

Researchers burrow deep to protect endangered frog

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To protect the locally endangered crawfish frog, researchers at Indiana State University first had to get to know the reclusive amphibian.

Named because it lives in abandoned crayfish burrows, the frog is a secretive species that spends most of its time underground.

"You could live in an area where they occur and you wouldn't have a clue. You wouldn't stumble upon them—they're essentially in burrows 11 months of the year," said Jonathan Swan, a graduate student majoring in biology.

The Wisconsin native was drawn to study the frogs because of their

uniqueness, which also poses a problem to protecting them. He and other researchers, including Rochelle Stiles, a doctoral student in biology, have been working to establish the natural history of these frogs as a first step to saving the 1,000 or so adults left in the state.

Crawfish frogs were listed as endangered in Indiana in 1988, but short of a few small studies by naturalists dating back to the 1800s, little is known about the creature, which is comparable in size to a small bullfrog.

"It's ironic we're doing this type of research in this decade," Stiles said. But "in Indiana, we know more than other states about what's going on."

That knowledge is thanks to federally allocated state funding awarded since 2009 to Mike Lannoo, professor of anatomy and cell biology at the Indiana University School of Medicine at Indiana State, and partnerships with the Indiana Department of Natural Resources and Detroit Zoological Society. Stiles and Swan work with Lannoo in his lab on campus.

In addition to their reclusiveness, crawfish frogs have a high mortality rate - of the 4,000-7,000 eggs a female lays, maybe one or two will make it to adulthood.

"We estimate it takes five years for one frog to replace itself—to breed and make another adult. That's not good odds," said Stiles, a native of Chippewa Falls, Wis. "Each frog is highly valuable."

Once reaching adulthood, however, they do have the benefit of being long-lived, up to 10 years. One of Stiles' research projects was installing time-lapse cameras at the entry of their burrows, which they emerge from to eat. "It's neat, because you can see how an individual frog spends its day and night," she said.

Swan has been creating artificial burrows for this prairie species. Of course, there's not much grassland in the state that hasn't been converted to farmland.

"Their habitat requirements and our land use just don't align. There are things that could potentially be done, but there aren't as many corridors or habitats available for them," he said. Former mining sites that are being reclaimed as grassland are among the species' biggest opportunities.

While captive breeding hasn't been attempted, a captive-rearing program with their partner in Detroit has allowed researchers to raise tadpoles to the juvenile stage and release them.

"They're not a species that is receptive to being kept in captivity," Swan said. "The tadpole stage is the easiest to work with them. There have been attempts in the past to retain some of these frogs, but the adults die within a short time period. They're definitely fickle."

The captive-raised juveniles, however, are more adaptive than the adults and have used Swan's faux burrows. But like human teenagers, they go about testing boundaries, moving from burrow to burrow, especially during the wet weather.

"It could be part of their DNA and constitution that during that stage, they're going to be moving. This is the first time we've had the opportunity to work with the juveniles at such a young age," said Swan, who gets up at 5 a.m. every day to monitor the artificial burrows.

Jen Heemeyer, who earned a master's degree from Indiana State in 2011, tracked the frogs with telemetry and learned they used the same home burrows, year after year. The frogs leave their burrow and travel up to 1,200 meters to breeding wetlands. After breeding, they return to their

home burrows, sometimes using different migratory paths. Of course, once they're out of the burrow, they're susceptible to predators.

"We have some sense, anecdotally, that these frogs have used these burrows previously—they know where they are, they sort of have this homing beacon and use the same pattern each year," he said. "It could be that in their younger life, they found these burrows. There seems to be a sense of orientation with them."

Future research options include creating new breeding ponds and possibly genomic sequencing to determine the genetic diversity of populations around the state.

"It's been a rewarding project. It's multi-faceted, monitoring both adults and juveniles and various side projects—all to gather information about the life history and [natural history](#) of the crawfish [frog](#)," Swan said.

Provided by Indiana State University

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