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BLUE GILL (*LEPOMIS MACROCHIRUS*) PREDATION ON SPOTTED SALAMANDER (*AMBYSTOMATA MACULATUM*) EGGS

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ABSTRACT

In central Pennsylvania spotted salamander (*Ambystomata maculatum)* eggs occur more frequently in vernal ponds without fish than permanent ponds with fish. To test whether this pattern of distribution in salamander eggs is due to fish predation, we monitored the frequency with which blue gills (*Lepomis macrochirus*) fed upon spotted salamander eggs. Contrary to expectation, blue gills did not significantly prey on spotted salamander eggs, although research by others has shown that blue gills do prey on salamander larvae. Further research is needed on the effect of fish on breeding behavior of spotted salamanders

Keywords: Ambystoma maculatum, *fish*, Lepomis macrochirus, *predation*, *salamander eggs*

INTRODUCTION

Predation may have a large effect in determining the abundance of salamanders in a particular body of water. For example, spotted salamanders (*Ambystoma maculatum*) generally lay their eggs more frequently in fish-less vernal ponds than in permanent ponds with many resident predators, including fish (Detwiler et al. 2000).

Salamander have evolved delayed hatching and various behavioral defenses to avoid predation by blue-gill fish (*Lepomis macrochirus*) (Kats et al. 1988, Sih et al. 1988, 1992, Sih and Moore 1993, Moore et al. 1996, Cunnington and Brooks 2000). However, it is unknown whether blue gill prey upon salamander eggs. In this study we hypothesized that blue gill do prey on spotted salamander eggs and that this predation can directly influence the abundance of spotted salamanders. This research could be used to understand the predator-prey relationships of blue gills and spotted salamanders, and/or to justify preservation of vernal ponds, should low predation rate be a determining factor of salamander abundance.

MATERIALS AND METHODS

Eight adult blue gills were collected by hook and line by Dr. Doug Glazier at Woodcock Valley Pond (McConnellstown, Pennsylvania). Spotted salamander eggs were obtained from vernal ponds along Petersburg Pike between Huntingdon and Petersburg, Pennsylvania. Amphipods (*Gammarus minus)* were collected at Petersburg Spring (Petersburg, Pennsylvania). The blue gills were kept in a large aquarium, filled with equal amounts of pond and spring water. The experimental tank was filled in a similar manner, to keep a consistent environment. Until use, the eggs and amphipods were kept in their original water in a cold room.

For each trial, two or three experimental fish were taken out of the main tank and placed in a sectioned-off aquarium for a day of acclimation before the start of trial. For each trial, a section of salamander eggs about the size of a golf ball (containing about 6 individual eggs) were added to each section, and the fish were monitored for 45 minutes while observations were recorded. After that time, two

amphipods were added to each section, as a control. The control was used to determine if the fish would eat at all under laboratory conditions. Three trials were run, two with three fish and one with the remaining two fish.

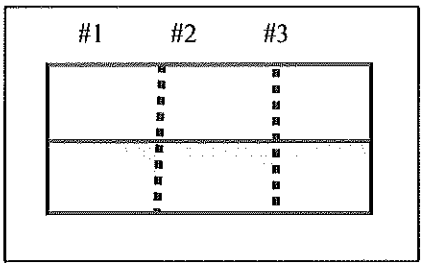

Figure 1. Diagram showing the experimental tank, including the dividers.

RESULTS

Table 1 shows the eggs to amphipod ratio eaten by the eight blue gills monitored during this experiment. None of the fish ate the salamander eggs, but every fish ate at least one amphipod during the observation time. According to the binomial theorem, the probability of obtaining these data by chance is 0.004.

*Table 1. Number of spotted salamander eggs eaten versus number of amphipods eaten by eight blue gills (*Lepomis macrochirus*).*

Fish	Number of eggs eaten	Number of amphipods eaten
1	0	2
2	0	1
3	0	2
4	0	2
5	0	2
6	0	2
7	0	2
8	0	2

DISCUSSION

Our findings do not support the hypothesis that blue gill predation on eggs is a determining factor of salamander abundance in permanent ponds. In fact, during the experiment the 'body language' of the fish suggested that they did not recognize the eggs as a prey item; the fish seemed afraid of the eggs. Therefore, egg predation is probably not a determining factor in the greater abundance of salamander eggs in vernal versus permanent ponds

Our conclusions are speculative, however, because the eggs were not from the same pond where the fish were captured. Because of this, these particular fish may not recognize salamander eggs as prey items. Further studies that might address this issue would run feeding trials using spotted salamander eggs from a pond containing blue gills.

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