Amphibian & Reptile Monitoring

During the 2006 Field Season

on the Lester and Monique Anderson Lands

in Lincoln, Vermont

Prepared for the

Colby Hill
Ecological Project

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Introduction

In the spring of 1999 Lester Anderson expressed an interest in establishing herpetological monitoring at selected sites on his property. Three types of monitoring were discussed: egg-mass counts of spring breeding amphibians, cover-board monitoring of woodland salamanders, and snake monitoring using artificial cover (slate). All these methods provide indices of different segments of the local herpetofaunal population. During the 1999 field season four ponds were selected for egg-mass monitoring and counts began. During the 2000 field season both the cover-board transects for salamanders and the snake covers were put in place. Counts began along the cover-board transects in 2000. However, many of the snake covers broke over the late fall and winter and needed to be replaced with thicker slates during the early fall of 2001 before counts began. The thicker slates have held up well with only two or three needing replacement each year since.

Methods

Egg-mass counts

Egg-mass counts took place at four ponds that I refer to using the name of the parcels on which they are found: Upper Fred Pierce (UFP), Lower Fred Pierce (LFP), Wells (WP), and Guthrie (GP). Upper Fred Pierce Pond is immediately across Colby Hill Road (east) from the Anderson residence. Lower Fred Pierce is roughly 100 m south of the residence across Colby Hill Road. Both of these ponds are found on the Fred Pierce tract. Guthrie Pond is immediately inside the gate off Guthrie Road on the Guthrie-Bancroft tract. Wells Pond is in a field roughly 50 m northwest of the Wells homestead on the Wells tract. Exact locations for these ponds are shown in the 2001 & 2002 reports.

Egg-mass counts at this site are designed to monitor egg-masses of two spring breeding species with very large and easily-identified egg-masses: *Rana sylvatica* (Wood Frog) and *Ambystoma maculatum* (Spotted Salamander). The annual high count of egg-masses for each species is the index that over time can be used to show the relative size of the female breeding population at these sites (Corn and Livo, 1989). It is not intended to provide an estimate of the total population of either of these species only a convenient index of the breeding females. This is a variation of the breeding site survey recommended by Heyer et al. (1994). Adults and young of these and other species may be found during these counts and their presence and numbers are noted but these numbers are not intended to provide a meaningful index to those populations.

Over time the index that will be most useful is the highest count of egg-masses on any one day for each of the two species monitored. Since the egg-masses are visible for a few weeks after laying, the high count will be very close to the total count in most years. These counts are not cumulative nor do they have to be from the same day for different species. All surveys are performed under conditions that allow the viewer to see easily into the pond (limited wind, no rain, and adequate light from a high angle). Polarized glasses are sometimes helpful. The counts are designed to take place in habitats where Wood Frog and Spotted Salamander have been previously located and during or shortly after their breeding period. Egg-mass counts begin soon after the snow and ice melts and continue until egg-laying activity ends or the total number of egg-masses is declining.

Cover-boards for salamanders

Three sets of cover-boards were constructed and put in place along the old wood road connecting the Guthrie-Bancroft fields with Rte. 17. This road starts in Lincoln and crosses into Bristol. Consequently some of the cover-boards lie in each town. The first two sets each contain 15 pairs of cover-boards. Although it was our intention to have three sets of 15 pairs, it was discovered in 2001 that the third set of coverboards actually contained 16 pairs rather than the 15 that was intended. The extra set was left in place and the data are included. Exact locations of the three sets with UTM coordinates are shown in the 2001 report. These cover-boards were spaced based on North American Amphibian Monitoring Program (NAAMP) protocols with Canadian design covers (Craig et al., 1999) that have been shown to be the most successful in attracting salamanders. The structures (salamander condos) each consist of four rough-cut white-oak boards which measure 305 mm x 152 mm (12" x 6") and two spacers. White oak was selected on the basis of its resistance to rot while in ground contact. It is expected that these boards will need to be replaced on a rotating basis as they begin to deteriorate. Each condo consists of two boards side by side on the ground with a slight gap (~10 mm) left between them, so that they almost form a square 305 mm by 315 mm. The remaining two boards are placed on top of them and at right angles. In between the two layers of boards are 10-mm square spacers 280 mm long, which are used to hold up the outside edge of the upper two boards and create a small gap of varying height for the salamanders. The pairs of structures were placed a minimum distance of 0.5 m apart based on NAAMP recommendations and each pair of condos was located a minimum distance of 6 m from the nearest pair. The three 15-pair transects are separated by distances of between 100 and 200 m. All organic matter was removed from under the condos so that they rested on the mineral layer. Herbaceous growth was removed from between the pairs and for a distance of ~50 cm in all directions and is kept free from the area. Forest litter is removed from the top of the condos but left between and around them. All condos are numbered with latex exterior paint (white). These numbers fade over the course of a year and are remarked as needed. The first set of 15 pairs consists of condos marked 1A and 1B through 15A and 15B. The second set consists of condos 16 A & B through 30 A & B, and the last set consists of condos 31 A & B through 46 A & B.

Records are kept on the specific condo in which amphibians are found. In addition, all amphibians found under the cover-boards are measured to provide some information on age-class structure of the population using the boards. The small salamander species, which are being monitored using this method, sometimes lose all or a portion of their tails to predators (birds and small mammals) so the most reliable measure of size is their snout to vent length (SVL) as opposed to their total body length (TBL); although we take both. This year, in addition to taking length measurements we massed 59% (309 of 521) of the Red-backed Salamanders found.

We also keep records on where within the salamander condos the amphibians are found. It is of interest to me in order to more effectively design future condos. Four locations have been noted: board (between boards), substrate (between board and ground), crack (in the space between the boards) and adjacent (along side the cover-boards).

During the fall of 2001, Middlebury College student Caitlin Corey gathered additional data on soil moisture, the sex of the salamanders found, salamanders found adjacent to the cover-boards, and interactions between different sex- and age-classes within cover-boards. Her most interesting and best supported finding (Corey, 2002) was that adult Red-backeds

would only rarely be found with adults of the same sex and much more often would be found with larger young or adults of the opposite sex. This strongly suggests that there is an upper limit to the number of adults that we can find under the boards since they exclude same sex adults. This is in addition to the apparent exclusion of the smallest size-classes by adults. Her analyses support our design concept that the multiple compartments formed by the visual barriers of the salamander condos allow adults to be physically quite close (a few centimeters) without excluding each other. She also points out that the age-class data generated by the cover-boards may not be representative of those in the larger populations as a result of the active exclusion of same sex adults and possible predation upon younger juveniles. She examined preferred positions within the cover-boards and found that over the course of the entire season salamanders were more often in one of the two ground contact positions (crack or ground), however, on certain days between the boards was the preferred position.

Snake-covers

The snake-covers are an experiment. I am not aware of any other efforts to monitor snake populations using covers, though they are used as an inventory tool. I chose to use slate as a result of its ability to absorb the sun's rays and retain its heat as well as slate's longevity in ground contact. Through experience and informal communications with other herpetologists I have come to believe that the larger the piece of cover the better, but practical and aesthetic considerations led me to initially try old roofing slate. The largest used roofing slate that I could locate was 610 mm x 360 mm and 5 mm thick. With two of these slates I formed a sandwich with a small wooden spacer in between but off center to create a small space of varying height for the snakes. I placed forty of these snake sandwiches along the upper margins of the Guthrie-Bancroft fields at a distance of roughly 2 m from the trees (see earlier reports for photos). I chose the upper margins of the fields to maximize the exposure to southern and western sun. The snake covers were placed on the cut grass that already was in place. No additional cutting or clearing was done. During the late fall and winter of 2000-2001 most of the original snake-covers were broken. During the early fall of 2001, they were all replaced with thicker slate slabs that measured 560 x 360 mm and were 20-25 mm thick. Three of these were broken over the summer of 2002 and replaced in the early fall. Those that had been marked previously with a Magnum 44 permanent marker needed to be remarked. A few slates are remarked each year with white exterior latex paint as needed. A few broken slates were replaced during the early fall of 2005 and 2006. New slates were slightly longer (610mm x 360 x 20-25 mm thick) but otherwise identical.

In 2006 we started checking the snake-covers on September 12. Starting in late summer is ideal, as it is after the young-of-the-year have been produced and snake numbers are at their annual maximum. In addition, the cooler air temperatures of late summer/early fall should make the relative warmth of the slate more attractive at this time of the year. The snake-covers were checked once a week through October 17. Snake populations are often widely dispersed throughout the foraging season; consequently it was unknown whether forty pairs of artificial cover would attract enough snakes to provide useful data. Conditions under the covers are changing from the first couple years as remaining vegetation dies, invertebrates colonize them, and small mammals begin to tunnel under them. In some places the woods are creeping into the field. Initially the covers were

approximately two meters from the woods. In the fall of 2006 we estimated some covers were only 1 meter from the edge of the currently cut area.

When a snake is found, we measure the snout to vent distance as well as the total body length. We record any unusual physical findings or injuries, and when we find Milksnakes (*Lampropeltis triangulum*) we record their patterns to allow us to distinguish individual snakes. This year, in addition to length measurements we massed all the snakes we found (n=113). We also keep records on where within the snake cover the reptiles are found. Two locations have been noted: between (between slate) and surface (between slate and ground).

Basic species information

Two of the spring-breeding amphibians that deposit large easily identified **egg-masses** are using the breeding ponds: *Ambystoma maculatum* (Spotted Salamander) and *Rana sylvatica* (Wood Frog).

