



Pond TS-6
A Natural Pond

Eastern Tiger Salamander (*Ambystoma tigrinum tigrinum*) Emergence in Natural and Man-Made Ponds

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Pond TS-7
A Man-Made Pond

Introduction:

Though they are common throughout most of the United States, eastern tiger salamanders (*Ambystoma tigrinum tigrinum*) are listed as Endangered in New York. Having lost their natural wetlands 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 how an artificial wetland compares to a naturally occurring wetland in productivity of metamorphic salamanders. Variables between the man made and natural wetlands include the usual lack of canopy over the man made wetlands and the presence of cleared areas around the pool.

The eastern tiger salamander is one of the largest terrestrial salamanders in the United States, with adults ranging from 18 to 21 cm in total body length. The subspecies that exists in New York is a gray to brown color with irregular olive green blotches covering its body. Like most Ambystomatids, the eastern tiger salamander is known to breed in the spring in temporary fish-less ponds, where its larvae are the top predator. As the pool dries, the larvae finish growing their limbs, absorb their external gills, and develop lungs before emerging onto dry land. The metamorphs, like the adults, are most active at night, and seek out small mammal holes for refuge.

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 fence surveys, metamorphs are being sampled from selected ponds.

The salamanders are identified by species, weighed, and measured from snout to vent. Those emerging from a natural pond with a tree canopy and surrounded by woodland will be compared to those emerging from a man made pond with no canopy surrounded by forest on one side and an open road on the other.



Tiger Salamander Metamorphs from TS-7 Awaiting Release on August 1, 2003

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 Southeast Drift Fence at Pond TS-6

Open Cover Allowing Salamanders in and Keeping Predators out

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 set up at both ponds, at the Northwest, northeast, southwest, and southeast edges. Each drift fence segment consisted of two pieces of aluminum flashing in a "V" formation, joined by a bucket sunk even with ground level at their vertex and at each end.

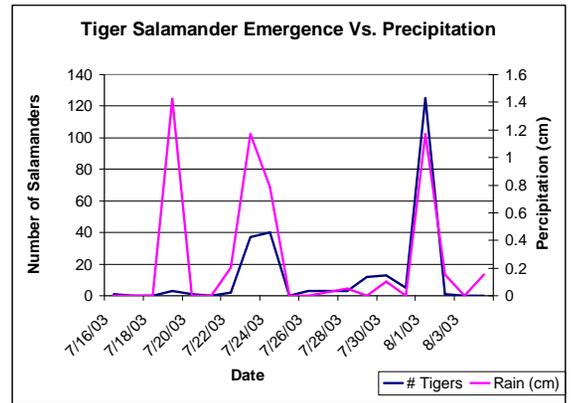
The drift fences were designed so that a salamander emerging from that portion of the wetland's border would travel uphill to where the fence was blocking its path. In an attempt to move around this obstacle the metamorph would crawl along the fence and the salamander would fall into the bucket.

The drift fences are checked in the morning, starting at 8:00 am, at which time each salamander is measured snout vent length, weighed, and water temperature is recorded. 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 pose as one big meal for a predator. They are let go away from the fence in tall grass or bushes where they can easily crawl out of sight.

On days where the fence is not monitored, lids are secured on the buckets to prevent salamanders from entering.

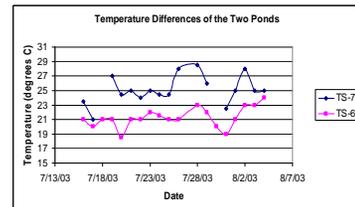
Results:

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 south-east 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, with 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 2.75 salamanders per day. On six of these 19 days, no salamanders were caught.



Only one salamander has emerged from Pond TS-6. This salamander was caught on the date that emergence at the other pond peaked, August 1.

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



Discussion:

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 this delay from the Pond TS-6 may be because the water in this pool is cooler than the water in the man-made pool. This is probably caused by the absence of a tree canopy to block sunlight from hitting 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 behind 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.

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