Amphibian & Reptile Monitoring

During the 2004 Field Season

on the Lester and Monique Anderson Lands

in Lincoln, Vermont

Prepared for the
Colby Hill Ecological Project

Prepared by

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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 (shown as Todd's Road on the attached map) 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 coverboards. 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 a Magnum 44 permanent marker or 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 will be monitored using this method often 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 as opposed to their total length.

I am also keeping 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 coverboards. Her most interesting and best supported finding (Corey, 2002) is 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 coverboards 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 coverboards 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 with the Mean Streak white paint sticks. The Mean Streak marks are easier to see and do not fade as quickly. A few broken slates were replaced during the early fall of 2003 and in 2004. New slates were slightly longer (610mm x 360 x 20-25 mm thick) but otherwise identical. All new slates were marked with a Mean Streak and a few old marks on existing slates were touched up.

In 2004 we started checking the snake-covers on August 31. 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 are checked once a week. Snake populations are often widely dispersed throughout the foraging season; consequently it was unknown whether forty pairs would attract enough snakes to provide useful data. Conditions under the covers are changing over the first couple years as remaining vegetation dies, invertebrates colonize them, and

small mammals begin to tunnel under them. I expect the amount and types of change to stabilize over the first few years.

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. During the fall of 2000 the suggested common name for this species (Crother, 2000) changed from Redback to Eastern Red-backed Salamander. The new common name is used from the 2001 report on.

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 or the black sides. 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 maximum size reported in Vermont had a snout to vent length of 365 mm and a total length of 465 mm. That snake

was unusually large. Of all the snakes we have with measurements recorded for snout to vent length and total length (N=63) the average snout to vent length is 165 mm and a total length of 209 mm (Andrews, 2005) They are found throughout the state in forested areas (Andrews, 2005). The 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).

During the fall of 2002, 2003 and 2004 two additional species were located under the snake-covers: *Thamnophis sirtalis* (Common Gartersnake) and *Lampropeltis triangulum* (Milksnake).

The Common Gartersnake is known to reach total body lengths (TBL) 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, 2005) 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 a snout-vent length (SVL) of 360 mm – 390mm, females usually mature in two to three years at an SVL of 420 mm to 550 mm. Litter size ranges from 1 to 101 and averages 27. The young 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).

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 I believe it is over-reported as a 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 are frequently confused with Rattlesnakes as a result of behavioral mimicry. They often will shake their tails when irritated.

Results and Discussion

Egg-mass counts

In 2004 egg-mass counts were performed on five dates (April 15, April 22, April 29, May 6, and May 12) 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 Wood Frogs made it to the ponds early in April. Our high counts for Wood Frog egg masses in all four ponds were either the 1st or 2nd week of the counts. Our first count was after three days of rain following six consecutive dry days. The temperature was below average during the first two weeks of April, but still above freezing. Timing of the counts for the Spotted Salamander was also appropriate, as there were no egg masses seen on the first count and the peak egg

masses with most ponds being on the fourth count. It is possible that a small number of additional masses were added after the last count, although it seems unlikely. By the fifth counts we had noted that most of the Spotted Salamander egg masses were turning green and some had moving embryos.

Table 5-8. shows that the counts for Spotted Salamanders at all sites were considerably lower than the highest counts in all ponds except Wells. None of the pools had record high counts nor did they have record low counts. Guthrie did have its second lowest count of 96, which is considerably down from 2003 when it was 230. Annual variation in these numbers is to be expected, and can be seen in Table 5-8 and Figure 1. What is surprising at this point is that Guthrie appears to vary independently of the other three. With additional years of data some patterns may emerge. Spotted Salamander numbers at nine other monitoring sites in Vermont have varied in size from 0 to 292 with a mean of 81. It is important to note that year to year variation at one site has been from 0 egg-masses to 292, hence the necessity of multiple-year data for a baseline. This year we calculated the average egg masses for each pond and they were as follows Guthrie (136), Lower Fred Pierce (183.3), Upper Fred Pierce (83) and Wells (103). It has been suggested that adults of this species may not lay eggs every year, in which case a different portion of the adult population is being sampled each year. 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, this suggests that in 2003 the number of breeding females ranged from ~27 at Upper Fred Pierce to ~77 at Guthrie. In 2004, the number of females ranged from ~31 at Upper Fred Pierce to ~55 at Lower Fred Pierce. Again this year, the later egg deposition of Spotted Salamander versus Wood Frog is clearly seen. In addition to species-specific differences, the timing of breeding also depends on elevation, aspect, spring temperatures, rainfall, and the amount of snow accumulated.