The Spotted Salamander is a large (190 mm) heavy-bodied salamander that is widespread in Vermont in areas where mature hardwoods or mixed hardwoods and suitable breeding ponds occur and migration is not obstructed. It is black with yellow spots and is largely fossorial. It emerges from its woodland overwintering sites during the first warm rains of spring to migrate to its breeding pond. Within a few short weeks it returns to its summer foraging territory. The egg-masses that it deposits are the most obvious evidence of its occurrence in an area.

The Wood Frog is a medium sized (60 mm) frog that is almost entirely terrestrial. It is easily recognized by its white upper lip and black mask on a solid brown background. It forages and overwinters in the woodlands and only enters ponds in the spring to breed. It too is widespread in Vermont as long as healthy woodlands and breeding ponds can be found and travel between the two is largely unobstructed. It also deposits large and easily identified egg-masses in early spring. Within two weeks it has usually returned to nearby woodlands.

Only one species of salamander is found often enough under the **cover-boards** to be monitored: *Plethodon cinereus* (Eastern Red-backed Salamander). Over time, as small mammals start to tunnel under the boards, other species may start to use them.

The Eastern Red-backed Salamander is a slender and small (40 mm) salamander that is our (Vermont's) only fully terrestrial species of amphibian. Its most common color morph has a dark reddish-brown back with black sides and a salt and pepper (gray and white speckled) belly. Occasionally it is missing the red stripe on its back and the entire salamander is a dark gray color, this is considered a *lead phase*. Very occasionally the entire salamander is orange-red, this is considered *erythristic*. This species undergoes its larval stage and metamorphosis inside the egg. Eggs are laid in moist conditions inside a rotten log or in cavities in the soil as long as there is some solid object to suspend the egg-mass from. Consequently, it does not require open water at any life-stage and is dispersed widely in medium to mature hardwoods or mixed hardwoods regardless of the distance to the nearest water body. It is sensitive to soil pH, soil moisture, depth of leaf litter, and the structure and age of the woodlands in which it breeds. Consequently, it is a good species to monitor as an indicator of forest health.

When the **snake-covers** were placed, it was unknown which species of snake would be most attracted to them. During the fall of 2001 only *Storeria occipitomaculata* (Red-bellied Snake) used the snake covers. The Red-bellied Snake is a small, secretive, viviparous (giving live birth) snake of woodlands and woodland openings. The median adult Red-bellied Snake reported in Vermont has a SVL of 195 mm and a TBL of 240 mm (N=79). The median juvenile Red-bellied Snake in Vermont has an SVL of 88 mm and a TBL of 110.5 mm (N= 62) (Andrews, 2006). They are found throughout the state in forested areas (Andrews, 2006). They have a state rank of S5 and are the third most reported species in the state. They have a brown or black dorsum (back) and a bright red venter (belly). Three light spots can be seen on the neck: one in the middle and one on each side. They are harmless and quite docile. They feed primarily on slugs but will also eat other invertebrates (Mitchell, 1994). We have one record of a female Red-bellied Snake collected (legally) in Bridport, VT and brought into captivity. She then gave birth to 14 young on July 29. Determining the sexes of snakes can be difficult as there are no obvious external characteristics. Generally the males have a longer tail relative to their total body length although there is often some overlap. Male Red-bellied Snakes generally have a tail length of 21-25% of their TBL while females generally have a tail length of 17-22% of their TBL (Ernst and Barbour 1989). As we continue to collect more data and improve our techniques we should be able to draw some conclusions regarding the sexual make up of the snakes using the snake covers.

Since 2001 two additional species have been located under the snake-covers: Milksnakes and *Thamnophis sirtalis* (Common Gartersnake). In 2006, no Milksnakes were found.

The Common Gartersnake is known to reach a total body length of up to 1000 mm (39 inches) in Vermont, though most adults are closer to 600 (~24 inches). They are the most common snake in the state (Andrews, 2006) and are widespread at all elevations and in a wide variety of habitats but are most abundant near a combination of water, small open areas, and exposed rock. Their primary food item is amphibians but worms, insects, spiders, and other small invertebrates are also eaten. Male Common Gartersnakes mature in one to two years at an SVL of 360 mm – 390mm, females usually mature in two to three years at an SVL of 420 mm to 550 mm. Litter sizes average 27 with a range from 1 to 101. Young Gartersnakes are born from mid-June to early November with most appearing in August and September. Neonates average 178 TBL (120mm – 278mm), and have a tendency to aggregate together (Ernst and Ernst, 2003). We have one record of a pregnant Gartersnake run over on August 8th. Ten babies (also run over) were counted around her body (Andrews, 2006). Based on our records for adult and juvenile Common Gartersnakes found in Vermont the average SVL is 336 mm and TBL is 412 mm and the median SVL is 350 and the TBL is 438 (Andrews, 2006). Male Common Gartersnakes generally have a tail length that is 21-30% of their TBL and females have a tail length that is 17-22% of TBL (Ernst and Barbour, 1989).

The Milksnake is known to reach lengths of 1100 mm (43 inches) in Vermont and adults are generally larger than Gartersnakes. This snake is the second most reported snake in Vermont, though this may in part be the result of its large size and its tendency to live near overgrown human dwellings, foundations, and barns. Milksnakes are oviparous (egg laying), smooth scaled, and eat a wide variety of prey including small mammals, birds, other snakes, and invertebrates. They often will shake their tails when irritated and are frequently confused with Rattlesnakes as a result of this behavior. The sex of the

Milksnake is not possible to determine based on tail length because there is too much overlap between males and females (Ernst and Barbour 1989).

Results and Discussion

Egg-mass counts

In 2006 egg-mass counts were performed on six dates (April 14, April 20, April 27, May 4, May 11, and May 25) at the four ponds that were selected for monitoring in 1999. All four ponds are man-made with well-defined shorelines and within easy migration distance of hardwoods. Since all of these ponds are permanent or semipermanent they usually hold some water even through dry years.

The results of this year's counts are shown in Tables 1-4. The first two weeks of April had on-again off-again rain, and over all there was slightly above average rainfall and above average temperatures. Amphibians were found moving in the lowlands during early March, which was a little unusual. The movement was interrupted by cold weather and amphibians were again found moving in late March and the movement was mostly over by mid-April. The first Wood Frogs probably made it to the ponds in Lincoln early in April or even late March. We heard Wood Frogs calling on our first day of the egg counts (April 14). Our high counts for Wood Frog egg-masses in all four ponds were between April 14 and April 27. By May 4 most egg-masses had hatched, and hatching was complete by May 11. There were very few Spotted Salamander egg-masses seen on the first count and the peak Spotted Salamander egg-mass numbers were on the fifth and sixth counts (between May 11 and May 25). We extended our counts into late May to ensure that no new egg-masses were being added, and we found that by then many of the Spotted Salamander egg-masses were green with algae and many of the embryos had already developed gills.

Tables 5-8 show that the counts for Spotted Salamanders at all sites were somewhat lower than the record high counts from other years. In all ponds, except Wells, the number of egg-masses was higher than last year. None of the pools had record high counts nor did they have record low counts. For all ponds except Guthrie, the record high counts for Spotted Salamanders egg-masses occurred in 2002. Last year the number of egg-masses in Guthrie was at its second lowest count of 83, which is considerably down from 2004 and from the highest count in 2003 when it was 230. This year the number increased to 111, just below the average of 126.5 for that pond. Annual variation in these numbers is to be expected, and can be seen in Tables 5-8 and Figures 1a and 1b. Although there is year-to-year variation, it is not consistent from pond to pond (see Figure 1a), there are not enough data to make any statistically significant conclusions, but it appears that the high count indices are on either a steady or an upward trend (see Figure 1b). According to Bishop (1941) breeding adult females lay from 2-4 egg-masses during their brief egg-laying period. Using an average of 3 masses per adult and just the high count indices, this suggests that in 2003 the number of breeding females ranged from ~27 at Upper Fred Pierce to ~87 at Lower Fred Pierce**.** In 2004, the number of females ranged from ~31 at Upper Fred Pierce to ~55 at Lower Fred Pierce. In 2005 the number of breeding females ranged from ~28 in Guthrie to ~46 at Lower Fred Pierce. In 2006 the number of breeding females ranged from ~32 at Wells to ~53 at Lower Fred Pierce. It appears that Lower Fred Pierce is consistently the most productive for Spotted Salamanders.

This year the greatest number of Wood Frog egg-masses were also found at Lower Fred Pierce with 454 found on April 20th. Last year Lower Fred Pierce was also the most productive pond for Wood Frog masses. In previous years Guthrie has been the most productive in terms of Wood Frog egg-masses, and still hosts a great number of masses (328). It is interesting that we did not find any Green Frogs at Lower Fred Pierce this year, yet we found them at the other three ponds. This year it appeared that some Wood Frog egg-masses were laid in the very beginning of April. When we arrived at Guthrie on April 14th, we saw an older raft of masses lower in the water with the appearance of having been frozen. Another raft of eggs were laid above the older one. These eggs appeared fresh on April 14th. Annual variation in these numbers is to be expected, and can be seen in Tables 5-8 and Figures 2a and 2b. Although there is year-to-year variation, it is not consistent from pond to pond (see Figure 2a). There are not enough data to make any statistically significant conclusions but it appears that the population index reflects an upward trend for Lower Fred Pierce and Guthrie (see Figure 2b). Wells remains relatively constant, and this may be due to its small size and limited substrate. The number of egg-masses appeared to be declining in Upper Fred Pierce; although the number of masses seen in 2006 was the second highest ever. This year, like 2004 and 2005, there was a great deal of Wood Frog egg-mass destruction in Upper Fred Pierce. On April 14th we counted 102 masses and on April 20th the number of masses had decreased to 95. On April 20th we also saw lots of *Rana clamitans* (Green Frog) tadpoles around and through the masses. One mass had five tadpoles around it. We also saw lots of snails in this pond, which we had not noted in previous years. By April 27th 48 egg-masses were found and we could see some tadpoles. The last two years we did not see any Wood Frog tadpoles in Upper Fred Pierce, but this year on May 4th we estimated about 250 Wood Frog tadpoles. Unfortunately, we did not see any still alive on either May 11th or May 25th. Hopefully, they were still there and they were just hiding. It was exciting to at least see some hatch for the first time in three years.

