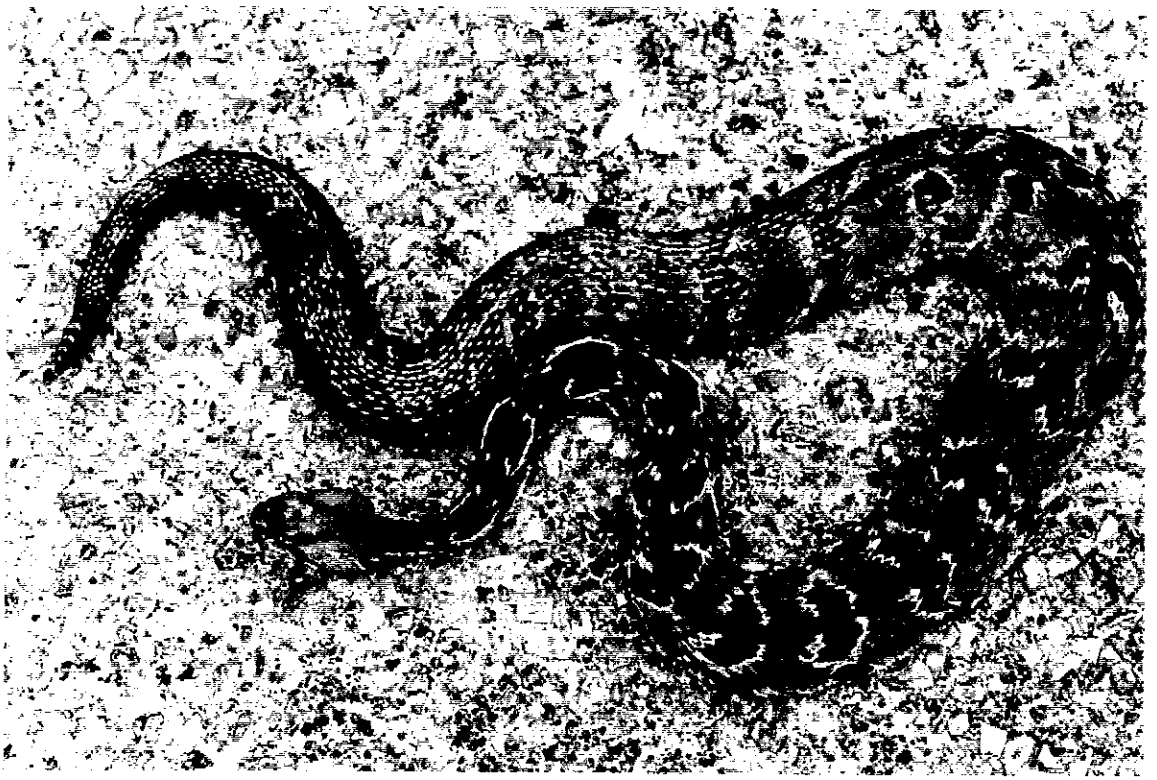
Herpetofaunal Sampling of Dry Culverts and Drift Fencing Along Forest Highway One Near Little Grand Canyon, Jackson County, Illinois



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Introduction

During 1997, through consultation between the Illinois Department of Transportation (IDOT) and the Illinois Department of Natural Resources (IDNR), a portion of Hickory Ridge Road in Jackson County, Illinois was proposed to be upgraded from gravel to oil and chip. The project was entitled "Forest Highway One". Consultation resulted in IDOT installing dry culverts with slotted tops in three locations along an east-west stretch of Forest Highway One in order to mitigate for amphibian and reptile crossing so that these herptiles would not be spending inordinate amounts of time thermoregulating on the upgraded road surface, thus resulting in higher mortality from vehicular traffic. One concern along this stretch of road was impacts to the state-threatened timber rattlesnake (*Crotalus horridus*) through vehicular mortality. Through a cooperative effort between Southern Illinois University at Carbondale's zoology department and IDNR Natural Heritage Division, the drift fencing was installed by Dr. Ronald A. Brandon, Matthew Heafner, and Natural Heritage biologist Scott Ballard, through materials provided by IDOT. Although reports on the number of road-killed herptiles both a year prior to the upgrading of the road surface (Brandon, 1997, 1998, 1999), and a year after the upgrading (in process) were funded by IDOT, no study has been undertaken to examine the level of use of the drift fences and dry culverts, via use of funnel traps.

