

## Brood Parasitism: Reducing Interactions between Kirtland's Warblers and Brown-headed Cowbirds

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Since its discovery as a migrant near Cleveland, Ohio, in 1851, the Kirtland's Warbler (*Dendroica kirtlandii*) has always been considered a rare bird. At various times people have called it America's rarest songbird. Its wintering ground in the Bahama Islands was discovered in 1879, and if we may judge from the frequency with which collectors found it there, its peak population within historic times occurred in the 1880's and 1890's.

At about that time two significant developments occurred on the nesting ground, one beneficial and temporary, the other detrimental and permanent. First, the pinelands of northern Michigan were lumbered rapidly, and the practices of the loggers led to vast fires that created an unprecedented amount of habitat for the nesting warblers. Second, as agriculture crept northward and the farmers cleared the hardwood forests from much of the southern Great Lakes region, the Brown-headed Cowbird (*Molothrus ater*) extended its range from the grasslands of the Midwest up into northern Michigan. This brood parasite, which lays its eggs in nests of other birds, found the Kirtland's Warbler the perfect host. It steadily grew in numbers and took an increasingly heavy toll up to the present time when control of cowbirds was instituted (Mayfield, 1977).

An appraisal of the true numbers of Kirtland's Warblers did not become possible until 1903 when the nesting ground was discovered in northern lower Michigan. At that time, before organized fighting of forest fires, the population might have been a few thousands of birds. Today a fairly accurate census is feasible because of our knowledge of the bird's requirements and behavior. In breeding season the pairs occupy small territories, and the males are loud and persistent singers. The habitat is highly distinctive. The nesting bird lives only among young pines the size of Christmas trees, growing densely enough to form thickets. The ground cover

must be low but ample to conceal the nests, which are imbedded in the ground. Nests are built on pervious soils that do not flood during rainstorms. The right forest stage occurs naturally about 8 years after forest fire, where regrowth consists mainly of Jack Pines (*Pinus banksiana*). Fortunately, the warbler will accept plantations of pines also if the tracts are extensive. Although the Jack Pine ranges from British Columbia to Nova Scotia and from the Great Lakes to the arctic, all the necessary conditions apparently come together only on the sandy plains of a small part of Michigan. All nests four to date have been on one soil type, Grayling Sand, and 90 percent of them have been located in the drainage of one stream, the Au Sable River (Mayfield, 1960).

The first census was taken in 1951, probably the first complete count of an entire songbird species in the world (Mayfield, 1953). This census and the second one, a decade later, showed the population remaining essentially stable at about 500 singing males. Since females are believed to be approximately equal in numbers, the total population of adults was about 1,000 (Mayfield, 1962). Field studies in the 1940's and 1950's caused me to doubt the species was maintaining itself, but dire predictions were not confirmed until the third census in 1971, when the count dropped 60 percent to about 400 birds (Mayfield, 1973a).

Alarmed by this decline, John Byelich of the Michigan Department of Natural Resources and G. William Irvine of the Huron-Manistee National Forests, called together a group of interested people in November 1971. These included members of the Kirtland's Warbler Committee of the Michigan Audubon Society, originally established in 1956 to advise the agencies. Many possibilities were discussed, including attention to problems on the wintering ground and censuses every year on the nesting ground, but discussion centered on preservation efforts that could be started immediately. Control of cowbirds promised instant results; whereas improvement of habitat would not benefit the warblers for years.

Concern about the cowbird was not new. Its effect on the warbler was well-documented, and means of control had been explored. The cowbird causes damage at every stage of the nesting process. First, it removes from the nest about as many of the host's eggs as it lays of its own. It usually accomplishes this unnoticed because the action is synchronized with the host's egg-laying, a time when nests are not ordinarily attended. Next, since the cowbird is usually larger than the host, its egg gets more than its share of the heat from the incubating host, thereby reducing the hatching success of the other eggs. Finally, cowbirds hatch two or three days ahead of the host young, and by virtue of their larger size and maturity, they trample nestlings of the host species. At the time of Kirtland's Warbler hatching, cowbird nestlings already in the nest weigh about five times as much as the warbler nestlings and are much stronger and more active.

In my field studies of the 1940's and 1950's, I found about 55 percent of Kirtland's Warbler nests parasitized by cowbirds, and losses from this cause alone reduced production of young by 36 percent (Mayfield, 1961). Parasitism rates climbed in the 1960's, exceeding 70 percent in some years (Walkinshaw, 1972). The effect

