

THE INITIATION AND SIZE OF GOLDEN-WINGED
WARBLER (*Vermivora chrysoptera*) CLUTCHES IN
RELATIONSHIP TO TEMPERATURE.

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ABSTRACT — We examined egg laying in the Golden-winged Warbler (*Vermivora chrysoptera*) in north central NY during 1991-94. Thirty nests were used for this study. Clutch sizes of 5-6 eggs were associated with temperatures ranging from 52°F-70°F. First egg dates and clutch sizes remain fairly constant, regardless of temperature fluctuations. Only the most severe, very consistent cold seems to delay egg laying.

KEYWORDS: *Vermivora chrysoptera*, clutch size, clutch initiation, temperature

The Golden-winged Warbler has been declining over most of its range for the past 100 years (Confer 1992a). It is designated as a species of management concern by the U.S. Fish and Wildlife Service (Confer 1992b). The golden-wing spends 6-7 mo in northern South America and Central America. It breeds in the northeastern U.S., e.g., the higher elevations of Pennsylvania and West Virginia, Minnesota, Michigan, Wisconsin, and north central New York. It also breeds in southern Ontario and extreme southwestern Quebec, Canada. The principal nesting habitat of the golden-wing is abandoned farmland in the early to middle stages of secondary succession (Confer and Knapp 1981), although the edges of swamp forests are also used.

A female golden-wing requires 2-4 days to build a ground nest (Confer 1992a). The female lays one egg per day until her clutch is complete, typically five to six eggs. Females lay only one clutch a season unless a clutch is predated, and then second attempts are common. Incubation begins on the day the penultimate egg is laid and requires 11-12 days. Nestlings fledge nine days after hatching.

In this study we examined the relationship between temperature and

egg laying. We related the date on which the first egg is laid and the size of the clutch to air temperatures. Between 1991-94, there were two years when temperatures in May-June were warmer than average and two years when temperatures were much colder.

METHODS

Field work was carried out at a number of sites across north central New York near Pulaski, Hannibal, Fulton, Central Square, Mexico, and Phoenix. Since spring 1989 John Confer and numerous student assistants have searched for Golden-winged Warbler nests and compiled nesting data in order to better understand the decline of this neotropical migrant. Nesting data includes clutch size and the date on which the first egg of each clutch was laid (first egg date or FED). For greater accuracy, we limited our estimates of FED to two circumstances. First, if an incomplete clutch was discovered, we estimated its FED by assuming that one egg was laid per day. Second, if we observed a nest on the day of hatching when the age of the young is quite evident, we estimated its FED by assuming 11 days of incubation and that incubation started on the day when the penultimate egg was laid.

Weather records for Syracuse, New York during May and June of 1991-94 and 30 year averages were provided by the Northeast Regional Climate Center at Cornell in Ithaca. We used a one day lag for temperature in order to test if the temperatures preceding the morning of the FED had an effect. Since temperatures preceding FED might influence egg laying, we used a two day mean of the daily average temperature prior to the FED. We believe that the day prior to the FED is the most critical day for a female to determine if she will begin her clutch. Therefore, we weighted the day prior to the FED by two. The weighted data with a one day lag was then compared graphically with the dates on which clutches were initiated.

We visually examined graphs of the relationship between the mean temperature during egg laying and clutch size. We also examined the effect of the mean temperature on clutch size for the five days preceding the FED.

RESULTS

Seventy-two Golden-winged Warbler nests were found during the study. The FED was known with a high degree of accuracy for 30 of these nests. These 30 nests were used in comparing egg laying vs. temperature.

In 1991, the FED was known for three nests. The earliest FED was on May 18, which corresponds to the warm temperatures from May 12-19. The other two nests were initiated during below average temperatures.

During the 1992 nesting season the FED was known for 10 nests (Fig 1a). In these figures the zero temperature was calculated as the 30-year average for May and June. The earliest FED for 1992 was May 19. Six of the ten nests were initiated during below average temperatures.

The FED was determined for 12 nests in 1993 (Fig 1b). Temperatures were below the long-term average during most of this nesting season. All 12 of these clutches began during periods of below average temperatures. The earliest FED was May 18, which matches our earliest FED for warmer years.

Results for 1994 (Fig 1c) suggest an effect of temperature on FED. The season began with uniformly cold temperatures until May 22. Although some birds arrived in the normal time span of May 7- 12, many birds did not appear on our sites until May 15-20. This is a week to 10 days later than the arrival of most birds in the previous years. The earliest FED for this year was May 24. This date is six days later than the average of the earliest FED for the preceding three years. All five nests for which the FED was known were initiated in late May during periods of above average temperatures. The consistently low temperatures until May 22 and the late arrival dates for many individuals probably contributed to the late FED for the 1994 nesting season.

