

various aspects of eagle biology. Information is urgently needed on the location of active eagle nests and also on wintering concentrations of eagles. If you have information on these or any other facets of eagle biology, please communicate with ALEXANDER SPRUNT, IV, *Box 231, Tavernier, Florida.*

PUBLICATIONS REVIEWED

THE KIRTLAND'S WARBLER. By Harold Mayfield. Cranbrook Institute of Science, Bloomfield Hills, Michigan, xvi + 242 pp., 9 figs., 8 pls., and colored frontispiece, 1960; \$6.00.

This is a research report filled with valuable information and presented in good, readable style. Truly exhaustive studies of the rare Kirtland Warbler have been pursued for many years, beginning in 1930, by Josselyn Van Tyne. From 1944 on, Mayfield was a part of the study team and it is to his very great credit that he has been able to bring the investigations to a meaningful, published conclusion.

Rare species of birds are likely to attract more attention than they deserve and more than the anticipated biological results would justify. But the Kirtland Warbler does present some special challenges and opportunities for significant results even though the total population of the species is probably less than 1000 individuals. The amazingly restricted breeding range in central Michigan and the comparably restricted winter range in the Bahama Islands invite special investigation of the factors leading to range limitation, survival, and productivity. The answers in so far as they emerge relate primarily to the breeding grounds where most of the research effort was concentrated.

The Kirtland or Jack Pine Warbler is limited in spring and summer to one small part of the range of the jack pine. The three factors suggested as contributing to this and which in combination are peculiar to the warbler's range in northern Lower Michigan are: porous soils, am-

ple ground cover, and unimpeded sweep of forest fires in the jack pines. The warbler requires extensive stands of small conifers, growing thickly, at least in clumps, and the foliage of them must reach down to the ground cover; the latter must be short but in places fairly thick and the soil must be dry and porous, for it is here that the nests are placed. By extensive correlation of environmental conditions with presence and absence of the birds, the author has been able to state the habitat requirements of the species as explicitly and dependably as has been possible for any species of passerine bird.

Chapters on territory, the nesting cycle, breeding behavior and song are rich in substantive findings and each is provided with a meaningful summary.

Although the Kirtland Warbler is a strictly territorial species, it is colonial, or perhaps better stated, it forms assemblies or settlements. Mayfield believes that "colonies" reflect a gregarious drive and that this may be beneficial in that females are aided in finding males and that there is mutual stimulation to breeding resulting from males being in communication by song; thus he tends to favor Darling's views on social stimulation.

Perhaps most significant are the chapters dealing with the influence of cowbird parasitism and with productivity and mortality. The cowbird probably invaded the breeding range of the warbler in the 1870's and became numerous there in the 1890's. Now it is calculated from survival studies that the warblers would produce 60 per cent more fledglings if there were no cowbird interference. As a consequence a pair of Kirtland Warblers at present produces only 1.4 fledglings per year. The annual survival rate for the adults of the species is about 60 per cent and the life expectancy is about two years.

This book may be regarded as a milestone in field research, representing prolonged, intensive effort, often of teams of workers, and with intelligent direction leading to clear biological results.

—ALDEN H. MILLER.