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White Ibis at VSO OBX Field Trip. Photo by Alan Mitchnick

What's Inside

Editor: Dixie Sommers

Change of Address (USPS or email)
Virginia Society of Ornithology
PO Box 5994, Williamsburg, VA 23188
vsomembership@cox.net

Send submissions by email. Attach MS Word document or plain text, with high resolution photos. Submissions may be edited for style and/or length.
Contact VSO President Bill Williams at:
info@virginiabirds.org

Tracking Virginia's American Kestrels

Advancements in Technology Shed Light on Movement Strategies and Habitat Use

Caylen Wolfer, The Clifton Institute

Across Northern Virginia's scenic agricultural landscape, one of the most frequently seen raptors is the colorful, pint-sized American Kestrel. Although relatively common in Virginia, they and many other grassland bird species have seen population declines over the last 50+ years. The northeast United States in particular is noted as the region of most persistent kestrel decline, leading many researchers to explore what may be causing these downward trends. Potential causes include loss of agricultural land to urbanization and intensive farming practices, exposure to pesticides, predation by Cooper's Hawks, competition with European Starlings for nest sites, and low fledgling survival.

Although it is a relatively well-studied species, there are still gaps in our understanding of kestrel ecology, such as home range sizes, movements, and habitat preferences. All of these are critical to understand before land management recommendations can be developed to better support the species.

Beginning in 2020, the Clifton Institute and the Smithsonian Conservation Biology Institute teamed up to begin an unprecedented study on American Kestrels, now known as the Northern Virginia Piedmont Kestrel Project. Using lightweight solar-powered GPS transmitters that can accurately take locations up to every 20 minutes, the team deployed units on 19 breeding female kestrels captured at nest boxes throughout Fauquier and Rappahannock counties in 2021. From the movement data alone, it was discovered that these kestrels had smaller breeding home range sizes than previously reported, at 78 acres with notably little to no territory overlap (Figure 1 on next page).

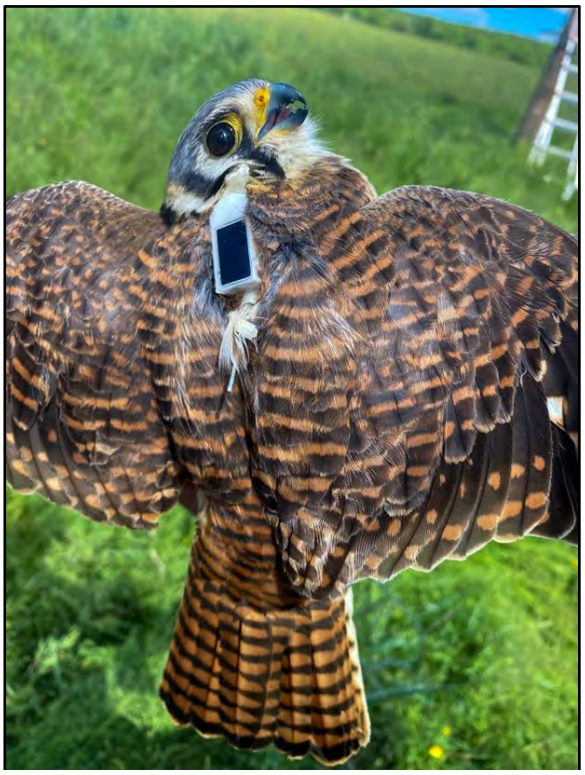
Small home ranges in many species, including raptors, are often associated with high quality habitat. Home range size itself was fairly stable across the nestling, fledgling, and post-breeding (fledglings no longer reliant on parents) stages of the season, but some females packed up and abandoned their nesting territories for what was likely better foraging habitat, setting up completely new territories to close out the summer season.

The tracking backpacks also detected long-distance excursions from nesting territories (some as far as Pennsylvania, but most between 1 and 10km), another first for this species. These birds may be prospecting for future nesting locations, but some were

certainly planning for where they would spend the end of their summer and, in some cases, winter. Overwintering locations and migration routes were also discovered, with 2 females traveling south to stay in South Carolina and Georgia in Winter 2021-22. These females ended up leaving on the same day to return to Virginia, taking only 2 days to come back to nearly the same boxes where they bred the year before.

To better understand habitat preferences, the team combined movement data with data on the available habitat around each tagged kestrel box. Each distinct field was categorized by habitat type (pasture, hay, meadow, row crop, forest, lawn) and vegetation height and density were measured throughout the breeding season. Preliminary analysis indicates kestrels' strong preference for pastures, both during and after nesting. Kestrels used less disturbed grasslands and meadows earlier in the season during nesting, but then avoided these areas later in the season, potentially due to the increasing vegetation height as the season progresses. The team is analyzing vegetation height and density data now to see how tall is too tall for kestrel foraging.

The GPS tagging continued in 2022 with 8 more females and 4 male kestrels receiving transmitters.



Female American Kestrel with a solar-powered GPS transmitter backpack. Photo by Sarah Cain.

