

PROJECT DESCRIPTION

Over the last few decades, population declines have been steeper for king rail than for other hunted rails. The cause of these declines is not clear. Though uncommon in the region, there is a relatively dense breeding population of king rail at Mackay Island NWR. The refuge is possibly one of the few remaining regional source populations, and is ideally suited to intensive population study. Given the abundance of king rails on the refuge, refuge management has been actively seeking research opportunities to better understand rail management on the refuge. Recent studies of rails on the refuge looked at analysis of fire effects on reproductive success. However, what is currently unknown is how fire affects wintering and migrating birds since rails are present on the refuge year-round. To understand seasonal requirements we need to first understand the dynamics of our population. What proportion is transient/migratory versus local/ year round birds. This project will identify the dynamics of the refuge population and provide genetic markers that can be used nationally to further the understanding of the national king rail population.

OBJECTIVES AND ALTERNATIVES

Analyses based on our panel of genetic markers will enable us to examine population structure at local and regional scales, within and between seasons. Importantly, the markers we develop will be useful in the future for looking at population structure of the king rail across the species range and will be available for future analysis of population structure, dispersal, and admixture. There is also a strong probability that a subset of our markers will be useful for population genetic analyses of related species of threatened and endangered rails.

METHODS AND PROTOCOLS

Monitoring Nests and Adult King Rails: Starting in mid-March, intensive searching for nests in

suitable habitat began. Nests found during the laying period were monitored once daily. Each egg was measured (weight, width, length), and marked individually with a Sharpie on the day it was laid. Full clutches were photographed for later analysis of female eggshell pattern distinctiveness. During incubation period, frequency of nest visits was reduced to every three to reduce both disturbance to the parents and risk of attracting predators. Nests were visited on the predicted day of hatching initiation so that chicks could be caught and sampled soon after hatching. Each chick was caught, measured (weight, tarsus length), and a small blood sample was drawn.

Once adults were captured, standard morphometrics (weight, flattened wing chord, tarsus length, tarsus and middle toe length) were obtained for all adult rails captured. In addition, we measured bill (length, width, depth) on all king rail adults. A 50uL blood sample was drawn by brachial venipuncture, and stored in 100% ethanol for genetic analysis. Adult king rails were fitted with a USGS permanent band, and an individually distinctive combination of 3 color bands per Federal Bird Banding permit #23728 (Master bander: Susan McRae), ECU IACUC AUP#253 (PI: Susan McRae).

Development of New Microsatellite Markers: In collaboration with James M. Maley and Dr. Robb T. Brumfield of Louisiana State University (LSU), a panel of variable microsatellite markers was developed to analyze population genetic structure at local and regional scales. Additional analyses were conducted to screen his sequence data for microsatellite loci.

McRae, S.B. 2012. Population dynamics of the king rail, *Rallus elegans*. East Carolina University. Final Report for CESU Agreement. 20pp.

DATA MANAGEMENT

Data and samples reside at East Carolina University, Department of Biology. Data is

reported in the final report (McRae 2012) and will be provided to inform regional management strategies throughout the Atlantic flyway.

DATA ANALYSIS / MODELS

Several levels of analysis are possible ranging from the family (parentage, inbreeding), to the local population (structure, recruitment), to regional and species-range scales (assessment of dispersal and migratory status, inter-population comparisons). We have completed preliminary variability testing, and are currently genotyping samples collected at the refuge.

ACCOMPLISHMENTS AND MANAGEMENT IMPLICATIONS

Nest location and spatial distribution data based on callback monitoring have been shared with colleagues from North Carolina State University to be incorporated into existing distribution models. These models are being used to help guide the Refuge Management Plan.

Added microsatellite markers to the conservation genetic toolbox which are useful for studying rails. Microsatellites are neutral genomic markers that will be used to genotype individual king rails. These markers will enable us for the first time to conduct population genetic analyses of king rails across the species range, and once published, they will remain available for future analyses of population structure, dispersal, and admixture in king rails.

Eight students of ornithology, conservation and ecology have so far received training during the course of this research.

During the course of the last year, we have developed methodology to conduct intensive study of king rail breeding success.

PARTNERS

North Carolina State University

Louisiana State University

SOURCES OF SUPPORT

Supplemental funding from the USFWS Webless Migratory Game Bird Program to continue through 2013.

Louisiana State University independently funded the work to develop a panel of variable satellite markers to analyze the population genetic structure.

MORE INFORMATION

Susan B. McRae, Department of Biology & North Carolina Center for Biodiversity
East Carolina University
Greenville, NC
27858-4353
mcrases@ecu.edu
Tel: (252) 328-6515

Michael J. Hoff, Refuge Manager
MacKay Island and Currituck NWR's
P.O. Box 39 (Shipping: 316 Marsh Causeway)
Knott's Island, NC 27950-0039
252-429-3100
Mike_hoff@fws.gov