

THE GOLDEN-WINGED WARBLER: COMPETITION WITH THE BLUE-WINGED WARBLER AND HABITAT SELECTION IN PORTIONS OF SOUTHERN, CENTRAL AND NORTHERN NEW YORK

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Introduction

Of special concern is the decline in abundance or local extinction of the Golden-winged Warbler (*Vermivora chrysoptera*). Gill (1980), in a comprehensive historical survey of the eastern United States, reported that the Golden-winged Warbler has become locally extinct whenever Blue-winged Warblers (*V. pinus*) have expanded into the former's range. This raises the possibility that Blue-winged Warblers somehow cause the local extinction. Confer and Knapp (1979, 1981) observed that the Golden-winged Warbler nested only in early succession fields. They suggested that the decline of Golden-winged Warblers was partly due to extensive reforestation of fields in much of eastern United States. The present study was designed to determine the relative influence of habitat loss or competition with the Blue-winged as factors that contribute to localized decline or extinction of Golden-winged Warblers.

Our survey was conducted in several areas of New York. Golden-winged Warblers are expanding into northern New York, as revealed by a comparison of the range map in Bull (1974) and preliminary range maps from *The Atlas of the Breeding Birds of New York*. In an area northeast of Oneida Lake we found four Golden-winged Warblers but no Blue-winged Warblers in four days of survey. This northern population allowed us to assess habitat selection by Golden-winged Warblers without any influence of Blue-winged Warblers. In central New York near Ithaca and Syracuse, Golden-winged and Blue-winged Warblers co-occur and Golden-winged Warblers are declining (Confer and Knapp, 1979, 1981 and this survey). This area enabled us to assess habitat selection by the Golden-winged Warbler in the presence of a potential competitor for nesting habitat. The Atlas also revealed a southern population of Golden-winged Warblers in the Ramapo Mountains that has co-occurred with Blue-winged Warblers for nearly 100 years (Eaton 1914, Bull 1974). This area, which was unknown to Gill (1980), illustrates the unusual event of both prolonged persistence of Golden-winged Warbler in one area and also its prolonged co-existence with Blue-winged Warbler. We present an analysis of the abundance and nesting habitat of the Golden-winged Warbler in these three distinct areas.

If Blue-winged Warblers drive Golden-winged Warblers out of the latter's preferred nesting habitat, then the following should occur: in

northern New York, where virtually no Blue-winged Warblers occur, Golden-winged Warblers should be able to select nesting territories that have preferred characteristics. In central New York, where the Blue-winged Warbler is abundant, the Golden-winged Warbler should be displaced from nesting habitat with preferred characteristics. If such displacement occurs, and the appropriate habitat characteristics are measured, then differences in nesting habitat between northern and central territories should be detectable.

The presence of Golden-winged Warblers in the forested Ramapo Mountains is very interesting. Golden-winged Warblers have disappeared from other areas as reforestation became prevalent (Confer and Knapp 1979 and 1981, Gill 1980). We hypothesized that this uniquely prolonged occurrence of Golden-winged Warblers in a forested region could occur only if these birds used a habitat that differed from the early succession habitat used by birds in central New York (Confer and Knapp 1979, 1981). Furthermore, if competition with Blue-winged Warblers is the major factor that causes the decline of Golden-winged Warblers, we hypothesized that the unique co-occurrence of these two species could occur only if the two species used quite separate habitats.

Methods

This study began 12 May 1986 and continued with almost daily field trips through 29 June 1986. The location and dates for the field trips are as follows: Orange Co.—May 30, 31, June 1, 2, 27, 28; Tompkins Co.—May 12-17, 19, June 4, 5, 7, 13, 14, 20; Oswego Co.—May 20, 24, 25, 27, June 5, 6, 19. On most dates observations were made in the field for 4-6 hours in the morning around sunrise and for 2-4 hours in the evening around sunset. These are the times when the birds were most conspicuous. On some dates observations were made in one area in the morning and in another in the evening. M. Frech participated in all trips while J. Confer participated in about half.

