



# Population Ecology of the Jefferson salamander, *Ambystoma jeffersonianum*, in Illinois

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## Abstract

Amphibian populations utilizing small isolated wetlands are often small in size, have little to no contact with other populations, and are susceptible to stochastic extinction processes. The persistence of such populations can only be ascertained by obtaining data that allow the prediction of the population's growth, trajectory, and capacity to achieve a sustainable size. The Jefferson salamander, *Ambystoma jeffersonianum*, is a state-threatened species, occurring at fewer than 15 ponds within Illinois. Individuals at a pond in the east-central part of the state are captured using a drift fence-pitfall trap array, then sexed, measured for SVL, and marked using a unique combination of toe clips. Also obtained are the number of egg masses, average percentage of successfully hatched eggs, and number of juveniles leaving the pond. All data is then entered into a life history table and used to develop a population model. Information obtained from the model will be used to determine which life history stage is critical to the survival of the population, and it will allow management efforts to focus on mechanisms that are most likely to cause declines.



## Introduction

- Habitat destruction and forest fragmentation have led to the isolation of small habitat fragments. Populations inhabiting these areas are typically small and are susceptible to stochastic extinction processes<sup>3</sup>, especially if they exist at the edge of the species' known distribution.
- Isolated populations of *Ambystoma jeffersonianum* breed at fewer than 15 ponds in east central Illinois<sup>4</sup>. This study provides information on a population at Lincoln Trail State Recreation Area (LTSRA, Fig.1; Clark County, Illinois).
- A population model will be used to assess the stability of the population as well as suggest any needed conservation measures<sup>1,2</sup>.

## Questions

- How many individuals are in the population?
- How stable is the population?
- What conservation efforts (if any) need to be made?

## Methods

- We constructed a drift-fence pitfall trap array around a pond at Lincoln Trail State Recreation Area (Fig. 2).
- We measured, sexed, and toe-clipped all individuals entering or leaving the breeding pond during the 2004 and 2005 breeding seasons.
- We counted all egg masses, and determined the average number of eggs per mass, the hatching success of each mass, and therefore, the number of larvae produced per season.
- We entered all demographic data into a life history table and developed a stage-based population model<sup>1</sup>.



Figure 1: Map of counties in Illinois. The two purple counties are where isolated populations of *Ambystoma jeffersonianum* are known to occur. The bottom county (Clark), is where LTSRA is located.



Figure 2: *Ambystoma jeffersonianum* breeding pond at LTSRA.

## Results

- In 2004, we recorded 104 marked *Ambystoma jeffersonianum* (68 females and 32 males)
  - We counted 487 egg masses
  - We determined that there were 6750 larvae
  - We recorded 4 marked juveniles
- In 2005, we recorded 84 marked *Ambystoma jeffersonianum* (47 females and 37 males)
  - We counted 393 egg masses
  - We determined that there were 5447 larvae
  - No juveniles were recorded
- In 2004 and 2005, the breeding pond dried before larval development was complete
- We recorded an average of 18 eggs per mass
- Females laid an average of 7 egg masses (129 eggs)
- Eggs had a 77% survival rate to hatching

## Management Options

- Initial emphasis should be placed on enhancing larval survivorship.
- We recommend that the breeding pond at LTSRA be excavated in order to provide a water depth that allows all larvae to complete metamorphosis.

## Literature Cited

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