Coyote Behavior: Lessons from northern landscapes with applications to the ranch
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Coyotes are a medium-sized (20 – 35 lb) carnivore in the same family as domestic dogs and wolves. Prior to 1900, coyotes were found mostly in western North America. Since then, coyotes have rapidly expanded their distribution across North America. Coyote expansion into Florida likely began in the 1950s and coyotes now occur in all of Florida's counties. They are considered nuisance animals to some people, and in some places, individual coyotes can have large impacts on livestock production via predation (especially for sheep operations). Coyote presence can alter the ecological community, especially of other carnivores (e.g., red fox and bobcat). In some ecosystems, coyotes can exhibit substantial predation pressure on native ungulates (e.g., white-tailed deer), however this remains an active area of research.

The complete removal of coyotes from Florida is unlikely as coyotes now play important roles in Florida's ecosystems, and any large-scale removal effort would involve extraordinary amounts of money and time, would need to be constantly maintained, and would still likely be unsuccessful. To establish strategies to address or minimize human and/or livestock conflict with coyotes, it is important to better understand coyote behavior. To this end, coyotes are among the most widely studied carnivores in North America, although research on the behavior of coyotes in Florida has been limited. As a first step, we can look to research on coyote behavior conducted in other areas to help us understand how coyotes likely behave in Florida.

We can think about coyote behavior at multiple spatial and temporal scales. First, coyote behavior can be defined at the landscape scale over a period of months. Behavior at this spatiotemporal scale influences coyote population density and ecological community responses. Coyote behavior can also be defined at the patch scale over a period of minutes, hours, or days. At this spatiotemporal scale, we can examine how coyotes partition their day into different behaviors such as resting, foraging, and traveling, and the types of land cover features coyotes use or avoid while engaging in these behaviors. It is behavior at this scale that can have direct impacts on livestock production via predation. In this article, we will discuss behavior at the patch scale.

At the patch scale, the daily movement of coyotes can be broadly separated into three types: encamped (resting, digesting, hiding), foraging (consuming, hunting, pursuing), and traveling (relocating, fleeing, exploring, patrolling). By broadly classifying coyote movement into these three behaviors, we can learn a lot about how the coyote views the landscape (Figure 1). For example, knowing how much time per day and at what time a coyote forages can tell us

about the prey availability on the landscape and when prey might be more vulnerable to coyotes. Furthermore, by identifying these broad movement behaviors we can then further examine what landscape features coyotes use or avoid when engaged in these behaviors. This information can help us clarify what types of areas might be at higher risk to coyote predation. By studying coyote movement behavior in Cape Breton, Canada, my colleagues and I found that coyotes were most active foraging and traveling during dawn and dusk. We found that coyotes also foraged during the day and night, but the types of land cover and landscape features coyotes used while foraging differed by the time of day. For example, during the day, foraging coyotes selected for open areas without trees, but during dawn, dusk, and at night they avoided open landscapes. Further, during dawn and dusk coyotes focused on the edges of forest and landscapes with a mixture of land cover types. Another interesting finding from this study was how foraging coyotes responded to roads and trails. Here, coyotes employed a close but not too close strategy – they avoided roads within a football field's length, but beyond that, preferred areas with roads. Ke Zhang (MSc; supervised by Raoul Boughton) examined coyote behavior in south-central Florida. Zhang found that coyotes in south-central Florida preferred improved pastures, and the presence (or lack thereof) of cows did not impact this response. Coyotes also preferred forest and scrub/shrubland, and avoided wetlands, dry prairies, roads, and other human-associated landscape features. Interestingly, Zhang also found that as temperature and rainfall increased, coyote movement decreased. In other words, coyotes reduced their activity in harsher weather. We found the same pattern further north in Cape Breton, Canada, but in Cape Breton, the harsh weather came in the form of colder temperatures and heavy snow.

While baseline studies of what land cover and landscape features coyote prefer or avoid are important, they do not account for differences in movement behavior among individuals, meaning that some important relationships can be missed. To this end, it is important to specifically examine how foraging coyotes respond to different landscape features, including whether foraging coyotes respond to cow or cow-calf presence within improved pastures. We found a strong link between behavior, diet, and urbanization among coyotes in Chicago, thus it is likely that there is a strong link between coyotes' behavior, diet, and landscape features in south-central Florida. This potential relationship warrants further investigation. I plan to build landscapes of prey availability, using a combination of remote cameras, acoustic recording units, and other methods. This builds on previous research that relies on land cover features to act as indices of prey availability, which only offers a limited view of how a coyote behavior changes across space and time. This future research will help us understand and predict which landscapes are more likely to experience negative wildlife-livestock interactions.

For further reading please see the <u>*RCREC Field Day 2021 Proceedings*</u> *and the following primary texts:*

Boughton, R. K., & Wight, B. R. (2018). Wildlife of Florida Factsheet: Coyote. *EDIS*, *2018*(5).

