

Dynamic Models of Shorebird Migration and Their Application to Shorebird Conservation in the Southeastern United States: An Adaptive Management Framework

Project Prospectus

July 15, 2002

Introduction: The U.S. Shorebird Conservation Plan established a national agenda for the planning and conduct of shorebird conservation. As part of this planning effort, a regional plan for the southeastern coastal plain of the U.S. was developed to identify priority species, threats to populations and their habitats, gaps in ecological knowledge, and recommendations for addressing regional conservation challenges. A major goal of the southeastern regional plan is to promote protection and management of coastal and inland habitats necessary to support successful migration through the planning region. Moreover, the National Shorebird Research Program has identified as a high priority the need to better understand the dynamics of migration, including how and why shorebirds move among stopover sites. A key to successful shorebird conservation in the southeastern U.S. and elsewhere is the availability of conceptual and analytical tools that can help support an adaptive process of planning, implementation, and evaluation. These tools must embody relevant, synthetic knowledge about shorebird ecology, as well as provide a means to predict and evaluate responses to both controlled and uncontrolled changes in important shorebird habitats. *The goal of this project is to form a partnership of shorebird managers and researchers to develop such planning, implementation, and evaluation tools.*

Approach and Objectives: In the proposed project we will attempt to develop and apply an adaptive, decision-theoretic framework for the purpose of conserving migration habitat on National Wildlife Refuges and other lands as appropriate in the Southeast. The essential elements of this framework are: (a) an explicit, unambiguous statement of decision-makers' objectives, (b) a finite list of alternative management actions, (c) model-based (stochastic) predictions of the consequences of those actions, and (d) a resource monitoring program. Essentially, the proposed project seeks to predict migratory behavior of shorebirds and then to use those predictions to support decision-making and evaluation by conservationists (Fig. 1). As an essential first step, we will model movements of shorebirds through the Southeast as a function of relevant environmental conditions (e.g., wind conditions, site-specific food availability, water depth), assuming that migratory behavior has evolved to maximize some measure of fitness (e.g., lifetime reproductive success, survival). A second goal of the modeling effort is to predict the consequences of changing environmental conditions, ultimately, in terms relevant to the stated objectives of management. Accordingly, a priority in this project will be to work cooperatively with those interested in shorebird conservation to develop management objectives and to evaluate and select alternative management actions appropriate for conserving a network of migration stopover sites on National Wildlife Refuges in the Southeast (Fig. 2). A critical need for this adaptive-management program will be the

development and implementation of a large-scale, coordinated monitoring effort for assessing extant population and environmental conditions, and for comparing predicted and observed responses of shorebirds to management actions.

Advantages of the Southeast for a Adaptive-Management Pilot Program:

The Southeast provides unique resources and circumstances for the development of a comprehensive adaptive management framework for shorebird conservation. First, shorebirds depend on the region heavily during spring, hence, it matches annual water draw-down cycles and facilitates implementation of management strategies. Second, small calidrids (sandpipers) dominate species composition in inland/managed wetlands. As a suitable biological model, we propose to use Semipalmated Sandpipers. Habitat requirements overlap many other species using the region and data on essential modeling parameters have been collected along a latitudinal gradient from wintering sites (Caribbean) to migratory stopovers (FL, SC, NC). The species has been research extensively in the Northeast as well, providing additional database and insights into their migratory ecology year round. Available estimates and information for the southeastern region include site-specific population numbers, migration chronology, turnover rates, prey base dynamics, determinants of habitat quality, body condition, and fat deposition rates. Local annual survival rates and probability of returning to a specific site as a function of body condition are available for the Caribbean. These data have been collected throughout a network of refuges (state and federal) and private lands across the southeast willing to implement adaptive management strategies. Finally, ongoing work to assess shorebird responses to management in the northeast (U.S. Fish and Wildlife Service Region 5) provides a natural “bridge” to extend lessons and strategies generated by our modeling efforts to the entire Atlantic Flyway.

Expected Benefits and Results: This project would: (1) synthesize available information about migration ecology in the Southeast; (2) design or re-design monitoring programs to evaluate the effectiveness of management prescriptions and to help assess the

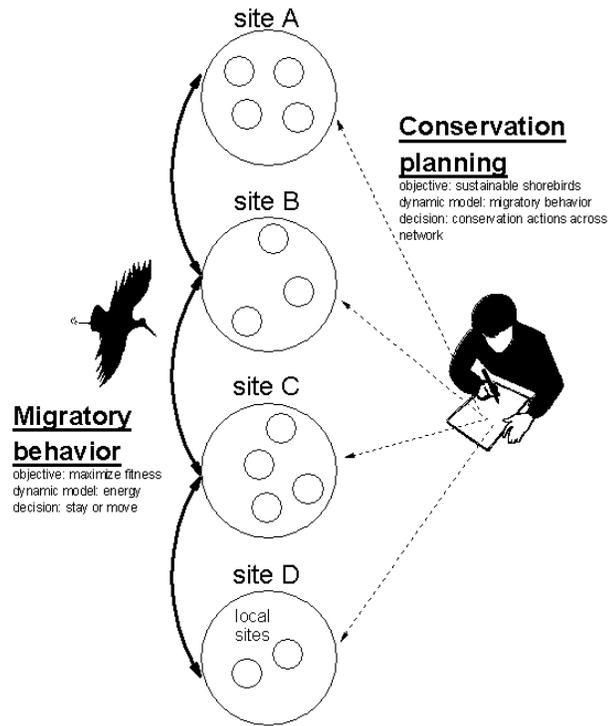


Fig. 1. Conceptual model for conserving migration stop-over sites for shorebirds.

effectiveness of other monitoring initiatives; (3) identify research needs to better understand the linkage between management actions and shorebird responses; and (4) provide a conceptual framework for organizing conservation planning efforts.

Necessary Agency Support:

The development of a credible adaptive-management framework for migrating shorebirds in the Southeast will require commitment and cooperation from the U.S. Fish and Wildlife Service (USFWS) and U.S. Geological Survey (USGS). The USFWS will need to commit staff time and funds for project planning, for implementation of prescribed management actions on NWRs, and for resource monitoring. The USGS will need to expand inter-disciplinary research on shorebird migration ecology, as well as develop practical methods for resource monitoring that can be implemented on NWRs on an operational basis. We believe a 5-10 year program will be needed to develop and implement the planning, decision-making, and evaluation tools for the adaptive-management approach envisioned in this document

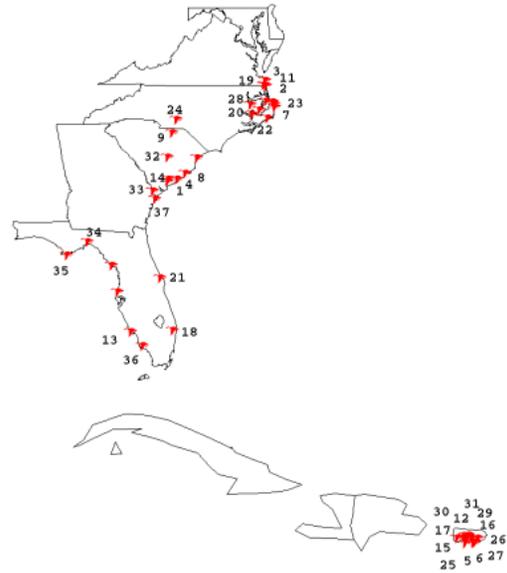


Fig. 2. National Wildlife Refuges in the Southeast.

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