Northern Virginia Piedmont Kestrel Project: Results from 2024 Field Season

Bert Harris, Joe Kolowski, and Alan Williams

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Summary

This was our fourth year of tracking American Kestrels with GPS transmitters. It's clear that kestrels prefer fields with short vegetation, and we are getting a detailed look at the interaction between vegetation structure and field type. Meadows, made up either of native or nonnative grasses, and cattle pastures are suitable as long as they are short in stature. Pastures, most of which remain short year-round, become increasingly important for kestrels later in the summer. We also measured the abundance of kestrel prey this season and we found more Meadow Voles in meadows than in pastures or hay fields. We also found that the taller the vegetation was, the more voles were present, regardless of how the field is managed. Therefore, we conclude that there is more kestrel food in tall fields, but the kestrels either aren't able to detect or catch the prey in tall vegetation. We recommend that landowners bushhog their fields in February to create ideal foraging habitat for kestrels, to leave habitat standing for wintering sparrows, and to avoid killing breeding grassland birds and Box Turtles. We also recommend that landowners leave tall strips of wildflowers and grasses along the edges of pastures and hay fields to serve as food sources for raptors and as pollinator habitat.

Introduction

- American Kestrels are small falcons that inhabit wide-open fields in Virginia. Kestrels have declined by 73% in the Piedmont of the eastern United States since 1966. Habitat degradation, insecticides (killing prey), rodenticides (toxic to kestrels), mortality during migration, and low fledgling survival may all be contributing to the decline. But the relative importance of these diverse factors is poorly known. We began the Northern Virginia Piedmont Kestrel Project in 2021 to study what's behind the decline in our area and to learn what landowners can do to help.
- Our focus is on tagging and tracking adult kestrels to understand which kind of fields are the best habitat and how this changes through the seasons. We are also monitoring nest success, fledgling survival, prey abundance in different kinds of fields, diet, and pesticides in the blood.

Figure 1. "Rocket" the kestrel with a GPS transmitter.

GPS tracking, habitat selection, and vegetation structure

- We have now attached GPS transmitters to 69 kestrels and we have collected a huge amount of data on habitat selection. Our analysis is ongoing. But our preliminary results indicate that meadows and pastures are preferred over hay fields and row crops.
- It is also emerging that vegetation structure is even more important than field type. For example, kestrels clearly prefer shorter fields, but the relationship between vegetation height and habitat usage is the same for meadows and pastures (Figure 2).

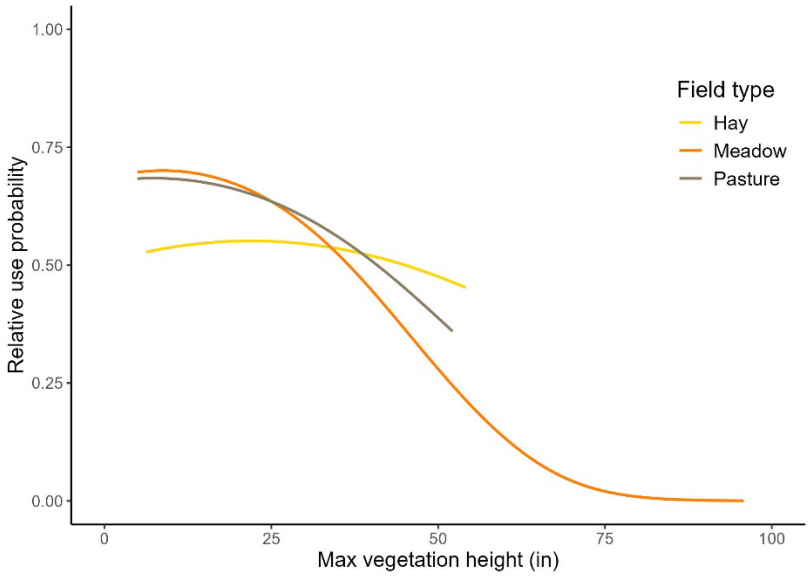

Figure 2. Kestrels strongly selected shorter fields. We can also see that use of all field types declined with increasing vegetation height, and the pattern of selection was indistinguishable in pastures vs. meadows. So, the height of the vegetation was more important for kestrels than the field type.

