02-0060W

Report to Illinois Wildlife Preservation Fund

Reproductive success of *Ambystoma platineum* Kickapoo State Park, Vermilion County, Illinois

submitted by Jennifer M. Mui

2) Survival of *Ambystoma* embryos

Introduction

Egg masses of *A. texanum* and polyploid *Ambystoma* were flagged and counted to determine their survival in a man made pond just outside of Middle Fork Woods Nature Preserve and a natural ephemeral pond within MFWNP. The man-made pond was excavated in December of 1996 to provide additional, more stable breeding habitat for the state endangered *A. platineum* and its sexual host *A. texanum*. In spring 2000, these two species bred in the man-made pond for the first time. This pond was studied to compare the breeding success in a man made pond to that in the natural pond. In 2002, salamanders bred in both the natural pond and the man-made pond.

Materials and Methods

The study site consists of one man made ephemeral pond just outside of Middle Fork Woods Nature Preserve which was excavated in December of 1996 and one natural ephemeral pond in MFWNP. In February of 2002, *Ambystoma* egg masses were found in both ponds. I located and flagged 25 polyploid and *A. texanum* egg masses in the new pond. Other egg masses were located but could not be counted due to the manner or place in which they were oviposited. In the natural pond, 25 dowel rods were placed throughout the pond and checked for egg masses. A total of 66 polyploid and *A. texanum* egg masses were laid on these 25 dowel rods. The eggs were counted and identified as *Ambystoma* polyploids or *A. texanum* based on the size of embryos. Embryos of *A. platineum* are larger than those of *A. texanum* (Downs 1989 a, b). Egg masses were assessed weekly until hatching to estimate their survival.

Results

Of the 25 egg masses flagged in the man made pond, 1 was identified as *A. texanum* and 24 as polyploid *Ambystoma*. In the natural pond, 10 egg masses were *A. texanum* and 56 were polyploid. In the man-made pond, 18 of the 24 polyploid masses and the 1 *A. texanum* mass were followed all the way through to hatching. In the natural pond, 43 polyploid and 5 *A. texanum* egg masses were followed through to hatching. In the man-made pond, 31% of polyploid embryos survived to hatching compared to 12.5% of polyploid embryos in the natural pond (Table 2), which was significantly different ($p = 0.008$) using a t-test. Eggs began hatching on 8 April in the man-made pond and all eggs had hatched by 17 April.

	Number of Masses	Average Survival
Natural pond polyploids	43	12.5%
Natural pond *A. texanum*	5	21.6%
New pond polyploids	18	31.1%
New pond *A. texanum*	1	42.9%

Table 2. Survival of polyploid *Ambystoma* and *A. texanum* embyos in a man-made and natural pond at Kickapoo State Park, Vermilion County, Illinois, Spring 2002.

3) Recruitment of *Ambystoma* metamorphs

Introduction

We used a drift fence with pitfall traps and cover boards to determine the recruitment of *A. texanum* and polyploid *Ambystoma* (*A. platineum* and individuals with higher ploidy resulting from fertilization by *A. texanum*) from a man made pond just outside of Middle Fork Woods Nature Preserve and a natural pond within MFWNP. At the natural pond, *A. opacum* were also monitored. They do not currently breed in the man-made pond.

Materials and Methods

The study site consists of one ephemeral pond just outside of MFWNP and one natural ephemeral pond within MFWNP. We built a drift fence of aluminum window screening around the man-made pond with pitfall traps placed at either end of the dam and plywood coverboards placed around the inside of the fence. At the natural pond, pitfall traps were placed every 4.5m, however because the fence was still flooded in most parts, coverboards were placed around the inside of the fence as well. The coverboards and pitfall traps were checked daily from 23 May until 14 June and every other day from 16 June until 20 June, when this report was written. Checking of fences will continue until the drying of the ponds or the end of emigration.

Metamorphs were found and identified to species based on overall appearance. The snout-vent length (SVL) and total length of all metamorphs were measured. The inter-narial distance was measured for all *A. texanum* and polyploid *Ambystoma*. Internarial distance and snout vent length have been used successfully to distinguish between adult *A. platineum*, tetraploids and *A. texanum* (Spolsky et al., 1992) and was confirmed to work with metamorphs at this site in 2000. All metamorphs were then released on the outside of the fence.

