Amphibian & Reptile Monitoring

During the 2000 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. 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. This year, 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 this year and will begin along the snake covers during the 2001 field season.

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. All of these ponds are marked on the attached maps (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 which 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 each consisting of 15 paired structures 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. 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 45 A & B.

Records will be kept on the specific condo in which amphibians are found. In addition, all amphibians found under the cover-boards will be 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).

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 suns rays and retain its heat as well as its 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 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. I plan to check these covers 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. Additional details and photos will be provided with next year's report. Snake populations are often widely dispersed throughout the foraging

season and forty pairs may not 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* and *Rana sylvatica*.

A. maculatum (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.

R. sylvatica (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 expected to be found often enough under the cover-boards to be monitored: *Plethodon cinereus* (Redback Salamander). Over time, as small mammals start to tunnel under the boards, other species may start to use them.

P. cinereus 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.

Additional information on Vermont reptile and amphibian species and a bibliography of useful resources are included with this report.

Table 2. Maximum counts of egg-masses from monitoring locations on the Lester and Monique Anderson lands in Lincoln during 1999 and 2000. 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
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
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
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

Table 3. Fall 2000 cover-board results from the Lester Anderson lands on the Bristol/Lincoln border in Vermont. Species being monitored is *Plethodon cinereus* (Redback Salamander). This is the first year of results.

Date	SV 1-20 mm	SV 21-30 mm	SV 31-40 mm	SV 41-50 mm	Total
Sept. 22	0	4	9	2	**15**
Oct. 6	0	6	16	10	**32**
Oct. 11	0	4	4	2	**10**
Oct. 20	0	0	2	0	**2**
Oct. 27	2	6	27	1	**36**
Totals	**2**	**20**	**58**	**15**	**95**

Table 1. Spring 2000 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			
April 17	**64**	**155** (many old, some nonviable)	*N. viridescens* - 5 *R. clamitans* - 7
April 29	**90** (8 nonviable)	**73** (none new, 53 nonviable)	*N. viridescens* > 20 *R. clamitans* > 50 tadpoles *P. crucifer* - 1 calling
May 14	**122** (5 new)	**0**	*N. viridescens* - 13 *R. clamitans* - 2 adults, 97 tadpoles *P. crucifer* - 1 calling
Upper Fred Pierce Pond			
April 17	**31**	**62** (many old and nonviable)	*N. viridescens* - 1 *R. clamitans* - 9
April 29	**46** (1 nonviable)	**57** (98% nonviable)	*R. clamitans* - 2 adults, 46 tadpoles
May 14	**54**	**0**	*N. viridescens* - 2 *R. clamitans* - 4 adults, > 30 tadpoles
Wells Pond			
April 17	**43** (5 groups of spermatophores)	**84** (few nonviable, 3 adults, 1 calling))	
April 29	**68** (2 nonviable)	**91** (9 new, all viable, only 4 of old masses viable)	*N. viridescens* - 2
May 14	**96** (10 new)	**0**	*N. viridescens* - 6 *R. clamitans* - 7
Guthrie Pond			
April 17	**83**	**538** (1 live, 1 dead adult)	*N. viridescens* - 4
April 29	**138**	**330** (33 viable, no new masses)	*N. viridescens* - 42 *R. clamitans* - 1 adult, 6 tadpoles *P. crucifer* - 1 calling
May 14	**119** (1 new)	**0** (>2500 tadpoles)	*N. viridescens* - 9 *R. clamitans* - 4 adults, 13 tadpoles

Results and Discussion

Egg-mass counts

I performed egg-mass counts on three dates (April 17, April 29, and May 14) 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.

The results of this years counts are shown in Table 1. The high counts for *A. maculatum* (LFP -122, UFP - 54, WP - 96, and GP - 138) continue to indicate healthy populations of this species and suggest that the timing of the counts was appropriate. Table 2 shows that there was remarkably little variation between the 1999 high counts and this years high counts at both UFP and LFP with increases at WP and GP. For comparison *A. maculatum* 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 large number of nonviable egg-masses at the Lower Fred Pierce Pond in 1999 was not repeated. In fact, the eggs at all the sites were mostly viable (Table 1). It is interesting to note how clearly the longer period of egg deposition of *A. maculatum* versus *R. sylvatica* is seen. Small numbers of new egg-masses of *A. maculatum* were still visible on May 14. Whereas no new *R. sylvatica* masses were seen after April 17.

Data from last year made it clear that the first egg-mass counts needed to start earlier in the spring to capture the *R. sylvatica* high count. This year's counts started over two weeks earlier and I believe successfully captured the maximum number of egg-masses. However, there were very few new egg-masses deposited after the first count day which indicates breeding was almost entirely done before I first arrived. I will move my first survey date another two weeks earlier next year if conditions are appropriate. The timing of breeding depends on elevation, aspect, and spring temperatures.