Objectives

1. Record all amphibians and reptiles encountered along the shoulders, drift fences, dry culverts, and in funnel traps in this east-west stretch of Forest Highway One. Additionally, incidental road-kills encountered during surveying will be recorded and used as supplemental information to the IDOT report;
2. Salvage road-killed amphibians and reptiles, including state-listed species, from this east-west stretch of Forest Highway One, as vouchers for documentation of herptile use of this road, for preservation and deposition in the Southern Illinois University at Carbondale herpetology collection;

3. Collect data, scale clip, and paint rattles on any live timber rattlesnake (*Crotalus horridus*) encountered in the vicinity of the project area;
4. Describe the study area in a detailed map and black and white photographs;
5. Search for and identify any potential *Crotalus horridus* den sites, and report them to the IDNR, Division of Natural Heritage.

Methods

General herpetofauna were examined by standard methods, including:

1. Visual encounter surveys;
2. Placement of funnel traps and checking them every other day during the time frame of mid-August, September, October, and mid-November 1998, and also mid-March, April, and May 1999. Funnel traps were arraigned using a numerical and letter designation. Trap numbers refer to the culvert where the trap is located. The letter designation refers to the order the trap is in at each culvert. The traps start at the northwestern corner of the drift fence (trap A) and run east and then down to the southwestern corner of the drift fence and run east (refer to Fig. 3).
3. Live timber rattlesnakes encountered were confined for a very short period of time. They were sexed, measured, scale-clipped to mark individual specimens, and then the basal portion of the rattle painted with fingernail polish of either yellow or red, depending upon the sex of the snake.

The locality of each amphibian and reptile encountered was located and recorded on a detailed map. Live timber rattlesnakes were scale-clipped ventrally with two V- notches in a ventral scale anterior to the cloaca for future identification. For example, specimen CH-15 had the fifteenth ventral scale anterior to the cloaca clipped with two V- notches. Males had the basal portion of the rattle painted with yellow fingernail polish for easy identification and females with red. All road-killed specimens were salvaged, preserved, reported to the Illinois Department of

Natural Resources, and deposited in the SIUC herpetology collection. Funnel traps were removed during months of non-use, so as not to create mortality of herptiles being stranded in them.

Results

Species accounts

Scientific and standardized common names, and authors of species and subspecies names used in the following species accounts, follow Collins (1990) with the exception of the southern leopard frog (*Rana sphenocephala*), which will be discussed under that species.

Family Ambystomatidae

Ambystoma opacum (Gravenhorst, 1807)

Marbled Salamander

Two individuals were found dead in trap 2-D (6 and 13 April, 1999) after heavy rains the day before being collected. This trap is located at the base of the bluffs in an area that collects rain water and much leaf litter.

Ambystoma texanum (Matthes, 1855)

Smallmouth Salamander

One individual was found dead in trap 2-D (13 April,1999) along with an *Ambystoma opacum*. The two salamanders were desiccated due to extremely warm weather.

Family Salamandridae

Notophthalmus viridescens louisianensis (Wolterstorff, 1914)

Central Newt

One eft form was captured (14 June, 1998) at culvert 2, 28.5 feet from east end of south fence between traps 2-G and 2-H and released.