Results

Ambystoma metamorphs began emigrating on 24 May 2002. Between 24 May and 20 June, I collected a total of 534 *Ambystoma* metamorphs, 64 *A. texanum* and 59 *Ambystoma* polyploids from the man-made pond and 132 *A. opacum*, 69 *A. texanum* and 210 *Ambystoma* polyploids from the natural pond (Figures 1 and 2). The average SVL of *A. opacum* metamorphs was 38.33mm, SD=1.78. The average SVL for polyploids at the man-made pond was 39.94 mm, which was significantly larger than at the natural pond, 36.60 mm ($p<0.001$). The average SVL for *A. texanum* at the man-made pond was 30.91, and 31.46 at the natural pond which was not significantly different ($p=0.03$).

1) Breeding migration of adult *Ambystoma* in 2002

Introduction

We used a drift fence/drop can array to compare the breeding migration of *Ambystoma* adults at 2 ponds in Kickapoo State Park, one in the Middle Fork Woods Nature Preserve (MFWNP) and a man-made pond just outside the preserve.

Materials and Methods

The study site consists of one man made ephemeral pond just outside of Middle Fork Woods Nature Preserve which was excavated in December of 1996 and one natural ephemeral pond within MFWNP. We constructed a drift fence using aluminum screening with drop cans placed every 4.5 meters on 8 February 2001. Traps were covered with plywood coverboards and held down with shelf brackets to prevent depredation. Traps were checked daily for the first month. Beginning in March, the traps were checked following precipitation events or every second day, whichever was more frequent.

Adults were removed from the cans and identified to species based on gross morphological characteristics. For bisexual species, sex was determined and recorded. The number of each species and sex captured in each can was recorded. All *A. texanum* and polyploid *Ambystoma* individuals (*A. platineum* and individuals resulting from fertilization of *A. platineum* embryos by *A. texanum*) were brought back to the lab, anesthitized, measured, and marked by clipping the outer back toe. For individuals from the natural pond, the left foot was used, for individuals from the man-made pond the right foot was used. The measurements taken were snout vent length, inter-narial distance, canthal distance, head width and head length.

On 8 March, the fence at the natural pond was flooded, making the pitfall traps ineffective and allowing a high rate of trespass. The fence remained flooded throughout the remainder of the season. Ten minnow traps were set and checked daily for a total of 7 days to increase the encounter rate. At the new pond the trespass rate for the fence was also very high, so two minnow traps were employed for 7 days. Adults seen in the pond were also captured using a dip-net.

Results

At the pond in the nature preserve, I collected 264 polyploids, 85 *A. texanum* (33 females, 52 males), and 43 *A. maculatum* (15 females, 28 males). In the new pond, I collected 17 polyploids, and 2 *A. texanum* (female). The first salamanders migrated to the ponds on 1 February, with the largest number moving on the night of 19 February (Table 1).

Date	Large Pond Polyploids	Large Pond *A. texanum*	Large Pond *A. maculatum*	New Pond Polyploids	New Pond *A. texanum*
1-Feb	0	3	0	0	0
12-Feb	1	1	0	0	0
19-Feb	1	0	0		
19-Feb (10pm)	105	35	1	0	0
20-Feb (4am)	98	16	5	0	0
21-Feb	8	2	0	0	0
22-Feb	1	0	0	10	0
23-Feb	0	0	0	2	1
25-Feb	2	0	0	0	1
8-Mar	9	20	2	2	0
14-Mar	0	0	0	1	0
16-Mar	0	0	0	1	0
17-Mar	7	5	6	1	0
24-Mar	3	0	3	0	0
25-Mar	7	0	5	0	0
29-Mar	3	0	1	0	0
30-Mar	7	0	4	0	0
31-Mar	5	3	12	0	0
1-Apr	3	0	1	0	0
2-Apr	4	0	3	0	0
Total	264	85	43	17	2

Table 1. Number of unmarked individuals captured on each day at the large pond in Middle Fork Woods Nature Preserve and the new man-made pond outside the preserve. There were no unmarked individuals captured on omitted days. Captures after 17 March were made with minnow traps.

