

## MORE ON THE EFFECT OF THE TIMING OF BANDING ON FEMALE TREE SWALLOW NEST SITE TENACITY

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Abstract.—Female Tree Swallows (*Tachycineta bicolor*) banded early in the nesting cycle are more prone to desert their nests than females banded later in the nesting cycle (Burt and Tuttle 1983, Cohen 1985). I examined whether age and previous banding and color-marking experience affected female tendencies to desert their nests after being handled. Subadult females were as likely as older females to desert after being banded and color-marked. Previously banded females were as likely as unbanded females to desert their nests after being banded and color-marked.

### MÁS SOBRE EL ANILLAMIENTO DE GOLONDRINAS (*TACHYGINETA BICOLOR*) Y SU SUSCEPTIBILIDAD EN ABANDONAR EL NIDO

Resumen.—Hembras de *Tachycineta bicolor* anilladas durante las primeras etapas del ciclo de anidamiento son más susceptibles a abandonar el nido que aquellas que se anillan más tarde (Burt y Tuttle 1983, Cohen 1985). Examiné si la edad, el hecho de haber sido anilladas previamente o marcadas con colores afectaba la tendencia de estas golondrinas a abandonar el nido luego de haber sido manipuladas. Tanto hembras adultas como subadultas exhibieron la misma propensividad de abandonar el nido luego de haber sido anilladas o marcadas con colores en diferentes partes de su plumaje. Tampoco hubo diferencias en el abandono de nidos por parte de aves que fueron anilladas o marcadas con colores por primera vez al ser comparadas con golondrinas que previamente habían pasado por este proceso.

Burt and Tuttle (1983) and Cohen (1985) reported that female Tree Swallows (*Tachycineta bicolor*) banded early in the nesting cycle were more prone to desert their nests than females banded late in incubation. They did not report whether female age and previous banding experience had any effect on female tendencies to desert their nests after being handled.

Yearling female Tree Swallows can be easily distinguished from older females because the subadult plumage is dull brown with partial blue-green iridescence (Cohen 1980, Dwight 1900, Hussell 1983). By their second year, nearly 90 percent of females have fully iridescent upper parts, but commonly retain brown feathers on their foreheads (Cohen 1980, Stutchbury and Robertson 1987a). Males develop the sexually monochromatic breeding plumage before their first winter (Dwight 1900, Hussell 1983). This sexually dimorphic chronology of plumage maturation offers an unusual opportunity to examine the effect of female age on behavior (e.g., Leffelaar and Robertson 1985, Lombardo 1986a, Stutchbury and Robertson 1987b).

In this report, I show that neither female age nor banding and color-

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marking experience had significant effects on female tendencies to desert their nests after being handled.

#### METHODS

I studied Tree Swallow breeding biology from 1980 to 1983 at a trail of nest boxes located on the salt marshes of the John F. Kennedy Memorial Wildlife Refuge at Tobay Beach on the south shore of Long Island, New York. The Refuge covers approximately 160 ha and contains coastal scrub vegetation, sand dunes, a large brackish pond, and an expansive *Spartina* salt marsh.

Nests were monitored throughout the breeding season to determine the nesting stage of resident pairs. I censused nests daily during the nest building and egg-laying stages. After the last egg was laid in a nest, I did not visit that nest again until its eggs were expected to hatch approximately 14 d later. Nests were visited every other day during the nestling period to weigh the nestlings.

My protocol (Lombardo 1986b) called for females to be captured, banded, and color-marked on the nest during the first day of incubation. Incubating females were captured between 0500 and 0600 EDT and released from the hand. If a female was not captured on the first day of incubation, I scheduled her capture for a later date. Some females were banded and color-marked earlier when they were fortuitously captured in their nest boxes during regular censuses. Swallows were sexed by noting the presence of a well-developed brood patch in females or a cloacal protuberance in males. Each captured swallow was banded with a U.S. Fish & Wildlife Service aluminum band and uniquely color-marked on their tails, wings, foreheads, throats, and breast feathers using a marking pen or Testors Airplane Dope (Samuel 1976).

Females will be referred to as subadult or adult females depending on plumage color (Cohen 1980, Dwight 1900, Hussell 1983). A female was defined as having banding experience if I had captured, banded, and color-marked her at least once during a previous breeding season. In the analyses that follow, a female was defined as deserting her nest after being handled during nest-building if another female was captured at that nest during either egg-laying, incubation, or the nestling period and was subsequently observed being parental at that nest. A female was defined as deserting her nest after being handled during egg laying if she stopped laying eggs or did not incubate the eggs she had already laid. A female was defined as deserting her nest after being handled during incubation if she stopped incubating her eggs. I determined if the eggs in a nest were being incubated by both observing the nest for female incubation behavior and touching the eggs to see if they were warm. A female was defined as deserting her nest after being handled during the nestling period if she was no longer observed feeding her nestlings.