Again this year, the later egg deposition of Spotted Salamander versus Wood Frog is clearly seen (see Figure 3). In addition to species-specific differences, the timing of breeding also depends on elevation, aspect, spring temperatures, rainfall, and the amount of snow accumulated.

To establish useful baseline indices, I had previously recommended at least five years of egg-mass counts. We now have eight years of data from the ponds, however the first year was poorly timed. Annual counts are now helping us to determine breeding trends and responses to weather events, predators, and habitat changes. What this gives us is a rough, relatively inexpensive indicator of the productivity of these ponds and their surrounding woodlands for these two species.

Other species noted this year were Blackflies, which were active by May 4 (seemed a little early!). On April 14 there was a plethora of flies around the barn at Wells. We also noted Caddis Fly larvae attached to some of the egg-masses on April 27 at Upper Fred Pierce. Moose tracks were seen at Guthrie, and at Upper and Lower Fred Pierce. Numerous birds were seen or heard in the vicinity of the ponds during the egg-mass counts including; American Robin, American Crow, Black-throated Green Warbler, Blue-headed Vireo, Blue Jay, Broad-winged Hawk (with nest), Eastern Phoebe, Gray Catbird, Hermit Thrush, Northern Flicker, Pileated Woodpecker, Pine Warbler, Red-tailed Hawk, Red-winged Blackbird, Ruffed Grouse, Ruby-throated Hummingbird, Savannah Sparrow, Song Sparrow, White-throated Sparrow, and Wild Turkey (could have been a hunter), Yellow-bellied

Sapsucker. We also found an owl pellet containing a rodent skull). Although we wrote down bird species seen or heard this in no way constitutes a complete list.

During egg-mass counts we also found Eastern Newts (*Notophthalmus viridescens*) at all of the breeding ponds. We found Green Frogs at all ponds except for Lower Fred Pierce. Both of these common species spend their adult lives in or near still water. These species lay eggs during the late spring or summer and are not suitable for spring egg-mass monitoring. Spring Peepers (*Pseudacris crucifer)* were heard or seen at Wells and at Lower and Upper Fred Pierce. This is a common spring-breeding species but it does not deposit conspicuous egg-masses, so it is not as convenient a species to monitor. We also heard an American Toad (*Bufo americanus*) on one occasion. American Toads don't usually call or become active until the temperatures are relatively warm. On that particular day it was close to 68 F. We also found *Rana palustris* (Pickerel Frog) egg-masses twice this year. Pickerel Frog egg-masses are similar to Wood Frog's as they are both round globular clusters of eggs with up to 3,000 eggs per mass. Pickerel Frog's egg-masses often have a brownish hue and the eggs are brown and yellow while a Wood Frog mass appears slightly grayish (Harding 2000) (see Pictures 1, 2, and 3). On May 11th we found one Pickerel Frog egg-mass at Guthrie and three Pickerel Frog egg-masses at Lower Fred Pierce. In Vermont we only have records of two other Pickerel Frog egg-masses. They were found on April 28 and on May 18 (Andrews 2006). We do know that Pickerel Frogs call later in Vermont (mid April – mid- June) while Wood Frogs call earlier (end of March until the end of May) (Andrews 2006). Additional Pickerel Frog masses might be found if egg-mass searches continued into June.

Cover-boards

The cover-boards were checked on seven dates: Sept 5, 12, 19, 26, Oct. 3, 10, and 17 (Table 10 and 11). This year we stopped the counts in the fall once we determined the number of salamanders seen each week was decreasing.

The species found under the cover-boards are almost exclusively the Eastern Red-backed Salamander. However, Eastern Newts in the Red Eft stage have been found using the cover-boards. Three Red Efts were found this year (Sept 12, 19, and 26). For the third year in a row a *Eurycea bislineata* (Northern Two-lined Salamander) was also found under a cover-board. For the first time a *Desmognathus fuscus* (Northern Dusky Salamander) was found under a cover board (see Picture 4). None of these sightings were included in Table 10-12.

In 2006 the high count for numbers of Eastern Red-backed Salamanders found under the cover-boards on one day was 123 on Sept. 5 (Table 10). In 2005 the high count was 101 found on Sept 7. In 2004 it was 92 (9/29), in 2003 it was 119 (9/19), in 2002 it was 109 (9/12), and in 2001 it was 94 (9/16) (see Table 12 and Figure 4). With the exception of 2001 and 2004, the high count has always been the first count in the fall. We found the high count to be on our first fall count on September 5, but the numbers remained fairly high and 86 were found on Sept 26. We had previously thought that since there is no obvious weather change of significance that corresponds with the drop in numbers after the first check, the quick decline was possibly a result of disturbance. To check this, in 2003 and 2004 we checked all cover-boards on the first check, but only one half of the cover-boards on the following check, and every other subsequent check. Interestingly, the rate of decline was almost identical for those covers checked every two weeks and those checked every week. Apparently, checking at one or two week intervals did not have any impact on board

use as a result of disturbance (Andrews and Talmage 2005). This is in accordance with the results published by Marsh and Goicochea (2003). They also found no difference between covers checked every week and covers checked every three weeks.

Based on Vermont data, juvenile Red-backed Salamanders are most often found from late July through November (Andrews 2006). This year on Sept 5 we found an adult Eastern Red-backed Salamander (presumably the mother) with 8 young. All of the young were very small with SVL of 12 -14 mm and TBL of 19-23 mm. This was the first time we had found an adult with young together under the cover boards.

It is important to note that individuals are not marked, and the total number of salamanders caught is not known. The same individuals may well have been counted on more than one date. However, for purposes of comparison from year to year we do not need to know the number of individuals. We can compare averages, high counts, and size-class information from the high count days (Figure 4 and Table 12). As mentioned previously in this report, Caitlin Corey's results suggest that there is an upper limit to the number of adults that we can theoretically find under the boards, since the cover-boards may exclude same sex adults (Corey, 2002). As we are still seeing annual variation, and an overall increase in the high count it appears we have not yet reached this upper limit (Figure 4). Corey's results also suggest that there is an apparent active exclusion of same sex adults and possible predation upon younger juveniles; therefore, the age-class data generated by the cover-boards may not be representative of those in the larger populations. It is still important data to collect. In theory, once we reach the upper limit the age class data under the cover-boards would remain relatively stable. At the same time there may be other factors we have yet to discover that influences the age classes of the salamanders found under the cover-boards. As this study continues it will be interesting to see if Corey's hypotheses are correct. If time and personnel permit it would also be interesting to collect another year's data using Corey's techniques.

Occasionally we can surmise that we are seeing the same salamander more than once, for example last year we were pretty sure that we had seen a lead-phased salamander more than once due to the rarity of lead phase and the fact that it was found under the same cover board with the same measurements. Normally, it is very hard to distinguish Eastern Red-backed Salamanders; although sometimes they have injuries that distinguish them. For example, on Sept 5 we found a salamander missing its tail under cover board 27 with SVL measurements of 30 mm and a TBL of 60 mm. On Sept 12 in the same place we found a salamander also missing its tail with a measurement of 31 (SVL) and 60 (TBL), these two findings were possibly the same individual. Altogether 21 of 520 salamanders found were missing either their whole tail or a piece of it, and 6 were lead phase (1.15%).

Many invertebrates are found during the study season including ants, centipedes, Camel Crickets, ground beetles, earthworms, millipedes, Short-legged Cricket, slugs and their eggs, spiders, and springtails.

American Toads, Wood Frogs, and Spring Peepers were found accidentally while checking the cover-boards during the 2006 field season.

Snake-covers

All snake-covers were checked at weekly intervals starting on Sept 12 with subsequent checks on Sept 19, 26, Oct 3, and 10 (Table 13 and 14). In 2002 we saw the species total rise from one to three and the total number of captures rise from five to 31, in 2003 the number of captures was 11, in 2004 it was 30, in 2005 it was 19, and in 2006 it was 113. The three species regularly captured are Common Gartersnake, Milksnake, and Red-bellied Snake. None of these species are rare in Vermont. In previous years we have tried to determine if some of the captures were the same snake. This year it is very likely that some of the snakes were captured more than once. As many of them were young of the year with similar lengths and as they grow very quickly we decided it was not worth guessing at which individuals were caught more than once. This year we did not catch any Milksnakes, but we did find a record number of snakes. All of the Common Gartersnakes were juveniles, either born this year or perhaps last year. Of the Red-bellied snakes, 37 out of the 61 captured were young of the year. On Oct. 10 we found 39 snakes (see Picture 5). This year we also began massing each snake. The results of that work are seen in Table 13 and 14.

