Eastern Tiger Salamander Tracking and Monitoring Techniques

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Abstract

Various methods are used for the tracking and monitoring of the New York State Endangered Species, the Eastern Tiger Salamander (*Ambystoma tigrinum*) in ponds and vernal pools surrounding Brookhaven National Lab (BNL). Such techniques as radio tracking, drift fencing, seining, and the use of an artificial egg-laying substrate, serve to monitor the tiger salamander, allowing for information to be gathered concerning habitat use during and after breeding, movement patterns, emigration distance, and seasonal habits.

Introduction

Once traced to Albany, tiger salamander populations are now found in New York State solely in Nassau and Suffolk counties on Long Island (figure 1). This decrease in tiger salamander habitat is widely attributed to development and human impact on the land. Through the tracking and monitoring of this New York State endangered species, one can survey the impact of development on an area, and what can be done to preserve the natural habitat of the animals which reside there.

Due to the fragile breeding habitat which tiger salamanders employ, this species serves as an indicator to the condition of the surrounding environment. Although tiger salamanders spend the majority of their time upland in a fossorial environment, the condition of the habitat in which they breed is of great importance to their survival as a species.

Methods and Materials

1.) Drift Fence Surveys

Drift fences serve as a means of monitoring salamanders in their natural habitat. Fences are constructed around the pond in an effort to sample the salamander as they move to and from aquatic breeding sites. Traps are checked daily for salamanders that have been captured. Animals found are then processed at the site, as weight, length, air and water temperature, pond water depth, and time are all taken into account.

Drift fences are made preferably of aluminum flashing held up by stakes on either side, encircling the pond (figure 2). Plastic buckets are used as traps, known as pitfalls.

2.) Egg Mass Grids

Egg mass grids are used to detect the presence of tiger salamanders, by serving as artificial oviposition sites at ponds and vernal pools.

Grids are assembled from polyvinyl chloride (PVC) tubing and nylon cord. PVC is connected in a rectangular shape and holes are drilled at intervals, which the nylon cord is then draw through, and woven in 10 cm squares. Foam pipe insulation is attached to one end to allow one end of the grid to float, and the opposite end to sink. (Alvarez, 2004) Grids are frequently checked for eggs which are subsequently identified and counted (figure 3).

3.) Seining

Seining is used to assess the species richness of animals in a pond, also allowing for detection of tiger salamanders. In addition, seining allows for the removal of salamander larvae and metamorphs from the water in order to count and identify (figure 4). Seining is best performed at night, when larvae rises up in the water column to feed. For small ponds, it is most effective to seine directly across the entire pond from shore to shore. In larger ponds, it is most effective to seine in towards shore in one continuous sweep. The bottom of the seine should be held to the pond floor by lead weights, to ensure an accurate survey of species richness and pond diversity. Each side of the net is attached to a seine pole, allowing the user to drag the net through the water, while keeping the bottom edge on the pond floor. If seining is being used to estimate density of animals in a pond, each seine haul should be independent of past ones so that each haul gives an independent estimate of the density of animals. (Heyer et. Al, 1994)

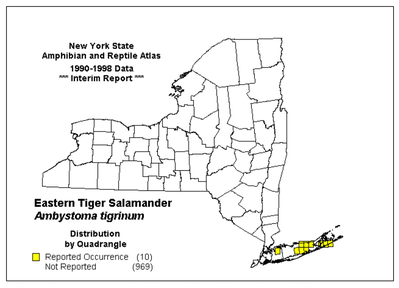

Fig.1 Current range of the Eastern Tiger Salamander in NYS.
http://www.dec.state.ny.us/website/dfwmr/wildlife/herp/eatisala.gif

Fig. 2 Drift fencing at breeding pond.

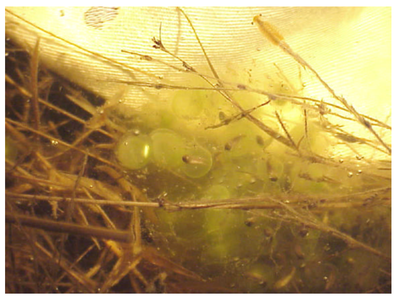

Fig. 3 Tiger salamander egg mass.

Fig. 4 Tiger salamander larvae.

Fig.5 Post-surgery adult tiger salamander.

Fig. 6 Metamorph found by seining in pond.

Fig. 7 Size of transmitter implanted in salamander when compared to a nickel.

4.) Radio Tracking

After being found in vernal pools and ponds, by way of previously mentioned methods the salamanders are marked by a transmitter during a short surgery. During the approximately twenty minute operation, the salamander is anesthetized by an anesthetic known as MS-222 (tricane methanosulfonate). A small incision is made on the abdomen, and the transmitter is inserted into the coelomic cavity (figure 7). If an individual already carries a transmitter, it must be removed in order to accommodate a new transmitter. At the end of the survey, animals with remaining transmitters should be found in order to remove transmitters. The incision made on the animal is closed with a non-dissolvable polyviolene suture (figure 5). The animal is rinsed with water so that any remaining anesthetic is removed, and revives about 15 to 30 min after the surgery. The animal is placed in a plastic container, kept moist by a wet paper towel, and recovers within hours, ready to return to its natural habitat.

Tracking the animal when back in its natural habitat is performed using handheld radio receivers attached to the 3-element yagi antenna. This system detects radio signals which become progressively stronger as the animal becomes closer. When a signal is tracked to a specific point, it is marked by flagging in the field to facilitate relocation. Additionally, GPS coordinates are taken, as well as date, time, air temperature, wind speed, and humidity.

Results

1.) Drift Fence Surveys

As a year round survey, drift fences provide information as to when tiger salamanders move to and from breeding sites as well as when movements due to weather occur. Metamorphs began emergence in late June and have continued through August.

2.) Egg Mass Grids

Egg mass grids were constructed or repaired, and placed at ponds in preparation for the tiger salamander breeding season, which begins around January, ending in April, with most activity generally taking place in March.

3.) Seining

Seining attempts produced confirmation of the presence of tiger salamanders in various ponds at BNL (figure 6). Seining in mid to late July indicated that metamorph emergence was nearing completion, as seining attempts provided less animals.

4.) Radio Tracking

Approximately 46 tiger salamanders are currently being tracked at 4 different ponds on lab property. Thus far, there have been no known mortalities due to transmitter implants. When dug up to change transmitters, one transmitter was found showing evident signs of predation, potentially by a short tailed shrew. It was also confirmed that tiger salamanders are more prone to movement during and soon after precipitation. (Faccio, 2003) The premature loss of some signals was suspected to be due to predation, transmitter failure, or length of migration.

Discussion/Conclusion

By tracking and monitoring the tiger salamander, one can determine during which periods migration to and from breeding ponds occur, at what point metamorphosis of tiger salamander larvae is complete, and the distance of migration after breeding or emergence. Knowledge of movements and habitat preferences is essential to the preservation of this endangered amphibian.

Literature Cited

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