Family Bufonidae

Bufo americanus charlesmithi Bragg, 1954

Dwarf American Toad

A total of eighteen individuals were observed in September and October, 1998, and April and May 1999. Three adults were found in trap 2-H (two on 6 April and one on 13 April, 1999) and released. Trap 2-H is located in a shaded woodland area. One adult individual was found dead in trap 3-E (6 April, 1999) which is located near the shoulder of Hickory Ridge Road. One adult was found in trap 1-B (19 September, 1998) and released. One adult was found in trap 1-F (17 September, 1998) and released. One adult was found in trap 1-E (7 October, 1998) and released. Two adults were found in trap 2-D (6 April, 1999) and released. One adult was found in trap 2-E (8 April, 1999) and released. Three adults were found in trap 3-A (15 April, 1999) and released. Three adults were found in trap 3-F (15 April, 1999) and released. Two adults were found in trap 1-B (3 May, 1999) and released. The Dwarf American Toad was the most frequently trapped species during the project.

Bufo woodhousii fowleri Hinckley, 1882

Fowler's Toad

A total of two individuals were found at culvert 1. One individual was found in trap 1-G (23 April, 1999) and released. The second individual was found dead in trap 1-B (19 September, 1999) and was covered with small red ants. The cause of death is unclear.

Family Hylidae

Acris crepitans blanchardi Harper, 1947

Blanchard's Cricket Frog

One adult was found (7 October, 1998) in the leaf litter at the base of trap 3-B on the south side of the north fence of culvert 3 and released.

Hyla chrysocelis Cope, 1880

Cope's Gray Treefrog

Three juveniles were found on the drift fence in various locations. One juvenile was found (19 May, 1998) at culvert 1 on the fence, 2 feet from trap 1-G and released. One individual was found (13 October, 1999) at culvert 2 on the green post on the east side of the south culvert opening and released. The last individual was found (15 April, 1999) was on the fence tucked behind the seventh post, 21 feet west of culvert 2 on the north side of the road and released. Several males were heard calling within the vicinity of the road during September and October 1998 and April and May of 1999.

Hyla cinerea (Schneider, 1792)

Green Treefrog

One male adult was found (8 April, 1999) alive in trap 1-F and released. No males were heard calling in the vicinity.

Pseudacris feriarum (Baird, 1854)

Upland Chorus Frog

One adult was found (14 June, 1998) at culvert 2, 10.5 feet from the east end of the south fence in the leaf litter and released. A second juvenile was found (17 September, 1998) at culvert 2, in the leaf litter at the base of trap 2-F and released. No males were heard calling in the vicinity of the roadway.

Family Ranidae

Rana sphenocephala Cope, 1886

Southern Leopard Frog

A total of ten individuals were found in traps and ten individuals were found around the drift fence for a total of twenty individuals observed. One young of the year was found (14 June, 1998) at the base of the drift fence of culvert 2 near trap 2-A and released. One young of the year was found (16 June, 1998) on the north side of the fence at culvert 3 near trap 3-F and was released. One young of the year was found (18 June, 1998) at culvert 2 on the north side of the north fence and released. One young of the year was found (22 June, 1998) at culvert 3, 12 feet west of trap 3-H on the north side of the drift fence and released. One young of the year was found (28 June, 1998) at culvert 3, 6 feet east of trap 3-E on the south side of the fence and released. One juvenile was found (30 June, 1998) in trap 2-E and released. One adult was found (25 August, 1998) at culvert 3 at the base of trap 3-H and released. One juvenile was found (3 September, 1998) at culvert 1, 7 feet from trap 1-B on the south side of the fence and released. Three juveniles were found (17 September, 1998) in trap 1-F and released. One juvenile was found (17 September, 1998) in trap 2-F and released. One juvenile was captured (17 September, 1998) at the mouth of culvert 2 between traps 2-F and 2-G and released. One juvenile was found (17 September, 1998) in trap 3-F and released. One juvenile was found (17 September, 1998) in the leaf litter at culvert 3 at the base of the drift fence on the north side of the fence and released. Two juveniles were found (29 September, 1998) dead in trap 1-C and deposited in SIUC herpetology collection. One adult was found (7 October, 1998) in trap 2-E and was released. This frog was very bronze in color with spots only on the hind legs and a very prominent spot on the tympanum. One male adult was found (15 April, 1999) in trap 3-F with three *Bufo americanus* and was released. One young of the year was found (20 June, 1998) along the north side of the north fence at culvert 1 and was released.

