THE CHANGING PROPORTION OF BLUE-WINGED AND GOLDEN-WINGED WARBLERS IN TOMPKINS COUNTY AND THEIR HABITAT SELECTION

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In this report we describe the result of three years of observation of Blue-winged Warblers *(Vermivora pinus)* and Golden-winged Warblers *(V. chrysoptera)* and their hybrids in Tompkins County, New York. Part of our observations concern the abundance of these birds at various nesting locations. We will describe only those sites where we thought we knew all resident males of a colony. Our census shows a statistically significant change in the proportion of these birds compared to earlier studies in Tompkins County (Short 1962, 1963; Ficken & Ficken 1967, 1968).

In 1978 we conducted analyses of the vegetation in the territories of Blue-winged Warblers and Golden-winged Warblers. We have found that Golden-winged Warblers nest in habitat with a very specific vegetation density. Blue-winged, however, nest in habitat with a wide range of vegetation density. We believe that the proportional increase in the Blue-winged Warbler in Tompkins County during the last 20 years is a result of its adaptation to a wider range of habitat.

METHODS

The proportion of resident Golden-winged, Blue-winged and their hybrids was estimated as follows. A male was considered to be a resident, and not a migrant, if: 1) the bird was seen singing from tree tops for at least 15 minutes during each of at least three visits to the area, and 2) observations of the apparently identical bird spanned at least 10 days and observations were spaced at least two days apart. More than half of the resident males were seen on 10 to 30 trips. Females were much more elusive than males and weaker criteria for residency was used for the females. Females seen in May in close association with a resident male were considered residents. Any female seen in June or July was considered a resident.

Thirty percent (our banding results) to sixty percent (Murray and Gill 1976) of banded birds will return to the same colony in consecutive years. We did not want to count the same birds twice in our census. Thus, residents of the same colony detected in consecutive years were not included in our estimate. There are two colonies for which

we have three consecutive years of observations, thanks to the field notes of Dan Gray. For these two colonies the residents of 1976 and 1978 were included in our estimate. Since a small proportion of birds could return on three consecutive years, this may cause a small error.

We have estimated the territorial boundary of 16 Blue-winged and 8 Golden-winged (see Confer and Knapp 1977 for method). For these 24 territories we have estimated the density of herbs (soft plants grown up to 1.3 m by August), shrubs (woody plants as high as the highest hawthorns and viburnums, about 4 m) and trees (anything over 4 m). These estimates were made at 20 locations chosen randomly in each territory. The rating for each of the three vegetation layers could range from zero, if none were present at any of the 20 sites, up to 60, if the vegetation layer was dense at all 20 locations.

ABUNDANCE

Table 1 summarizes the abundance of these warblers in Tompkins County. Most of the 1976 data were given to us by Dan Gray, to whom we owe a large measure of gratitude. The Varna colony is particularly significant. It was suitable for the Golden-winged in the past, but none were resident in the last three years at Varna. There certainly are Golden-winged Warblers still in Tompkins County, so the change in breeding birds at Varna is not due to the local elimination of the species. We believe that the absence of the Golden-winged Warbler is due to successional changes which have now made the Varna colony much too forested (see Habitat Selection).

Table 2 compares Short's census values from two colonies (Varna and a now unoccupied colony) with our census values tabulated to reduce duplicate counting of the same individuals. The chi-square value indicates that there has been a change in the proportion among the three categories—Blue-winged, Golden-winged, and hybrids from 1957-1958 to 1976-1978.

Earlier studies do not provide any estimate of the absolute abundance of these two warblers in Tompkins County. Thus, it is impossible to determine if the proportional changes result from just an increase in Blue-winged Warblers or from an increase in the Blue-winged Warblers coupled with an absolute decrease in the Golden-winged Warblers. It would have been helpful to us if an approximate estimate of absolute abundance were available. From our observation of apparently suitable habitat, much of which was only seen while driving by, and our experience with the density of these warblers in suitable

habitat in Tompkins County, we would hazard the guess that there might be about 20 to 50 male Golden-winged Warblers and about four to six times as many Blue-winged Warblers.

The significant change reflected by the chi-square value summed for all three plumage categories (Blue-winged, Golden-winged and hybrids) does not consider the three categories individually. We cannot say with statistical certainty that, for example, the proportion of hybrids is now lower than before. We can only say that the three categories considered together have changed. However, it is interesting to note that the trend is for fewer hybrids now than 15 to 20 years ago.

HABITAT SELECTION

Our survey of the density of vegetation layers shows two major differences between Blue-winged and Golden-winged Warblers. Golden-winged Warblers nest only in areas of comparatively few trees. Blue-winged Warbler territories have a wide range of tree density. The average tree value in territories of Golden-winged Warblers was 7.4 while the average value for the Blue-winged was 19.9. These tree values are statistically different at the 99% confidence level. The range of tree values in the 16 Blue-winged territories, 2 to 54, encompassed the entire range for the 8 Golden-winged territories, 3 to 12.

