

Double-broodedness in the Kirtland's Warbler.—It was long thought that Kirtland's Warbler (*Dendroica kirtlandii*) was single-brooded (Van Tyne *in Bent, Life Histories of North American Wood Warblers. Bull. U. S. Natl. Mus.*, 203, 1953). Mayfield (The Kirtland's Warbler. Cranbrook Inst. Sci., Bloomfield Hills, Mich., 1960) reported two instances of "re nesting after fledging of young" in 1954.

During the course of field work at Mack Lake, Oscoda County, Michigan (1963-1971) we observed seven additional instances of double-broodedness: one each in 1963, 1965, and 1966; and two each in 1964, and 1967. All but the two in 1967 were reported by Berger and Radabaugh (*Bird-Banding*, 39: 161-186, 1968). In that paper, dealing primarily with returns, a line of evidence was presented suggesting that all female Kirtland's Warblers would be double-brooded if young fledged early enough from first nests. At 44-45° north latitude the majority of nestings do not meet this criterion. Berger and Radabaugh noted that the latest fledging date, after which a female might enter another nesting cycle, was 28 June. They thus set this as a "cut-off" date beyond which new nests would not be found. In the present study 17 pairs fledged young on or before 28 June. Of these, only seven have been found with new nests. Thus it seems clear that a significant portion of females, fledging young early enough, do *not* re nest.

We have no conclusive evidence on the genetics of double-broodedness. Of the seven known double-brooded females from this study, none has repeated this performance in any subsequent season. All seven were banded as adults so nothing is known of their parents, thus precluding the tracing of genetics backwards in time. They have been involved with 30 discovered nests in the years we have known them. There were 49 warbler nestlings banded at, and fledging from, these nests. Only seven of the 49 have been observed as adults. Further reducing these meager data is the fact that four of these were males. Of the three female offspring, none has been observed attempting two broods. We know of seven nests built by these three females. There were 17 nestlings banded at, and fledging from, these seven nests. However, none of these "third generation warblers has been observed as adults thus far.

The role of the male, relative to double-broodedness, is incompletely known. No male has been involved with two broods in more than one season (and only the "original" seven were thus involved). It is possible that females would more likely be double-brooded if their mates aggressively took over the feeding of the fledglings. When young Kirtland's Warblers first fledge, the parents appear to vie for them, often with aggressive behavior involved. There appears to be a full range of male reaction to fledglings, including a few males that take little or no part in feeding the young. If the female does the bulk of this feeding, such activity might inhibit re nesting.

At this point our data are inadequate to draw conclusions regarding the possibility of two genetic strains, one double-brooded, the other not. It appears clear, however, that double-broodedness is related in part to the length of the first nesting cycle. A female fledging young too late in the season would probably not re nest regardless of any genetic propensity. After the successful fledging of a brood by the end of June, a possible modifying factor affecting re nesting might be the male feeding behavior towards the young just fledged.

I would like to thank Andrew Berger for getting me interested in this aspect of the warbler's life history, and for the many enjoyable hours together in the field, especially in 1963 when we found one of the seven examples referred to above.—Bruce E. Radabaugh, 4171 Airport Road, Waterford, Michigan 48095.

Received 15 November 1971, accepted 27 January 1972.

A modified holding box for banding large numbers of birds.—When large numbers of birds are banded over a short period of time, it is vital that holding time and handling be held to a minimum. A simple holding box designed by Vandenbergh (*Bird-Banding*, 31: 22-23, 1960) was modified by us in a study of the Brown-headed Cowbird (*Molothrus ater*). This box allowed us to age, sex, and band large numbers of these birds quickly and efficiently.

Wooden boxes measuring approximately 4 x 1 x 1 ft. were constructed and divided into four equal sections (Fig. 1). The boxes are fashioned from 1 x 12 in.

pine boards and large truck tire inner-tubes. Four sides of each cubicle are of wood, whereas the two opposite outside walls are of double-thickness inner-tube. The rubber is stretched and nailed to the wood using 1 x 2 in. lattice. A 5 x 5 in. cross-shaped cut is made in the center of each rubber wall. This allows efficient placement of birds on one side by one worker and their removal from the opposite side by the bander.

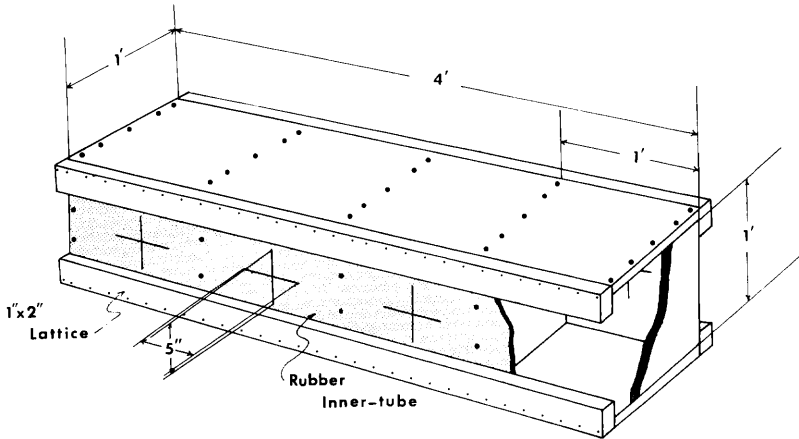


FIGURE 1. A completed holding box with one cubicle exposed.

In our study two cubicles were used for females and two for males, thus allowing age-class separation. With a full crew of 15 persons using three of these boxes, we banded over 2,400 cowbirds in less than 45 minutes. This figure contrasts with 2,800 cowbirds banded in over three hours using the same number of personnel but without the separating boxes. The exclusion of light from the cubicle interiors aids in keeping the captive birds quiet between separation and banding, effectively reducing handling mortality. Total cost of each four-sectioned box is approximately \$5.—D. W. Coon, Bureau of Sport Fisheries and Wildlife, Portland, Oregon 97232 and R. F. Gotie, Department of Wildlife and Fisheries Sciences, Texas A & M University, College Station, Texas 77843.

Received 2 March 1971, accepted 16 January 1972.