Amphibian & Reptile Monitoring

During the 2001 Field Season

on the Lester and Monique Anderson Lands

in Lincoln, Vermont

Prepared for the

Colby Hill
Ecological Project

Prepared by

Jim Andrews
Biology Department
Middlebury College
Middlebury Vermont
05753

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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 were begun along the cover-board transects in 2000. Many snake covers broke over the late fall and winter and needed to be replaced with thicker slates during 2001. New snake covers were put in place during the early fall and counts began this year.

Methods

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 Figures 1-3.

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 Figure 4. 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 (Figure 5). 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 will be kept free from the area. Forest litter will be removed from the top of the condos but left between and around them. All condos are marked with a Sanford Magnum 44 permanent marker. 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, two Middlebury College students (Caitlin Corey and Heidi Rothrock) were hired to gather the data from the cover-boards. Caitlin Corey also 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. These data will not be gathered annually. She analyzed these data for a senior thesis project that I advised her on.

Snake covers

The snake covers are an experiment. I am not aware of any other efforts to monitor snake populations using covers, though some other experiments have begun. 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. 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. The covers are checked in the fall after the young-of-the-year have been produced and snake numbers should be at their maximum. In addition, the cooler air temperatures of the fall should make the relative warmth of the slate more attractive. 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. Additional covers may need to be added at other sites.

Basic species information

Two of the spring-breeding amphibians that deposit large easily identified egg-masses are using these 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 in this report.

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 (give live birth) snake of woodlands and woodland openings. The maximum size reported in Vermont had a snout to vent length of 263 mm and a total length of 330 mm. They are found throughout the state (Andrews, 2002) in forested areas. 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).

A bibliography of useful resources is included with this report.

Results and Discussion

Egg-mass counts

I performed egg-mass counts on four dates (May 1, 7, 14 and 21) 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 held water even through a very dry year such as this one.

The results of this year's counts are shown in Table 1. Although conditions were very dry during the spring (and entire year) timing of the counts for the Spotted Salamander was appropriate based on the addition of new egg masses until a few days before the last count. It is possible that a small number of additional masses were added after the last count, although it seems unlikely. Table 2 shows that the counts were the highest of the past three years for this species at all sites (LFP -178, UFP - 72, WP - 111, and GP – 183). For comparison, 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. 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. The highest percentage of nonviable eggs was seen at Guthrie on May 14. Twelve

percent of the egg masses of this species seen on that date were mostly or all nonviable. Egg masses at all other sites showed less than 10% nonviability (Table 1). Again this year, the longer period of egg deposition of Spotted Salamander versus Wood Frog is clearly seen. Small numbers of new egg-masses of Spotted Salamander were still visible on May 21, whereas no new Wood Frog masses were seen after May 7.

A large snow pack delayed the first count until May 1, however Wood Frog egg masses were not well developed at that time which suggests that all were still visible and the high count is accurate. There were very few new egg-masses deposited after the first count day which indicates breeding of this species was almost entirely done before I first arrived. The timing of breeding depends on elevation, aspect, spring temperatures, and the amount of snow accumulated.

The number of Wood Frog eggs at all but Upper Fred Pierce Pond were slightly lower than last year's counts: LFP - 101, UFP - 66, WP - 80, GP-340. The high count of 340 egg-masses at Guthrie Pond shows that this continues to be the most productive site for this species. 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 has been as large as 3-225. Large numbers of Wood Frogs hatched successfully with estimates of greater than 90,000 tadpoles visible during the May 14th count at Guthrie.

To establish useful baseline indices, I continue to recommend five years of egg-mass counts. These do not have to be in consecutive years. After the baseline is established additional counts could be every other or every few years. This will help minimize the effect of natural annual variation on multi-year averages. What this gives us is a rough, relatively inexpensive indicator of the productivity of these ponds and their surrounding woodlands for these two species. The great majority of these eggs (>99%) will be eaten as eggs, tadpoles, or metamorphs.