Since last year's counts began too late to capture maximum numbers, all of this years high counts are much higher: LFP - 155, UFP - 62, WP - 91, GP-538. The high count of 538 egg-masses at Guthrie Pond is almost double that of any of my other survey sites in Vermont. This is evidence of a large breeding population, however the very high numbers of non-viable eggs tell us that very few of those eggs hatched. Since a single mass can contain over 1000 eggs, it is not surprising that I counted over 2500 tadpoles of this species on May 14 at Guthrie Pond.

This species is an explosive breeder and early spring thaws can stimulate breeding at dangerously early dates. It appears that this year this species was originally coaxed to its breeding ponds during an unusually warm day in late March or early April which was then followed by a period of normal temperatures during which many of the egg-masses froze. 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.

To establish useful baseline indices, I 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 five dates: Sept. 22, Oct. 6, Oct. 11, Oct. 20, and Oct. 27. I was pleasantly surprised that salamanders were moving into the condos even before we were finished constructing them. Those salamanders located in the condos before all three transects were constructed are not counted in the totals reported here. By the time we did our first count on September 22, fifteen *P. cinereus* were using the artificial cover (Table 3). After peaking at 32 on Oct. 6, there appeared to be a steady decline in numbers as the temperature cooled. I was surprised to see a major wave of activity on October 27 when 36 salamanders were found. This may have been an end of the year migration to overwintering locations as the size-class information shows that it was not the same group of salamanders that were occupying the boards on October 6. Next year we will begin roughly weekly counts again during the last week in September through the end of October. These may have to be shifted if, as a result of global warming, the date of ground freeze moves later into November.

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. Since all the covers were new this year and the sites were disturbed, this first year's data may be considerably different from that of year two.

It is interesting to note that 77% of the salamander sightings (73 of 95) were between boards, 14% (13) under boards, 8% (8) in the cracks between boards, and 1% (1) adjacent to the boards. This suggests that the two-story condo design greatly increased the number of observations.

On September 16 while constructing the cover-board array, three *P. cinereus* (two adults and one juvenile) were located in the same condo. This is a little surprising based on the territoriality of this species. Additional year's data will give us a better idea of how common an occurrence this really is.

Many invertebrates were found using the cover-boards. Although numbers were not noted, lists were kept each day of the total variety of groups located. These were not identified to species. Camel crickets, millipedes, centipedes, slugs, ground beetles, earth worms (large crawlers), daddy longlegs, and spiders were all noted.

Other amphibians and reptiles

Jan Decher sent me some photos of a turtle to identify. He had found the turtle on the Guthrie-Bancroft tract downhill from the third cover-board transect (Figure 4). The photos clearly showed an adult *Clemmys insculpta* (Wood Turtle). This is the first record of this species from the Baldwin Creek or Beaver Brook drainage. This is the most unusual species of those so far located on the Anderson lands. In Vermont it is a species of "special concern" and has a state rank of S3. This means that although it is not listed as threatened or endangered it is a species that should be monitored due to a variety of threats to its numbers: collection, road mortality, habitat destruction, and nest predation. This species is largely terrestrial. It overwinters in flowing water and returns to its home stream regularly, but feeds on land. It is a colonial species that wanders up and down river bottoms and up to 400 m or more from its stream to feed or lay its eggs. In this case, its home stream is probably Beaver Brook (slower current) but possibly Baldwin

Creek. Based on the number of annuli on its scutes it is at least twenty years old. It is an adult but not an old individual. This species does not reach breeding age until it is approximately 14 years old. Given the busy roads paralleling these two rivers it is pretty impressive that this turtle has managed to survive as long as it has. It probably feeds on your lands at certain times of the year when desired food items are available (including: worms, berries, and mushrooms). Other turtles may also use this portion of the property. I have attached a Vermont Nongame and Natural Heritage Program fact sheet on this species.

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 calling at both Guthrie Pond and Lower Fred Pierce Pond. 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. Two adult *Bufo americanus* (American Toad) were found while building the cover-board array on the Guthrie-Bancroft property. This species lays strings of eggs during the late spring and summer. A single *Thamnophis sirtalis* (Common Garter Snake) was also seen while building the array.

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.

Bobolink	Exact location not noted	May 14
Butterflies	(over 20, 40 mm yellow with black wing margins in Guthrie-Bancroft fields)	Sept. 20

Acknowledgments

Additional help in gathering the data and building the cover-boards was provided by Kate Wright, Kris Andrews, Jon Dillon, and Jon Duckworth.

Literature Cited

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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.

