

damaging effects. White and Kinney (1974) note that in birds, eggs subjected to physiological zero for moderate periods followed by more appropriate temperatures may result in normal but delayed development. Field data from the literature thus indicate that periods of torpor in hummingbirds extend as long as 2 to 3 hrs, while data reported here show a brooding adult flushed from a nest may not return for 5 to 6 hours if the occurrence is at night.

Both chicks in this study hatched and fledged normally. It is possible that such extended cooling at night may occur naturally in hummingbird nests, in addition to the normal brief cooling periods from feeding sorties in the daytime. Such extended cooling is probably rare but might occur when the brooding adult is flushed from the nest, especially at night, by a tree-climbing predator. The cooling data demonstrate an important aspect of nesting ecology and physiology of hummingbirds. The remarkably variable intraspecific incubation periods probably reflect the ability of the embryos to remain viable in the face of regular cooling periods or even an extended cooling during incubation.

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History of a Female Kirtland's Warbler and Her Descendants

A naturalist's account of an unusual bird.

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This is a story of a female Kirtland's Warbler (*Dendroica kirtlandii*), her families, her neighbors. Among the many human participants who aided in the unfolding of the story, Dr. Frank Novy was the first when he banded a male Kirtland's Warbler during the summer of 1965, 10 miles northeast of Grayling, Crawford County, Michigan. This male continued to occupy the same territory each summer for 5 years. Bill Coates and I found him in late May 1970 and we watched his unbanded mate for a long period as she built a nest adjacent to a small jack pine beneath some low blueberry bushes, no more than 4 or 5 inches in height. Many days later we examined the contents of the nest, finding that there were 3 warbler eggs and one Brown-headed Cowbird (*Molothrus ater*) egg. Undoubtedly the female warbler had laid 4 or 5 eggs and all but 3 had been taken by the cowbird. In so doing the cowbird had apparently damaged another egg, for only 2 hatched. We had removed the cowbird egg by then. When the nestlings were several days old we captured the female warbler, banding her with number 61-24179 and later banded the nestlings although we had little hope of ever seeing the three again. During 1971, none of the family, including the male, was found.

On 17 June 1972, Warren Faust, Larry Masters and I visited the Lovells Management Area for the first time. This, too, is in Crawford County, 9½ miles north of the previous region and 4 miles north of the town of Lovells. It is a region set aside for Kirtland's Warbler management by the Michigan Department of Natural Resources. It had been planted to jack pines in the late 50's and early 60's in ten-row strips. The trees were 4 feet apart, the rows 6 feet apart, with 10 rows planted then 15 rows left unplanted. In these rows, the 3 of us, and later Doug Middleton, Ronald Hoffman and Jerry Brow located during the next 3 days, 4 Kirtland's Warbler nests from which nestlings fledged. This story deals with the lives and descendants of some of these 4 pairs and their descendants. The parents were all marked with U.S. Fish and Wildlife Service bands and one colored band, each individual of the same sex marked different than any other. All nestlings were banded on the right leg only with U.S. Fish and Wildlife Service bands.

To my surprise, one of the nests on the Lovells Management Area belonged to female 61-24179 who had moved from the Artillery Range 9½ miles away. Normally adult Kirtland's Warblers remain on or near their original nesting territory during their entire adult life.

This story could have been much different also but, beginning in 1972, in a combined effort, the U.S. Fish and Wildlife Service, the Michigan Department of Conservation, the U.S. National Forest Service, the

Michigan, Pontiac and Detroit Audubon Societies began removing adult Brown-headed Cowbirds from the Kirtland's Warbler nesting regions. Previous to this the cowbirds had so disrupted nesting activities that the warblers were rearing practically nothing but cowbirds. Female cowbirds had deposited 1 to 3 eggs, on an average, in 69 per cent of the warbler nests, removing also 1 to all of the warbler eggs so that the average warbler pair was rearing an average of only 0.507 warbler nestlings per summer. During 1972 this average jumped to 2.50 nestlings fledged per nest while during the 5 years when adult cowbirds were removed the average number of known nestlings fledged per pair on the same Artillery Range increased to 2.88. At Lovells during this same period it was found to be 3.37 and for 139 pairs on 4 regions, The Artillery Range, Lovells Management Area, Muskrat Lake and Pere Cheney, this average per season per pair was 3.30 nestlings fledged.

Female 61-24179, we named "Sexy." She laid 5 eggs during late May 1972. They all hatched, then fledged 25 June.