Cover-boards

The cover-boards were checked on thirteen dates: July 22, Sept. 16, 22, 29, Oct. 6, 19, 28, Nov. 4, 10, 17, 25, Dec. 1, and 8 (Table 3). This is far more checks than was expected to occur. The check on July 22 was a training session for the Middlebury College student who I hired to gather data from these cover-boards and the data from that date are recorded but not used for these comparisons. The late November and early December dates are a result of the very warm and late fall with no significant freezes until December. We continued to find salamanders using the boards through December 1. During maintenance of the boards on June 8, two Wood Frogs were found using the cover for the first time. They were not seen during the normal fall monitoring period. At this time we also discovered that we had one extra set of cover-boards in the third set. Pair number 38 had been repeated. Pairs from 38 on were renumbered through 46. During our training session on July 22 a single Eastern Newt (*Notophthalmus viridescens*) in the Red Eft stage was found using the boards. Like the Wood Frogs this species had not been seen previously using the boards nor was it found during the fall count period. On our first official fall count on September 16, 94 *P. cinereus* were using the artificial covers (Table 3). This is almost three times the previous high count of 36 in 2000. This is an average of slightly more than one per cover board. This rate is more than I had expected. Since last year was the first year the coverboards were in place and all sites had been recently disturbed, these numbers may be

more typical of what we can expect in the future. After September 16, numbers gradually declined through October 28 with a limited number continuing to use the boards until December 1. Since the first count was by far the largest, it suggests that we should begin our monitoring in early September to see how dependent the high count is on timing of the first count. Last year (2000) numbers bounced back after a low count of two on October 20. Fearing a repeat of this pattern, we continued to monitor until the ground froze and no more salamanders were found. We did not see any sudden increases in numbers but instead the fairly steady decline mentioned earlier. Interestingly, during November more of the smallest age class (1-20 mm) moved to the boards after the adults were gone. Next year we will begin roughly weekly counts during the first week in September.

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. These counts end when the ground freezes. This year demonstrated how much annual variation there can be for the date the ground freezes.

This year, the student hired to be in charge of gathering the cover-board data (Caitlin Corey) not only gathered additional types of data but also performed some different analyses with these data for her senior thesis. She recorded 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 thesis is attached. Her most interesting and best supported finding 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. The decline in numbers of salamanders caught as the fall progressed was a clear pattern but not surprising.

Snake-covers

The new snake-covers were all in place by early September. The first check was September 26 and succeeding checks were on October 3, 11, 17, 24, and November 1 (Table 4). On October 3 a Red-bellied Snake (*Storeria occipitomaculata*) was found between the slates of one of the covers. A probable specimen of this species had been found previously while replacing the slates on September 16th. The specimen had been dead for some time suggesting that it may have been crushed at the same time the slates were broken. The snake of October 3 was the first confirmed specimen of this species to be found on the property during the course of the survey and monitoring. On October 11, three more Red-

bellied Snakes were found using the covers and October 17 a final individual was found. All of these were of different sizes showing that they were indeed different individuals. It was very heartening that a cryptic species such as this one was attracted to the artificial snake covers. Three of the snakes were found below the lower of the two slates in each cover on the surface of the ground. Two of them were found between the two slates in the space created by the wooden spacers. For the coming year, I plan to use the same protocol and number of snake-covers to see how well they withstand the elements and mowings and to see if numbers or species change. Numbers of covers may need to be expanded in the future.

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, slugs, ground beetles, earth worms (large crawlers), daddy longlegs, black ants, red ants, earwigs, ground beetles, large red mites, sow bugs, bumble bees, woolly bears, other caterpillars, snails, and spiders were all noted. Small mammal tunnels were visible under many of the covers.