Female captures were separated into five different stages of the nesting cycle; nest building, egg-laying, early incubation (i.e., the first 5 d of

TABLE 1. The frequency of female Tree Swallow nest desertion after banding and color-marking. Early incubation refers to the first 5 d of incubation (Burtt and Tuttle 1983).

	Females captured	Females deserting	% Desertion
Stage in the nesting cycle, all females			
Nest building	10	6	60.0
Egg-laying	45	20	44.4
Early incubation	62	15	24.2
Late incubation	9	2	22.2
Nestling period	2	0	0.0
Stage in the nesting cycle, adult females			
Nest building	5	3	60.0
Egg-laying	22	7	31.8
Early incubation	38	8	21.1
Late incubation	5	1	20.0
Nestling period	1	0	0.0
Stage in the nesting cycle, subadult females			
Nest building	5	3	60.0
Egg-laying	23	13	56.5
Early incubation	24	7	29.2
Late incubation	4	1	25.0
Nestling period	1	0	0.0

incubation [Burtt and Tuttle 1983]), late incubation (days 6–14), and the nestling period for analysis. Statistical analyses follow Zar (1974).

### RESULTS

Forty-three of 128 (33.6%) captured females deserted their nests after being banded and color-marked at their nests (Table 1). Females were most prone to desert their nests after being handled during the nest building and egg-laying stages ( $\chi^2 = 8.02$ ,  $df = 3$ ,  $P < 0.05$ ). I combined capture and nest desertion data collected during the late incubation and nestling periods into a single category for this analysis because of small sample sizes (Table 1).

Subadult females were as likely as adult females to desert their nests after being handled during the nest building (Fisher Exact Test,  $P >$

TABLE 2. Comparison between the tendencies of previously banded and unbanded females to desert their nests after being handled. Experienced females were banded and color-marked at least once during a previous breeding season. Unexperienced females were never handled before being banded and initially color-marked.

Banding experience	Females captured	Females deserting	% Desertion
Experienced	43	13	30.2
Unexperienced	85	30	35.3

0.50), egg-laying ( $\chi^2 = 2.78$ ,  $df = 1$ ,  $P > 0.05$ ), early incubation ( $\chi^2 = 0.52$ ,  $df = 1$ ,  $P > 0.75$ ), and late incubation (Fisher Exact Test,  $P > 0.90$ ) stages of the nesting cycle (Table 1). Sample sizes were not large enough to determine whether desertion after handling at any particular stage in the nesting cycle was affected by the time in the season when females were handled.

Previously banded females were as likely as unbanded females to desert their nests after being handled ( $\chi^2 = 0.33$ ,  $df = 1$ ,  $P > 0.50$ ; Table 2).

#### DISCUSSION

Burt and Tuttle (1983), working in Ohio, found that nine of 18 females captured during egg-laying, five of 21 females captured during early incubation, and 0 of 10 females captured later in incubation deserted their nests after being banded. The desertion frequencies reported by Burt and Tuttle (1983) were not statistically different from the desertion frequencies during comparable stages of the nesting cycle reported here (egg-laying,  $\chi^2 = 0.15$ ,  $df = 1$ ,  $P > 0.50$ ; early incubation,  $\chi^2 = 0.0008$ ,  $df = 1$ ,  $P > 0.999$ ; late incubation, Fisher Exact Test,  $P > 0.20$ ). Cohen (1985, pers. comm.) observed similar frequencies of desertion in females at his study area in Colorado, but did not provide the data for a statistical comparison. Nevertheless, the similarity in female desertion frequencies from three widely separated areas suggests that female Tree Swallow responses to handling are very predictable. Therefore, I concur with Burt and Tuttle's (1983) recommendation to avoid handling female Tree Swallows at their nests before the late incubation period.

Interestingly, Cohen (1985) found no significant tendency of males to desert the nest after being handled during egg-laying, incubation, or the nestling period, but suggested that males were more likely to desert their nest late in nest building or during the period between the end of nest building and egg-laying. I caught very few males before the nestling period so a statistical comparison is not possible.

The decision to desert after handling is a parental investment consideration (Trivers 1972) that is likely to be affected by a consideration of past investment (e.g., clutch size [Armstrong and Robertson 1988]) and the prospective benefits of deserting (e.g., the prospects of reneating during the current breeding season [Carlisle 1982]). Because subadult females generally nest later in the season than adult females and lay smaller clutches (DeSteven 1980, Kuerzi 1941, this study), subadults and adults might be expected to have different probabilities of desertion after handling that are affected by clutch size and when in the season the female is handled. Unfortunately, sample sizes were not large enough to determine whether desertion was affected by clutch size or the time in the season when females were handled.

Prior handling had no effect on the probability of female desertion. Thus, workers should avoid handling all female Tree Swallows at their nests before the late incubation period.

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