As described in the species description section, Common Gartersnakes and Red-bellied Snakes give birth in the late summer. It appears this was a productive year for both species and we timed our searches to coincide with these young snakes dispersing.

Although the sixth year of results, these results should be considered only the fifth year of the baseline data using this method. After the first year, the new covers were replaced with thicker slabs that would resist breaking when the grass is cut. Unlike year one, these remained in place successfully throughout the year. In addition, the local microhabitat that exists in and around the covers was still stabilizing over the first year. Vegetation under the covers was dying and small mammals and invertebrates were colonizing them. The small mammals and invertebrates create tunnels in which the snakes travel and the invertebrates serve as food and may be creating overwintering microhabitat (see the 2002 report for details). Changes in vegetation immediately surrounding the cover-board, colonization, and tunneling may be ongoing but were far less visible this year. Although for a few cover-boards there has been a change in the distance the cover-boards are from the woods.

As usual, many invertebrates were found using the snake-covers. These were rarely identified to species: centipedes, earthworms, firefly larvae, ground beetles, Isabella Tiger Moth Larvae, lightening bug, millipedes, pill bugs, Short-legged centipede, Stinkbug, springtails, Red Mite, red and black ants, Rove Beetle, and Wood Larvae. Small mammal tunnels were visible under many of the covers. We saw Monarchs flying in the field on Oct. 3.

On October 10 we found four young house cats that all were skittish yet appeared to be healthy. We presume these cats had recently been dropped off. Birch Andrews made a gallant effort and captured two of them; she subsequently found homes for both cats. Unfortunately, we were not able to capture the other two and they were not seen when we returned on Oct 17.

Summary

The **egg-mass** counts were timed well. We now have seven solid years of data and are starting to be able to look at year-to-year comparisons. This year we counted the highest

number of total Wood Frog masses so far. We will continue to watch with great interest the interaction between the Wood Frogs and the Green Frog tadpoles at all the pools, especially at Upper Fred Pierce. The numbers of Spotted Salamander egg-masses were slightly below average with no records broken either with high or low counts. As we collect more years worth of data, we will be able to look at trends that are statistically meaningful. Finally, we found four Pickerel Frog egg-masses in two ponds for the first time; it will be interesting so see if we find more next year.

We now have six solid years of data from the **cover-boards.** Our high count of Eastern Red-backed Salamanders was in the first week of September. This year the 123 counted on that day was a record high count. Collecting mass information was new this year and is another important step in understanding this species' natural history.

We also have five solid years of data from the **snake-covers**. Our techniques continually evolve. We have been learning how to sex snakes using probes and hemipene eversion. We hope to gather more data on sex next year. The addition of mass information will also give us more information about these species. As we collect more data in the future we may be able to calculate annual growth rates, and other life history information. We did not see any Milksnakes in 2006, but the record high number of juvenile Common Gartersnakes and Red-bellied Snakes indicate it was an extremely productive year for those two species.

Opportunities for long-term monitoring are both exceptionally rare and very valuable. Most funding for this type of project is short-term. This greatly limits the type of data that can be gathered. We appreciate the opportunity that has been created for us through the Colby Hill Ecological Project.

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Table 1. Spring 2006 egg-mass data from Lower Fred Pierce Pond on Lester Anderson lands in Lincoln, Vermont.

Location/Date	Ambystoma maculatum **egg-masses**	***Rana sylvatica* egg-masses**	**Notes**
April 14	0 Spermatophores and an adult seen in pond.	454 Water temperature at top of the masses was 25 C and below masses was 10 C.	Visibility good to excellent. Movement in valley began in early March, was interrupted and started again in late March and is now mostly over. *R. sylvatica* are still calling and adults seen in pond.
April 20	74 Spermatophores found throughout pond.	377 A few egg masses are new, but most are green and close to hatching. Some egg masses found on the sunny edge have hatched.	Visibility excellent.
April 27	107 17 very fresh, three opaque Spermatophores found throughout pond.	195 Tadpoles starting to hatch, lots of tadpoles on "warm" side ~4300 have hatched, many non-viable eggs left.	Visibility good to excellent. Polarizing glasses used when needed. Clear yesterday, ~ 7 C. Frost last 2 nights.
May 4	109 Seven masses were opaque, eight were primarily non-viable.	0 Mostly broken up and scattered pieces.	Visibility excellent. About 50,000 *R. sylvatica* tadpoles found along bank where egg masses were.
May 11	158 Four masses were primarily non-viable.	0	Visibility poor Tadpoles swimming around three *R. palustris* egg masses found below the remnants of *R. Sylvatica* egg masses.
May 25	156 Five are opaque, and nine are non-viable. Hard to see clumps on bottom, probably missed some. Masses are mostly green, and many embryos have gills.	0	Visibility excellent, polarizing glasses used when needed. About 20,000 *R. sylvatica* tadpoles. Very productive pond.

Table 2. Spring 2006 egg-mass data from Upper Fred Pierce Pond on Lester Anderson lands in Lincoln, Vermont.

Location/Date	*Ambystoma maculatum* egg-masses	Rana sylvatica egg-masses	Notes
April 14	1 Five groups of spermatophores and nineteen adults seen in center area.	102	Visibility good to excellent. Movement in valley began in early March, was interrupted and started again in late March and is now mostly over. *R. sylvatica* are still calling and adults seen in pond.
April 20	63 Thirteen adults seen.	95 Some tadpoles getting close to hatching, lots of snails and *R. clamitans* on masses. One mass has five tadpoles around it.	Visibility excellent, polarizing glasses used when needed.
April 27	77 Nine are fresh, one adult seen along with some spermatophores. A few caddis flies were attached to an egg mass.	48 Eight masses mostly non viable, Egg masses are starting to hatch, can see tadpoles. Egg masses mostly falling apart and no new masses seen.	Visibility good to excellent. Polarizing glasses used when needed. Clear yesterday ~ 7 C, frost last 2 nights. Found snails around and on egg masses, we don't remember snails last year (2005).
May 4	106 One non-viable egg mass seen, we also saw an *A.maculatum* larvae that hatched last spring.	1 About 250 *R. sylvatica* tadpoles seen.	Visibility excellent.
May 11	81	0 Did not see any *R. sylvatica* tadpoles	Visibility poor, polarizing glasses used. Marsh marigold in full bloom.
May 25	125 Mostly green and fairly old, saw an *A. maculatum* larvae eating an earthworm.	0	Visibility excellent - polarizing glasses used in shade.

Table 3. Spring 2006 egg-mass data from Guthrie Pond on Lester Anderson lands in Lincoln, Vermont.

Location/Date	*Ambystoma maculatum* egg-masses	Rana sylvatica egg-masses	Notes
April 14	0 Can see spermatophores.	328 Egg mass cloud is in same place as last year. One batch of masses looks older and lower in water with some algae and are non-viable, perhaps they froze. Another big batch on top some look very fresh.	Visibility excellent. Movement in valley began in early March, was interrupted and started again in late March and is now mostly over. *R. sylvatica* are still calling and adults seen in pond.
April 20	37 One egg mass was white, and one was exposed.	141 There is a new one separate from the huge mass, some of old ones are now on surface with embryos moving, The new ones from last week are on the surface or are "beached" but, still alive.	Visibility excellent, polarizing glasses used when needed. Yesterday was warm, ~18 C, today is sunny and clear. Water dropped considerably, down about 1.5 feet, big step was completely covered, but is now completely uncovered and water is about 8" below rock. Lower rock is still under water.
April 27	87 Four are non-viable – could have frozen, four are opaque.	141 Top layer on surface is in shreds, one thick layer of dead eggs. Lots of hatched tadpoles (very small). The old masses (1st layer) have mostly hatched or are non viable.	Visibility good to excellent. Polarizing glasses used when needed. Clear yesterday ~ 7 C. Frost last 2 nights.
May 4	64 Two non-viable, two opaque some look pretty fresh.	0 All egg masses are broken up or dead, there are lots and lots of dead eggs.	Visibility ok, hard to see in deep water.. Greater than 10,000 *R. sylvatica* tadpoles.
May 11	69	0	Visibility poor, polarizing glasses used. Lots of floating cattails.
May 25	111 All egg masses are pretty old and green, but can still see embryos and non-viable eggs. We saw two big piles on the bottom today that we probably didn't see last time because the visibility at that time was so poor.	0	Visibility excellent - polarizing glasses used in shade.

Table 4. Spring 2006 egg-mass data from Wells Pond on Lester Anderson lands in Lincoln, Vermont.

Location/Date	*Ambystoma maculatum* egg-masses	*Rana sylvatica* egg-masses	Notes
April 14	0 Spermatophore clumps spread throughout.	62 Adult *R. sylvatica* seen and heard as we approached. One very old mass and then lots of fresh.	Visibility excellent. Movement in valley began in early March, was interrupted and started again in late March and is now mostly over.
April 20	38 One adult was seen.	61 One mass was non-viable.	Visibility excellent. Today is sunny and clear.
April 27	59 Four are fresh. One adult was seen, and a few spermatophores.	63 Cattails lifting through clump of egg masses causing many of them to come out of the water where they froze and dried out.	Visibility excellent. Polarizing glasses used when needed. Clear yesterday ~7 C, frost last 2 nights. *R. clamitans* tadpole in *R. sylvatica* egg mass.
May 4	60 Some are relatively fresh.	54 Most egg masses are falling apart, cattail grew through egg mass and eggs dried out.	Visibility ok – used polarizing glasses. Cloudy morning with increasing sun. More than 3,000 *R. sylvatica* tadpoles seen.
May 11	76	0	Visibility poor, polarizing glasses used. Marsh marigold in full bloom.
May 25	97	0	Visibility good to excellent - polarizing glasses used in shade. Greater than 500 *R. sylvatica* tadpoles seen, no dense groupings, but could see them along the shore in the sun.