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

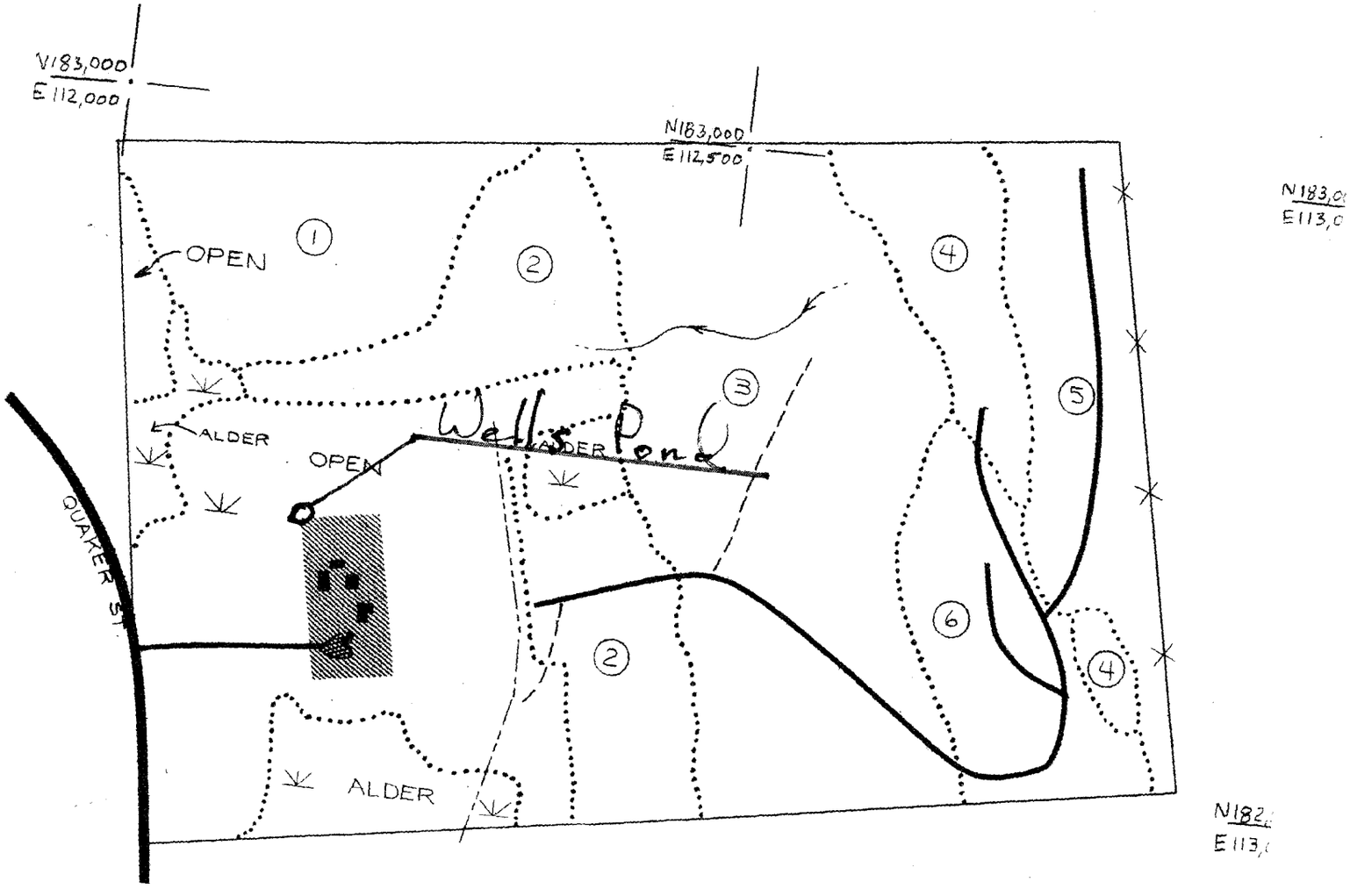


Figure 1. Location of the egg-mass monitoring pond on the Wells tract of the Lester and Monique Anderson lands in Lincoln Vermont.

