

States since 1940, when I had the impression that the bird was in no danger of extinction. Only three specimens have been collected in Cuba, all in 1942 (Orlando Y. Garrido, pers. comm.).

Taking a parallel case, Swainson's Warbler is also a swamp-inhabiting bird, and its population today may be less than that of Bachman's Warbler during the 1880's and 1890's. Yet I venture to state that if all licensed collectors living today set out to collect every Swainson's Warbler they saw, they would scarcely make a dent in the total population.

Thus, despite the fact that man has played the major role in the decline of so many organisms, I doubt that he is guilty in this instance. For some reason, Bachman's Warbler seems to be poorly equipped for survival even under the conditions it demands and is not sufficiently adaptable to survive under different conditions. In the long process of the evolution, flourishing, and eventual extinction of species, perhaps this is one whose time has come. In this pessimistic outlook, however, I sincerely hope that I may be proven wrong.

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**Winter habitat of Kirtland's Warbler.**—The alarming decline of Kirtland's Warblers (*Dendroica kirtlandii*) on the nesting ground in northern Lower Michigan (Mayfield, Auk, 89:263-268, 1972) has stimulated interest in its survival problems on the wintering ground in the Bahama Islands. As an aid to those who may be looking for the bird in the Bahamas, I am bringing together what we know about the winter habitat.

Observers have found Kirtland's Warbler on several of the major islands of the Bahamas from the northernmost to the southernmost, but no one has seen it in winter on the nearby mainland of Florida nor on the nearby islands of Cuba and Hispaniola. The greatest numbers of reports have come from those islands visited by the greatest numbers of bird students. On New Providence near Nassau collectors took 45 specimens between 1884 and 1915; and on Grand Bahama visiting groups of the Florida Audubon Society and local residents have found it every year from 1959 through the 1960s.

Yet the bird has proved difficult to find by those seeking it. James Bond spent about 100 days in these islands, mainly in the 1930s, and saw the Kirtland's Warbler only once. Josselyn Van Tyne and I spent 59 man-days on New Providence and Eleuthera searching for it in January and February of 1949, and I have made a number of brief trips to Great Abaco, Grand Bahama, and Inagua since that time without ever finding the bird. John Emlen spent about 500 hours systematically combing measured tracts on Grand Bahama and Andros, with brief visits to other islands from 1968 to 1971, without seeing it. His time in the field exceeded 200 days. Others have had similar experiences for shorter periods.

Unless the birds are concentrated in some locality or in some unusual habitat not yet discovered, the prospect of finding them is discouraging indeed. The 400 Kirtland's Warblers in existence in 1972 are to be sought on 4,466 square miles of the Bahamas distributed among 15 islands larger than 10 square miles each, 700 smaller cays, and 2,400 "rocks."

The person with most experience with Kirtland's Warbler on its wintering ground was C. J. Maynard, who collected 38 specimens between 1884 and 1915 on New Providence and Eleuthera. Writing in 1896 about his experience in 1884 when he collected 26 specimens, he described the behavior and habitat of these birds as follows: ". . . shy birds of solitary habits, for never in any case did I find two together. They inhabit the low scrub, preferring that which is only three or four feet high, but retire at night to roost in the higher, more dense shrubbery near the spots which they frequent during the day. Those taken were, with one or two exceptions, found in an exceedingly limited area, within a mile or two of the city [Nassau], and always in old fields grown up to low shrubbery . . . the only note that they uttered was a harsh chirp, with which they greeted me when alarmed at my approach. When one was not secured at first sight, it generally retreated into the bushes and silently disappeared. The thick and tangled character of the scrub rendered any quiet or swift pursuit impossible, thus a retreating bird was never seen again that day, and a number escaped this way . . . twice at least as I was making my way through the thickets in search of the Greater Yellow-throat . . . birds appeared from out of the thicket within a yard of my path, remained a few seconds then darted off into the scrub." (Birds of eastern North America, rev. ed.:594).

C. B. Cory, who collected the first winter specimen (on Andros) on 9 January 1879, said it behaved like a Myrtle Warbler (*Dendroica coronata*) and seemed to prefer thick brush (Bull. Nuttall Ornithol. Club, 4:118, 1879). The last winter specimen also was taken in brush, on Watling Island (San Salvador) on 27 December 1965, ". . . at the edge of an extensive area of scrub forest or low coppice with canopy about 8 to 10 feet above the ground, i.e., composed of what could be called small trees . . . Palms were scarce there." (Dennis Paulson, in litt., 22 October 1966).