This year **t**he high count of 450 egg-masses at Guthrie Pond is above average and that pool continues to be the most productive site for Wood Frogs, but increases at Lower Fred Pierce may change that in the future. Lower Fred Pierce continued to increase this year and had a record number (228) of egg masses this year. In Guthrie, the cover and feeding surfaces provided by the cattails may enhance tadpole survival. Egg-mass numbers from nine other monitoring sites for this species vary from 0 to 225 with a mean of 85. Year to year variation at other sites has been as large as 3-225. At Guthrie the annual variation has been as high as 133 to 538 (see Figure 2). The total number of high counts for each pond is shown in Table 9. The great majority of the eggs (>99%) of both species will be eaten either during the egg stage, or as tadpoles/larvae, metamorphs, or juveniles. This year there was a great deal of Wood Frog egg mass destruction in Upper Fred Pierce. We heard a Wood Frog chorus and counted 69 egg masses, and saw more than 90 frogs on April 15; by April 22 that number of egg masses had increased to 71. On April 29 we could only count 3 masses because the rest had been destroyed, presumably by the Green Frog tadpoles that were constantly swimming through them eating the algae off the masses (see Picture 1). Although 71 egg masses were close to the average of 77 for Wood Frog egg masses in Upper Fred Pierce, in 2004 we did not find a single Wood Frog tadpole.

To establish useful baseline indices, I had previously recommended at least five years of egg-mass counts. We now have six years of data from the ponds, however the first year was poorly timed. Annual counts from now on will help 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.

Invertebrates noted this year included predaceous water beetles, water boatman, macrobodellan leech, and caddis fly larvae. A bluebird was seen on the wire between Upper and Lower Fred Pierce on April 9.

During egg mass counts we also found Green Frogs *(Rana clamitans)* and Eastern Newts (*Notophthalmus viridescens*) at all the breeding ponds. These species lay eggs during the late spring or summer and are not suitable for spring egg-mass monitoring. Both of these common species spend their adult lives in or near still water. Spring peeper (*Pseudacris crucifer)* were heard or seen at the egg-mass survey ponds. 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.

Cover-boards

The cover-boards were checked on eight dates: Sept. 8, 15, 22, 29, Oct. 6, 13, 20, 27, and Nov. 3 (Table 10). Cool fall weather arrived when expected in late October and early November dropping nighttime lows below freezing.

The species found under the coverboards are almost exclusively the Eastern Red-backed Salamander. However, Eastern Newts in the Red Eft stage have been found using the boards. Only one Red Eft (juvenile form of Eastern Newt) was found this year (September 29). For the first time a Two-lined Salamander (*Eurycea bislineata*) was also found under a cover board. This species is predominantly found in saturated soils and was found at coverboard 29, which is fairly close to a small stream. Neither of these sighting were included in Table 10.

On our first fall count on September 8, 78 Eastern Red-backed Salamander were using the artificial covers (Table 10). Like last year, this is an average of slightly more than one per cover board. Last year's high count was 119, in 2002 it was 110, in 2001 it was 94, and in 2000 it was 36. With the exception of the first year, the high count has always been the first count. This year we started a few weeks earlier and the estimated high count was on September 29 with 92 found. After September 29, numbers dropped continually until our last count day on November 3. This year the counts dropped 35 percent between the high count and the next week. In 2003 they dropped 39% after the first (high) count. They dropped 38% after the first count in 2002 and 40% after the first check in 2001. 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 we checked all cover-boards the first check, but only one of each pair on the following check, and every other check after that (Table 10). 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 does not have any impact on board use as a result of disturbance. This is in accordance with the recent results published by Marsh and Goicochea (2003). They also found no difference between covers checked every week and covers checked every three weeks. Covers checked daily did show different results. We wondered if perhaps, there was still an impact of the first disturbance. This year we checked earlier than in previous years Sept 8

vs. Sept 19 (2003), Sept 12 (2002), Sept 16 (2001), or Sept 16 (2000). We found fairly consistent numbers 78, 80, and 75 before the high count of 92. In 2001 the cover-boards were checked once in July and C. Corey found 98 Eastern Red-backed Salamander at that time. It might be that the numbers are fairly consistent through the summer, and peak in early fall and then gradually fall off as winter approaches. One possible explanation for high numbers in early fall may be that the Red-backed salamanders start mating in the autumn and continue through the spring. One study found a population in NY started mating in the second week in October. Females have the ability to keep sperm in their cloacae through late April (Petranka 1998). Perhaps the high numbers are due to the salamanders congregating together for mating before dispersing underground for over wintering. Next year in addition to starting earlier in the September, we will also check the cover boards once in June, July and August.