Other amphibians and reptiles

The Red-bellied Snakes using the snake-covers were the most interesting new discovery of the season. Other herptiles found during the surveys were *Rana clamitans* (Green Frog) and *Notophthalmus viridescens* (Eastern Newt). 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. *Pseudacris crucifer* (Spring Peepers) were heard or seen at all 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.

Other species of interest

Other species (not reptiles or amphibians) are often identified while in the field. Those that were most interesting are listed here.

Brown Thrasher, near Upper Fred Pierce Pond and residence, May 1

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Literature Cited

Andrews, J.S. 2002. The atlas of the reptiles and amphibians of Vermont. James S. Andrews, Middlebury, Vermont 90 pp.

Corn, P.S., and L.J. Livo. 1989. Leopard Frog and Wood Frog reproduction in Colorado and Wyoming. Northwest Naturalist 70:1-9

Craig, B., C. Rikley, B. Slade, A. Way, and N. Wilson. 1999. Evaluating four types of salamander cover boards at Smithsonian Institution forest biodiversity permanent plots utilizing student volunteers. In abstracts of the Canadian Amphibian and Reptile Conservation Networks Quebec 1999 annual meeting.

Crother B.B., 2000. Scientific and standard English names of amphibians and reptiles of North America north of Mexico, with comments regarding confidence in our understanding, Herpetological Circular # 29. Committee on Standard English and Scientific Names, Brian B. Crother Chair, Society for the Study of Amphibians and Reptiles. 82 pp.

Heyer, W.R., M.A. Donnelly, R.W. McDiarmid, L. C. Hayek, and M. Foster (editors). 1994. Measuring and monitoring biological diversity: Standard methods for amphibians. Smithsonian Institution Press. 364 pp.

Mitchell, J.C. 1994. The Reptiles of Virginia. Smithsonian Institution Press, Washington 352 pp.

NAAMP, The North American Amphibian Monitoring Program website. http://www.mp1-pwrc.usgs.gov/amphibs.html

Table 1. Spring 2001 egg-mass data from the Lester Anderson lands in Lincoln, Vermont.

Location/Date	***Ambystoma maculatum* egg masses**	***Rana sylvatica* egg masses**	**Notes**
Lower Fred Pierce Pond			
May 1	59	**101**	*N. viridescens* 7 *R. clamitans* 25 *R. sylvatica* 1, (dead) 1 Very dry, no rains
May 7	112	4	*N. viridescens* adults 7, subadult 1, dead 1 *P. crucifer* calling 1 *R. clamitans* tadpoles >100 *R. sylvatica* tadpoles >1000
May 14	153	0	*N. viridescens* adults >20 *P. crucifer* adult dead 2 *R. sylvatica* tadpoles >50
May 21	**178**	0	*N. viridescens* adults >10 *R. clamitans* tadpoles >60 *R. sylvatica* tadpoles 0
Upper Fred Pierce Pond			
May 1	25	**66**	*N. viridescens* 2 *P. crucifer* calling 1 *R. clamitans* tadpoles 15 *R. sylvatica* calling 1 Very dry, no rains
May 7	52	0	*N. viridescens* adult 3 *R. clamitans* tadpoles >100, adults 1 *R. sylvatica* tadpoles 0
May 14	58 (6 nonviable)	0	*N. viridescens* 1 *R. clamitans* tadpoles >22
May 21	**72**	0	*N. viridescens* 0 *R. clamitans* tadpoles >50, adults >3 *R. sylvatica* tadpoles 0

Table 1. Continued.