In Tompkins County the Golden-winged's requirement for few trees restricts it almost entirely (see below) to fields last farmed about 10 to 30 years ago. Like Kirtland's Warbler, the Golden-winged Warbler is specialized for a very transient habitat (see below) of early succession. The Blue-winged Warbler nests in the same fields as the Golden-winged Warbler, but also nests in young second-growth forest. Such areas may have been abandoned about 30 to 70 years ago. Thus, the Blue-winged is a habitat generalist while the Golden-winged is a specialist.

The Golden-winged has been described as nesting in dry shrubby hillsides in North Carolina (Odum 1950). Chapman (1907) cited descriptions by Brewster, Jacob and Gibbes, all of whom thought the Golden-winged preferred marshy areas. Scheider's (1959) description of Golden-winged nesting habitat for north-central New York seems to us very apt for the birds' habitat in Tompkins County.

In Tompkins County soil moisture does not matter to the Golden-winged. Of all the territories we observed, Golden-winged Warblers nested in the two with the most standing water. Yet several nested in

territories that were as well-drained and dry as the driest territories occupied by Blue-winged Warblers. One of the particularly wet territories occupied by a Golden-winged Warbler was located on an otherwise heavily forested hillside. In the center of the territory a large seepage area had prevented tree growth and had created an opening in the forest. It seems to us that the characteristic that made this area suitable as a Golden-winged territory was not the wetness, but the openness which resulted from the wetness. Perhaps the observations of others that the Golden-winged Warbler nests in wet places result more from the openness around some wet areas than from the wetness itself.

DISCUSSION

The Blue-winged Warbler is now a common resident in much of the abandoned farmland in Tompkins County. Its tolerance for a wide range of habitats has allowed it to become widely distributed. Earlier studies indicate only the abundance at one or two colony sites. However, we suspect that the Blue-winged's current abundance is greater than that implied by reports 15 to 20 years ago.

In Tompkins County we suspect the future looks good for the Golden-winged Warbler. Locally much farmland has been and probably will continue to be abandoned and unoccupied due to the poor soil, short growing season, comparatively low land values, and low human density. While the Varna colony may now be too forested for the Golden-winged, other sites are just now becoming suitable.

We do not know if Golden-winged Warblers are as selective in choosing their nesting habitat in other regions as they are in Tompkins County. But, if so, the future for the species in other locations may be bleak. Like the Kirtland's Warbler, the Golden-winged nests in habitat that exists for only a brief time during succession. The recent disappearance of the Golden-winged Warbler from parts of its range (see Bull 1974) is likely due to changing land practices and the absence of large tracts of recently abandoned and subsequently unoccupied farmland.

TABLE 1

RESIDENT "WINGED" WARBLERS IN TOMPKINS COUNTY, N.Y. AT SPECIFIED COLONIES

	Blue-winged	Golden-winged	Brewster's	Lawrence's	Unseen singing males
Varna (Monkey Run, South Side)					
1942	1	(First record for Tompkins County)			
1949	1	—[1]	—	—	
1958-59[2]	3	4	2	0	
1961-63,66[3]	35	13	8	0	
1976[4]	8	0	2	1	
1977	6	0	0	0	
1978	5	0	0	0	
Ithaca College — Coddington Road					
1976[5]	3	2	0	0	
1977	9	5	1	1	
1978	8	7	1	1	
Schwann Road					
1976[4]	3	1	1	0	
1977[4]	4	1	1	0	
1978	3	1	1	0	
Monkey Run, North Side					
1977	3	1	0	1	
1978[4]	2	0	0	0	
Michigan Hollow (Private Recreational Land)					
1977	1	1	1	0	
Thomas Road — Route 79					
1978	1	0	0	0	1
Turkey Hill Road (100 Block)					
1978	1	1	0	0	
Pennsylvania Avenue — Railroad Bed					
1978	3	0	0	0	

	Blue winged	Golden-winged	Brewster's	Lawrence's	Unseen singing males
		National Cash Register			
1978	2	0	0	0	
		Tompkins County Airport			
1978	0	0	0	0	3
		Road Survey			
1977	2	0	0	0	

1 "—" means no record of bird absence or presence
2 Short (1962)
3 Ficken and Ficken (1967)
4 Gray (field notes 1976)
5 known to be incomplete

TABLE 2

RESIDENT CENSUS VALUES USED TO TEST FOR CHANGE IN PROPORTION OF "WINGED" WARBLERS. CUMULATIVE CHI-SQUARE INDICATES A STATISTICALLY SIGNIFICANT DIFFERENCE AT THE 95% CONFIDENCE LEVEL.

	Blue-winged	Golden-winged	Hybrids
1957-58[1]	15 (52%)	9 (31%)	5 (17%)[2]
1976-78	82 (75%)	16 (15%)	11 (10%)
Chi-square	1.80	3.38	1.01

Cumulative chi-square = 6.19

1 Short 1962
2 Hybrids include only Brewster's and Lawrence's, not as defined by Short.

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