

Tree swallow (*Tachycineta bicolor*) reproductive success at nine breeding restoration sites in the New Jersey Meadowlands

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INTRODUCTION

- Tree swallows are cavity-nesting, aerial insectivores that breed throughout much of northern North America (Muldal *et al* 1985).
- Shortage of high quality nest cavities can limit tree swallow populations (Rendell and Robinson 1989).
- The NJ Meadowlands Commission (NJMC) conducts an annual project to restore tree swallow breeding populations.
 - Nest boxes are placed at nine sites across the Meadowlands.
 - Populations are monitored throughout breeding season.
- The purpose of this study was to compare reproductive success among the nine sites, and to begin to consider which variables might correlate with any patterns.

OBJECTIVES

- The overall objective was to compare reproductive success across the nine breeding restoration sites.
 - Specific variables assessed were:
 - nest occupancy rate
 - reproductive success:
 - clutch size, fledging rate

METHODS

- Nine study sites:
 - DeKorte, Harrier Meadow, Kearny Marsh, Kingsland Impoundment 1, Kingsland Impoundment 2, Marsh Resources Inc., Mill Creek, Mill Creek Path, and Skeetkill Marsh. (see Map 1)
- A total of 253 nest boxes were placed at the nine sites in the Spring before tree swallows returned for the 2008 breeding season.
 - Each site is a shallow body of water bordered by dense phragmites reed and/or spartina grass populations.
 - The nest boxes:
 - stood in or at water's edge.
 - were mounted atop wooden posts between 0.5 and 2.5 meters above water.
 - were positioned so that holes were oriented in the direction of the body of water
 - floor area = 5 in. x 5 in. -- optimal for maximum potential clutch size (Rendell and Robertson 1989)
- Data collection (one clutch only):
 - Nest boxes were checked $\geq 1x$ per week for:
 - occupancy, # of eggs, # of hatchlings
- Data analyses (focused on first clutches only):
 - Chi-squared analysis was used to compare the sites for % nest boxes occupied.
 - Kruskal Wallis ANOVA was used to compare the sites for:
 - # eggs per nest
 - # fledglings per nest

REPRODUCTIVE BIOLOGY

- Tree swallow nest phenology (unpublished data):
 - Eggs incubate for ~ 14 days.
 - Nestlings grow for ~ 17 days before fledging.



Tree swallow with food for young



Adult returning to feed nestlings



Accessing a nest box at Kingsland Impoundment



Nest lined with gull feathers



Nestling removed from box

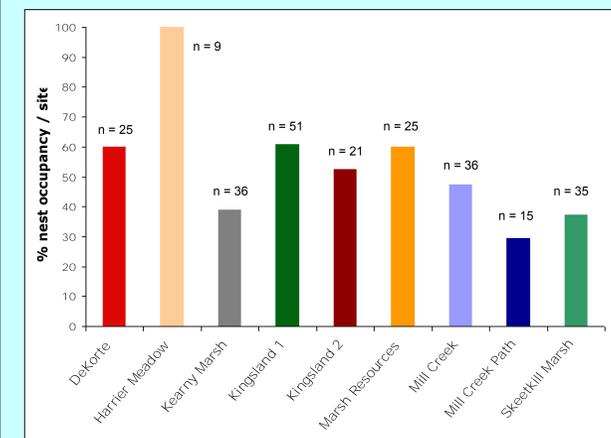
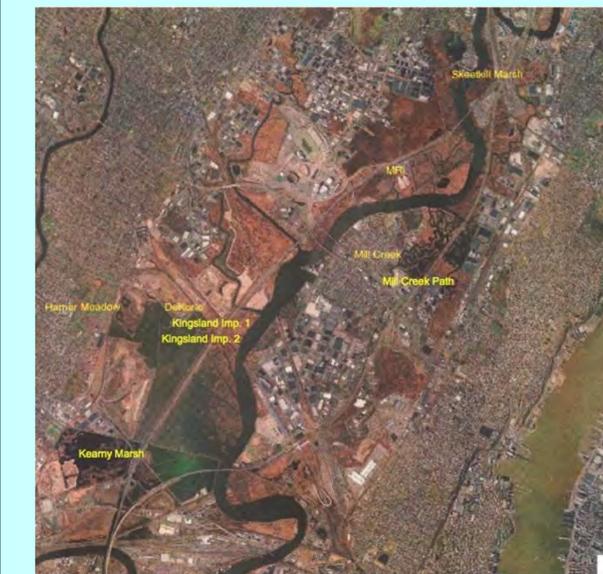


Figure 1. Percent nest boxes in which tree swallows nested at each site. Values were lower at Mill Creek Path and Skeetkill Marsh than at most other sites ($p < 0.0001$). n represents # of nest boxes.