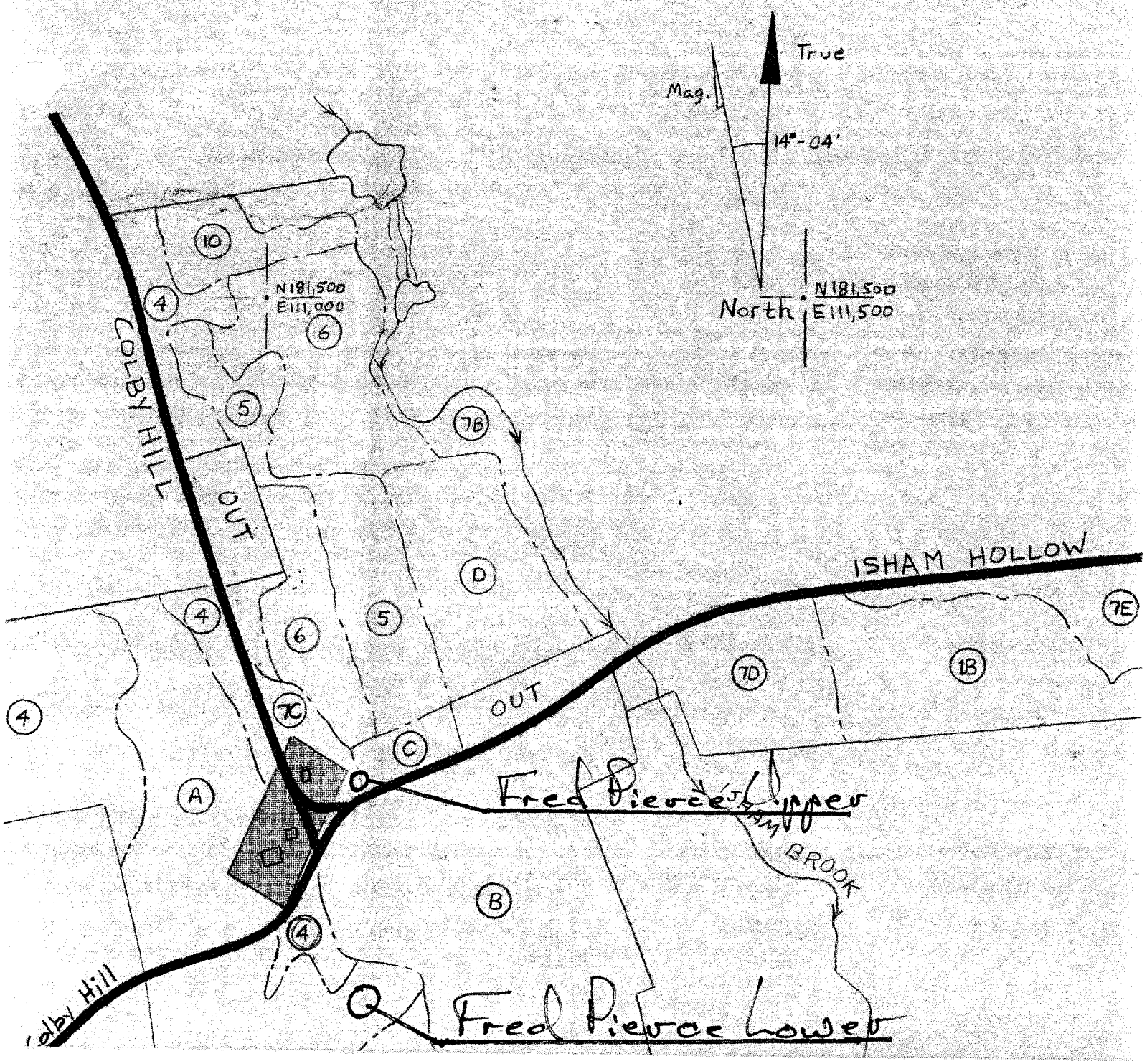


Figure 2. Location of the egg-mass monitoring ponds on the Fred Pierce tract of the Lester and Monique Anderson lands in Lincoln Vermont.