Smith (1961) identified southern Illinois populations as *Rana pipiens sphenocephala*. Prior to 1972, all North American leopard frogs were considered to be the same species, *Rana pipiens*. Brown and Brown (1972a) and Brown (1973), however, showed that the *Rana pipiens* complex consists of up to five sibling species, three of which occur in Illinois. While these three were not named, they were referred to as the western call type, eastern call type, and northern call type. Mecham et. al (1973:2) suggested that the eastern call type, referable to as *Rana sphenocephala*, be recognized as a species separate from *Rana pipiens*. Pace (1974) discovered an older available name, *Rana utricularia*. Brown et. al (1976) petitioned the International Commission Zoological Nomenclature (ICZN) to conserve the species name *sphenocephala* by suppressing *utricularia*, and the ICZN (1992) ruled to give the specific name *sphenocephala* precedence over *utricularia*.

Family Kinosternidae

Sternotherus odoratus (Latreille, 1802)

Common Musk Turtle

One adult was captured (14 June, 1998) alive on Hickory Ridge road, 0.3 miles south of the 4-way stop of Hickory Ridge road and Poplar Ridge road.

Family Emydidae

Terrapene carolina carolina (Linnaeus, 1758)

Eastern Box Turtle

Nine adult Eastern Box Turtles and one young of the year were observed. One adult female was captured (29 May, 1998) alive on the road (AOR) heading northeast on Hickory Ridge road 3.5 miles south of the 4-way stop of Hickory Ridge road and Poplar Ridge road and released. One adult male was captured (31 May, 1998) AOR heading east on Hickory Ridge road

0.6 miles south of the 4-way stop of Hickory Ridge road and Poplar Ridge road and released. One adult female was found (2 June, 1998) AOR heading east 0.2 miles north of culvert 1 on Hickory Ridge road and released. One adult male was found (10 June, 1998) AOR heading south on Hickory Ridge road, 3.25 miles south of the 4-way stop of Hickory Ridge road and Poplar Ridge road and released. One adult male was found (12 June, 1998) AOR heading east on Hickory Ridge road 3.05 miles south of 4-way stop of Hickory Ridge road and Poplar Ridge road and released. One young of the year was found (14 June, 1998) alive in trap3-B and was released. One adult male was found (28 June, 1998) AOR heading east on Hickory Ridge road 2.8 miles south of 4-way stop of Hickory Ridge road and Poplar Ridge road and released. One adult male was found (17 September, 1998) AOR heading north on Poplar Ridge road 0.25 miles east of 4-way stop of Hickory Ridge road and Poplar Ridge road and released. One adult male was found (11 May, 1999) AOR on Hickory Ridge road 3.8 miles south of 4-way stop of Hickory Ridge road and Poplar Ridge road and released.

Family Phrynosomatidae

Sceloporus undulatus hyacinthinus (Green, 1818)

Northern Fence Lizard

One juvenile was observed (11 September, 1998) at culvert 3 on the south side of the north fence, 18 feet east of trap 3-A, eating insects.

Family Scincidae

Eumeces spp. Wiegmann, 1834

Skinks

One juvenile was observed (19 May, 1998) AOR on Hickory Ridge road 3.8 miles south of 4-way stop of Hickory Ridge road and Poplar Ridge road. One juvenile was observed (12

June, 1998) AOR on Hickory Ridge road 4.0 miles south of the 4-way stop of Hickory Ridge road and Poplar Ridge road. One juvenile was observed (3 September 1998) AOR on Hickory Ridge road 0.8 miles south of the 4-way stop of Hickory Ridge road and Poplar Ridge road. One individual was observed (20 June, 1998) at culvert 2 near a fallen log between traps 2-D and 2-E. Juveniles of *Eumeces fasciatus* and *Eumeces laticeps* are morphologically similar and positive identification could not be made due to inability to capture any individuals.

