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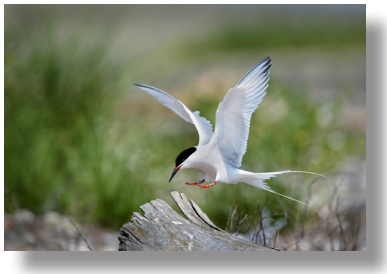
Patuxent Wildlife Research Center

Modeling Sex-specific Demographic Rates in Metapopulations



- ***The Challenge:*** Research that integrates population dynamics and ecological studies is needed to identify the causal factors involved in population declines and viability. For highly mobile organisms such as birds, "between-patch" movements and the use of different geographic sites and habitats at various stages of the annual cycle can make it difficult to measure the effectiveness of "within-patch" site-specific management activities. These local restoration activities must be evaluated within the context of overall population changes on a regional or metapopulation scale. The major objective of this study is to develop new multistate capture-recapture/resighting and ultrastructural models to examine sex-specific regional survival, movement, and recruitment rates. Once developed and tested with data collected from a long-term study of a suitable species, these general types of models can be adapted for widespread use on a variety of other species.

- ***The Science:*** The unequal sex-ratio (~60% females) in the breeding population of the study species, the Roseate Tern (Sterna dougallii), has resulted in many birds forming odd mating associations (female-female pairs, trios, multi-female groups) which usually have lower productivity than typical male-female pairs. As a result, the relative lack of males may be a significant factor limiting overall population productivity and recovery. Collaborative studies are underway to determine the cause(s) of the unequal sex-ratio in the breeding population based on differences in the roles of males and females in caring for young chicks and older fledglings during the period after they have left the breeding colony sites but before they begin migration to South American wintering areas. Several partners are involved including federal and state agencies, universities, and non-profit organizations.

- ***The Future:*** Models developed to estimate sex-specific survival showed a lower survival of breeding adult males compared to females. Other results showed that brood-splitting and division of parental care occurs in this species with the male parent and older fledgling sometimes departing and leaving the female parent (and younger chick, if there is one) behind at the colony site. Taken together, these results suggest that one cause of the differences in the mortality of adult males and females may be due to more males providing extensive post-fledging care than females. Another analysis of 19 years of capture-recapture data showed that the overall population decline since 2000 has not been due to a major change in overall adult survival or productivity at the major breeding colony sites, suggesting that there has been a change in postfledging survival and recruitment into the breeding population. New models will be developed to examine this hypothesis. Recent work also has shown the Northeast US and Canadian birds all concentrate and stage (often on FWS and NPS lands) around the "Cape [Cod] & Islands" area of southeast Massachusetts between mid July and late September, making the entire population of this endangered species vulnerable to any human-related activities or natural events (e.g., hurricanes) that may affect the coastal areas and waters of this region where these birds forage, rest, and prepare for migration.

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