This year, the bulk of the population under the boards continues to be in the 31-40 size-class (40%) and there were no salamanders over 50-mm snout to vent length this year. This is the same as last year (see Table 10). In 2004, 20% of the salamanders were in the 21-30 mm category, which was a change from 2003 when only 9% were in that category. Female Red-backed Salamanders reach sexual maturity within 3.5 years when they are between 34-39 mm and males when they reach 32-37mm (Petranka 1998). The reason for the large increase in juveniles is not known. With more years' data we may be able to discern some patterns in these relationships.

These individuals were not marked, so the total number caught is not known and 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.

Many invertebrates are found under the cover boards including slugs, ants, silverfish, millipedes, centipedes, camel crickets, daddy longlegs, earthworms, sow bug, snails, and wolf spiders. Metamorph American Toads (*Bufo americanus*) were found accidentally while checking the cover boards on September 8, 15, and 22. Adult Green Frogs, Wood Frogs and Spring Peepers were also found along the path occasionally throughout the fall.

Snake-covers

All snake covers were checked at weekly intervals starting on August 31 with succeeding checks on September 8, 15, 22, 29, October 6, 13, 20, 27, and November 3 (Table 11). 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 and in 2004 it was 30. As mentioned previously, the two new species were *Thamnophis sirtalis* (Common Gartersnake) and *Lampropeltis triangulum* (Milksnake). Both of these were found along with *Storeria occipitomaculata* (Red-bellied Snake). Neither of these species is rare and both had been located on this parcel of land during Jeremy Hertzig's (1998) inventory. This year, based on the measurement and location data we caught fourteen Common Gartersnakes, ten Milksnakes, and six Red-bellied Snakes. Last year we caught the same three species but only three Common Gartersnakes, five Red-bellied Snakes, and three Milksnakes (see Table 12). Since some snakes of the same species were very close in size and measurements of live snakes vary with the behavior of the snake, and the experience of the measurer, it is possible that a few, although slightly different in measurement, were caught more than

once. Three snakes are marked in Table 11. They are assumed to be caught for the second time this season and are counted only once in the totals. By just looking at measurements it would appear that other snakes could possibly have been seen multiple times. However, this year we began taking very detailed notes about the markings on individual Milksnakes. The pattern on Milksnakes lends itself to individual identification. It appears that none of the Milksnakes were caught more than once during the season.

Common Gartersnakes give birth in the late summer. On September 15 we caught nine juvenile Common Gartersnakes under the covers, the next week (September 22) we caught 2, and the following week (September 29) we caught 4.

Although the fourth year of results, these results should be considered only the third 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, colonization, and tunneling may be ongoing but were far less visible this year.

As usual, many invertebrates were found using the snake-covers. Although numbers were not noted, lists were kept each day of the total variety of groups located. These were not identified to species. Field crickets, centipedes, millipedes, slugs, ground beetles, earth worms (large crawlers), daddy longlegs, black ants, red ants, earwigs, large red mites, sow bugs, bumble bees, woolly bears, other caterpillars, cocoons, snails, and spiders were all noted. Small mammal tunnels were visible under many of the covers. For the second year in a row we found a praying mantis egg case, attached to the underside of a snake cover.

Summary

The **egg-mass** counts were timed well. We now have five solid years of data. The high counts of Wood Frog egg-masses were about average. We will continue to watch with great interest the interaction between the Wood Frogs and the Green Frog tadpoles at Upper Fred Pierce. The numbers of Spotted Salamander egg-masses were also about average with no records broken either with high or low counts. As we collect more years worth of data, we are able to start looking at trends and it is interesting that the two amphibian species appear to cycle in different ways. If the females of a species do not breed every year, we expect we will be able to show cyclical peaks and valleys in their numbers as monitoring continues into the future.

We now have four solid years of data from the **cover-boards.** Our high count of Eastern Red-backed Salamanders was slightly lower and later in the season than in previous years. We plan to add a few counts in the summer to further tease out some seasonal fluctuations in their population numbers.

We also have four solid years of data from the **snake-covers**. This year we found greater numbers of Common Gartersnakes and Milksnakes than ever before. As our identification

of individual Milksnakes continues to improve, we may be able to start identifying individual snakes from year to year. This could give us additional data on annual growth rates and perhaps other aspects of their natural history. This year we also found a high number of juvenile Common Gartersnakes. This indicates a successful year for reproduction. In the future, we will separate juveniles from adults in the tables.

Opportunities for long-term monitoring are both exceptionally rare and very valuable. Most funding for these projects 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. We have attached two pictures to this report, but we will also be forwarding a CD of pictures taken throughout the season.

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