Study uses GPS to explore deers' relationship with the forest

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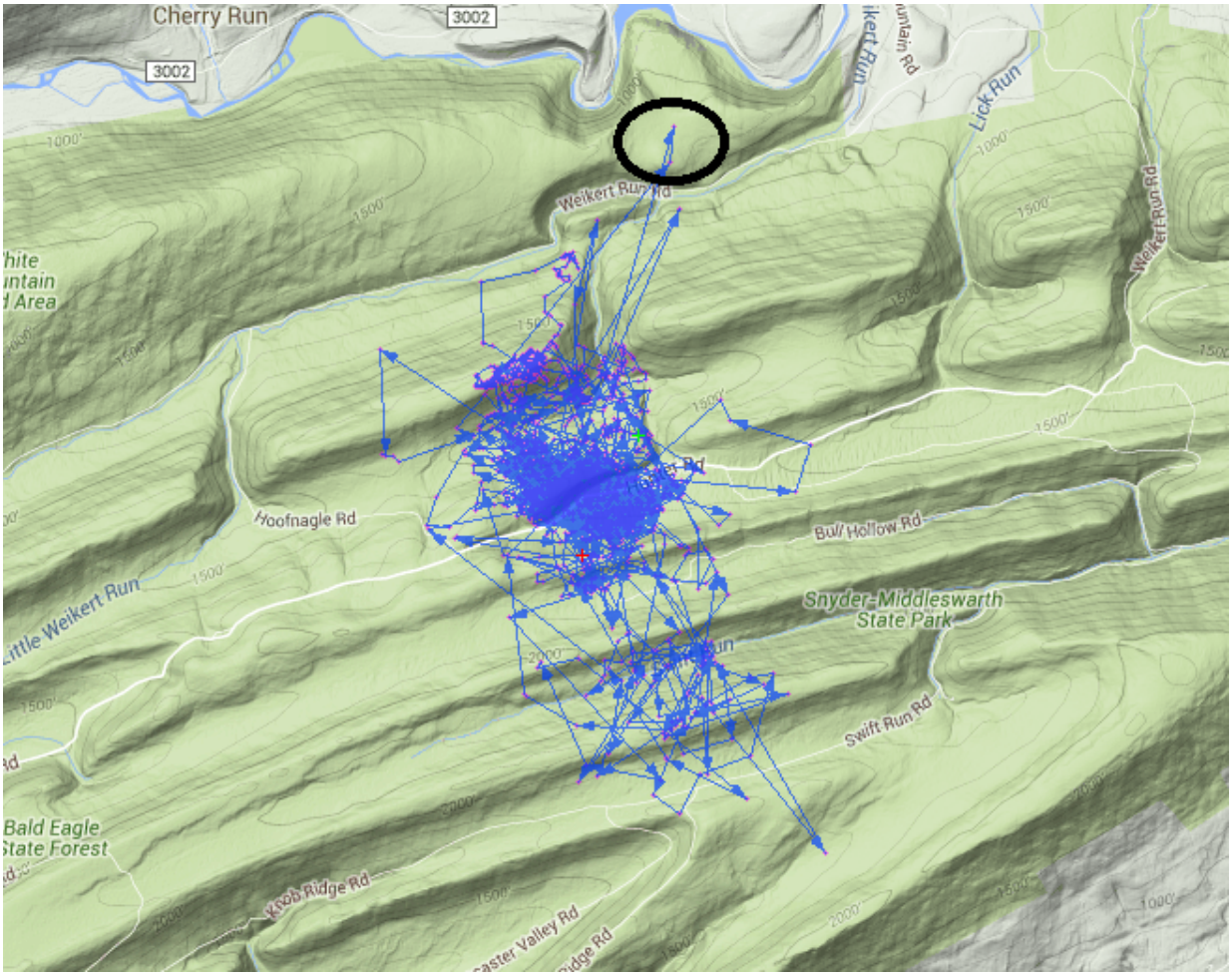

A map shows all 2,570 locations collected on one deer throughout 2013. Credit: Duane Diefenbach

White-tailed deer, though cute and wide-eyed like Bambi, can wreak havoc on the land around them. And no one knows this better than Jack Ray.