Harold Mayfield and Bruce Radabaugh had both found that occasionally Kirtland's Warblers rear two broods during one summer. We hoped to confirm this so Warren Faust and I returned in late July 1972. The first nest we found belonged to Sexy and her mate "White" - 81-58936. Since it requires 13-15 days for Kirtland eggs to hatch, 8-10 days for nestlings to fledge, and the four nestlings fledged 25 July 1972, we estimated 4 eggs in the second clutch were laid about 2-5 July.

The winter passed. Sexy had made her 7th and 8th flights between her winter home, probably the Bahamas, and Lovells, Michigan. When we returned in late May 1973, Sexy and White were mated for the second consecutive year (they could also have been there in 1971). From 2-5 June 1973, 61-24179 laid 4 eggs, all hatched and, on 28 June, all fledged. When we returned on 27 July she had a second nest with 3 nestlings ready to fledge. That night we thought it quite a feat for one pair of warblers to rear 4 consecutive broods during two summers.

When late May 1974 arrived Sexy had completed another flight south and another back north. Warren Faust found her with a new mate (he was banded with number 830-20585). White did not return. Her new mate, "Black", and Sexy had 5 eggs, 27-31 May 1974 which hatched 15-16 June; all 5 nestlings fledged 25 June. While Black cared for the fledged young, Sexy produced 4 more eggs, 3-6 July, hatched all 4 on 20 July and fledged all 4 on 30 July.

Again she made her flights south and north. Neither White nor Black returned in 1975 so she mated with a male banded during 1974, 830-20519, on the same territory used by White during 1972 and 1973. We named him "Yellow." Yellow remained on this territory during both 1975 and 1976 and was mated with Sexy both summers. From 28 May until 1 June 1975 she laid 5 more eggs which hatched 13-14 June and all 5 nestlings fledged 23 June. We found no second nest during 1975. Her mate, Yellow, on his territory, was still feeding full-grown young from the first nest when they were 40 days old. Indications were that they had no sec-

TABLE 1. Offspring of female Kirtland's Warbler 61-24179 and her consorts.

| HER MATE | REGION | YEAR | NEST NUMBER | BAND NUMBERS OF NESTLINGS | SEX OF NESTLING AS FOUND LATER AND YEARS |
|-----------|-------------------------|------|-------------|---------------------------|--|
| 70-94978 | Artillery range | 1970 | 2 | 121-93324-25 | None found |
| 81-58936 | Lovells Management Area | 1972 | 20 | 81-58929 | |
| | | | | 81-58930 | Male |
| | | | | 81-58931 | (1973, 1974, |
| | | | | 81-58932 | 1975, 1976) |
| | | | | 81-58933 | |
| " | " | " | 33 | 81-58991-94 | None found |
| " | " | 1973 | 10 | 820-89210 | |
| | | | | 820-89211 | Male |
| | | | | 820-89212 | (1974, 1975) |
| | | | | 820-89213 | |
| " | " | " | 33 | 820-89286 | |
| | | | | 820-89287 | |
| | | | | 820-89288 | Female |
| | | | | | (1974, 1975) |
| 830-20585 | " | 1974 | 24 | 830-20530 | Female |
| | | | | 830-20531 | (1975, 1976) |
| | | | | 830-20532 | Female |
| | | | | 830-20533 | (1976) |
| | | | | 830-20534 | |
| " | " | " | 40 | 830-20605-08 | None found |
| 830-20519 | " | 1975 | 6 | Black Right (5) | |
| | | | | 860-40330 (banded 76) | Female |
| | | | | | (1976) |

A nestling band number in italics is a bird that returned to the Lovells Management Area during later years after birth. None of their children were found except on the Lovells Management Area.

ond nest or it was lost. I observed the female about a quarter-mile from her first nest in late July.

In late May 1976 Sexy and Yellow were back on their 1975 territory. This was Yellow's third year here and Sexy was now at least 7 years old. From 30 May-3 June she produced 5 more eggs, all of which hatched 16-17 June but, alas, the morning of 22 June when we went to band the nestlings, our first visit in several days, all 5 were dead in the nest, partly devoured by ants. Since they were freshly dead, we assumed some non-predatory mammal had run over the nest during the previous night, frightened off Sexy and the young had died from exposure. It could have been a snowshoe hare, a deer or a porcupine. The nest itself was unharmed. It had been in a rather open spot about 2 feet from the nearest

tree and was in a natural thoroughfare for small mammals. At that time we were not sure that a neighboring Sharp-shinned Hawk (*Accipiter striatus*) had not picked off Sexy but shortly thereafter we located her, very much alive. Later during the summer we were unable to find either of the pair.