Maps were drawn marking where the bird was seen during each visit. Three to seven visits were made to all territories except one in the northern region. This territory was located late in the breeding season and a singing bird which was acting territorial was observed for a long time on one morning only. Boundaries for a territory were based upon the maximum area used during the entire breeding season. In early June, after the birds stopped singing vigorously, characteristics of the vegetation in each territory were measured. Vegetation characteristics were measured along three to five transects for each territory. The transects were parallel and the same distance apart within a territory, but ranged from 40 to 90 feet apart in territories of different size. Vegetation measurements were made at twenty or more sites at equidistant intervals along the transects within each territory. To insure an

unbiased sample of each territory, a distance along each transect was randomly selected as the starting point. The vegetation density for herbs, shrubs and trees was determined at each site. The percent cover was rated on an integer scale from zero to three, where zero represented total absence of a vegetation category, one represented some cover up to 33% of the maximum density, two described cover between 33 and 66% of the maximum density, and three represented 66% or more of the maximum density cover.

Subjects

Although four male Golden-winged Warblers were located in the northern area, only two territories were mapped. This constitutes a small, preliminary sample. The small size was mostly due to the difficulty of spending sufficient time in the three distant regions during the four weeks in which the birds sing vigorously. In the central region, nine resident Golden-winged Warblers were located and six territories were studied well enough to be mapped. Of the six male Golden-winged Warblers found in the southern region, four were studied well enough for their territories to be mapped. In the northern area, two females were located and a nest with a nestling was discovered in one territory. The parents were gathering food for their young and gave a wonderful distraction display. Two of the Golden-winged Warblers found in the central region sang the Blue-winged Warbler song; neither showed any other sign of hybridization. Also in this region, we found a Golden-winged Warbler family (a father previously counted, a mother and a fledgling). These parents also performed a distraction display; the female was especially magnificent as she literally tumbled between our feet. In the southern area, one female was located.

Results and Discussion

The abundance of resident Golden-winged, Blue-winged and hybrids (that could be recognized by use of binoculars) found in our survey is summarized in Table 1. Golden-winged Warblers continue to decline in the Ithaca area (Table 2). Before 1942 all birds were Golden-winged Warblers as the Blue-winged Warbler had not yet arrived. By 1957-58 the Golden-winged Warbler represented only 31% of the total population while Blue-winged Warbler represented 52% and hybrids 17% (Short 1963). By 1976-78, the Golden-winged Warbler had declined to 15% of the total, while Blue-winged Warbler rose to 75% and the hybrids declined to 10% (Confer and Knapp 1979, 1981). In the current survey, the Golden-winged Warbler population has declined even further to 9%, while the Blue-winged Warbler population increased to 88% and the hybrid population continued to decline to an estimated frequency of 3%. None of the fields near Ithaca with nesting Golden-winged

Table 1. Territorial Golden-winged and Blue-winged Warblers and their hybrids observed in 1986 survey.

Area	Golden-winged n (%)	Blue-winged n (%)	Hybrids n (%)
Southern	7 (35)	13 (65)	0 (0)
Central			
Ithaca	3 (9)	28 (88)	1 (3)
Syracuse	7 (33)	11 (52)	3 (14)
Northern	6 (100)	0 (0)	0 (0)

Table 2. Territorial Golden-winged and Blue-winged Warblers and their hybrids in Ithaca, New York.

Date	Golden-winged n (%)	Blue-winged n (%)	Hybrids n (%)
pre-1942	(100)		
1957-1958 ¹	9 (31)	15 (52)	5 (17)
1976-1978 ²	16 (15)	82 (75)	11 (10)
1986 ³	3 (9)	28 (88)	1 (3)

¹ L. Short 1962

² Confer & Knapp 1978

³ This survey

Warblers during the 1976-78 survey had nesting Golden-winged Warblers this past summer, although Blue-winged Warbler still nested in these areas. Succession may have progressed past the vegetation stage that is suitable for Golden-winged Warbler in these fields.

We located no hybrids in the southern region (although they are occasionally found there), and hybrids were rare in the Ithaca area. Table 2 suggests a decline in hybrid frequency over time in the Ithaca area. Hybridization might become less frequent, as the duration of co-occurrence increases, if isolating mechanisms between these two species become enhanced.

One unusual feature common to ten out of twelve territories in all three regions of New York State was a large open area located within the territory (Table 3). The large, open areas were frequently mowed or sprayed due to the presence of electrical power lines, gas pipelines, lawns, or else they were denuded ground having dirt, rocks or a paved surface. In two of the southern territories, there were marshes which constituted a large open area. Several territories had two of the above-mentioned features.