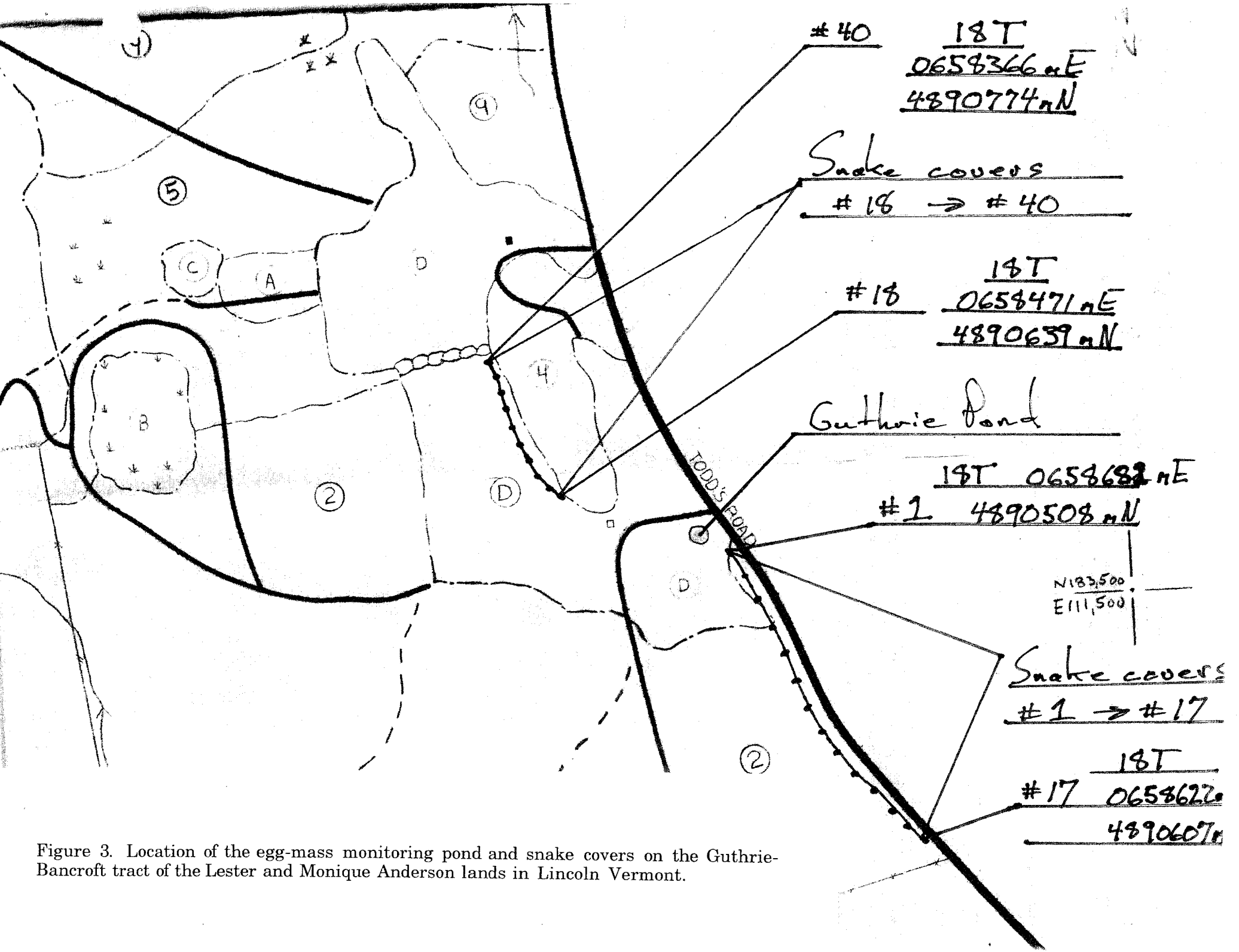


Figure 3. Location of the egg-mass monitoring pond and snake covers on the Guthrie-Bancroft tract of the Lester and Monique Anderson lands in Lincoln Vermont.

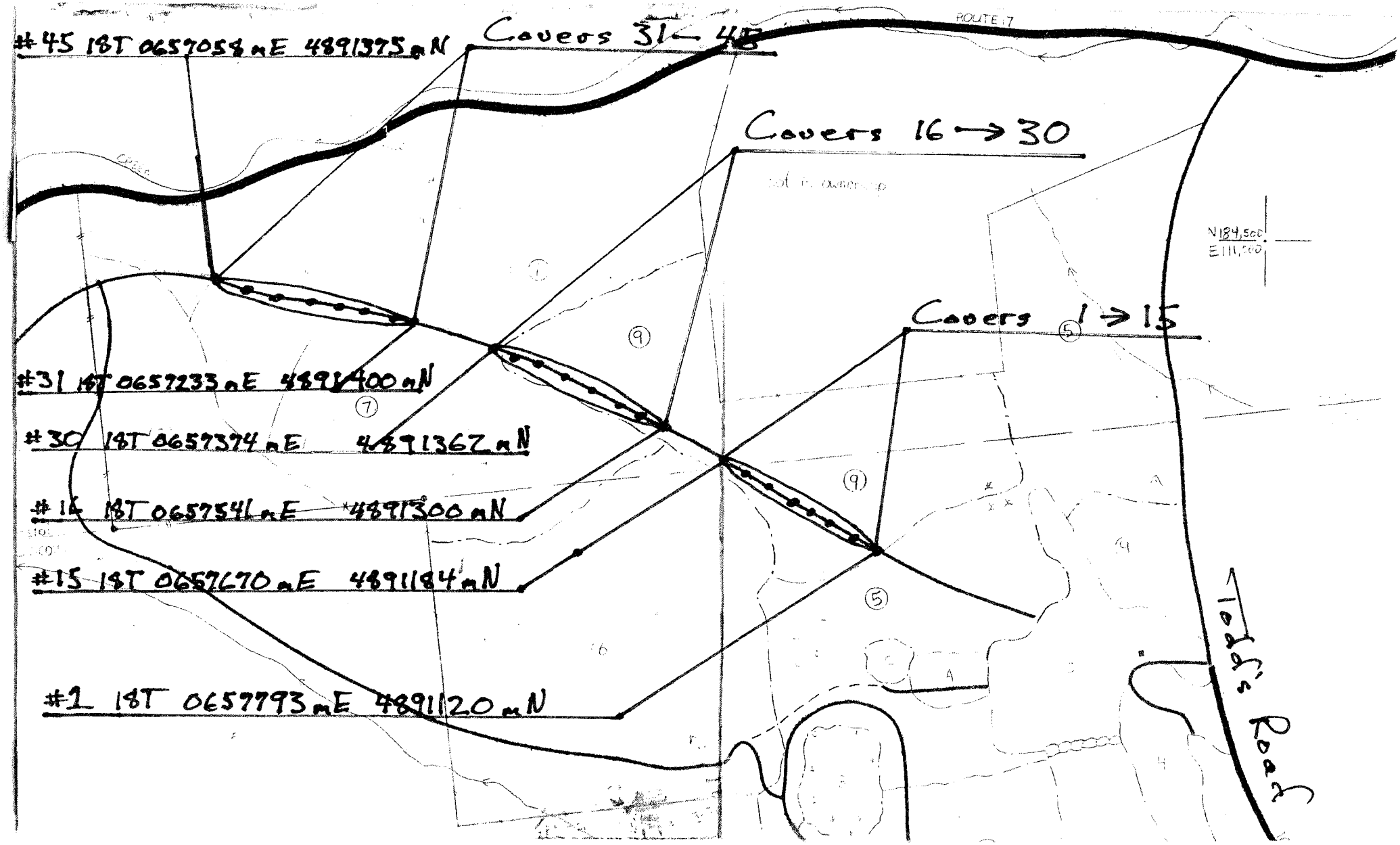


Figure 4. Location of the three cover-board transects on the Guthrie-Bancroft tract of the Lester and Monique Anderson lands in Lincoln Vermont.