Table 5. Maximum counts of egg-masses in the Lower Fred Pierce Pond on the Lester and Monique Anderson lands in Lincoln from 1999 to 2006.

Lower Fred Pierce Pond	*Ambystoma maculatum*	*Rana sylvatica*	Notes
1999 count dates: 5/5, 5/18	134	1	Early masses missed
2000 count dates: 4/17, 4/29, 5/14	122	155	Timed well, early eggs of *R. sylvatica* nonviable
2001 count dates: 5/1, 5/7, 5/14, 5/21	178	101	Timed well, very dry spring
2002 count dates: 4/23, 5/1, 5/10, 5/20	270	170	Timed well, irregular spring with late snow
2003 count dates: 4/17, 4/25, 5/3, 5/9, 5/20	260	210	Timed well, cool spring, April drier than normal
2004 count dates: 4/9, 4/15, 4/22, 4/29, 5/6, 5/12	166	228	Timed well
2005 count days: 4/13, 4/20, 4/26, 5/4, 5/11, 5/25	137	365	Timed well, went slightly later than normal
2006 count days: 4/14, 4/20, 4/27, 5/4, 5/11, 5/25	158	454	Timed well, went slightly later than normal

Table 6. Maximum counts of egg-masses in the Upper Fred Pierce Pond on the Lester and Monique Anderson lands in Lincoln from 1999 to 2006.

Upper Fred Pierce Pond	*Ambystoma maculatum*	*Rana sylvatica*	Notes
1999 count dates: 5/5, 5/18	63	20	Early masses missed
2000 count dates: 4/17, 4/29, 5/14	54	62	Timed well, early eggs of R. sylvatica nonviable
2001 count dates: 5/1, 5/7, 5/14, 5/21	72	66	Timed well, very dry spring
2002 count dates: 4/23, 5/1, 5/10, 5/20	137	95	Timed well, cool spring, April drier than normal
2003 count dates: 4/17, 4/25, 5/3, 5/9, 5/20	80	144	Timed well, cool spring, April drier than normal
2004 count dates: 4/9, 4/15, 4/22, 4/29, 5/6, 5/12	92	71	Timed well
2005 count days: 4/13, 4/20, 4/26, 5/4, 5/11, 5/25	113	60	Timed well, went slightly later than normal
2006 count days: 4/14, 4/20, 4/27, 5/4, 5/11, 5/25	125	102	Timed well, went slightly later than normal

Table 7. Maximum counts of egg-masses at Guthrie Pond on the Lester and Monique Anderson lands in Lincoln from 1999 to 2006.

Guthrie Pond	*Ambystoma maculatum*	*Rana sylvatica*	Notes
1999 count dates: 5/5, 5/18	50	5	Early masses missed
2000 count dates: 4/17, 4/29, 5/14	138	538	Timed well, early eggs of R. sylvatica nonviable
2001 count dates: 5/1, 5/7, 5/14, 5/21	183	340	Timed well, very dry spring
2002 count dates: 4/23, 5/1, 5/10, 5/20	121	133	Timed ok, may have missed high count for R. sylvatica irregular spring with late snow
2003 count dates: 4/17, 4/25, 5/3, 5/9, 5/20	230	330	Timed well, cool spring, April drier than normal
2004 count dates: 4/9, 4/15, 4/22, 4/29, 5/6, 5/12	96	450	Timed well
2005 count days: 4/13, 4/20, 4/26, 5/4, 5/11, 5/25	83	280	Timed well, went slightly later than normal
2006 count days: 4/14, 4/20, 4/27, 5/4, 5/11, 5/25	111	328	Timed well, went slightly later than normal

Table 8. Maximum counts of egg-masses in the Wells Pond on the Lester and Monique Anderson lands in Lincoln from 1999 to 2006.

Wells Pond	*Ambystoma maculatum*	*Rana sylvatica*	Notes
1999 count dates: 5/5, 5/18	66	50	Early masses missed
2000 count dates: 4/17, 4/29, 5/14	96	91	Timed well, early eggs of R. sylvatica nonviable
2001 count dates: 5/1, 5/7, 5/14, 5/21	111	80	Timed well, very dry spring
2002 count dates: 4/23, 5/1, 5/10, 5/20	126	62	Timed well, irregular spring with late snow
2003 count dates: 4/17, 4/25, 5/3, 5/9, 5/20	110	71	Timed well, cool spring, April drier than normal
2004 count dates: 4/9, 4/15, 4/22, 4/29, 5/6, 5/12	110	59	Timed well
2005 count days: 4/13, 4/20, 4/26, 5/4, 5/11, 5/25	106	74	Timed well, went slightly later than normal
2006 count days: 4/14, 4/20, 4/27, 5/4, 5/11, 5/25	97	63	Timed well, went slightly later than normal

Table 9: Combined high counts, and average high counts for all ponds of egg-masses for *Ambystoma maculatum* and *Rana sylvatica* found on Lester Anderson lands in Lincoln, Vermont.

Lester Anderson Lands (total egg masses)	***Ambystoma maculatum***	**Average *A. maculatum***	***Rana sylvatica***	**Average *R. sylvatica***
1999 count dates: 5/5, 5/18	313	78	76	19
2000 count dates: 4/17, 4/29, 5/14	410	103	846	212
2001 count dates: 5/1, 5/7, 5/14, 5/21	544	136	587	147
2002 count dates: 4/23, 5/1, 5/10, 5/20	654	164	460	115
2003 count dates: 4/17, 4/25, 5/3, 5/9, 5/20	680	179	755	189
2004 count dates: 4/9, 4/15, 4/22, 4/29, 5/6, 5/12	464	116	808	202
2005 count days: 4/13, 4/20, 4/26, 5/4, 5/11, 5/25	439	110	779	195
2006 count days: 4/14, 4/20, 4/25, 5/4, 5/11, 5/25	491	123	947	474

Table 10. Fall 2006 cover-board results from the Lester Anderson lands on the Bristol/Lincoln border in Vermont. The species being monitored is Eastern Red-backed Salamander (*Plethodon cinereus*).

Snout to Vent Length							
Date	1-20 mm	21-30 mm	31-40 mm	41-50 mm	51-60 mm	Unk.[1]	Total
9/5/06	9	14	62	35	1	2	123
9/12/06	0	24	42	25	0	0	91
9/19/06	0	11	41	22	0	0	74
9/26/06	0	14	55	16	0	1	86
10/3/06	0	8	32	12	0	0	52
10/10/06	0	7	27	18	0	0	52
10/17/06	2	8	15	17	0	0	42
Total	**11**[2]	**86**[2]	**274**[2]	**145**[2]	**1**[2]	**3**[2]	**520**[2]

[1] Salamanders escaped before measurements were taken.
[2] Some salamanders may have been caught on more than one occasion throughout the field season.

Table 11. Percentage of totals for each cohort of Eastern Red-backed Salamanders (*Plethodon cinereus*) found during fall 2006 cover-board monitoring on the Lester Anderson lands on the Bristol/Lincoln border in Vermont.

Snout to Vent Length							
Date	1-20 mm	21-30 mm	31-40 mm	41-50 mm	51-60 mm	Unk.[1]	Total[2]
9/5/06	7.32%	11.38%	50.41%	28.46%	0.81%	1.62%	100.00%
9/12/06	0.00%	26.37%	46.15%	27.48%	0.00%	0.00%	100.00%

9/19/06	0.00%	14.86%	55.41%	29.73%	0.00%	0.00%	100.00%
9/26/06	0.00%	16.28%	63.95%	18.61%	0.00%	1.16%	100.00%
10/3/06	0.00%	15.38%	61.54%	23.01%	0.00%	0.00%	100.00%
10/10/06	0.00%	13.46%	51.92%	34.62%	0.00%	0.00%	100.00%
10/17/06	4.76%	19.05%	35.71%	40.48%	0.00%	0.00%	100.00%
Average	**1.73%**	**16.68%**	**52.16%**	**28.91%**	**0.12%**	**0.40%**	**100.00%**

[1] Salamanders escaped before measurements were taken.

[2] Some salamanders may have been caught on more than one occasion throughout the field season.

Table 12. Percentage of totals for each cohort of Eastern Red-backed Salamanders (*Plethodon cinereus*) found on high counts days during cover-board monitoring on the Lester Anderson lands on the Bristol/Lincoln border in Vermont (2001-2006).

Snout to Vent Length						
Date	1-20 mm	21-30 mm	31-40 mm	41-50 mm	51-60 mm	Unk.[1]
2001 (9/16)	0.00%	20.21%	63.83%	12.77%	1.06%	1.08%
2002 (9/12)	0.00%	8.26%	79.82%	10.09%	0.00%	1.83%
2003 (9/19)	1.68%	10.08%	66.39%	21.01%	0.00%	0.84%
2004[2] (9/29)	0.00%	36.96%	54.35%	6.52%	0.00%	2.17%
2005 (9/7)	0.99%	20.79%	66.34%	9.90%	0.00%	1.98%
2006 (9/5)	7.32%	11.38%	50.41%	28.46%	0.81%	1.62%
Average/Year	**1.67%**	**17.95%**	**63.52%**	**14.94%**	**0.31%**	**1.59%**

[1]Salamanders escaped before measurements were taken.