Table 3. Large, open areas within territories of Golden-winged Warblers in three areas of New York.

Condition	Central			
	Southern ¹	Ithaca	Syracuse	Northern
Mowed or sprayed				
electric power line	1	2	1	2
gas pipeline		1		
lawn	1		2	1
Marsh	2			
Denuded surface				
dirt		1		1
rock			1	
paved	2			
Territories²				
with:without any	3:1	2:0	3:1	2:0

¹ Southern survey restricted to Ramapo Mountains

² Several territories had two of these features so that the sum of their occurrences is greater than the number of territories.

Table 4. Vegetation characteristics of Golden-winged Warbler territories in three areas of New York.

	Herbs		Shrubs		Trees	
	Mean Score	(S.E.)	Mean Score	(S.E.)	Mean Score	(S.E.)
Southern	1.9	(.11)	1.5	(.12)	1.3	(.13)
Central	2.4	(.06)	1.5	(.09)	.3	(.06)
Northern	2.7	(.08)	0.8	(.12)	.4	(.09)

Vegetation characteristics were similar within the territories of northern and central birds (Table 4). The densities of herbs and trees were indistinguishable. Northern territories had less shrub growth. A t-value, calculated by comparing the shrub values for all sites in northern vs. southern territories, was highly significant ($t = 3.77$, d.f. = 172, $p < 0.01$). However, by our impression, the northern region is far more open with less shrubby vegetation than the central area. We believe that the lower shrubbiness in northern territories does not indicate preference for areas with fewer shrubs but rather that there are fewer shrubs in this area. Tentatively, we suggest that the difference in amount of shrubs in central vs. northern territories did not result from the presence vs. absence of competition with Blue-winged Warblers. Further studies of this are anticipated. We believe that there is no change in habitat selectivity by Golden-winged Warblers between these two areas.

Habitat use in the southern region was quite distinctive. In the Ramapo Mountains, Golden-winged Warbler territories included a moderate amount of tree growth. While the territories always included shrubby and sometimes open areas, they often extended as much as 20 m into adjacent forests. A t-value, calculated by comparing the tree values for all sites in the southern vs. the central and northern territories, was highly significant ($t = 7.23$, d.f. = 210, $p < 0.01$). In fact, the minimum degree of tree growth in a southern territory was nearly twice as great as the maximum degree of tree growth in any central or northern territory (Table 4). By our knowledge of New York, the Golden-winged Warbler population in the Ramapo Mountains is unique in that it has maintained itself in the same area for a prolonged time and in its moderately extensive use of forest. The unusually prolonged occurrence in the same area probably results from the unusual adaptation by the Golden-winged Warbler to a later stage in plant succession. We believe that both the use of moderately forested territories and also the prolonged occurrence in the same area are unique to the Ramapo Mountains. The authors would be delighted to receive other information on this matter.

If competition between Golden-winged and Blue-winged Warblers has been a major factor contributing to the usual decline of the former, then the prolonged co-occurrence of these birds in the Ramapo Mountains might be due to the adaptation by each of these species to different habitats. If, on the other hand, these birds utilize similar and overlapping territories in the area of prolonged co-occurrence, this would show that for at least one region competition has not been so important.

In fact, in the Ramapo Mountains there was extensive overlap between Golden-winged and Blue-winged Warbler territories. Two of the four mapped territories for Golden-winged Warbler overlapped with

two Blue-winged Warbler territories each; one overlapped with one Blue-winged Warbler territory; and one had an adjacent Blue-winged Warbler territory. Of the three less well mapped Golden-winged Warbler territories, two overlapped with a total of four Blue-winged Warbler territories. In the Ramapo Mountains, Golden-winged Warblers used habitat that was similar to that used by Blue-winged Warblers in central New York (Confer and Knapp 1979, 1981). However, in central New York the two species generally used different habitats. Both the co-occurrence with Blue-winged Warblers for nearly 100 years and the similar and possibly convergent habitat selection by the two species suggests that competition between these species is not a major limiting factor for the Golden-winged Warbler in the Ramapo Mountains. The unusual attribute of Golden-winged Warblers that seems to be correlated with their prolonged existence in one area and with their prolonged co-existence with Blue-winged Warbler, appears to be the adaptation of this population to a nesting habitat with a greater degree of reforestation.

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