Map 1. Aerial photo of study sites, Hackensack River.

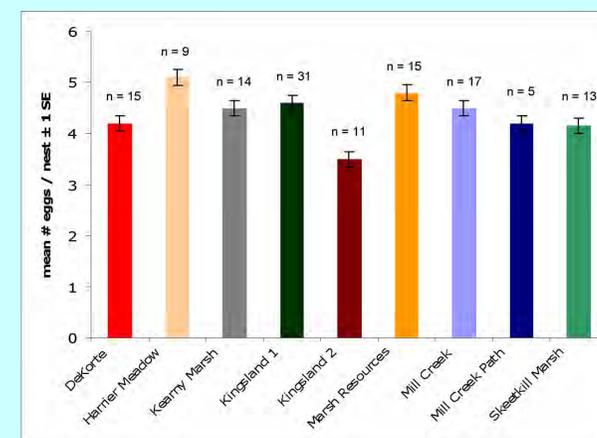


Figure 2. Mean number of eggs per nest at each site. No significant differences among sites ($p < 0.28$). n represents # of nests.

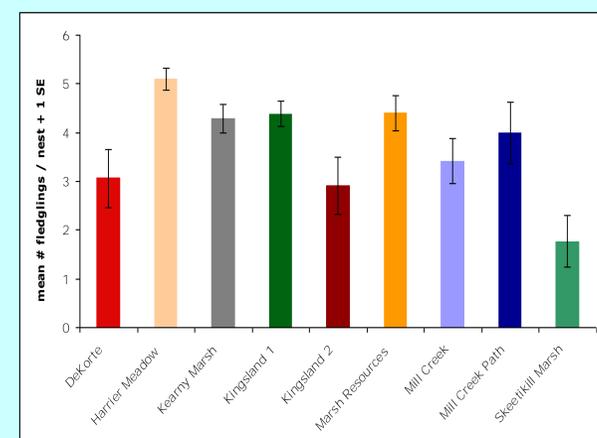


Figure 3. Mean number of fledglings per nest at each site. Values were generally lower at Skeetkill Marsh than at most other sites ($p < 0.0004$). n for each site is same as in Figure 2.

RESULTS

- % nest occupancy (Fig. 1):
 - well below 100% at most sites
 - significantly lower at Skeetkill Marsh and Mill Creek Path than at most other sites (chi-square = 63.0, $p < 0.0001$)
 - Note: Nest boxes at Mill Creek Path were overtaken by house sparrows (*Passer domesticus*).
- # eggs per nest (Fig. 2):
 - no significant differences among sites (Kruskal Wallis H = 9.791, $p = 0.28$)
- # fledglings per nest (Fig. 3):
 - significantly lower at Skeetkill Marsh than at most other sites (Kruskal Wallis H = 24.635, $p < 0.0004$)

DISCUSSION

- The less than full occupancy rates of nest boxes at most sites may be explained by the early stage of the restoration efforts. Subsequent breeding seasons are likely to result in higher nest occupancy rates as the birds that were raised at the sites in previous years return to breed as adults.
- If lower reproductive success at Skeetkill Marsh (lower nest occupancy rate and lower # fledglings per nest) is also confirmed in subsequent years, further work should examine possible causal factors (e. g., predators, age of breeding swallows, food abundance, food quality, climate). Given that females at Skeetkill were laying similar numbers of eggs as at the other sites, data collection should focus on success of eggs and nestlings. Of particular interest will be whether contaminants from adjacent industrial and office sites are directly impacting nestling success or the abundance or quality of insect prey that the adults feed their young.

- Overall, reproductive success for breeding pairs at most sites is fairly high. However, there appears to be enough variation within and among the sites for all of the variables examined in this study to warrant further work that explores the ecological factors (see above) and mechanisms that may be most critical.

ACKNOWLEDGEMENTS

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