Scincella lateralis (Say, 1823)

Ground Skink

A total of twelve individuals (two juveniles and ten adults) were observed during this project. Two adults were observed (15 May, 1998) at culvert 2 between traps 2-E and 2-F in the leaf litter on the shoulder of the road. One adult was observed (19 May, 1998) in the leaf litter at the northern mouth of culvert 2. One juvenile was observed (25 August, 1998) in the leaf litter at culvert 2, 5 feet east of trap 2-G on the north side of the fence. One adult was observed (27 August, 1998) in the leaf litter at culvert 2, 4 feet east of trap 2-C on the north side of the fence. One adult was observed (19 September, 1998) in the leaf litter at culvert 2, between trap 2-C and the roadway. One juvenile was observed (19 September, 1998) in the leaf litter at culvert 3 at trap 3-E. One adult was observed (19 September, 1998) in the leaf litter at culvert 3 near entrance to the Forest Service road (4.85 miles south of 4-way stop). One adult was observed (23 April, 1999) in the leaf litter at culvert 2 on the shoulder of the road near trap 2-B. One adult was observed (7 May, 1999) in the leaf litter near a fallen log between trap 2-E and 2-F. One adult was observed (3 September, 1998) in the leaf litter at culvert 2 on the north side of the fence six feet east of trap 2-C.

Family Colubridae

Coluber constrictor Linnaeus, 1758

Racer

One adult dead on road (DOR) was collected (15 May, 1998) on Hickory Ridge road, 1.6 miles south of the 4-way stop of Hickory Ridge road and Poplar Ridge road and deposited in the SIUC herpetology collection. One adult DOR was collected (17 May, 1998) on Hickory Ridge road 2.55 miles south of the 4-way stop of Hickory Ridge road and Poplar Ridge road and deposited in the SIUC herpetology collection. One adult AOR was captured (11 May, 1999) on Hickory Ridge road 3.6 miles south of the 4-way stop of Hickory Ridge road and Poplar Ridge road and released.

Elaphe obsoleta (Say, 1823)

Rat Snake

Only one adult DOR was collected (17 May, 1998) on Hickory Ridge road, 3.8 miles south of the 4-way stop of Hickory Ridge road and Poplar Ridge road and 0.4 miles north of culvert 1. The specimen was deposited in the SIUC herpetology collection.

Opheodrys aestivus (Linnaeus, 1766)

Rough Green Snake

One adult AOR was found (3 September, 1998) on Hickory Ridge road heading east at 1.7 miles south of the 4-way stop of Hickory Ridge road and Poplar Ridge road and released. One adult DOR was collected (25 September, 1998) on Hickory Ridge road at 0.75 miles south of the 4-way stop of Hickory Ridge road and Poplar Ridge road and deposited in the SIUC herpetology collection.

Storeria occipitomaculata occipitomaculata (Storer, 1839)

Northern Redbelly Snake

Two adult DOR's were collected (10 April, 1999) on Hickory Ridge road, 0.1 miles west of culvert 2 and deposited in the SIUC herpetology collection.

Virginia valeriae elegans Kennicott, 1859

Western Earth Snake

One adult DOR was collected (19 September, 1998) on Hickory Ridge road, 20 feet west of culvert 3 and 4.82 miles south of the 4-way stop of Hickory Ridge road and Poplar Ridge road and deposited in the SIUC herpetology collection.

Family Crotalidae

Agkistrodon contortrix (Linnaeus, 1766)