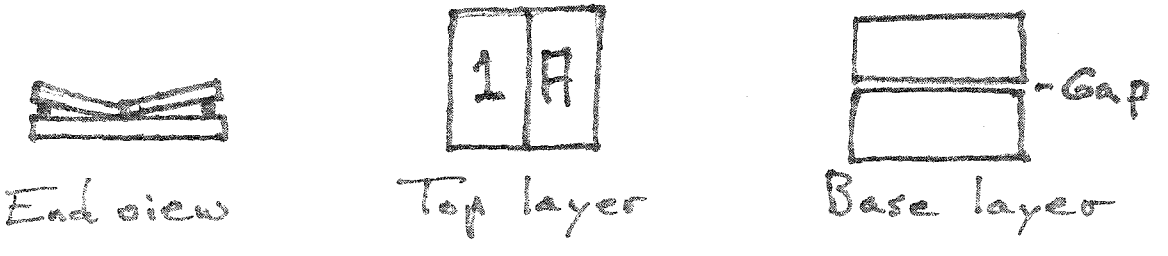
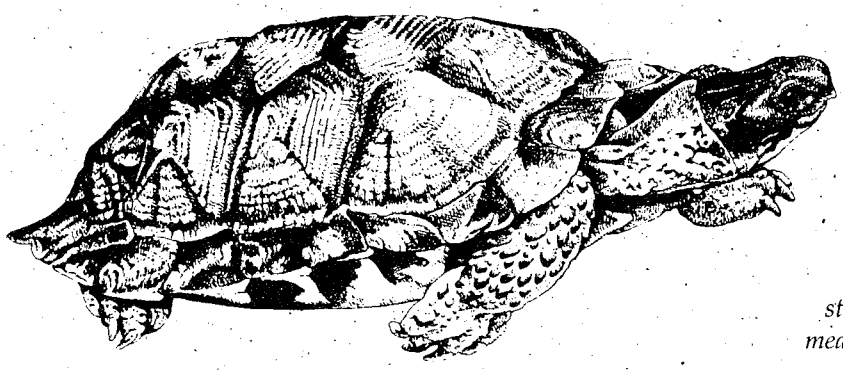


Figure 5. Design of cover-boards used on the Guthrie-Bancroft tract of the Lester and Monique Anderson lands in Lincoln Vermont.

Vermont's Wildlife Heritage

Nongame and Natural Heritage Program

Species at Risk



Wood Turtle

Clemmys insculpta

The wood turtle is a moderately sized turtle with reddish-orange skin on portions of its neck and legs and a roughly textured, or sculpted shell. The adult's shell is about 7 to 8 inches long. It spends the winter on stream bottoms and most breeding occurs in streams. Although it regularly returns to streams throughout year, it may travel up to 1000 feet from the stream while foraging for food in hardwood forests or meadows.

Turtles are an ancient group of animals, originating many millions of years ago. Wood turtles have likely been in Vermont for the past 10,000 years, following the retreat of the last glacier. In spite of their long history of success, wood turtles have not fared well recently in the face of human development and use of the landscape. The wood turtle is a species of conservation concern in the northeastern states, including Vermont, due to its region-wide decline.

Human activities are the main cause of the turtles' decline. While it is rare that any person intentionally harms a wood turtle, the cumulative effect of our activities does have a negative impact. Although it is illegal to collect wood turtles in Vermont, people do remove them from the wild. Collection results in population decline and loss. A Connecticut wood turtle population was studied before and after a water supply area was opened to limited permit hiking. Wood turtle collection was the likely cause of this population disappearing after only ten years.

We also harm turtles by transforming their habitat into housing or commercial building lots, clearing away stream-bank vegetation, and inadvertently hitting them with mowing machines or cars.

Adult wood turtles may live 60 years, but egg and hatchling survival is extremely low. Survival of adult wood turtles is key to maintaining this species. Mature turtles are important because they manage to produce the few offspring that will carry the population into the future.

Turtle Time Table

Early April - First emergence from water to stream bank. Initially, turtles stay near stream, then gradually move farther away.

Early June - Initial movements to summer foraging areas which may be 1000 feet from stream. These areas consist of meadows, wetlands and woods.

Mid June - Females with eggs move to nesting area. Some females will travel over one mile to nest. Return to foraging area within a few weeks

June through mid September - Turtles spend up to a month at a time foraging well away from stream, but return to the stream for short periods.

Late August through mid November - Breeding occurs in the stream, and also occurs to a lesser extent in the spring months.