Prey Abundance

- We set up large arrays of 24 track tubes, spaced 10 yards apart, to detect Meadow Vole footprints (Figure 3). The tubes are sections of vinyl rain gutters, placed horizontally on the ground, that have a piece of paper on the bottom with ink pads on either end and a ball of sunflower butter in the middle as bait. We sampled 56 fields three times from April 8th to September 9th.
- We found that meadows had many more voles than hay fields or pastures, and that taller vegetation hosted more voles (Figure 4). Fields shorter than 20 inches hosted very few voles. The effect of vegetation height was stronger than that of field type.
- These results indicate that tall vegetation, especially meadows, can serve as a food source for kestrels as long as the kestrels can hunt in short vegetation along the edges of tall fields or wide mowed trails.

Figure 3. Study sites for kestrel prey abundance research and an example track tube that was used to record vole footprints. Look closely for the footprints!

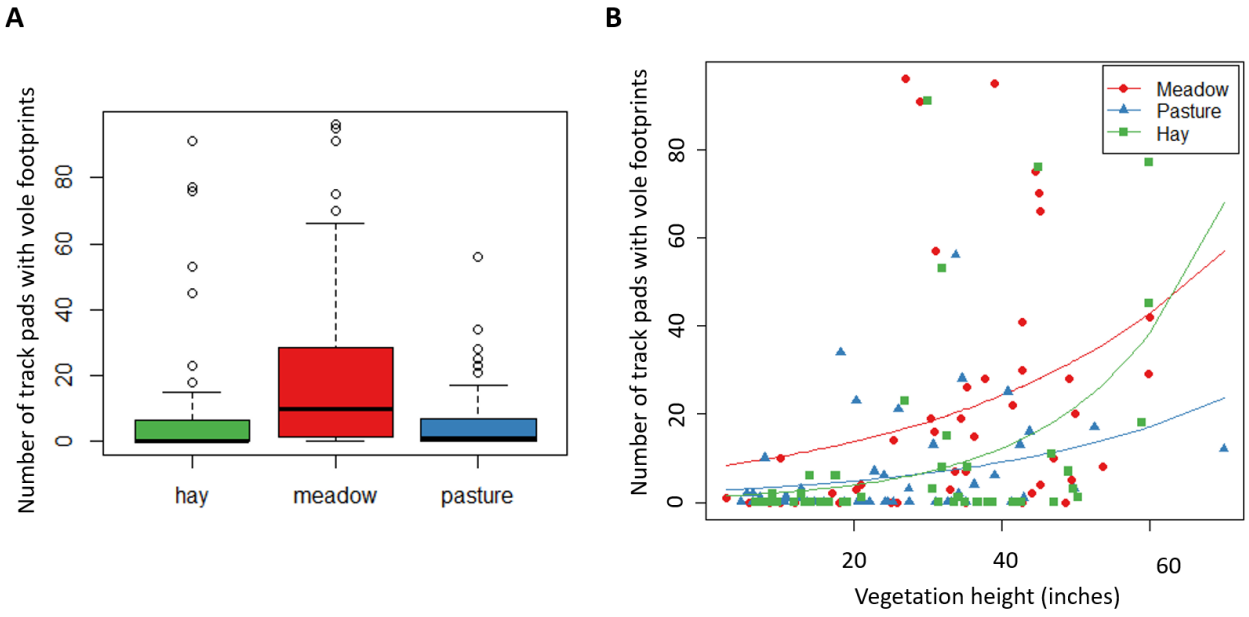

Figure 4. (A) The abundance of Meadow Voles (important prey for kestrels, Barn Owls, and other raptors; measured by the number footprints) was much higher in meadows than other habitats. (B) Vole abundance was higher in taller fields of all types. Vole abundance was very low if the grass was less than 20 inches tall.

