the species is present in a given area at one time. It is fortunate that this is true, for the Ricebird is as destructive as ever where conditions permit. War prices stimulated the once decadent rice industry of the South Atlantic States and the acreage this year probably is in excess of 6000. The destruction of rice by Ricebirds must average about 25%, and the money loss for rice alone, not including expense incurred in attempts to protect the crop, probably in the neighborhood of \$150,000.

Were the loss much less it would be a mistake to protect the Bobolink, since its depredations fall so heavily upon individual planters whose main money crop is rice. Not only is rice damaged in the fall, but sprouted rice and oats and wheat in the milk suffer almost as heavily from depredations of the birds on their spring migration. From personal observation I regard the Bobolink as the most exasperating bird pest of the United States. Overwhelming flocks of them (I have seen 25,000 to 30,000 on 60 acres of rice) pitch in the ricefields from which it is almost impossible to dislodge them. If by great effort the flocks are put on the wing, they simply wheel and in a few moments are settled upon the rice again. When this cereal is in the milk the birds keep a steady stream of rice milk running through them. In the intestines it seems hardly altered from the state in which it is swallowed, and certainly only a small proportion of its nutriment is used. The Ricebirds not only gorge themselves by day but even continue their feeding on moonlight nights. At length they become so fat and lazy as hardly to be dislodged from the rice by any means. In many fields, half of the rice is destroyed, and in some all of it, or at least so much that harvesting is unprofitable. Fancy yourself a rice planter, seeing the promised results of your investment and labor melting away before the onslaught of these pests, and you may well understand why the Bobolink's song, however attractive, and its insectivorous habits in its breeding range, seem trivial reasons for protection of so destructive a species.

As a consequence of these investigations an order has been issued by the U. S. Department of Agriculture, permitting the killing of the birds, in Pennsylvania, New Jersey, Delaware, Maryland and the District of Columbia from September 1 to October 30 inclusive, and in the states from Virginia to Florida from August 16 to November 15, but no birds may be sold or shipped for purpose of sale.—W. L. McATEE.



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