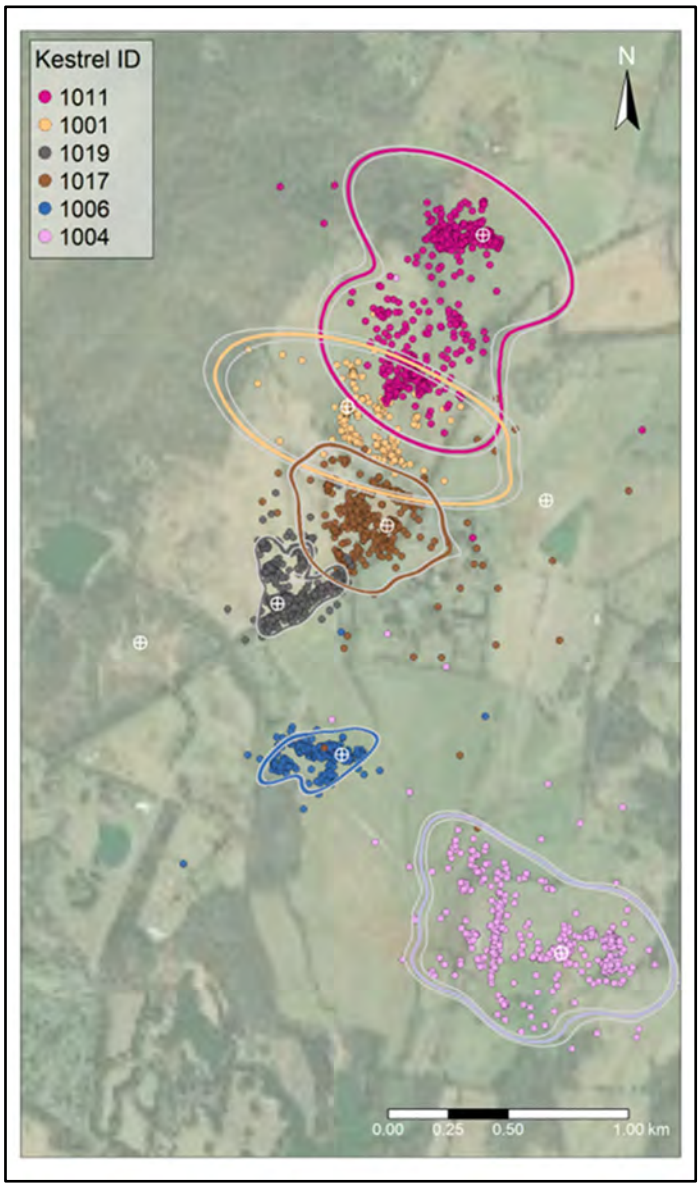


Figure 1. Estimated home range boundaries and tracking locations during the nestling stage of 6 breeding female kestrels in 2021. All available nest boxes depicted by white targets. Figure by Joe Kolowski.

The data for males in particular surprised the researchers: the males seem to range much more widely than females, with huge variation from one male to the next. One male in particular was found traveling a 7-mile route one way each day to provide food for his family.

The team also assisted in a regional study conducted by Hawk Mountain Sanctuary to help investigate fledgling mortality as a potential cause of kestrel decline in the northeast. Nestlings from 10 nest boxes were weighed and measured weekly, and at the final check blood was drawn to test for various pesticides. VHF transmitters were attached to 2 nestlings at each box. Once fledged, the

kestrels were tracked weekly to determine how far they traveled and how they survived the summer. In Northern Virginia, there was no evidence of death after fledging, with 8 fledglings being tracked all the way into October when they all disappeared, presumably to migrate. Although more comprehensive blood analyses still need to be done, preliminary testing has shown no nestling exposure to rodenticides. Virginia data on fledgling survival and nestling toxin exposure is being pooled with data from other study sites to make conclusions about the potential role of fledgling survival in kestrel declines.

After two groundbreaking research seasons, the Northern Virginia Piedmont Kestrel Project is planning for its biggest season yet in 2023. To further explore the dynamics of male and female pairs and their movement strategies, 40 GPS units will be deployed on 20 female and 20 male adult breeding kestrels. The project also installed cameras in over 30 boxes this winter, creating a large network that will record the entire nesting period. Cameras will help answer questions about causes of nestling mortality, and the relationship between foraging distance, prey deliveries and nest attendance. Finally, prey abundance surveys will be done in different field types to quantify the amount of prey available to kestrels.

This comprehensive approach to combining high-resolution GPS tracking data with nest success, reproductive output, and prey selection will yield a much more complete understanding of what kestrels need to be successful and maintain healthy populations in not just Virginia, but the northeast United States.

For updates including field photos, publication news, and videos from camera boxes, follow Northern Virginia Piedmont Kestrel Project on Facebook and Instagram. Follow the locations of the tagged kestrels by visiting scbi-cec.shinyapps.io/AmericanKestrelTracking/

Want to support kestrels? Visit cliftoninstitute.org/restoration/resources/, with information on how to build, install, and maintain a kestrel box, and best practices to maintain your land with native grassland species in mind. If you live around Fauquier County, you can also sign up for a free property visit and receive advice on how to best steward your land for kestrels and beyond.

Editor's Note: The VSO has supported the Clifton Institute's kestrel research through our conservation grants program. Your VSO dollars at work!

VSO Annual Meeting – May 5, 2023

This spring the VSO Annual Meeting will be a virtual gathering on the evening of **May 5, 2023**.

Dr. Bryan Watts of the Center for Conservation Biology, College of William and Mary, will be our keynote speaker.

The brief business meeting will include the election of officers and directors, recognition of the 2nd Virginia Breeding Bird Atlas Regional Coordinators, and presentation of awards, grants, and scholarships. The evening will begin with several student research grant honorees presenting overviews of their respective field studies.

Watch you email for further details and registration information.