Indiana Department of Natural Resources

WILDLIFE RESTORATION GRANT—INDIANA

Gray Fox Investigations

A chemically immobilized (drugged) gray fox with GPS collar attached and supplemental oxygen provided to help ensure safety of fox. (Photo by Julia Nawrocki)

CURRENT STATUS

First year of a four-year project

FUNDING SOURCES AND PARTNERS

Wildlife Restoration Grant Program (W48R3)
Wildlife Ecology Institute
Luther College
Gilchrist Foundation

PROJECT PERSONNEL

Dr. Tim Hiller, Principal Investigator, Wildlife Ecology Institute
Dr. Dawn Reding, Project Partner, Luther College
Julia Nawrocki, Field Ecologist, Wildlife Ecology Institute
Brandon Bernhardt, Field Ecologist, Wildlife Ecology Institute

BACKGROUND AND OBJECTIVES

Gray foxes (*Urocyon cinereoargenteus*) are a valuable and understudied furbearer, not only in Indiana, but also across their entire range. Several indices suggest populations declined between the 1970s and 2010s in Indiana and other Midwest states. The cause(s) of these declines is unknown but may be linked to habitat loss and fragmentation, changing mesocarnivore (e.g., coyote, *Canis latrans*) community structure, disease, and other factors; there is likely a complex relationship among these factors. To assess factors potentially affecting current populations, we implemented a large-scale, comprehensive study at two sites in Indiana to provide recommendations for management of this species in Indiana and other Midwest states. The objectives of this project are to:

Gray fox recovering from drugs. The tag in each ear permanently marks each fox. (Photo by Julia Nawrocki)

1. Attach a global position system (GPS) collar to 40–70 gray foxes in Indiana in two multi-county study sites;
2. Assess survivorship and cause-specific death of gray foxes, including an attempt to assess pup survival;
3. Determine habitat use of gray foxes;
4. Model potential gray fox habitat in Indiana;
5. Assess diseases and parasites of gray foxes;
6. Conduct diet analysis; and
7. Evaluate gene flow and identify potential genetic barriers.

More information can be found on the project webpage: https://www.wildlifeecology.org/grayfox_indiana.html

METHODS

Our study area includes two multi-county study sites selected based on differing proportions of land-cover types (e.g., cultivated crops, forest) and differing numbers of observations of gray foxes. The central Indiana study site includes Bartholomew, Decatur, and Shelby counties, which consists of 67% cultivated crops and 18% forested land cover. This site also had sufficient reports of gray foxes to allow us to achieve our objective for collaring an adequate number of foxes. Conversely, the southern Indiana study site includes Crawford, Harrison, Orange, and Perry counties, which consists of 12% cultivated crops and 60% forested land cover. This site contains the highest relative number of gray fox observations in the state. Our selection of two study sites with differing landscape compositions will allow for a comparison of population characteristics between them. Also, land ownership patterns differ substantially by site and may provide additional information related to gray fox populations. The central site consists almost exclusively of privately owned lands, whereas the southern site includes a substantial amount of publicly managed lands.

Our capture methods include our use of cage-traps on public and private lands, with permission. In addition, we have an incentive program in which a trapper may contact us immediately after trapping a live gray fox on one of our study sites during the regulated trapping season. Once captured, we safely use drugs to chemically immobilize the fox, attach a GPS collar, collect blood and tissue samples for DNA and disease testing, and collect other data. We then use a combination of drugs to reverse the effects of the original drug, and we allow the fox to recover fully and safely in a small dog kennel. Once recovered, we release the fox at the capture site and closely monitor the collared fox via telemetry signals for the next several days. We periodically monitor each fox by using an antenna and receiver that detect the very high frequency (VHF) signals emitted from the collars. We can also use a special receiver to download the location data using an ultra-high frequency (UHF) signal from each GPS-collared fox once we locate them by using that VHF signal and get close enough to the fox.

WEI Field Ecologists, Brandon Bernhardt (L) and Julia Nawrocki (R), after collecting data from a chemically immobilized gray fox. (Photo by Caylen Wolfer)

Gray fox on our southern study site with cage-trap set in background. (Photo by Brandon Bernhardt)

One of our GPS-collared gray foxes, taken by a trail camera placed by a trapper. (Photo by Chris Isaacs)

Locations from foxes will be used for our statistical analyses to determine home-range size (i.e., the specific area regularly used by an individual fox) and habitat use. When one of our collared foxes dies, we collect the carcass to determine cause of death. Once we have data from all foxes, we can estimate survival rates. By collecting blood and tissue samples, we can monitor for diseases (primarily canine distemper and canine parvovirus) and toxicants (such as lead). We are also collecting parasites to determine if these may be affecting foxes. From the genetic samples that we collect, we can determine how isolated different populations of gray foxes in Indiana may be, and what genetic barriers (such as a very large area of non-forested agricultural land) may be causing that isolation. We are collecting carcasses of gray foxes from throughout Indiana to collect DNA and tissue samples. Last, the project webpage has an online observation form by which anyone observing a gray fox in Indiana may submit information. This can then be used to determine specific areas within study sites for focusing capture efforts as well as for modeling potential habitat within the state.

PROGRESS TO DATE

After much planning, we started our field work in October 2020 to coincide with the trapping season for gray foxes (Oct. 15–Jan. 31). From October to December 31, 2020, we GPS-collared eight gray foxes, all of which were captured by trappers during the regulated trapping season. During that time, one collared fox was found dead. We collected ear-punch tissue (for future genomic DNA analysis) and blood samples from foxes. We tested for blood-lead levels; only one of the eight foxes had any detectable lead, at a low level. We also made blood-smear slides for microscopic analysis of blood-borne parasites and blood-cell characterization (e.g., to detect evidence for anemia, inflammation, or other abnormalities), and five samples have already been evaluated by a clinical pathologist. We were also able to collect enough blood from six samples to sequence DNA from potential blood-borne pathogens and to separate the serum for antibody testing for seven diseases: heartworm, Leptospirosis (6 serovars), Toxoplasmosis, canine distemper virus, canine parvovirus, canine adenovirus-2, and canine coronavirus. We found and collected ectoparasites from seven foxes and identified the ticks and fleas present. During this time, we also collected seven carcasses from trappers for DNA and tissue samples. In the future, we plan to secure additional permission to increase our capture efforts (using cage-traps, particularly after the regulated trapping season) for gray foxes, to locate dens and collect data from pups during spring, and to conduct necropsies to determine cause of death.

COST: $1,021,738 FOR THE COMPLETE FOUR-YEAR PROJECT