

POPULATION AND BREEDING ECOLOGY OF THE
PROMISCUOUS SALTMARSH SHARP-TAILED SPARROW
IN RHODE ISLAND SALT MARSHES

BY

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ABSTRACT

Little research has been conducted on the population dynamics and nesting ecology of birds that are restricted to discontinuous, human-altered salt marshes in the Northeast. Fewer studies have focused on the site fidelity of promiscuous birds, and as a result, avian dispersal theory is based primarily on monogamous species. Saltmarsh Sharp-tailed Sparrows (*Ammodramus caudacutus*) breed exclusively in salt marshes of the mid- to northern Atlantic coast and are one of the few North American species having a promiscuous mating system (i.e., mates indiscriminately with no pair bond). I investigated the population dynamics and nesting ecology of Saltmarsh Sharp-tailed Sparrows at the Galilee salt marsh restoration site and nine reference (satellite) marshes in Rhode Island. Mist-nets were employed to capture and uniquely color-band sparrows, nest success was monitored, and nest site characteristics were quantified.

I investigated site fidelity patterns of promiscuous Sharp-tailed Sparrows by determining annual and cumulative return rates, and annual survival based on capture-recapture models. At Galilee, male and female adult sparrows exhibited an equally low to moderate mean survival rate of 39.6% and moderate site fidelity with a mean annual return rate of 35.1% (ranging from 23.4-56.5%). Although lower and more variable than adults, mean juvenile survival of 14.4% and a mean return rate of 11.6% were high for a passerine, indicating strong natal philopatry at Galilee. Based on all study marshes, the mean adult return rate was 31% in both 1997 and 1998, and greater than or equal to mean juvenile return rates of 29.7% and 12.4%, respectively. Mean return rates of adult males (31-40%) to all study sites in 1997 and 1998 were greater than or equal to females (13.3-35.2%). Ten percent of the sampled population, predominantly males, moved among

study marshes, with a maximum recorded distance of 26 km. Site fidelity patterns of the Sharp-tailed Sparrow in Rhode Island did not support current avian dispersal theory. Ecological factors (i.e., habitat availability and quality) may be more influential on the site fidelity of Sharp-tailed Sparrows than their promiscuous mating system.

My second objective was to investigate Sharp-tailed Sparrow population dynamics, nest success, and nest-site selection; before and immediately after restoration of tidal flow at Galilee marsh, and to examine differences between Galilee and satellite marshes. Tidal flow was restored in 1997 at the Galilee marsh in Narragansett, Rhode Island, where the construction of a road in 1956 had severely reduced tidal exchange, resulting in the expansion of common reed (*Phragmites australis*). Sharp-tailed Sparrow abundance declined from 1994 to 1998 at Galilee, particularly for juveniles and females. Based on capture data, the abundance of females declined by 25% (exponential rate of decrease, $r = -0.2826$) and juveniles by 48% ($r = -0.653$) annually. Sparrow densities of 4.4 females ha^{-1} and 9.2 adults ha^{-1} in 1994 were high, and declined to recent estimates of 1.4 females ha^{-1} and 4.0 adults ha^{-1} in 1998, which may be more typical for Rhode Island. Densities at satellite marshes (0.7-3.3 females ha^{-1}) were similar to those observed at Galilee in 1997 and 1998. Mayfield estimates of 21-day nest success were exceptionally high at Galilee in 1993 (83%), but decreased dramatically with the restoration of tidal flow in 1998 (5%). Hatching success (82.1%) was slightly higher than fledging success (70.3%) at Galilee in 1996, but decreased greatly in 1997 (36.8%), whereas nestling success remained stable (77.1%). During 1993-1997, 50-100% of nest failures were due to predation at Galilee; whereas in 1998, after restoration of tidal flow, 91% of failures were due to flooding. Apparent nest success at Galilee was at a high of 95% in 1993 and

lowest in 1995 and 1998 (23% and 27%). Low apparent nest success (22%) and frequent loss to flooding (78% of failed nests) also occurred at less tidally-restricted Prudence Island marshes in 1998; whereas, at protected mainland satellite marshes, success was higher (74%) and nests were lost equally to flooding (38%) and predation (25%).

Principal component analyses and Kruskal-Wallis tests showed that Sharp-tailed Sparrows flexibly use vegetative cover, as all vegetation measurements except *Spartina patens* coverage varied significantly among study marshes ($P < 0.5$). Median percent coverage of *S. patens* (50%) and absolute substrate elevation (0.46 m, NGVD 29) at Galilee nest sites were greater than at random sites (15% and 0.44 m, respectively). The majority of nests at Galilee in 1996 (67%) and 1998 (41%), and fewer in 1997 (26%) were located in short *Phragmites*. *Phragmites* did not appear to be a preferred nesting habitat at satellite marshes where short-graminoids were more abundant; 63% of Prudence and 30% of mainland nests were in salt meadow and 25% and 51% (respectively) were in a mix of salt meadow and short *Spartina alterniflora*. A slight increase in overall median nest elevation in the restricted marsh from 1997 to 1998 (+0.05 m in east and +0.03 m in central marshes), suggested a possible response to increased tidal flow at Galilee. Previously used habitats at Galilee will be regularly flooded and remain unsuitable until the eventual restoration of 8.5 ha of salt meadow, which may produce a substantial increase in Sharp-tailed Sparrows. Longer-term data from marshes throughout their breeding range are required to more accurately assess the population and reproductive status of the Sharp-tailed Sparrow.