The reproductive performance of female 61-24179 is given in Table 1. Since she and her mate fledged 30 nestlings between 1972 and 1975, some of these birds were apt to be found later. Their offspring are shown in Table 2.

During 6 summers, female 61-24179 was known to lay 38 eggs of which 37 hatched and 32 fledged. She could have fledged 2 families during 1971 but probably had cowbird trouble as did other Kirtland's Warblers that year. Females in the past years, up to 1972, had not had a chance such as did Sexy and her mates but even after 1972 no other female studied had as good fortune as she did. Of her 4 returning daughters, not one has failed to hatch an egg that we observed. Through 1976, we have observed 31 eggs laid by them of which 26 hatched and fledged. Of Sexy and her daughters, 69 eggs were observed, only 5 of which were lost to predators. Sexy's sons and their mates did not have as good fortune. One male and his mates, produced 27 eggs of which 19 hatched and 11 fledged. A second male and his mate produced 25 eggs of which 22 hatched and 17 fledged. Thus, the success of Female 61-24179 and her children was 117 eggs laid during 6 summers of which 100 hatched and 82 fledged (70.08 per cent). (Since 1 male mated during 1975 with his half-sister, their 4 eggs are listed only once.). In addition to the 6 children, 2 grandchildren have also returned so that additional chapters can be written about this family. Sexy, her 4 daughters, and 1 granddaughter were never found to lay a sterile egg. One egg, her first year, did not hatch but was probably damaged by a cowbird. Following 1970, all of her eggs that we observed hatched.

On the other hand, eggs laid by the mates of her sons (which were not close family relatives) numbered 39, of which 10 (25.64 per cent) failed to hatch. Yet, when these 2 males were mated with a sister in one case and a niece in another, 13 eggs were produced, all of which hatched and 9 fledged.

During the 5 summers, 1972 through 1976, Sexy, her children, and their mates fledged 80 nestlings, an average of 5.00 nestlings per pair, per summer (there were records for 16 summers for the different birds). Sexy and her mates fledged 30 nestlings during 5 summers or an average of 6.00 per summer. The average of 64 pairs, including the above family, at Lovells was 3.37 nestlings fledged per summer per pair, 1972-1976, inclusive. For 4 regions which we studied 139 pairs, including the above family fledged 457 nestlings or 3.30 per pair per summer.

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Care and Treatment of Injured Birds

A non-technical guide for the kind-hearted

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Over the last several years I have taken care of many injured birds ranging in size from the bluebird to the Snowy Owl. Even for a professional person I have met with a great deal of frustration and disappointment. However, I have also learned a lot and have enjoyed "getting to know" these feathered creatures.

The care of injured birds is frustrating from two main points: (1) the "cure rate" is very low and; (2) nobody seems to know much about the subject (i.e., few veterinarians are trained to deal with avian disease and injury and a thorough combing of most libraries produced little that was useful). Consequently, most of my knowledge comes from common sense and trial and error.

BASIC CARE

When an injured bird is found or brought to you¹, there are certain "basics" that we begin with. Maintenance of a normal body temperature is paramount. Put the injured bird in a warm spot, in a cage or cardboard box and keep the animal secluded from pets (dogs, cats), children, inquisitive adults, and noise. The less you handle the bird and the quieter it is, the better it will do. Arrange some type of a perch from a stick according to the size of the bird's foot. Always insure a constant and fresh water supply in a bowl that is not too high to preclude the bird from being able to drink from it. If you must keep the bird for a while, a source of grit should be supplied (usually a handful of sand).

Feeding is probably the biggest "bugaboo" of all. I know many well intentioned bird lovers who have attempted the "eyedropper-and-warm-milk" approach to injured birds and, to me, this just doesn't make sense. Cow's milk is certainly not a natural food for any bird. If you have an injured bird, I would suggest no feeding for the first 12 hours, unless the bird is young and therefore would require frequent feedings to survive. Allow the animal to adjust to his new surroundings. I would suggest matching the bird's natural diet as closely as possible: Insects for insect feeders and seeds for the seed-eaters. Hamburger and dog food are poor substitutes for natural foods.

If you discover no injuries but simply what appears to be a thin, weak creature, then by all means institute feeding right away. See if the bird will eat on its own for several hours. If not, you may have to put the food in its mouth or, using a small pair of forceps (tweezers), gently push the food into the craw.

Frankly, if 1 out of 20 small birds that you work with lives, you will be doing well. I have found that the larger the bird, the better it does.

¹Since protective federal statutes prohibit the keeping and unlicensed handling of wild bird specimens, the Michigan Department of Natural Resources requests that any proposed housing of injured birds be reported to the nearest DNR office.