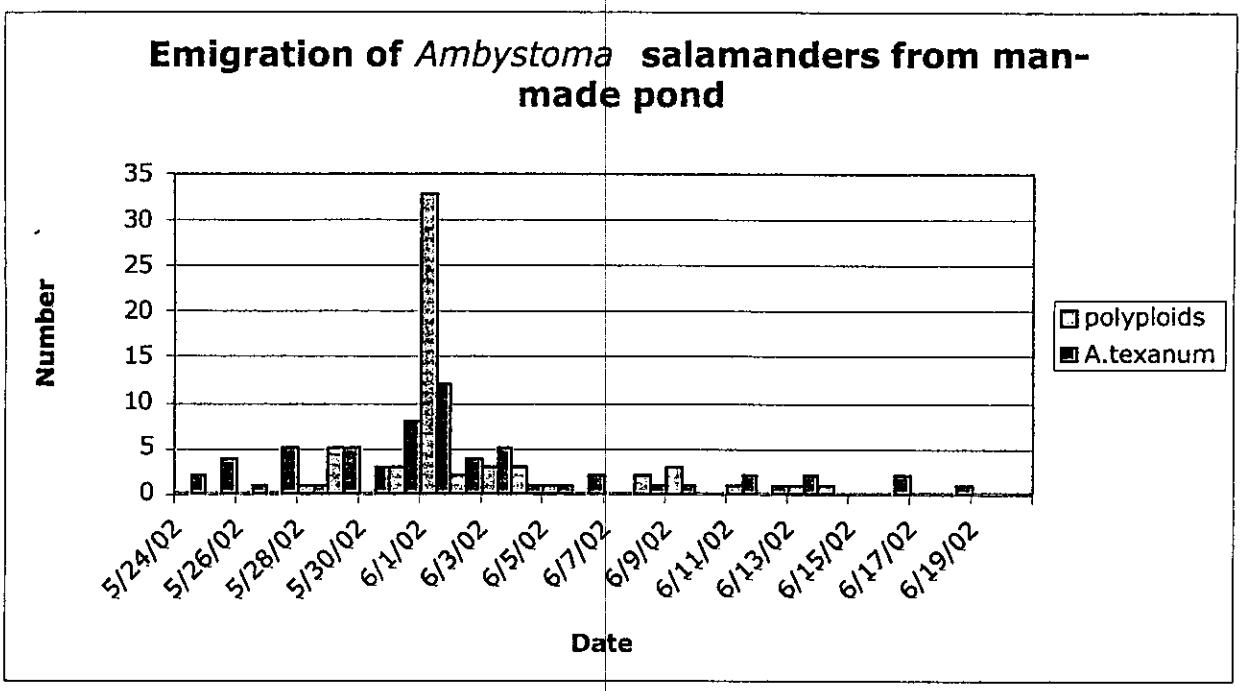

Figure 1. Emigration of salamanders from the man-made pond at Kickapoo State Park, Spring 2002.