Diet

- We are working with Smithsonian-Mason School of Conservation (SMSC) students, our research technicians, and volunteers to collect data on kestrel diet, prey delivery rates, and predators from footage from security cameras in the nest boxes.
- So far, we have collected camera data from five boxes, and we found that the diet differed dramatically among the boxes (Figure 5). It will be fascinating to see if this substantial variation holds up as we analyze data from more boxes, and we will study what explains these differences.

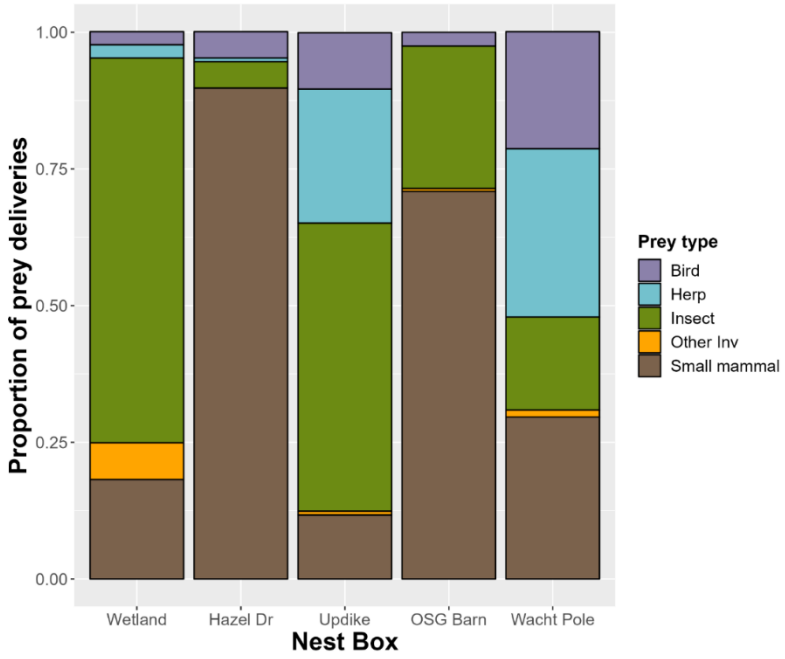

Figure 5. Variation in prey delivered to five kestrel boxes as determined by camera footage. Herp = reptile/amphibian, Other Inv = other invertebrate. The kestrels showed a remarkable amount of variation in diet among the different boxes.

Long-distance movements

- We had not intended to use our GPS tags to study long-distance migration, but they have yielded the highest-resolution tracks of American Kestrel migration ever collected (Figure 6)! We now have data from four birds, including "Peaches" who has made the trip to Georgia three times. It is remarkable that she returns to the same farm each winter.
- "Dee" the kestrel started her southbound trip on the very early date of June 20th. This changes our understanding of the timing of fall migration in kestrels.