Ellington, E. H., Muntz, E. M., & Gehrt, S. D. (2020). Seasonal and daily shifts in behavior and resource selection: how a carnivore navigates costly landscapes. *Oecologia*, *194*(1), 87-100.

Zhang, K. (2017). Coyote (*Canis latrans*) spatial ecology and interaction with cattle (*Bos taurus*) in the sub-tropical rangelands of Florida. MSc thesis, *University of Florida*, Gainesville, Florida.

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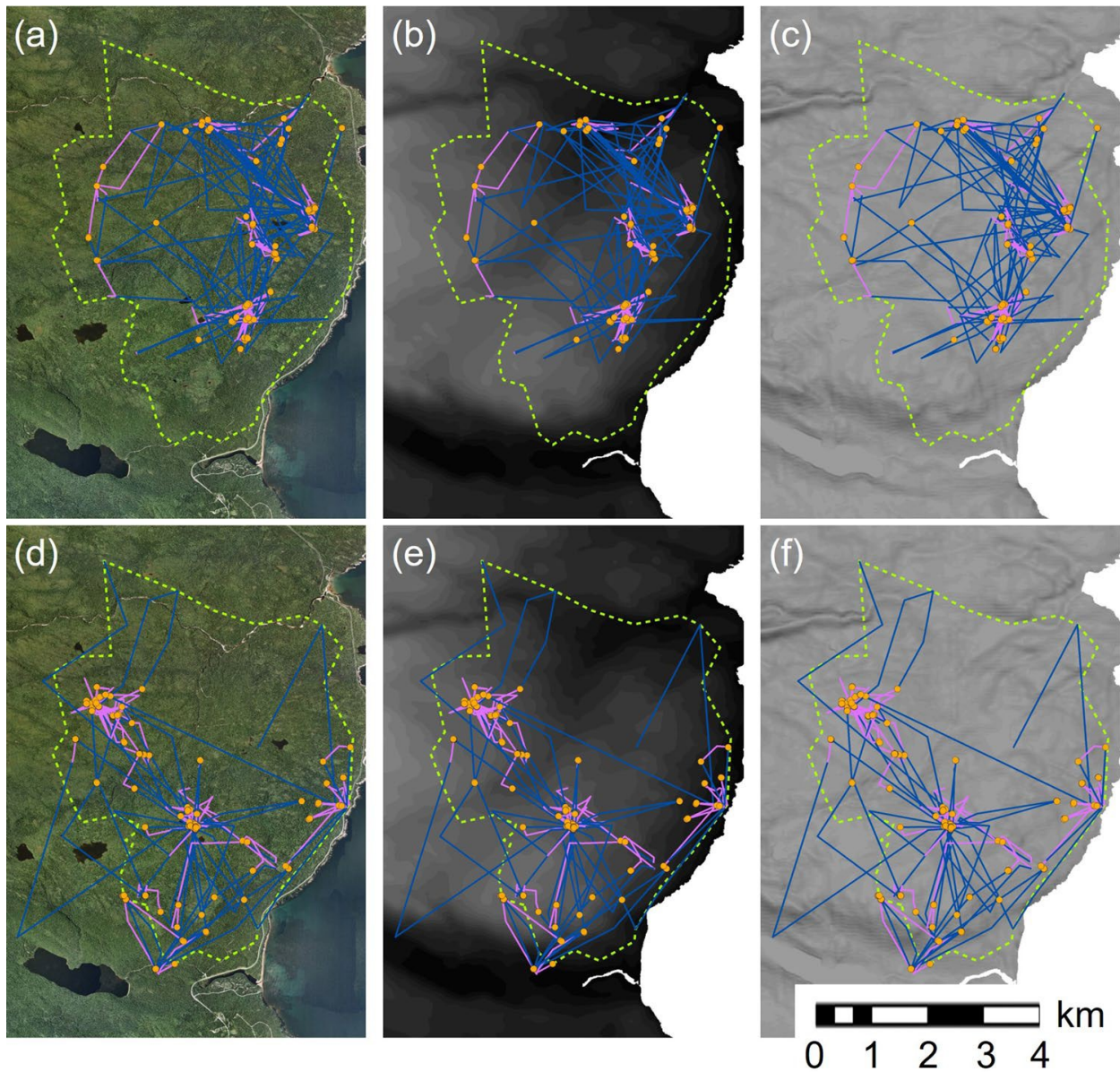
Upcoming Events

Visit our calendar online to view all our upcoming events and their registration links:

November 16, 11:00 – 11:45 a.m., Ona Soil and Water Science Program Highlight with Dr. Maria Silveira. Dr. Silveira will be presenting "Carbon Balance in Florida Grazing Land Ecosystems."

December 14, 11:00 – 11:45 a.m., Ona Graduate Student Highlight with Clay Cooper. Clay will be presenting his research findings as a master's student under the advisement of Dr. Brent Sellers at the UF/IFAS Range Cattle Research and Education Center in Ona. His research focused on investigating management strategies for controlling brunswickgrass in bahiagrass seed production fields in Florida.

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