Copperhead

A total of five individuals were found on Hickory Ridge road (three DOR's and one AOR). One adult DOR was collected (19 August, 1998) on Hickory Ridge road 3.0 miles south of the 4-way stop of Hickory Ridge road and Poplar Ridge road and deposited in the SIUC herpetology collection. One adult DOR was collected (19 August,1998) on Hickory Ridge road 2.95 miles south of the 4-way stop of Hickory Ridge road and Poplar Ridge road and deposited in the SIUC herpetology collection. One adult DOR was collected (25 August, 1998) on Hickory Ridge road 0.7 miles west of culvert 3 and just north of culvert 1 and deposited in the SIUC herpetology collection. One juvenile AOR was photographed and released (7 September, 1998) on Hickory Ridge road 4.25 miles south of the 4-way stop of Hickory Ridge road and Poplar Ridge road and 0.25 miles north of culvert 1 heading southwest across the road. One adult DOR

was collected (15 September, 1998) on Hickory Ridge road 1.7 miles south of the 4-way stop of Hickory Ridge road and Poplar Ridge road and deposited in the SIUC herpetology collection.

Conant and Collins (1998) identify western southern Illinois *Agkistrodon contortrix* populations as *A. c. contortrix* X *A. c. mokeson* intergrades.

Crotalus horridus Linnaeus, 1758

Timber Rattlesnake

One juvenile DOR was collected (7 September, 1998) on Hickory Ridge road, 50 feet north of culvert 1 and 4.3 miles south of the 4-way stop of Hickory Ridge road and Poplar Ridge road. The individual was deposited in the SIUC herpetology collection. One adult male was captured (21 April, 1999) in trap 2-D. The animal was scale clipped, the rattle painted yellow to identify sex, photographs taken, and released at the site of capture.

Discussion

A total of 198 person hours were incurred by the principal investigator during this project. This figure represents 100 person hours commuting to and from the project site and 98 person hours spent in the field. The 24 funnel traps were out in the field and in use approximately 192 days or 4608 trap hours for each trap. A total of 33 individuals were captured in the funnel traps (3 salamanders, 20 toads, 8 frogs, 1 turtle, and 1 snake). Of the 33 individuals captured in funnel traps, only one state-threatened species (timber rattlesnake) was recorded.

Vandalism was recorded on ten occasions at the study site. Two funnel traps at each culvert were clearly marked with SIUC's address and the fact they were being used for research. On one occasion four funnel traps were stolen (22 March, 1999). One week later (31 March, 1999) the new traps put out to replace the stolen traps were also stolen. Funnel traps were

disturbed (pulled out of the ground and stood against the fence or funnel ends removed) on three occasions (19 September, 1998, 10 April, 1999 and the 11 May, 1999). Drift fencing was either stolen or ripped from the posts on five separate occasions and had to be repaired. This repair ranged from replacing a whole wing of fencing to repairing a small section by splicing in new material. The extent to which this vandalism effected the results of this project is unknown but must have been significant. These acts of vandalism account for approximately 1000 lost trap hours and almost 20 person hours spent replacing traps and fencing. We can only guess how many animals may have been released unseen by us.

Although, only two timber rattlesnakes (1 DOR and 1 in trap) were encountered during this project, their use of the culverts may be greater than this implies. Large secretive snakes, such as timber rattlesnake, have a low trapability compared to species such as Bufo and Rana spp. and this could account for the low numbers. No new timber rattlesnake dens were recorded or reported to the IDNR, Division of Natural Heritage. A study using pitfall traps, radio tagging, or the use of photographic recording devices would give a clearer picture into the movement patterns of the state-threatened timber rattlesnake at this site.

Acknowledgments

Dr. Ronald A. Brandon reviewed this manuscript, provided guidance and assistance with field work, including the construction of the permanent drift fence. Scott R. Ballard, Natural Heritage biologist (IDNR), provided field assistance and helped with permits and state funding. His assistance with information on the reptiles and amphibians of Illinois proved invaluable to the continuation of this project. Special thanks to the Illinois Department of Natural Resources, Natural Heritage Division, and the Illinois Wildlife Preservation Fund who provided the money to fund this project.

Special thanks to my wife, Sue Ann Heafner, who assisted unselfishly during many hours of field work. Glen Kruse, Endangered Species Program Manager for the Illinois Department of

Natural Resources Division of Natural Heritage, issued a state permit for the possession of endangered and threatened species and the salvage of endangered and threatened species. Kirby Cottrell, Director, Office of Resource Conservation, issued a state scientific permit. Thanks to Conservation Police Officer Chris Mohrman for patrolling the study site and reporting vandalism.

