



STATE WILDLIFE GRANT PROJECT REPORT—INDIANA

Repatriation of Eastern Hellbenders Via Translocations and Head-Starting



Indiana’s largest salamander, the Eastern hellbender, has been called “old lasagna sides” because of the skinfolds running along the sides of its body.

Current Status

Final year of a four-year project

Funding Sources and Partners

State Wildlife Grant Program (T07R11)
Purdue University
The Nature Conservancy

Project personnel

Principal investigator, Dr. Rod N. Williams, Purdue University
Dr. Zachary H. Olson, post-doctoral researcher (2011–2012)
Dr. Steven J.A. Kimble, post-doctoral researcher (2012–2013)
Bart T. Kraus, master’s student (2011–present)

Technicians

Kaylin Adams (2011)

Seth LaGrange (2011, 2012)
Stephen Nelson (2011)
Nick Carrico (2011)
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Cody Rhoden (2012)
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Background

Hellbenders are large salamanders that live underwater their whole lives in cool, clean rivers and streams. They can be found from Missouri east, through the

Appalachian states, including Midwestern states like Indiana. Hellbenders are nocturnal. They live under large, flat rocks for shelter and feed primarily on crayfish. Their presence is thought to indicate high water quality. They breed in late fall. During that time males occupy a suitable rock, hoping to attract a female mate that will then deposit eggs. Males guard their nest rocks against potential predators until the young hatch.

Hellbender populations have declined across their range the past few decades. Causes are not well known, but may include habitat destruction from dredging and damming of waterways; habitat degradation, such as excessive siltation; mortality from fishing; and collection for the pet trade.

Recently completed research on Indiana's Eastern hellbender (*Cryptobranchus alleganiensis alleganiensis*) population has revealed that numbers and densities are critically low. Indiana's hellbender population was found to be composed almost exclusively of old individuals. This means there has been little successful reproduction during the last 20 years. Separate investigations of water quality and health of individuals provided little evidence that either was compromised. As a result, neither seems to be a likely cause for lack of reproduction in Indiana. However, mark/recapture and telemetry data suggest hellbenders were scattered throughout the Blue River with little spatial overlap among individuals. These isolated individuals may not come into contact with others during breeding season. This may play a part in the lack of reproduction throughout the Blue River.

Objective

The overall goals of this research are to locally increase hellbender population numbers via translocations within and among rivers, evaluate post-release movements of translocated Eastern hellbenders, and develop a headstarting program. The rationale for translocating is to increase the number of breeding adults and therefore increase the potential for natural reproduction. Ultimately, the results of this research may influence management decisions to repatriate Eastern hellbenders throughout much of their former range.

Methods

We are using multiple approaches to increase population numbers throughout Indiana. The first approach relies on capturing and translocating individuals from within the river. In the second, we translocated an equal number of juvenile Eastern hellbenders from a genetically compatible population that was captive-reared from wild-caught eggs from West Virginia. We monitored the translocated individuals by implanting radio transmitters that allowed us to track their movements and survival. We also captured and implanted radio transmitters into resident individuals that acted as comparison or control individuals. Hellbenders were transported in a system designed specifically for this project to minimize stress to the animals by maintaining appropriate water temperature and dissolved oxygen.

We evaluated the success of our translocations in two ways. First, we located each individual via radio telemetry as many as five times per week to evaluate post-release movements such as homing behaviors and differences in home ranges, and to document survival. Second, we conducted extensive nest searches to document any reproduction in our study sites and in other sites in the river. If we found hellbender egg masses during these surveys, we collected up to two egg masses for captive-rearing and headstarting. These captive-reared eggs were hatched, and the juveniles were reared in captivity to give them a better chance for survival upon release into the wild.

Progress to Date

We have successfully completed the field portion of this project (2011–2013). During 2012 we caught and implanted radio transmitters in 20 resident hellbenders throughout our translocation sites. We also successfully implanted radio transmitters into eight Eastern hellbenders known to be isolated throughout the river. These eight individuals were then translocated to more densely populated locations in an attempt to bolster local reproduction. Intensive radio telemetry has revealed no extensive post-translocation movements by individuals, indicating our translocations of adult hellbenders were successful. Nest searches have revealed that reproduction has occurred at several of our translocation sites. At least eight nests have been discovered since 2012. Moreover, we have discovered three additional nest-site locations within the study area. In 2012, we discovered one fertilized egg mass with 120 viable eggs. This clutch was collected after a male regurgitated all 120 eggs upon capture. A second clutch of 15 eggs was found strewn unprotected along the bottom of the river.

Both clutches of eggs were moved into captivity at Purdue University for hatching and headstarting. The eggs showed signs of development during early embryogenesis, but few embryos hatched. Most individuals were likely injured when the guarding male consumed the eggs.

In 2013, two additional clutches were collected from artificial nest boxes and moved into captivity. One clutch later died for unknown reasons but the second successfully hatched approximately 200 individuals. We currently have, rearing in captivity, 12 individuals from the 2012 clutch, 235 individuals from the 2013 clutch, and two individuals from a 2014 clutch. All larvae will be released back into Indiana waters once they have reached 2 to 3 years of age.

During 2012, we captured four additional adult Eastern hellbenders. Three were implanted with radio transmitters and translocated to supplement the existing population at one of our study areas. In addition, 10 juveniles were surgically implanted with transmitters and released at our second study area one month after surgery. The 10 juvenile surgeries were performed at the Purdue Veterinary Small Animal Hospital, where we successfully identified the sex of all via laparoscopy.

We have monitored the survival, habitat use and movement of nearly 40 translocated hellbenders for the past two years. We collected 28 months of telemetry data that could be used to assess hellbender survival. We documented 11 hellbender mortalities (six adults and five juveniles). We located two of the 11 carcasses, but could not determine the exact causes of mortality. Survival rates ranged from 25% (juveniles) to 80% for adults.

Juvenile mortality in the wild can exceed 99% for salamanders, therefore increasing the survivorship from less than 1% to 25% is a critical step towards increasing Indiana's hellbender population. Adult survival estimates for hellbenders that were translocated compared to those that were not moved were equal. This indicates that translocations are an effective method to bolster local reproduction in select areas. Results of this study are critical to the continuation of headstarting and translocation of hellbenders in Indiana.

This project has enabled two post-doctoral researchers, a graduate student and numerous undergraduate technicians to learn important skills for their future careers. Data obtained from this project will be used to help the graduate student meet requirements for his degree from Purdue and to provide information to help manage Eastern hellbenders in Indiana and throughout their range.

Cost: \$692,854 for total three-year project