As shown in Figure 2, we observed no correlation between clutch size and mean temperature while laying. Clutch sizes of 5-6 eggs, the most common clutch sizes, were associated with a range of temperatures from 52°F to 70°F. This temperature range almost entirely encompasses the observed range of mean temperatures during egg laying. Similarly, a graph of the five day mean temperature preceding the FED and clutch size showed no apparent correlation.

CONCLUSION

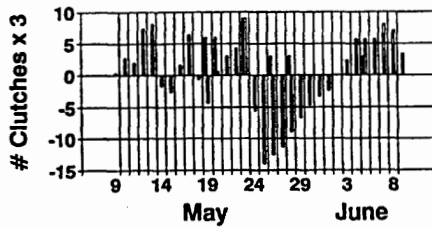
Will (1986) observed that an unusually cold and rainy May delayed the FED for both Golden-winged and Blue-winged (*V. pinus*) warblers. Walkinshaw (1983) suggested that higher than average temperatures regardless of occasional frosts accelerated the FED for Kirtland's warblers (*Dendroica kirtlandii*). Our data show no correlation between FED and temperature for three of four years. Only temperatures that are consistently much below average seemed to delay both arrival and egg laying. However, our small sample size of FED's does warrant caution. We suggest that there are a number of factors that together determine the initiation of golden-wing clutches with temperature being one of them.

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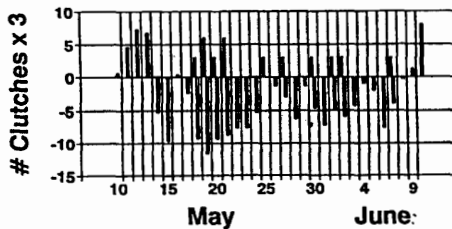
1992. CLUTCH ONSET vs TEMPERATURE

Temp: 2-day weighted mean, 1-day lag



1993. CLUTCH ONSET vs TEMPERATURE

Temp: 2-day weighted mean, 1-day lag



1994. CLUTCH ONSET vs TEMPERATURE

Temp: 2-day weighted mean, 1-day lag

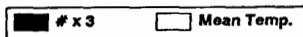
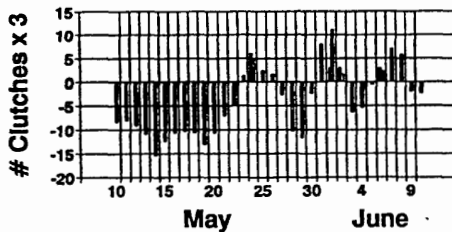


Fig. 1a,b,c. Influence of temperature on clutch initiation of Golden-winged Warblers (*Vermivora chrysoptera*) for 1992-'94, Fig 1a, 1b, 1c respectively. The temperature was calculated as a two day mean for the days immediately preceding the FED. The weather data was collected at Syracuse, New York. The number of clutches was multiplied by three for visual clarity.

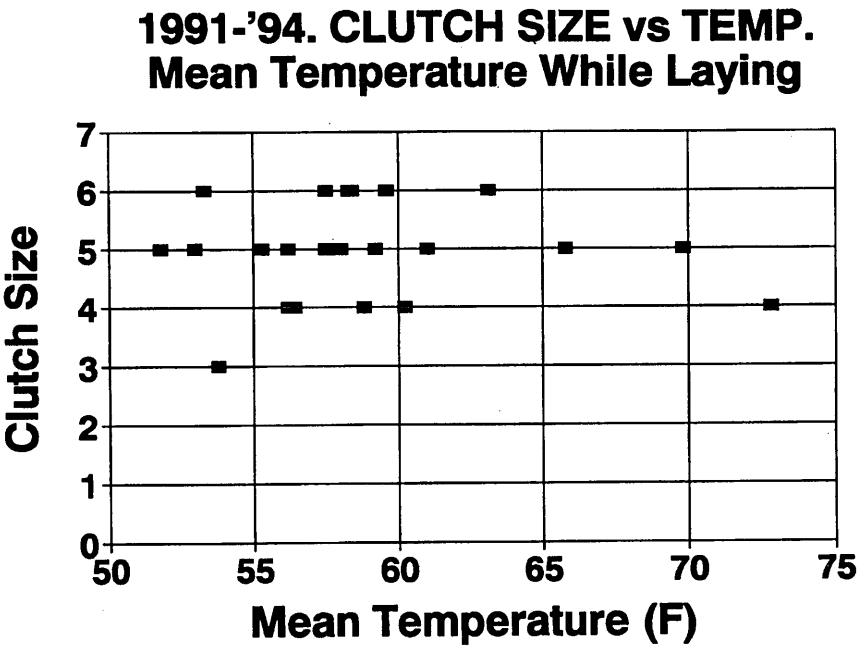


Fig 2. Influence of temperature on clutch sizes of Golden-winged Warblers (*Vermicora chrysopleura*) for 1991-'94. The temperature was calculated as a mean for the days in which egg laying occurred. The weather data was collected in Syracuse, New York.

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