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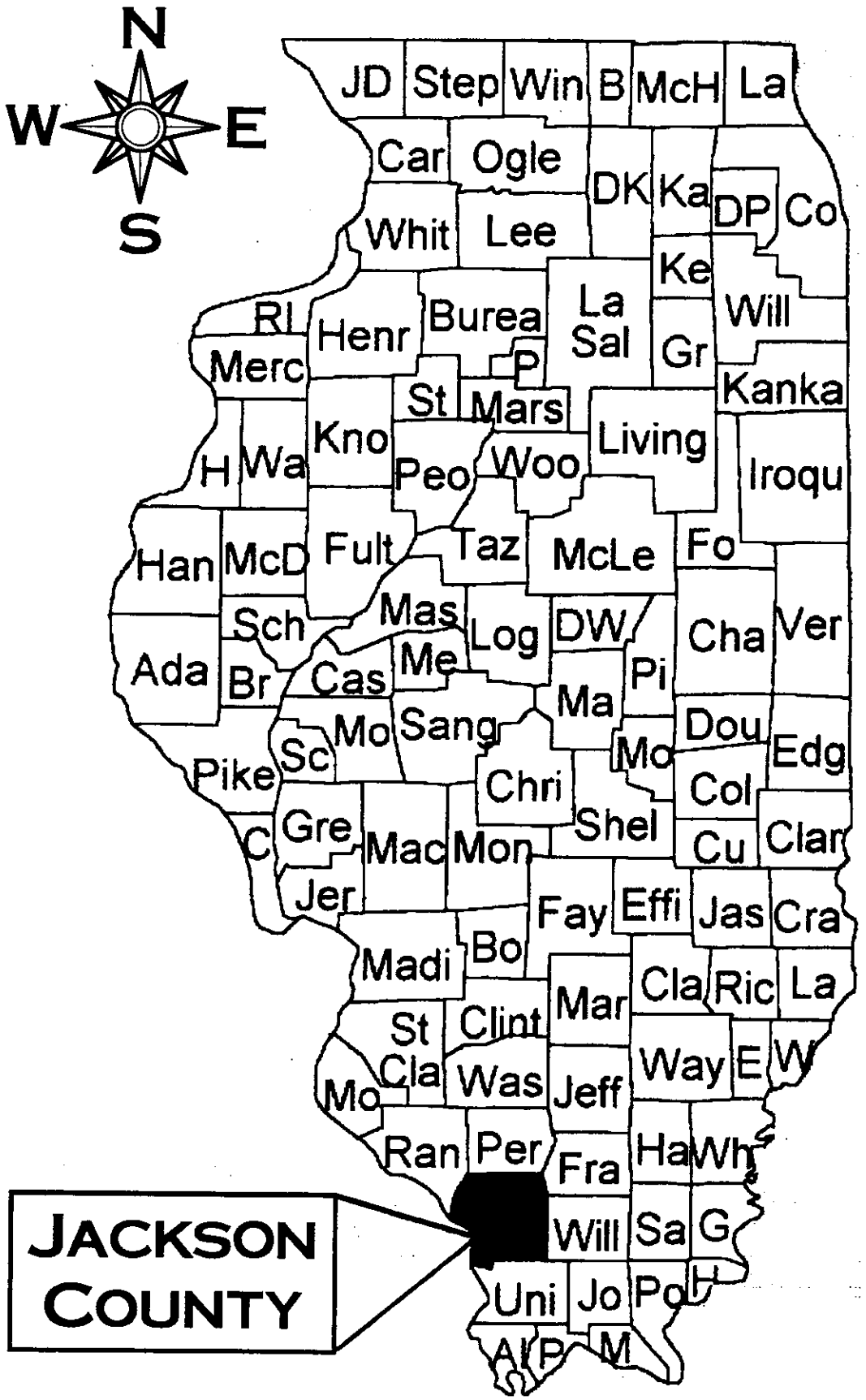
