

Satellite-GPS Telemetry and the Conservation Biology of Swallow-tailed Kites and Snail Kites



Ken Meyer co-founded Avian Research and Conservation Institute (ARCI; www.arcinst.org) in 1997; he now serves as Executive Director. ARCI's mission is to conduct problem solving research on rare and imperiled birds that stimulates management action and enhances public appreciation for science based conservation planning.

From 1996 to 2007, Avian Research and Conservation Institute (ARCI) used Microwave Telemetry's (MTI) Doppler-only PTT-100 to address conservation-related questions about the ecology and demography of Swallow-tailed Kites (*Elanoides forficatus*) and Snail Kites (*Rostrhamus sociabilis*). This research was very productive, but it soon became clear that GPS-enabled PTTs would allow us to focus more sharply on hypotheses about movements and habitat selection and, thus, to recommend effective management practices. Agency interest grew rapidly, but the smallest available Argos/GPS units, weighing 22 grams, were too heavy for these lightly-built species.



Photo by Ken Meyer

Adult Swallow-tailed Kite

Fortunately, MTI kindly offered to take on the challenge of producing a 17g Argos/GPS unit, light enough for the kites and the smallest GPS-enabled PTT ever made, in time for the 2011 nesting season. The following accounts summarize our findings based on Doppler technology and our preliminary results from the more recent GPS tracking.

Discovery of the 8,000 km migration pathway and wintering destinations of the U.S. population of Swallow-tailed Kites was one of the first applications of MTI's 18g PTT when it became available in 1996. This knowledge has made it possible to address human-caused threats to kites over their year-round range. These transmitters also produced the first estimates of adult survivorship and revealed the areas and seasons for which mortality levels were greatest. In the summer of 2011, we began using MTI's Argos/GPS units to find previously undetected pre-migration communal roosts and to estimate detectability and turn-over rates (with our partners from GA Dept. of Natural Resources, SC Nature Conservancy, and AL Dept. of Conservation and Natural Resources). We are identifying important habitat features and land parcels, refining survey methods, and improving population size and trend estimates. ARCI is

particularly interested in documenting use and habitat selection within National Wildlife Refuges by breeding, staging, and migrating kites. On the South American winter range, where our prior research revealed high mortality, GPS locations will improve our ability to identify likely sources of mortality.

The goal of our first satellite-tracking study of Snail Kites, begun in 2007, was to compare the utility of PTT (Doppler only) and VHF data for estimating home-range areas, survivorship, and movements of 10 adults carrying a combination PTT/VHF package. Home range areas differed significantly between VHF (205 km²) and satellite (961 km²) methods. Seven of the 10 tagged kites regularly made movements of 100 to 125 km, often returning within a few days to their starting point. We could not have detected such movements with any feasible and affordable VHF tracking protocol. Our survival estimate in 2007 was 1.00 based on the satellite data but only 0.67 based on VHF detections of the same individuals.



Photo by Rob Bennetts

Adult male Snail Kite with Apple Snail

While the satellite tracking produced a cumulative two-year estimate of 1.00 (the VHF transmitters expired after the first year), a concurrent estimate from a study in the same area using band resightings and VHF telemetry was less than 0.50. Our present research uses GPS locations to compare movements among foraging areas with regard to snail, vegetation, and hydrologic conditions. In addition, copper concentrations determined from successive tissue sampling of the tagged kites will be analyzed in relation to levels in snails at successive foraging locations to determine whether this toxic metal, long used as a fungicide in citrus groves and detrimental to bird reproduction, is being acquired by the kites. Snail copper levels are extremely high at some planned water storage sites essential to Everglades restoration. Because these reservoirs are expected to draw foraging Snail Kites, we want to know how much residual copper the birds acquire. The GPS-derived movement data are also being used help develop a risk-assessment model for this endangered species with regard to proposed wind-power facilities in southern Florida.

MTI's 17g Argos/GPS PTTs are performing extremely well in these valuable studies, producing on average nearly eight fixes, accurate to within 18 meters, every 24 hours. Unlike any other spatial depiction of movements, these systematically gathered datasets document finely scaled locations with no observer or detection biases for species that were previously impossible to track with GPS technology. We are grateful to MTI for making such research possible. We also thank USFWS, USGS, Florida Fish and Wildlife, National Fish and Wildlife Foundation, Southern Company, Felburn Foundation, and our collaborators: G. Kent, J. Coulson, D. Demarest, P. Darby, K. Hart, and R. Frakes.



Southbound paths of 11 Swallow-tailed Kites tracked with 17g Argos/GPS PTTs