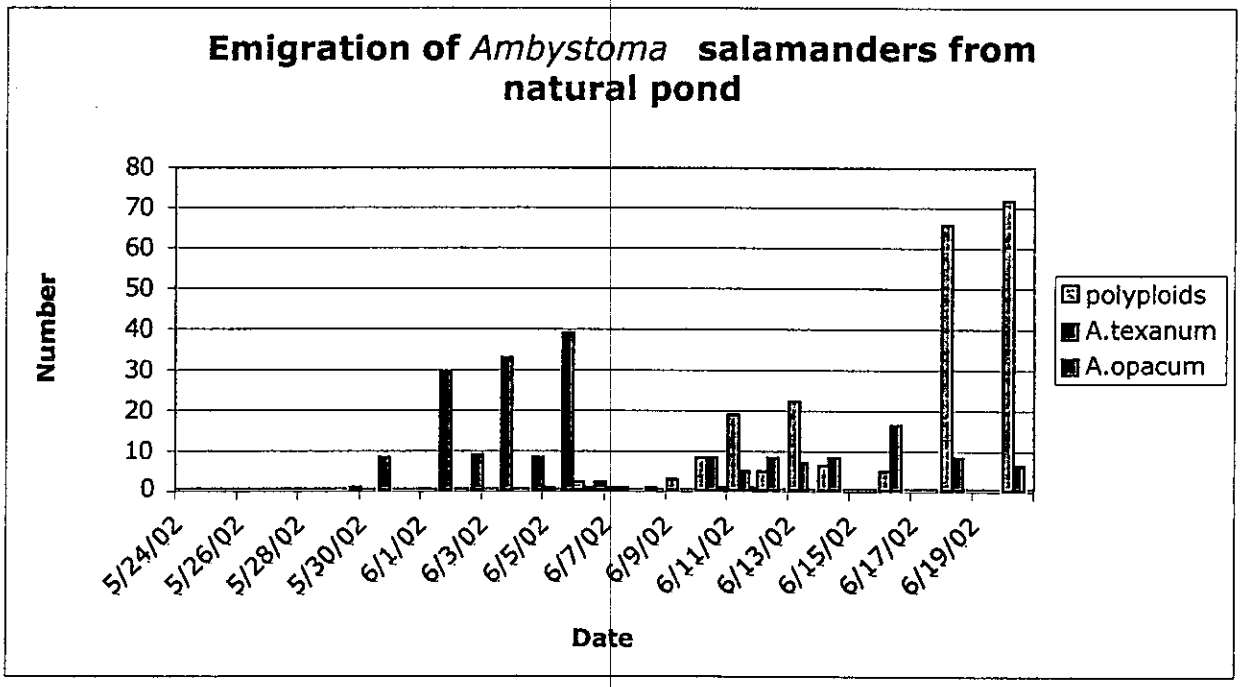

Figure 2. Emigration of salamanders from the natural pond at Kickapoo State Park, Spring 2002.

Summary

A greater number of salamanders bred in the natural pond than in the man-made pond in 2002. The number of polyploid metamorphs emigrating from the natural pond was higher than the number of polyploid metamorphs emerging from the man-made pond, however those at the man-made pond were larger. Polyploid embryonic survival in the man-made pond was higher than in the natural pond. The man-made pond is situated in an open field on the edge of a woodland habitat, while the natural pond is situated in a closed canopy forest. This difference may allow greater solar radiation at the man-made pond. Twice during the embryonic period, the natural pond was covered by a layer of ice approximately 3-5 cm thick. The man-made pond was partially covered by a thin layer of ice on both occasions. Several egg masses in the natural pond were encased in ice, and all embryos within subsequently died. The initial density of larvae in the man-made pond was greater than in the natural pond, however fewer larvae survived to metamorphosis. Metamorphs of polyploid *Ambystoma* in the man-made pond emerged sooner and at a larger size than those in the natural pond. The warmer temperatures of the man-made pond may have increased productivity allowing for greater food resources.

Literature Cited

Downs, F.L. 1989a. *Ambystoma platineum* in Pfingsten, R.A. and Downs, F.L. 1989. Salamanders of Ohio. Ohio Biological Survey, New Series 7(2): 132-138

Downs, F.L. 1989b. *Ambystoma texanum* in Pfingsten, R.A. and Downs, F.L. 1989. Salamanders of Ohio. Ohio Biological Survey, New Series 7(2): 139-154

Spolsky, C., C. A. Phillips, and T. Uzzell. 1992. Gynogenetic reproduction in hybrid mole salamanders (genus *Ambystoma*). Evolution 46:1935-1944.


ATTENTION!
DO NOT ENTER THIS CAVE BETWEEN SEPTEMBER 1 AND APRIL 30.
This land is a
REGISTERED ILLINOIS
NATURAL HERITAGE LANDMARK


CAVE REGIST
QUESTIONNA
EASE COMP
SHORT QUESTI
IN THIS REGIS


CAVE REGISTER
QUESTIONNAIRE