Introduction:

Though they are common throughout most of the United States, eastern tiger salamanders (Ambystoma tigrinum) are found as Endangered in New York. Aside from the fact that natural wetlands are under threat due to urban sprawl and development, some eastern tiger salamanders have been reported to be breeding in artificial wetlands, such as road side drainage ditches. This study addresses the question of whether artificial wetland and microhabitat conditions are suitable for emergence of metamorphosed salamanders. Variables between the two ponds and the presence or absence of canopy over the two ponds are examined in order to determine whether they impact the emergence of salamanders.

The eastern tiger salamander is one of the largest terrestrial salamanders in the United States, with adults ranging in size from 18 to 21 cm in total body length. The subspecies that exists in New York is a grey to brown color with irregular silver green blotches covering its body. This subspecies is known to breed in the spring in temporary floodplain ponds, where its larvae are the top predator. At the pond site, the larvae grow and develop into adults before emerging onto dry land. The metamorphs, like the adults, are most active at night, and seek out small mammal tunnels for refugia.

At Brookhaven National Laboratory, eastern tiger salamanders are abundant compared to the rest of Long Island. Over 15 wetlands on the lab ground have been identified as breeding pools, some of them natural and some of them man made. Using drift fences, surveys, metamorphs are being sampled from selected ponds.

Methods:

Two ponds known to host tiger salamander larvae on the lab were chosen, one man-made pond and one natural pond. Four segments of drift fences were setup at both ponds, at the Northwest, northeast, southwest, and southeast edges. Each drift fence segment consisted of two pieces of aluminum tubing in a “V” formation, joined by a basket sunk even with ground level at their vertex and at each end. The drift fences were designed so that a salamander emerging from that portion of the wetland’s border would travel uphill to where the fence was blocking its path. In an attempt to move around this obstacle the metamorph would crawl along the fence and the salamander would fall into the bucket.

The drift fences are checked in the morning, starting at 8:00 am, at which time each salamander is measured snout to vent length, weighed, and water temperature is measured. A layer of mud is allowed at the bottom of each bucket to allow the salamanders to hide and to keep beetles off of them. After being measured, the salamanders are spread out when released so as not to pass as one big meal for a predator. They are let go away from the fence in tall grass or bushes where they can hide until night.

On days where the fences are not mentioned, lids are secured on the buckets to prevent salamanders from entering.

Results:

To date (August 4, 2003), 246 eastern tiger salamander metamorphs have been recorded from Pond TS-7. These salamanders started emerging on July 16, 2003, when one salamander was found in the north-west drift fence. The number of salamanders caught over the 19 day survey period varied from day to day. Emergence was substantial on July 23 and 24, when 37 and 40 salamanders caught, respectively, and peaked on August 1 with 125 individuals. During emergence, the average number of salamanders per day was 12.95, but if the peak days are removed from the pool the average drops to 3.76. On six of those 19 days, no salamanders were caught.

The average temperature of Pond TS-6 was 21.26 ºC, and ranged from 18.5 ºC to 24 ºC. The average temperature of Pond TS-7 was 25.12 ºC, and ranged from 21 ºC to 28.5 ºC. On average, Pond TS-7 was 3.76 ºC warmer than Pond TS-6. The average temperature of Pond TS-6 was 21.26 ºC, and ranged from 18.5 ºC to 24 ºC. The average temperature of TS-7 was 25.12 ºC, and ranged from 21 ºC to 28.5 ºC.

More salamanders emerged on rainy nights than clear nights. 1.17, .79, and 1.17 cm of rain fell on July 23, 24, and August 1 (the nights when emergence was greatest), respectively. A total of 5.21 cm of rain fell during the survey, with an average of .27 inches per night (n=19). If these three nights are removed, the total precipitation falls to 2.08 cm, and the average becomes .13 cm per night (n=16).

The results to date indicate that the emergence of eastern tiger salamander metamorphs from Pond TS-6 is incomplete, while the emergence from Pond TS-7 is near its end. The reason for the delay from the Pond TS-6 may be because the water in this pond is cooler than the water in the man-made pond. This is probably caused by the absence of a tree canopy to block sunlight from heating the water in TS-7, and the presence of a canopy around TS-6. Tiger salamanders, like other amphibians, are exotherms and gather heat from their surroundings. Thus, the warmer the surroundings the more energy they take in, and the faster their metabolism and development.

The strong correlation between rain and emergence from Pond TS-7 can also be explained by basic principles of amphibian biology. Since amphibians lose moisture easily through their skin, emergence on rainy nights may reduce the risk of the metamorph drying out before it can find shelter on land.

Acknowledgments:

I’d like to thank my mentor, Jeremy Feinberg of the U.S. Fish & Wildlife Service, and Tim Green, the Natural and Cultural Resources Manager, for all their help in setting up and running this project. Rocco Devito helped with the manual labor setting up the fences. Tim Mitterer for providing me with weather data. My father, Steven Hoffmann, helped design and provide materials for the anti-predator screens. I’d also like to mention Sonu Coote, Megan Dyer, and Pia Kelly for their support, and Tim Walters for not laughing at me too much.