[2]Approximate totals had both cover-boards been checked, based on the doubling of the number of salamanders found under odd numbered cover-boards in 2004.

Table 13. Fall 2006 snake-cover results from the Lester Anderson lands on the Bristol/Lincoln border in Vermont for the Common Gartersnake (*Thamnophis sirtalis*). This is the sixth year of results. A record **113** snakes were found and measured in 2006. Two species were caught: the Common Gartersnake, and the Red-bellied Snake (*Storeria occipitomaculata).*

Date	*Species*	S-V length in mm	Total length in mm	Location Cover # - Cover Area	Mass and Physical Info
Sept. 12	*T. sirtalis*	153	199	#21 - between	3.5 g
Sept. 12	*T. sirtalis*	158	206	#21 - between	3.3 g
Sept. 12	*T. sirtalis*	160	210	#21 - between	4.0 g
Sept. 12	*T. sirtalis*	150	200	#22 - ground	3.5 g
Sept. 12	*T. sirtalis*	150	195	#22 - ground	3.5 g
Sept. 12	*T. sirtalis*	158	200	#22 - ground	3.5 g
Sept. 12	*T. sirtalis*	144	184	#28 - ground	2.5 g
Sept. 12	*T. sirtalis*	148	196	#28 - between	2.0 g
Sept. 12	*T. sirtalis*	155	199	#28 - ground	3.0 g
Sept. 12	*T. sirtalis*	145	189	#38 - between	2.0 g
Sept. 19	*T. sirtalis*	135	182	#12 - between	2.4 g
Sept. 19	*T. sirtalis*	150	197	#12 - surface	2.7 g
Sept. 19	*T. sirtalis*	150	200	#22 - surface	2.6 g
Sept. 19	*T. sirtalis*	150	193	#22 - surface	3.8 g
Sept. 19	*T. sirtalis*	155	200	#22 - surface	2.8 g
Sept. 19	*T. sirtalis*	160	210	#22 - surface	2.6 g
Sept. 19	*T. sirtalis*	163	211	#28 - between	2.5 g
Sept. 19	*T. sirtalis*	160	207	#28 - surface	3.2 g
Sept. 19	*T. sirtalis*	150	195	#37 - between	2.6 g
Sept. 19	*T. sirtalis*	135	170	#40 - surface	2.3 g
Sept. 19	*T. sirtalis*	150	193	#40 - surface	2.8 g
Sept. 19	*T. sirtalis*	158	200	#40 - surface	2.6 g
Sept. 19	*T. sirtalis*	160	210	#40 - surface	3.0 g
Sept. 26	*T. sirtalis*	160	210	#07 - between	2.8 g
Sept. 26	*T. sirtalis*	155	205	#20 - between	2.7 g
Sept. 26	*T. sirtalis*	140	173	#21 - between	2.2 g
Sept. 26	*T. sirtalis*	140	180	#21 - between	2.8 g
Sept. 26	*T. sirtalis*	150	190	#21 - surface	3.8 g
Sept. 26	*T. sirtalis*	180	228	#21 - between	3.0 g
Sept. 26	*T. sirtalis*	140	185	#22 - surface	2.9 g
Sept. 26	*T. sirtalis*	160	205	#22 - surface	3.1 g
Sept. 26	*T. sirtalis*	155	195	#28 - surface	2.8 g
Sept. 26	*T. sirtalis*	160	210	#36 - between	2.3 g
Sept. 26	*T. sirtalis*	140	185	#40 - surface	2.0 g
Sept. 26	*T. sirtalis*	145	195	#40 - surface	2.4 g
Sept. 26	*T. sirtalis*	150	195	#40 - surface	2.4 g
Sept. 26	*T. sirtalis*	155	195	#40 - surface	2.3 g
Sept. 26	*T. sirtalis*	160	200	#40 - surface	2.9 g

Table 13. Continued.

Date	Species	S-V length in mm	Total length in mm	Location Cover # - Cover Area	Mass and Physical Info
Oct. 3	*T. sirtalis*	155	195	#20 - under	2.6 g
Oct. 3	*T. sirtalis*	160	205	#20 - surface	3.1 g
Oct. 3	*T. sirtalis*	175	225	#20 - surface	2.9 g
Oct. 3	*T. sirtalis*	175	225	#21 - surface	3.0 g
Oct. 3	*T. sirtalis*	155	205	#22 - surface	2.9 g
Oct. 3	*T. sirtalis*	165	215	#22 - surface	2.9 g
Oct. 3	*T. sirtalis*	168	218	#22 - between	3.4 g
Oct. 3	*T. sirtalis*	134	199	#40 - surface	3.7 g
Oct. 3	*T. sirtalis*	147	195	#40 - surface	2.4 g
Oct. 10	*T. sirtalis*	150	190	#20 - between	2.4 g Permanent kink in neck
Oct. 10	*T. sirtalis*	155	200	#21 - surface	2.9 g
Oct. 10	*T. sirtalis*	140	190	#40 - between	1.1 g
Oct. 10	*T. sirtalis*	140	180	#40 - between	1.3 g
Oct. 10	*T. sirtalis*	154	204	#40 - surface	3.0 g

Table 14. Fall 2006 snake-cover results from the Lester Anderson lands on the Bristol/Lincoln border in Vermont for the Red-bellied (*Storeria occipitomaculata*). This is the sixth year of results. A record 113 snakes were found and measured in 2006. Two species were caught: the Common Gartersnake (*Thamnophis sirtalis)*, and the Red-bellied Snake.

Date	Species	S-V length in mm	Total length in mm	Location Cover # - Cover Area	Mass and Physical Info
Sept. 12	*S. occipitomaculata*	107	242	#20 - between	3.8 g Brown
Sept. 12	*S. occipitomaculata*	175	230	#21 - between	3.5 g Brown
Sept. 12	*S. occipitomaculata*	205	252	#22 - ground	5.5 g Brown
Sept. 12	*S. occipitomaculata*	170	225	#40 - ground	3.8 g Brown
Sept. 12	*S. occipitomaculata*	235	290	#40 - ground	7.8 g Dark Brown
Sept. 19	*S. occipitomaculata*	155	203	#20- between	3.0 g
Sept. 26	*S. occipitomaculata*	180	220	#21 - surface	4.0 g
Sept. 26	*S. occipitomaculata*	180	230	#21 - surface	3.5 g
Sept. 26	*S. occipitomaculata*	219	269	#22 - surface	6.6 g
Sept. 26	*S. occipitomaculata*	225	275	#36 - between	7.0 g
Sept. 26	*S. occipitomaculata*	180	210	#40 - surface	4.8 g Tail has been injured
Oct. 3	*S. occipitomaculata*	200	250	#22 - surface	5.6 g
Oct. 3	*S. occipitomaculata*	80	105	#40 - surface	0.7 g
Oct. 3	*S. occipitomaculata*	185	238	#40 - surface	3.9 g
Oct. 3	*S. occipitomaculata*	195	245	#40 - between	3.7 g Pale underbelly
Oct. 10	*S. occipitomaculata*	200	250	#9 - between	5.3 g
Oct. 10	*S. occipitomaculata*	185	240	#18 - surface	4.0 g
Oct. 10	*S. occipitomaculata*	190	240	#18 - surface	3.5 g
Oct. 10	*S. occipitomaculata*	75	95	#20 - between	0.4 g
Oct. 10	*S. occipitomaculata*	80	105	#20 - between	0.6 g
Oct. 10	*S. occipitomaculata*	165	215	#20 - between	3.3 g
Oct. 10	*S. occipitomaculata*	180	234	#20 - between	2.8 g
Oct. 10	*S. occipitomaculata*	85	105	#21 - between	0.6 g
Oct. 10	*S. occipitomaculata*	90	115	#21 - between	0.8 g
Oct. 10	*S. occipitomaculata*	150	200	#21 - between	2.1 g
Oct. 10	*S. occipitomaculata*	150	200	#21 - between	2.4 g
Oct. 10	*S. occipitomaculata*	160	210	#21 - between	2.8 g
Oct. 10	*S. occipitomaculata*	185	235	#21 - surface	3.9 g
Oct. 10	*S. occipitomaculata*	190	245	#21 - surface	4.0 g
Oct. 10	*S. occipitomaculata*	80	105	#39 - between	0.6 g

Table 14. Continued.

