

A Comparison of Amphibian Communities between Natural Ponds and Constructed Ponds of Multiple Age Classes: Evaluating Conservation and Mitigation Implications

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Project Overview

Among the many causes for amphibian declines, habitat loss and alteration remains the most significant. In the United States, a lack of federal protection for isolated wetlands that provide habitat for unique species has resulted in a loss of potential breeding habitat. The process of constructing ponds in order to replace the functions of lost ponds, or mitigation, has been found to not replicate the lost ponds in structure or ecological processes. A lack of general monitoring has produced a void in knowledge of what long-term role constructed ponds play in amphibian communities. Vernal, temporary ponds are of particular importance in the caudate rich Eastern United States, where multiple caudate and anuran species utilize them exclusively for breeding habitat (see species involved section).

This research will compare amphibian communities of natural ponds and multiple age classes (2-20 years) of constructed ponds in Daniel Boone National Forest, Kentucky, USA. These data will produce a chronology that will determine at what age, if any, constructed ponds most resemble natural ponds in terms of amphibian communities. Also, constructed and natural ponds will be compared with relation to habitat variables including canopy cover, hydroperiod, coarse woody debris, aquatic vegetation, and distance to nearest possible source pond. Understanding the habitat use and community changes of amphibians is important to those concerned with management, especially in the light of continued habitat loss, pollution, and climate change. The results from this study will be immediately relevant to those who construct ponds for habitat enhancement and mitigation, and will better allow said parties to construct ponds to suit natural amphibian communities. As amphibian conservation and management become increasingly important in light of rapid declines, the ability to construct habitat and monitor it efficiently will be crucial in preservation of the diversity of North American caudates.

Caudate species directly involved: marbled salamander (*Ambystoma opacum*), spotted salamander (*Ambystoma maculatum*), jefferson salamander (*Ambystoma jeffersonianum*), four toed salamander (*Hemidactylium scutatum*), and eastern red-spotted newt (*Notophthalmus viridescens*)

Potential species affected by management conclusions: All other vernal pool breeding caudates of the Eastern United States including tiger salamander (*Ambystoma tigrinum*), blue-spotted salamander (*Ambystoma laterale*), polyploidy Jefferson/blue-spotted hybrid complex, etc.

Abbreviated Budget

<u>Description</u>	<u>Cost</u>	<u>Amount</u>	<u>Total</u>
Hardware cloth, stakes, etc. for constructing aquatic traps	\$250.00	1	\$250.00
Collapsible mesh minnow traps	\$9.99	40	\$399.60
Travel cost (mileage only)	\$0.41/mile	4320mi	\$1,771.20
Stipends for undergraduate assistance	\$7.25	256hr	\$1,856.00
Total project cost			\$4,276.80
Kentucky Academy of Science Marcia Athey Fund to defray travel cost			(\$600.00)
Caudata.org grant to defray cost of undergraduate assistance			(\$1,000.00)
Final project cost			\$2,676.80

The funds from the Caudata.org grant would support the stipend for undergraduate field assistance. Not only is this assistance necessary to gather data from a sufficient number of field sites, but also functions as a method for giving undergraduates who are interested in amphibian conservation valuable field research experience. Graduate student's thesis projects are not monetarily supported at the department level, and students are expected to acquire funding through grants and personal funds.

Timeline of Work/Dissemination of Results

Amphibian sampling will be conducted May-September 2010. Manuscript preparation will begin in the fall and submission for scientific publication will take place in the spring. Results will be presented to the United States Forest Service personnel of Daniel Boone National Forest. Presentations will be made at the Joint Meeting of Ichthyologists and Herpetologists, The Meeting of the Kentucky Academy of Sciences, The Meeting of the Society of Wetland Scientists, among others.