Ray's property borders Rothrock State Forest, a prime location for an outdoorsman like himself. Yet when it comes to the apple trees he uses for his annual homemade apple cider, the location poses a bit of a challenge. Those apples are a favorite snack for deer, and he's witnessed firsthand how innocent snacking can ruin any hopes of delicious apple cider.

According to Christopher Rosenberry, supervisor of deer and elk management with the Pennsylvania Game Commission, deer snacking like the kind that wipes out Ray's apple harvest is normal behavior, and it presents a danger to the entire forest.

"Deer are browsers. They will browse on woody vegetation, and too much browsing may eliminate the small trees in the forest. If there's a timber harvest or an ice storm or something that removes the canopy, and those young trees do not exist under the canopy, you can potentially lose your forest."

Thanks to geospatial technologies like GPS, one Penn State research study may soon have a better understanding of how to balance these woodland creatures' affect on forest vegetation.

A deer is ear-tagged and outfitted with a GPS collar. Credit: Duane Diefenbach

The Deer-Forest Study, led by professors Duane Diefenbach and Marc McDill, is a collaborative project among Penn State, the Pennsylvania Game Commission, the Pennsylvania Department of Conservation and Natural Resources, Bureau of Forestry and the Pennsylvania Cooperative

Fish and Wildlife Research Unit.

Entering its third year, the study outfits deer in three areas—Rothrock, Bald Eagle and Susquehannock State Forests —with GPS collars that monitor each deer's location. In addition to the GPS collars, field researchers also go in the field to collect data on vegetation levels in the locations visited by each deer.

"The objective of the research is to look at the simultaneous effects of deer browsing, competing vegetation and soil conditions on the vegetation that's out there in our forests," said Diefenbach, an adjunct professor of wildlife ecology.

According to Diefenbach, the GPS technology has been instrumental in the success of the project.

"The deer collar is basically a GPS unit that relies on satellites to estimate a location," Diefenbach said. "Those collars can transmit data to a satellite, which then transfers that information to us via the Internet. Because of this technology, we can get more locations over a longer period of time."

Thanks to this technology, Diefenbach, McDill and other researchers can watch remotely from their computers as each deer zigzags across the forest terrain.

"I think one thing that the GPS collars have provided is some insights into how adult male deer are able to avoid being killed," Diefenbach said. "Because we've been following their movements every 20 minutes during the hunting season, you can see they respond incredibly quickly to the hunters."

According to Diefenbach, opening day of regular deer hunting season in

Pennsylvania brings as many as 700,000 hunters to the state's forests.

"We've known for decades that adult males are much harder to kill than females or even younger males, but this study has really shed light on how they survive."

For a seasoned researcher like Diefenbach, the evolution of technology in the field has been crucial to recent discoveries and advancements in deer research.

"When I was a graduate student, we had very high frequency (VHF) collars. Generally, what people did was go out on the ground, try to plot the animal's location as best they could on a USGS topographic map, and then by recording multiple readings of where a signal was coming from so they could determine the location," Diefenbach said.

"Using the technology we have today, we can get hundreds of locations per day on one animal. So it's just a game changer in understanding animal movements and how they respond to environmental factors and human activity. There's just no other way we could collect data this accurate."

According to Rosenberry, studying deer movements isn't only crucial to species-specific management, it's also necessary for a better understanding of forest management in general.

"One of our goals is to maintain deer populations at levels where forest habitat is sustainable. And that's important not only from a deer standpoint—because the forest provides a habitat for deer—but for many other wildlife species, plant species and recreation."

For Rosenberry, studying this relationship is an important step in preserving forests for future generations.

"When we look at a forest, a lot of times we just see the big trees," Rosenberry said. "But in order for those big trees to exist, there had to be small trees at some point in the past. Those small trees that are growing today will be the forests of tomorrow."

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