Date	Species	S-V length in mm	Total length in mm	Location Cover # - Cover Area	Mass and Physical Info
Oct. 10	*S. occipitomaculata*	65	83	#40 - between	0.4 g Dark Brown
Oct. 10	*S. occipitomaculata*	70	95	#40 - between	0.5 g Dark Brown
Oct. 10	*S. occipitomaculata*	72	97	#40 - between	0.6 g Dark Brown
Oct. 10	*S. occipitomaculata*	75	93	#40 - between	0.4 g Dark Brown
Oct. 10	*S. occipitomaculata*	75	95	#40 - between	0.5 g Dark Brown
Oct. 10	*S. occipitomaculata*	75	97	#40 - between	0.6 g Dark Brown
Oct. 10	*S. occipitomaculata*	75	101	#40 - surface	0.6 g Dark Brown
Oct. 10	*S. occipitomaculata*	80	103	#40 - surface	0.6 g Dark Brown
Oct. 10	*S. occipitomaculata*	82	104	#40 - between	0.6 g Dark Brown
Oct. 10	*S. occipitomaculata*	84	109	#40 - surface	0.6 g Dark Brown
Oct. 10	*S. occipitomaculata*	85	105	#40 - surface	0.5 g Dark Brown
Oct. 10	*S. occipitomaculata*	85	105	#40 - surface	0.7 g Dark Brown
Oct. 10	*S. occipitomaculata*	86	111	#40 - surface	0.7 g Dark Brown
Oct. 10	*S. occipitomaculata*	88	113	#40 - surface	0.7 g Dark Brown
Oct. 10	*S. occipitomaculata*	90	110	#40 - between	0.7 g Dark Brown
Oct. 10	*S. occipitomaculata*	90	112	#40 - surface	0.7 g Dark Brown
Oct. 10	*S. occipitomaculata*	95	117	#40 - surface	0.7 g Dark Brown
Oct. 10	*S. occipitomaculata*	175	225	#40 - between	3.7 g Lighter brown
Oct. 10	*S. occipitomaculata*	220	285	#40 - between	6.6 g Lighter brown
Oct. 17	*S. occipitomaculata*	79	99	#20 - between	0.5 g
Oct. 17	*S. occipitomaculata*	88	108	#20 - surface	0.5 g
Oct. 17	*S. occipitomaculata*	90	110	#20 - surface	0.8 g
Oct. 17	*S. occipitomaculata*	77	97	#21 - between	0.7 g Grayish
Oct. 17	*S. occipitomaculata*	84	104	#21 - between	0.7 g
Oct. 17	*S. occipitomaculata*	88	112	#21 - between	0.8 g
Oct. 17	*S. occipitomaculata*	70	90	#40 - between	0.5 g Injured slightly below vent
Oct. 17	*S. occipitomaculata*	75	98	#40 - surface	0.5 g
Oct. 17	*S. occipitomaculata*	77	97	#40 - surface	0.5 g
Oct. 17	*S. occipitomaculata*	80	104	#40 - surface	0.7 g
Oct. 17	*S. occipitomaculata*	82	104	#40 - surface	0.7 g
Oct. 17	*S. occipitomaculata*	90	112	#40 - surface	0.7 g

Table 15. Total individuals captured under snake-covers and estimated total individuals seen over entire season (2001-2006) on Lester Anderson lands in Lincoln, Vermont.

Species	*2001*		*2002*		*2003*		*2004*		*2005*		*2006*	
	Total	Est.	Total	Est.	Total	Est.	Total	Est.	Total	Est.	Total	Est.[1]
S. occipitomaculata	5	5	19	15-19	6	***5***	***6***	***6***	***9***	***9***	***61***	***N/A***
T. sirtalis	0	0	9	9	5	***3***	***21***	***14***	***8***	***8***	***52***	***N/A***
L. triangulum	0	0	3	3	5	***3***	***10***	***10***	***2***	***2***	***0***	***N/A***
Total	5	5	31	27-31	16	***11***	***37***	***30***	***19***	***19***	***113***	***N/A***

[1] One hundred and thirteen snakes were found under the cover boards in 2006. Some of the snakes may have been found and measured on more than one occasion. Our high counts for one day were 34 *S. occipitomaculata* on Oct. 10 and 15 *T. sirtalis* found on Sept. 26. The majority of snakes found this year were juveniles, as they grow very quickly and their weight fluctuates with feeding, estimating the total number of individuals could not be done reliably.

Figure 1a: High Counts of *Ambystoma maculatum* egg masses on Lester Anderson Lands, Lincoln Vermont (1999-2006)

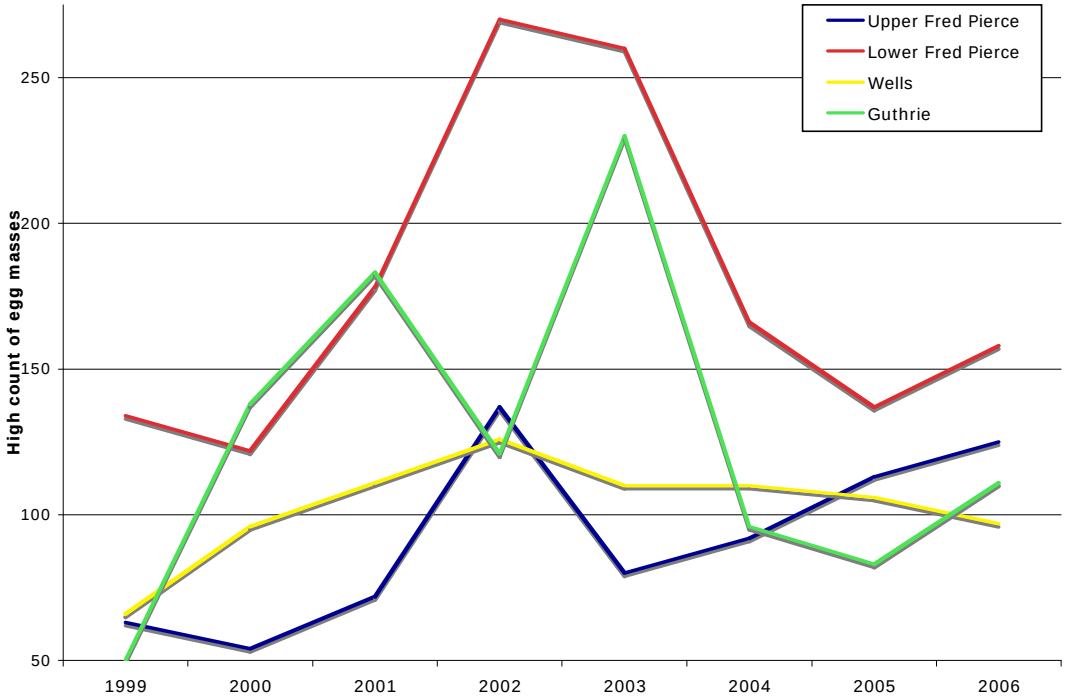


Figure 1b: High Counts Trend Lines for *Ambystoma maculatum* egg masses on Lester Anderson Lands, Lincoln Vermont (1999-2006)

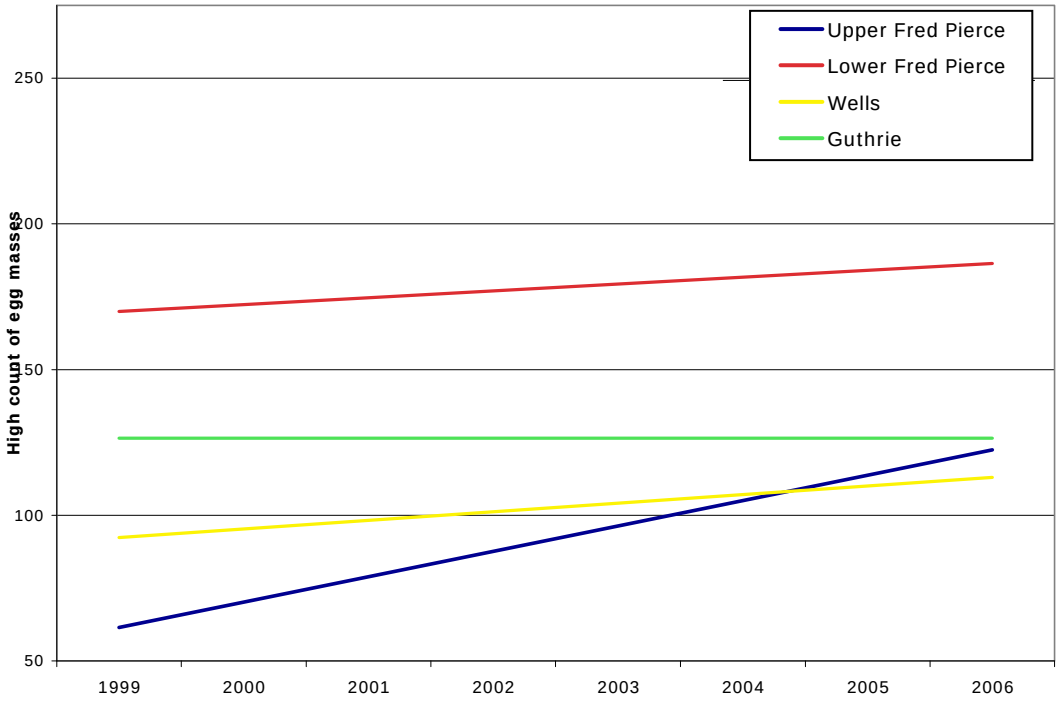


Figure 2a: High Counts of *Rana sylvatica* egg masses on Lester Anderson Lands, Lincoln, Vermont (1999-2006)

