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KIRTLAND'S WARBLER POPULATION

Harold Mayfield

There is a growing conviction among ornithologists that some songbirds do not prosper except in tracts of suitable habitat much larger than the total of their defended territories. That is, the whole is greater than the sum of the parts. The Kirtland's Warbler may provide the best evidence to date for this conclusion.

Our present evidence suggests that major increases in the population of this species result from the availability of very large tracts of suitable habitat on the nesting grounds, while smaller changes are modulated by variations in rainfall on the wintering grounds. There is a considerable amount of conjecture in these views, as I shall explain.

Breeding ground

First, let us consider the breeding ground. I will confess that I have been reluctant to conclude that the population of this bird was controlled mainly by the availability of nesting habitat. This notion seemed simplistic and myopic. It focused on the only aspects of the bird's life we understood. It offered a suspiciously simple answer to a complex problem. Aldous Huxley has said that biology has lagged behind other hard sciences because it is loaded with multiple causes, and "multiple causation is antipathetical to the orderly mind." We like simple answers. In physics and chemistry, for example, one effect usually has one cause. In biology, on the other hand, there are usually many causes for a single effect, and, worse yet, usually we do not know them all.

In the case of the Kirtland's Warbler, the raw and poorly understood facts indicate that very large forest fires, which bring very large tracts of suitable habitat about ten years later, produce an upsurge in the bird's population. At this point, I want to emphasize very large. Just counting the acres of jack pine at scattered locations, may be irrelevant. The extent of the tracts is crucial. Once I inspected a strip 150 yards wide and two miles long that looked perfect for warblers but had none.

Our first example dates from 1871. In that year, according to inspired writers, "an empire burned" in the pinelands. More than a million acres burned in the Au Sable River valley, the heart of the Kirtland's Warbler nesting range. As a result of that sweeping fire and the cutting that had already taken place, the forest here, which had been predominantly white pine, became mostly jack pine. Then, about ten years later we find the Kirtland's Warbler more numerous in winter and in migration than ever before or since.

Our best evidence comes from the Bahama Islands. Henry Bryant spent four months on the islands from January to May, 1859, and again in the winter 1866. He collected birds mainly on New Providence, but also on five other islands. He did not find any Kirtland's Warblers. However, in the 1880s and 1890s hardly any collector failed to find the bird, and in total they brought back 66 specimens. Charles Maynard alone in 1884 took 24 specimens from one area of New Providence. These occurrences have not been duplicated since that time. Bird watchers in this century, with modern binoculars, have seen very few Kirtland's Warblers, and these have been almost always scattered individuals.

Also in the 1880s and 1890s, although bird watchers were few, spring records backed up by specimens, occurred as far west as Missouri and Minnesota, where they have not appeared since that time. Scattered spring records in the Southeastern States revealed the general migration route but no inkling of abundance.

We have no actual counts until 1951, when we found 432 singing males on the nesting ground in Michigan (about 25 % greater than at present). Nearly a quarter of that count came from the site of the 28,000-acre Canada Creek fire in 1939 in Montmorency and Presque Isle counties. No Kirtland's Warblers nest there today. Another quarter of the 1951 count came from the 31,000-acre Lovells fire of 1933 in Crawford County.

Ten years later, in 1961, the number had increased 16 % to 502, with the

Canada Creek area still producing nearly 20 % of the total, and with the 17,000-acre Mack Lake fire of 1946 in Oscoda County contributing nearly a quarter of the total. By this time the precise consequences of various fires is difficult to estimate because extensive plantings of pines were now inhabited by warblers. There were no fires within the nesting range larger than 10,000 acres from 1946 until 1980.

The third census of the population was taken in 1971, and it showed an alarming decrease of 60 % to 201 singing males. Immediately, annual counts were instituted, and the population remained nearly flat for 20 years, swinging moderately between 167 and 242 males. Then in 1991 the first significant increase brought the count to 347, with more than half the population on the 28,000-acre Mack Lake burn of 1980 in Oscoda County. Thus, there appears to be a clear relation between large fires and upsurges in populations of Kirtland's Warblers in the last 110 years.

This relation seems almost too neat, because it does not reveal how incomplete our knowledge is. What swings in population occurred in the 60 years between 1890 and 1951? If the Kirtland's Warbler benefits disproportionately from very large tracts on its nesting ground, why does it do so? Is the production of young greater? Are there fewer unmated adults? Or do large tracts mislead us by serving as attractants bringing together a larger proportion of the population where we count them? We have always wondered about the unknown number of scattered birds that may be dropped in migration like dust in the vastness of the northern pine forests. I was once startled to detect a nonsinging male slipping unannounced and unchallenged through the midst of a colony where all the resident males were marked and known by song. How many of these are missed in our counts?

What is suitable habitat? Is all the suitable habitat occupied by nesting birds? Norman Wood, the discoverer of the nesting range in 1904, remarked that he had seen hundreds of acres of similar land that did not have nesting warblers. Others of us can say the same. For example, just west of Higgins Lake there is a planted tract

of almost two square miles of young jack pine, which has never held any nesting warblers. Why? I have asked several experts and got a different answer from each.

Another term I have used repeatedly is large tract. What is large? For a long time we have noted that the bird rarely nests on tracts smaller than 80 acres, although they do not appear to utilize nearly all of this space for their nesting territories. Would they do better on tracts of 1,000 acres or 5,000 acres? The optimal area is difficult to pin down, even though we know the exact size of the areas burned, because ordinarily only a fraction of a burned area becomes "suitable." Of the 28,000 acres in the Mack Lake burn of 1980, only 5-6,000 acres are judged suitable.

Winter range

Since the population of Kirtland's Warblers has been fairly stable over the last 20 years, and the climate and vegetation in the Bahamas seem to have changed little in centuries, we have found little cause for alarm about the bird on its wintering ground. Yet, our knowledge of the bird for more than half of each year is skimpy, to say the least. Our knowledge of the bird on its wintering range is comparable to our knowledge of it on its summering range in 1904. We know that this species, like many other warblers nesting on our continent and wintering in the neotropics, seems rather solitary, eating insects and small fruits. If so, we would expect it to be affected by variations in food supply according to local rainfall. Indeed, Radabaugh quotes two eyewitnesses to a heavy mortality among songbirds in the Bahamas during a drought in the winter of 1971-1972. One said, "bushels of dead birds" were to be seen along the roadsides.

More recently Larry Ryel compared the Michigan counts with rainfall at Nassau and found a correlation of .85 between these two facts, with high rainfall in the Bahamas pointing to high winter survival. Thus, rainfall in the wintering ground may account for some part of the seemingly random fluctuations that have been noted in Michigan counts. These fluctuations have amounted to as much as 20 %, and it is easy to imagine a much more severe effect of several dry winters in succession.