Location/Date	***Ambystoma maculatum* egg masses**	***Rana sylvatica* egg masses**	**Notes**
Wells Pond			
May 1	23	79	*A. maculatum* spermatophore groups 2 *N. viridescens* 15 *R. sylvatica* 6
May 7	45 (2 nonviable)	**80** (7 nonviable)	*N. viridescens* 1 *R. sylvatica* tadpoles >50
May 14	63 (4 nonviable)	64 (6 nonviable)	*N. viridescens* 1 *P. crucifer* 2 in amplexus *R. clamitans* 4 *R. sylvatica* tadpoles >200
May 21	**111** (10 are new)	0	*N. viridescens* 1 *R. clamitans* tadpoles 0, adults 6 *R. sylvatica* tadpoles >7000
Guthrie Pond			
May 1	21	**340**	*N. viridescens* 7 *P. crucifer* calling 1 *R. clamitans* tadpoles 8 *R. sylvatica* tadpoles adults 9
May 7	107 (5 nonviable) (2 partially nonviable)	46 (3 masses partially nonviable)	*N. viridescens* >6 *R. clamitans* tadpoles >15, adults 4 *R. sylvatica* tadpoles >70,000
May 14	142 (17 nonviable)	0	*N. viridescens* 5 *R. clamitans* tadpoles 2, adults 9 *R. sylvatica* tadpoles >90,000
May 21	**183**	0	*N. viridescens* 9 *R. clamitans* tadpoles 30, adults 5 *R. sylvatica* tadpoles >10,000 (~30mm)

Table 2. Maximum counts of egg-masses from monitoring locations on the Lester and Monique Anderson lands in Lincoln from 1999 to 2001. The entire ponds are surveyed at each site.

Site	*Ambystoma maculatum*	*Rana sylvatica*	Notes
Lower Fred Pierce Pond			
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
Upper Fred Pierce Pond			
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
Wells Pond			
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
Guthrie Pond			
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

Table 3. Fall 2001 cover-board results from the Lester Anderson lands on the Bristol/Lincoln border in Vermont. Species being monitored is *Plethodon cinereus* (Red-backed Salamander). This is the second year of results. A very warm fall extended the season of activity. On June 8 during maintenance of the cover boards, two Wood Frogs (*Rana sylvatica*) were found using them. On July 22 during training a Red Eft (*Notophthalmus viridescens*) was found using them. Data from these two days are not included here.

	Snout to Vent Length						
Date	1-20 mm	21-30 mm	31-40 mm	41-50 mm	50-55 mm	Unknown	Total
Sept. 16	0	19	60	12	1	2	**94**
Sept. 22	0	4	41	10	1	0	**56**
Sept. 29	0	1	52	20	0	0	**73**
Oct. 6	0	0	42	19	0	1	**62**
Oct. 19	0	10	16	11	0	1	**38**
Oct. 28	1	0	10	1	0	0	**12**
Nov. 4	0	0	6	4	0	0	**10**
Nov. 10	3	0	2	1	0	0	**6**
Nov. 17	4	0	1	0	0	0	**5**
Nov. 25	0	0	2	8	0	0	**10**
Dec. 1	1	0	1	0	0	0	**2**
Dec. 8	0	0	0	0	0	0	**0**
Totals	**9**	**34**	**233**	**86**	**2**	**4**	**368**

Table 4. Fall 2001 snake-cover results from the Lester Anderson lands on the Bristol/Lincoln border in Vermont. This is the first year of results. Covers placed in 2000 were almost all broken over the late fall and winter and were replaced in early fall 2001 with thicker slate. Five Red-bellied Snakes (*Storeria occipitomaculata*) were found using the covers. This is particularly interesting since this species was not located during the initial herpetological survey of the property. Species, snout to vent and total lengths are shown along with the location within the snake cover. Snakes were located either between the two layers of slate or on the ground underneath the two snake covers.

Date	Species	S-V length in mm	Total length in mm	Location in covers
Sept. 26	None			
Oct. 3	*S. occipitomaculata*	Not measured	270	between
Oct. 11	*S. occipitomaculata*	110	140	ground
Oct. 11	*S. occipitomaculata*	180	230	between
Oct. 11	*S. occipitomaculata*	190	240	ground
Oct. 17	*S. occipitomaculata*	100	125	ground
Oct. 24	None			
Nov. 1	None			
Totals	***S. occipitomaculata*-5**			