November through April - Turtles stay underwater at wintering sites in streams where they absorb oxygen through their skin. Some movement may occur during this time, but the turtles are generally confined to protected pools.

(continued on back)

The Nongame and Natural Heritage Program (NNHP) is responsible for managing and enhancing Vermont's native plants, natural communities, and animals that are not hunted or fished (nongame species). A unit within the Vermont Department of Fish and Wildlife, the NNHP's mission includes the preservation of Vermont's rich and varied natural heritage for present and future generations.

Amphibians and Reptiles of Vermont

Nongame and Natural Heritage Program
Vermont Department of Fish and Wildlife
103 South Main St.
Waterbury, VT 05671-0501
May 1999

Common Name	Scientific Name	State Rank	State Status
Reptiles			
Spiny Softshell	*Apalone spinifera*	S1	T
Common Snapping Turtle	*Chelydra serpentina*	S5	
Painted Turtle	*Chrysemys picta*	S5	
Spotted Turtle	*Clemmys guttata*	S1	E
Wood Turtle	*Clemmys insculpta*	S3	SC
Common Map Turtle	*Graptemys geographica*	S3	SC
Common Musk Turtle	*Sternotherus odoratus*	S2	SC
Five-lined Skink	*Eumeces fasciatus*	S1	E
Eastern Racer	*Coluber constrictor*	S1	SC
Timber Rattlesnake	*Crotalus horridus*	S1	E
Ringneck Snake	*Diadophis punctatus*	S4	
Eastern Rat Snake	*Elaphe obsoleta*	S2	SC
Milk Snake	*Lampropeltis triangulum*	S5	
Northern Water Snake	*Nerodia sipedon*	S3	
Smooth Green Snake	*Liochlorophis vernalis*	S4	
Brown Snake	*Storeria dekayi*	S4	
Redbelly Snake	*Storeria occipitomaculata*	S5	
Eastern Ribbon Snake	*Thamnophis sauritus*	S2	SC
Common Garter Snake	*Thamnophis sirtalis*	S5	
Amphibians			
Jefferson Salamander	*Ambystoma jeffersonianum*	S2	SC
Blue-spotted Salamander	*Ambystoma laterale*	S3	SC
Spotted Salamander	*Ambystoma maculatum*	S5	
Marbled Salamander	*Ambystoma opacum*	SR	
Northern Dusky Salamander	*Desmognathus fuscus*	S4	
Allegheny Dusky Salamander	*Desmognathus ochrophaeus*	SR	
Northern Two-lined Salamander	*Eurycea bislineata*	S5	
Spring Salamander	*Gyrinophilus porphyriticus*	S4	
Four-toed Salamander	*Hemidactylium scutatum*	S2	SC
Northern Redback Salamander	*Plethodon cinereus*	S5	
Common Mudpuppy	*Necturus maculosus*	S2	SC
Eastern Newt	*Notophthalmus viridescens*	S5	
American Toad	*Bufo americanus*	S5	
Fowler's Toad	*Bufo fowleri*	S1	SC
Gray Treefrog	*Hyla versicolor*	S5	
Spring Peeper	*Pseudacris crucifer*	S5	
Western Chorus Frog	*Pseudacris triseriata*	S1	E
Bullfrog	*Rana catesbeiana*	S5	
Green Frog	*Rana clamitans*	S5	
Pickerel Frog	*Rana palustris*	S4	
Northern Leopard Frog	*Rana pipiens*	S4	
Mink Frog	*Rana septentrionalis*	S4	
Wood Frog	*Rana sylvatica*	S5	

Useful Sources of Information on New England Reptiles and Amphibians

Identification. A few good field guides to reptiles and amphibians exist. These help you identify herptiles but do not give you life history information. One that is easy to find, and up to date is:

Conant, R., and J.T. Collins. 1998. A field guide to reptiles and amphibians of Eastern and Central North America. Third Edition, expanded, Houghton Mifflin Company, Boston Massachusetts 616 pp.

Natural History. These guides focus less on identification and more on natural history, local distribution, and conservation.

DeGraaf, R.M., and D.D. Rudis. 1983. Amphibians and reptiles of New England. The University of Massachusetts Press, Amherst, Massachusetts 85 pp.

Harding, J.H. 1997. Amphibians and reptiles of the Great Lakes Region. The University of Michigan Press, Ann Arbor, Michigan 378 pp. (Lake Champlain is part of the Great Lakes Drainage so we share most of the same species.)

Hunter, M.L., A. Calhoun, and M. McCullough (eds.). 1999. Maine amphibians and reptiles. The University of Maine Press, Orono, Maine 272 pp. (This edition includes a CD of local frog calls. Call 207-581-1408 to order.)

Klemens, M.K. 1993. Amphibians and reptiles of Connecticut and adjacent regions. State Geological and Natural History Survey of Connecticut, Bulletin No. 112 318 pp. (call 203-566-7719 to order)

Tyning, T.F. 1990. A guide to amphibians and reptiles. Little, Brown and Company. Boston Massachusetts 400 pp.