All modern observers mention the presence of scrub: on Inagua between 1935 and 1940 "in scrub near the sea" (James Bond, in litt., 22 March 1946); on Eleuthera in "scrub growth" (Margaret Hundley, Auk, 84:426, 1967); on Paradise Island, called Hog Island before 1962, across the harbor from Nassau "in low broad-leafed scrub . . . along a path through a plantation of Australian pine, *Casuarina equisetifolia*" (David Challinor, Jr., Wilson Bull., 74:290, 1962), and in "woods . . . fairly open, consisting of tall pines [*Casuarina*?] with a considerable (but not dense) undergrowth of palmettos and unidentified broad-leaved shrubs rather than in the pines." (George Wallace, Jack-Pine Warbler, 46:7, 1968).

The first of the modern series of records on Grand Bahama came in November, 1959, "in scrub and *Casuarina* growth near West End airport (Dorothy Blanchard, Jack-Pine

Warbler, 43:39-42, 1956). Charles F. Walker saw the bird at West End on 28 December 1969. He detected it first on the lawn of the hotel, watched it pursue a moth to the concrete floor of the porch, fly to the top of a small shrub in the lawn, and finally vanish at low level in a dense row of broad-leaved shrubs. Although he searched the area carefully for the next several days, he did not find the bird again (30 December 1971). However, the "usual place" for finding the Kirtland's Warbler on Grand Bahama has been an open stand of large ". . . Caribbean pine (*Pinus caribaeae*) with an understory of poisonwood (*Metopium toxiferum*) and palmetto (*Serenoa repens*)." (Hundley, op. cit.). Here the Kirtland's Warblers gleaned food from the trunks and branches like Black-and-white Warblers (*Mniotilta varia*). In April, 1969, Paul Fluck mist-netted and banded a Kirtland's Warbler "in fairly open, young Caribbean pine about 25 feet high, with a shrubby understory" (John T. Emlen, in litt., 14 December 1971).

From all of these reports, old and modern, I conclude that the Kirtland's Warbler usually inhabits low broad-leaved scrub in the Bahamas. Areas that have been cleared and then allowed to grow back but have not yet reached their maximum height and density may hold particular promise. I think it is significant that no one has reported them in the high scrub or coppice, trees 15 feet or more in height, that abounds in these islands. The presence of pines where the warblers have occurred repeatedly on Grand Bahama I think may be incidental or of secondary importance. By shading and by encouraging ground fires the pine may hold back the brushy understory to the desired state of sparseness and low height. All of the large pines I have examined show fire scars at the base. Only the northernmost islands of the Bahamas have pines, and even on these the Kirtland's Warbler has occurred frequently on portions that have no pines. The several mentions of Australian pine I think is a consequence of the widespread planting of this exotic in resort areas visited by tourists; that is, the tree happens to be where the visitors are.

Unfortunately for the searcher, low broad-leaved scrub is abundant on all the islands of the Bahamas.—HAROLD F. MAYFIELD, 9235 River Road, Waterville, Ohio 43566, 14 January 1972.

**Stability of a population of male Red-winged Blackbirds.**—An important aspect in the survival of a species is its ability to recover rapidly from a low population resulting from some catastrophe. The history of a population of Red-winged Blackbirds (*Agelaius phoeniceus*) for 8 years illustrates a method of rapid increase after a decline occasioned by a series of drought years. During the drought the number of nesting females declined drastically but the number of males holding territories remained essentially constant. This arrangement permitted rapid increase once conditions became more favorable because the males were ready each year on their territories for the available females.

The Redwings of Millbrook Marsh near State College, Pennsylvania were studied by several persons beginning in 1960. The details of the vegetation changes resulting from a drought are recorded by Brenner (Amer. Midl. Naturalist, 76:201-210, 1966). His data show that monthly precipitation in 1960, 1962, and 1963 was about 20 per cent below normal. During these years a rainfall deficit of 26 inches occurred, mostly during the growing season. During this drought the marsh changed from vegetation, measured in biomass, composed of cattails (48.3 per cent) and sedges (39.3 per cent) to few cattails (4.6 per cent) and many sedges (89.5 per cent). For five years the territories of the breeding males were mapped in considerable detail (Brenner, op. cit.). For 1965-67 Peek mapped the territories. In these latter years, due to some changes in drainage of