

Non-Invasive Population Survey of *Cryptobranchus alleganiensis* Using Nest Boxes In Bent Creek,
Asheville, North Carolina

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Abstract:

Cryptobranchus alleganiensis or Hellbenders are a species of endangered, aquatic, giant salamanders that populate the eastern coast of the United States. One of the problems that this species face is habitat degradation caused by an increase in suspended river silt that fill the rock crevasses in which the salamanders reside. In addition the previous survey technique of flipping over rocks in order to look for hellbenders is problematic because once a hellbender's rock has been overturned, that hellbender will never return to that spot. I propose a project to build nest boxes or hellbender habitats in order to survey and build habitats for a hellbender population in Bent Creek NC. These nest boxes will be constructed from cement and will be implanted into Bent Creek. Any hellbender found in the nest boxes will be documented and photographed while remaining untouched. This survey will also determine if there is a viable breeding population in Bent Creek. This project will also work to monitor this populations through two mating seasons with occur in the fall.

Background

Cryptobranchus alleganiensis, or hellbenders, are a species of fully aquatic, giant salamanders that are endemic to the eastern United States. Hellbenders live in fast moving, high oxygenated waters and have a diet of crawfish as well as fish³. They are on the list of special concerned species, one main reason for this is habitat deterioration. Hellbenders live in the crevasses of large rocks, however, because of human development there has been an increase in silt suspended in rivers and creeks. This silt plugs the rock crevasses to effectively abolish their habitat. Surveying techniques have also played a part in habitat deterioration. To survey hellbenders, researchers have flipped over or disturbed colonial rocks in order to find hellbenders. This is problematic because a hellbender will never recolonize a rock that has been flipped over, therefore this technique works to eliminate a piece of their habitat. In order to support hellbenders, researchers must help to rebuild their habitat and to survey the animal in non-harmful ways.

In 2013, former UNCA student, Alexander Levine¹, found hellbenders in Bent Creek, Asheville, NC. This project would be a continuation of his study to see if these hellbenders represent a viable breeding population. In order to survey the hellbenders without destroying their habitat, we will use nest boxes. This method has been used by Duke graduate student Arianne Messerman to help restore hellbender habitats in western North Carolina³. Nest boxes are cement containers made from non-toxic concrete, they can be inserted in a riverbed where hellbenders are known to thrive. These boxes act as artificial habitats that can be occupied by hellbenders. This project would utilize the nest boxes in Bent Creek to monitor the hellbender habitat while also providing a new habitat for these animals.

Methods

At the beginning of the project, abiotic samples would be taken from Bent Creek. The area in Bent Creek that will be surveyed will be deep water pools that are separate from the public walking trails. This will be done in order to avoid the nest boxes from being disturbed. Data that is collected from these sites, will be used to determine the optimal location to set up the nest boxes. At the same time, we will build approximately 10 nest boxes. This study will utilize a newer nest box design that is more resistant to dislodgment due to high river flow. The boxes are also designed to mimic rock creases which are the preferred habitat of hellbenders. The boxes are constructed by first creating wooden molds and wire frames. A PCP pipe is placed in the frame in order to create a path way or hellbenders to enter the habitat. Once the frames and molds have been constructed, cement is poured and dried over the molds. When the cement is dried the molds are removed to reveal the completed nest boxes. Once the optimal locations have been decided and the boxes are constructed, the boxes will then be installed into Bent Creek. The nest boxes will then be monitored regularly in order to determine the condition of the boxes as well as hellbender occupancy. The boxes will be monitored more often in the fall, during mating season, in order to detect any eggs or larvae occupying the boxes. This survey will continue through two mating seasons in order to increase the chance seeing hellbenders taking up residency in these boxes. Any hellbender found in these boxes will be photographed and documented.

Budget

Non-toxic cement \$140
Gauge hardware cloth \$50
Metal handles \$8
4x10 PVC pipe \$16
PVC lids \$30
Ratcheting straps \$25
Plywood sheets \$90
Building supplies (hammer, nails, crowbars, and tape) \$58

Budget Justification

I request funding in order to purchase supplies in order to construct nest boxes. Each nest boxes averages \$100 to construct. The plywood is required to construct a mold for the nest box, with this budget two molds can be constructed. Each nest box and nest box lid requires a metal frame made out of gauge cloth. The PCV pipe is placed in the mold in order to create an entrance way for the hellbenders. The ratcheting straps are wrapped around the mold in order to keep the structure in place while the cement is drying. Each nest box requires one and a half bags of cement. While another one and a half bags of cement are also required for 4 nest box lids. The PVC lids and metal handles are placed on the nest box lids in order to more effectively survey the nest boxes after installation. The building supplies fund would be used to purchase nails, tape, plastic slip tides and other material necessary for construction. With a budget of \$500 I will be able to start building the first 5 nest boxes for my research.

Timeline of Research Activities

Fall Semester of 2017: Start building nest boxes.
Spring Semester of 2018: Finish building the nest boxes

May-June of 2018: Install nest boxes into Bent Creek

July of 2018- Fall Semester of 2019: Observe and catalog the activities of the hellbender.

Fall Semester of 2019: Compile data, prepare scientific article to be published in the UNCA Journal.

Prepare a presentations for the UNCA Symposium.

Citations

1) Levine, Alexander. "Determining the Presence of Eastern Hellbender (*Cryptobranchus alleganiensis alleganiensis*) and Differentiators of Occupied vs. Unoccupied Habitats in Bent Creek, Buncombe County, North Carolina." December 2013, 152-58. Accessed March 1, 2017.

2) Mayasich, Joseph , et al. "EASTERN HELLBENDER STATUS ASSESSMENT REPORT." National Regulatory Research Institute, June 2003, pp. 1-40. Google Scholar, Accessed 17 Sept. 2017.

3) Messerman, Arianne. "The Use of Nest Boxes by the Hellbender Salamanders in Western North Carolina." April 2014, 1-28. Accessed March 1, 2017.