Calls. A very useful tape to help you learn the calls of frogs and toads is:

Eliot, L. 1992. The calls of frogs and toads; Eastern and Central North America. Nature Sound Studio. Ithaca New York.
(call 1-800-336-5666 to order)

Websites. Many useful sites exist. Some provide more reliable information than others. A few reliable sites to get you started:

North American Amphibian Monitoring Program (NAAMP).
http://www.im.nbs.gov/amphibs.html

North American Reporting Center for Amphibian Malformations (NARCAM).
http://www.npsc.nbs.gov/narcam/

Society for the Study of Amphibians and Reptiles (SSAR).
http://falcon.cc.ukans.edu/~gpisani/SSAR.html

The Snakes of Massachusetts (a useful identification key).
http://klaatu.oit.umass.edu/umext/snake/

The Salamanders of Vermont

Species that spend their adult lives in or near water

Name	Field Marks	Habitat	Occurrence	Notes
Mudpuppy *Necturus maculosus* 20-33 cm	very large, totally aquatic dark-brown salamander with the external gills of a larvae throughout its life; wide flat heads with squared snouts; young larvae have light longitudinal stripes	large permanent bodies of water	primarily in the major tributaries of both Lake Champlain and the Connecticut river, as well as larger lakes draining into them	very difficult to locate other than through methods used for fish; has been killed in lampricide treatments of Lewis creek
Eastern newt *Notophthalmus viridescens* 5.7-12.2 cm	a small to medium-sized salamander with rough relatively dry skin and no vertical grooves along its sides; red in its adolescent terrestrial stage (red eft), becoming green as it matures with yellow undersides; at all stages it has red spots and a line horizontally through its eye	primarily hardwood woodlands at all elevations; terrestrial when young and aquatic when adult; adults found in permanent and semipermanent water that is slow or standing	very abundant in appropriate habitat throughout the state	toxic to predators in the red eft stage
Dusky salamander *Desmognathus fuscus* 6.4-11.5 cm	a muddy-brown medium-sized salamander with a rounded body and partially keeled tail; look for a light line extending from the eye down and backwards to the corner of the mouth	very wet soils along slow streams and in small seepage areas in hardwood forests particularly where the soil is richly organic and deep with a heavy, dark overstory	locally common in appropriate habitat; found at a wide range of elevations; apparently intolerant of occasional drying	partially keeled tail, wet habitat, and dark-brown color separate it from the elusive Mt. Dusky
Spring salamander *Gyrinophilus porphyriticus* 12.1-19 cm	large size of adults and larvae; solid salmon-pink with dark reticulations; heavy rounded body with laterally flattened tail	springs and cool, clean, well-oxygenated, headwaters of streams	can be locally abundant in high-elevation, small, fishless, (?) streams; distributed wherever permanent cool headwaters can be found	turn large flat rocks in streams that are over a square foot in area to locate this impressive salamander
N. two-lined salamander *Eurycea bislineata* 6.4-12 cm	delicate slender body with a flattened yellow or brown back contrasting with darker sides; adults have tails with yellow-orange undersides	very wet soils, gravel, or in crevices between rocks; in or along permanent streams or ditches in wooded areas	throughout Vermont at all elevations; it can be locally abundant	during or after heavy rains it wanders up to 100 meters from the nearest stream or seep

Species which are entirely terrestrial throughout their lives

Name	Field Marks	Habitat	Occurrence	Notes
Redback salamander *Plethodon cinereus* 5.7-10 cm	small slender and delicate with a flat red back; sometimes dark brown or gray morphs are found	mature hardwood forests that are not highly acidic in nature appear to be the best habitat but it is found in smaller numbers in any wet woods	widely distributed at all elevations throughout the state; often very abundant under ideal conditions	our only salamander that does not spend its larval stage in the water, hence it can be found far from the nearest standing water

Unconfirmed species found in nearby states

Marbled salamander *Ambystoma opaqum* 9-10.7 cm	short, heavy, rounded, body with a black background and strong pewter bars or blotches	dry hillsides with semipermanent or temporary pools	reported once in the 50's from the Inman Pond area of Fair Haven	not verified in the state; unlike other *Ambystoma* species it migrates to breeding sites in fall
Mountain dusky salamander *Desmognathus fuscus* 7-10 cm	look for a redback-like dusky with a rounded tail and a light line from the eye to the corner of its mouth	redback-type habitat under logs and rocks but along streams and ravines	one juvenile reported from within the state; no populations of adults have been located	this species is found across the border in New York State; the Taconics would be a good place to look for it
Slimy salamander *Plethodon glutinosis* 12.1-17.2 cm	a large slender black salamander with white spots and very sticky skin secretions	shaley stream-banks or road-cuts	limited amounts of this habitat occur in Vermont, if found, one would expect it to be in southern Vermont	isolated populations are reported from New Hampshire but the contiguous range begins further south in southern New York

Version 3, James S. Andrews, April 1996; most sizes and names are taken from Reptiles and Amphibians of Eastern/Central North America by Roger Conant and Joseph T. Collins, 1991