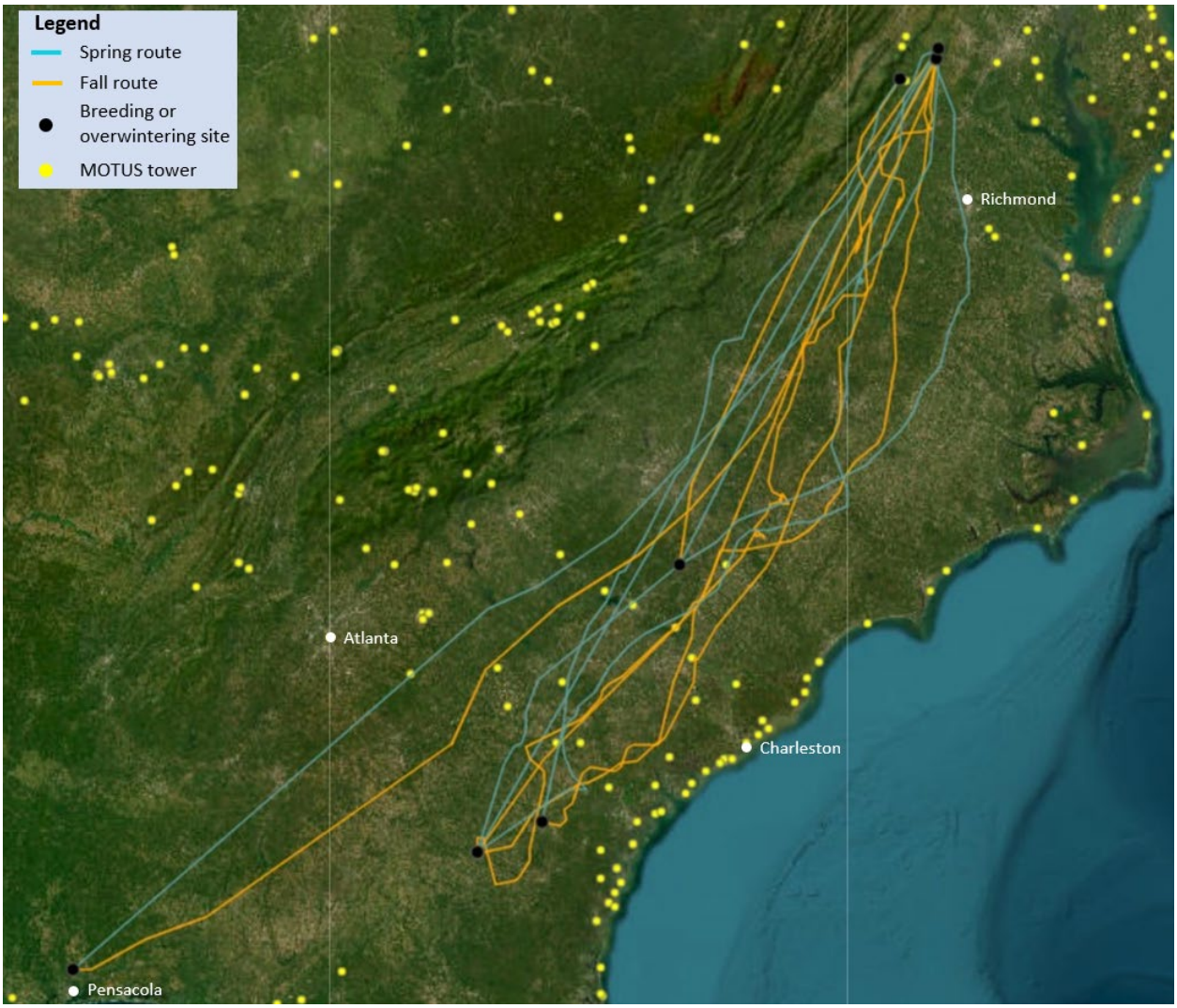

Figure 6. This map shows the migratory routes of four kestrels. These are the highest resolution migration tracks ever recorded for American Kestrels. These results also indicate that the coverage of MOTUS towers (which are used to track migration) is currently too sparse to capture most of these movements.

Land management recommendations

- Meadows should ideally be bushhogged or burned annually in February or March. Bushhogging or burning at this time creates ideal foraging habitat for kestrels, leaves habitat standing for wintering sparrows and avoids killing breeding grassland birds.
- Please consider leaving tall strips of grasses or wildflowers along the edges of agricultural fields. This will provide habitat for kestrel prey and pollinators. Mowing wide trails through tall meadows also works.
- Hay fields should ideally not be hayed in between April 15th and July 1st. Approximately 80% of grassland birds in our area are finished nesting by July 1st (Virginia Working Landscapes data).
- We recommend that landowners who have big fields install kestrel nest boxes that are spaced every ⅓ of a mile. Information on how to build or buy a box and how to install a predator guard is here. The Virginia Grassland Bird Initiative will often install boxes for free and our new Raptor Conservationist can also help!