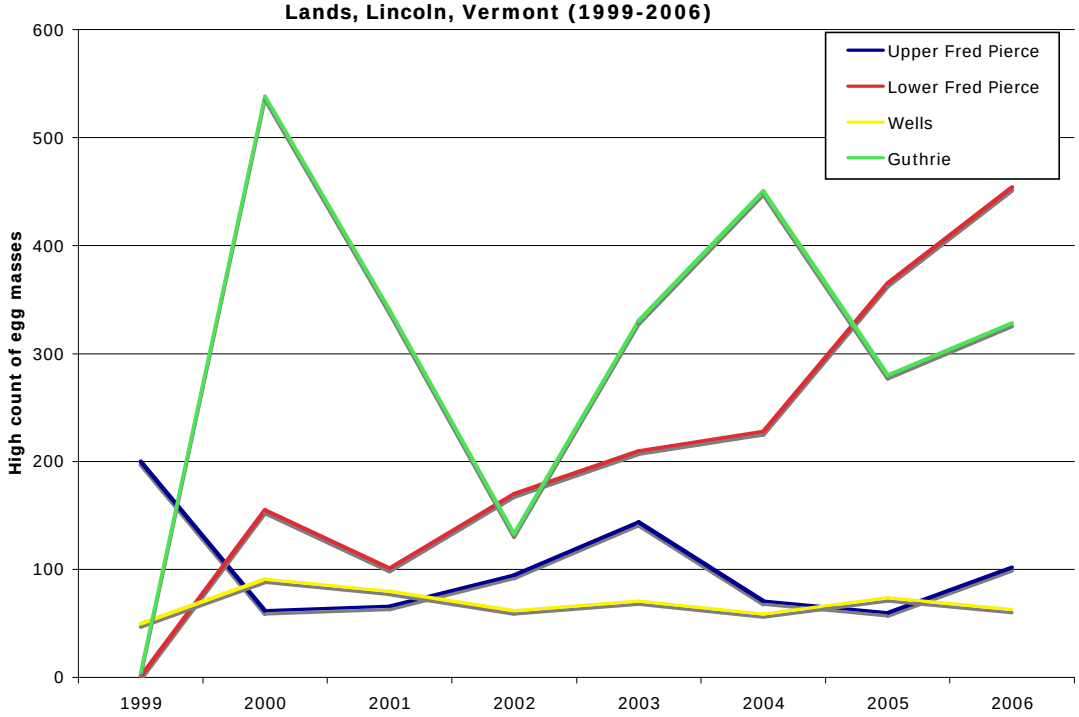


Figure 2b: High Counts of *Rana sylvatica* egg masses on Lester Anderson Lands, Lincoln, Vermont (1999-2006)

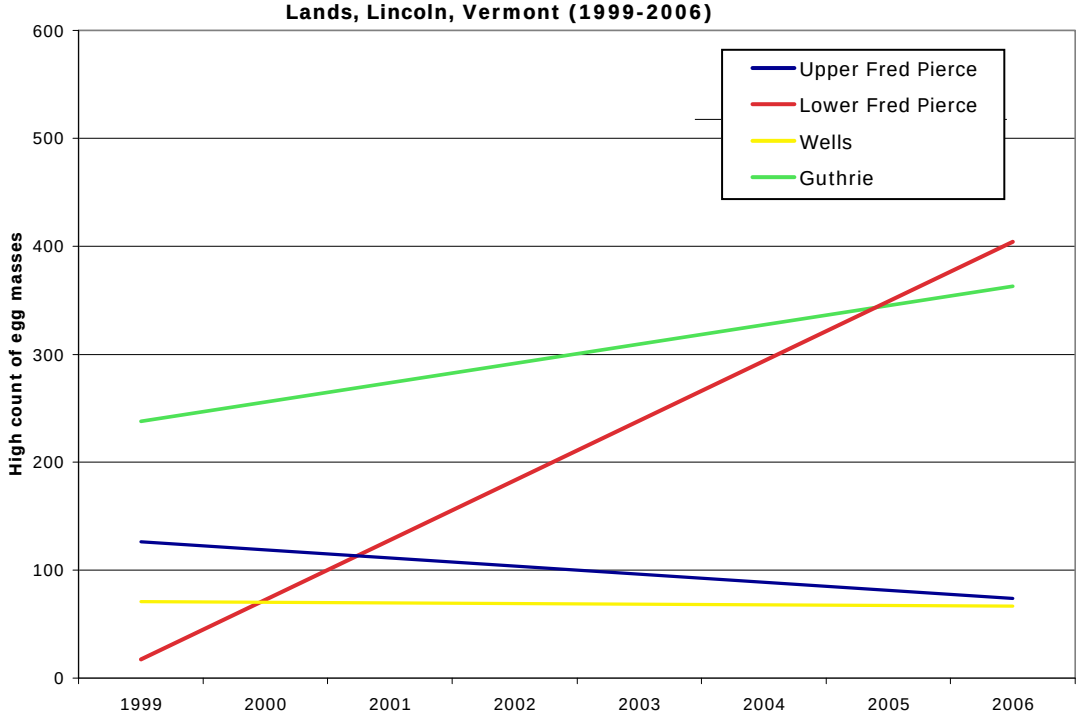


Figure 3: Average number of *Rana sylvatica* and *Ambystoma maculatum* egg masses throughout the spring of 2006 on Lester Anderson Lands, Lincoln Vermont

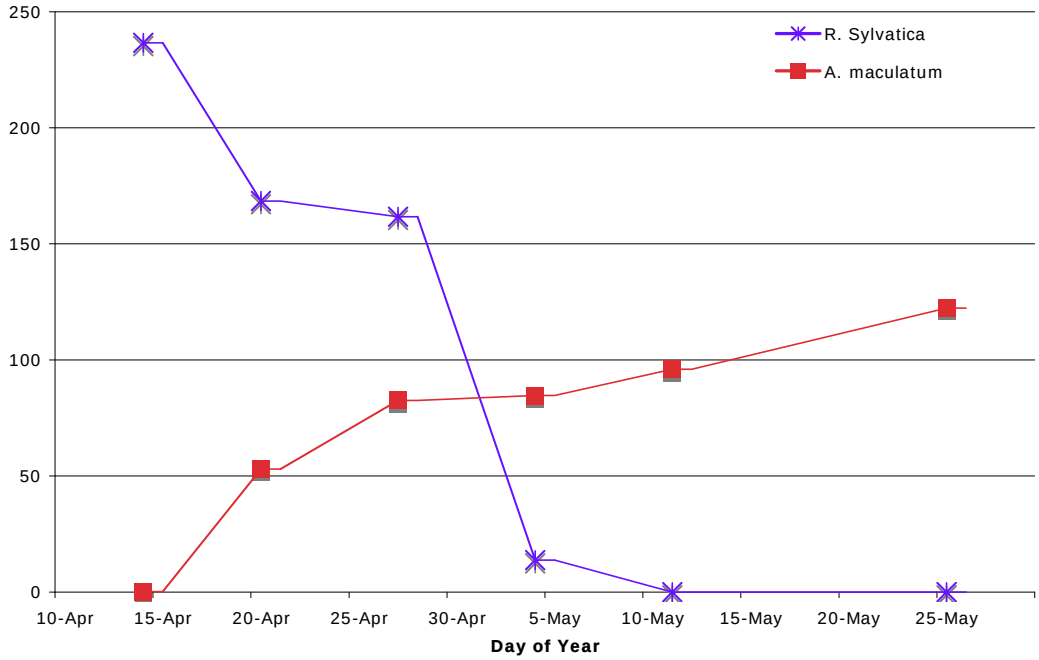
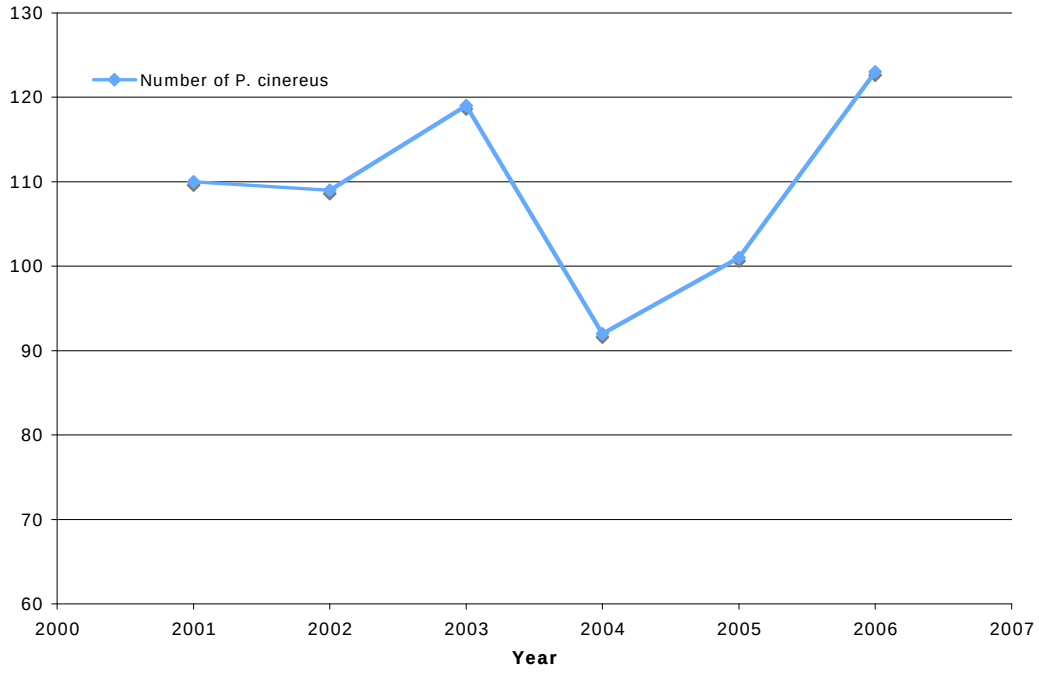


Figure 4: High Counts for *Plethodon cinereus* on Lester Anderson Lands, Lincoln, Vermont (2001-2006)



Picture 1: Spotted Salamander egg mass in hand.

Picture 2: Wood Frog egg mass in hand.

Picture 3: Pickerel Frog egg mass in hand.

Picture 4: Dusky Salamander found under cover-board on September 19, 2006

Picture 5: Juvenile snakes found on October 10, 2006.