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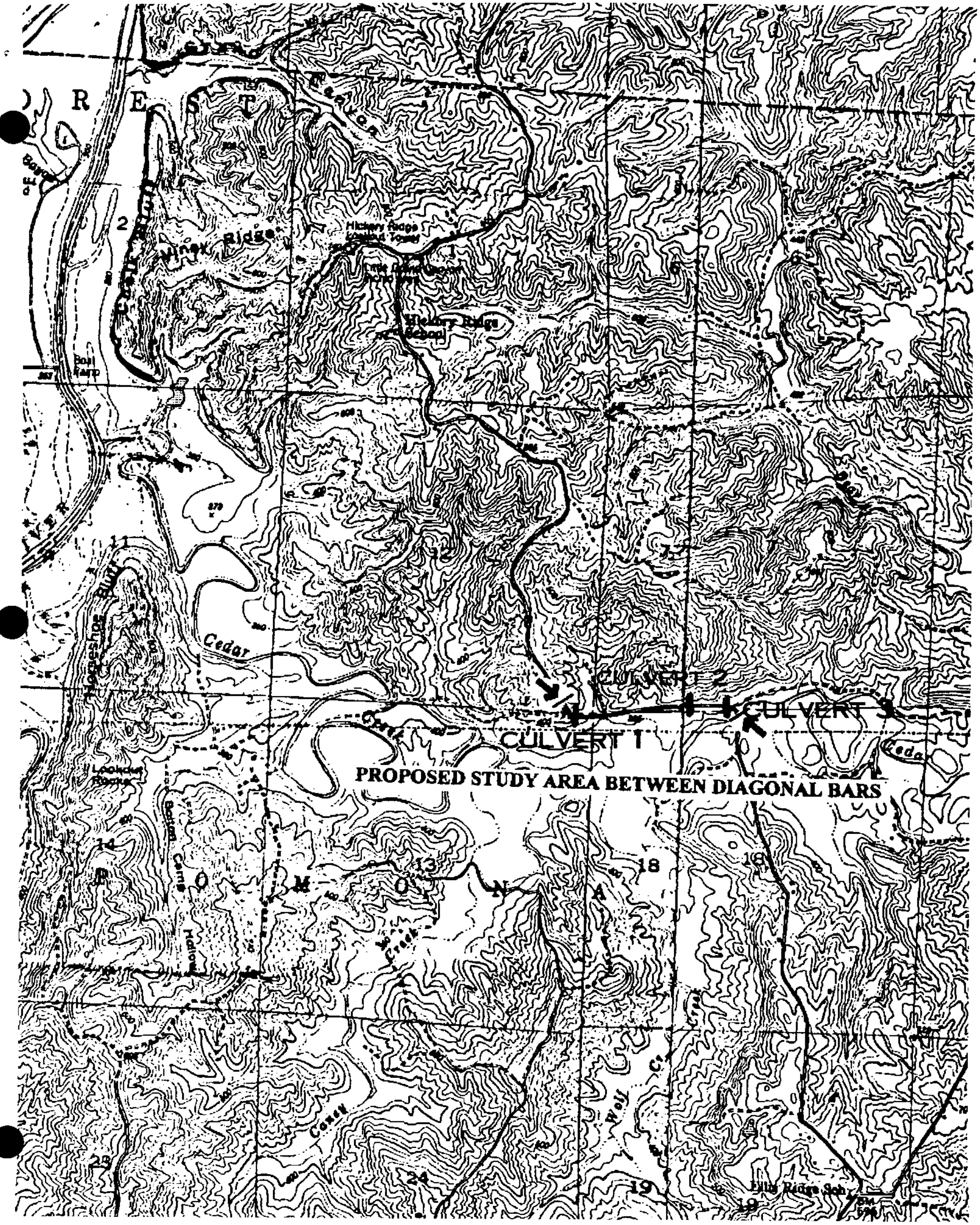
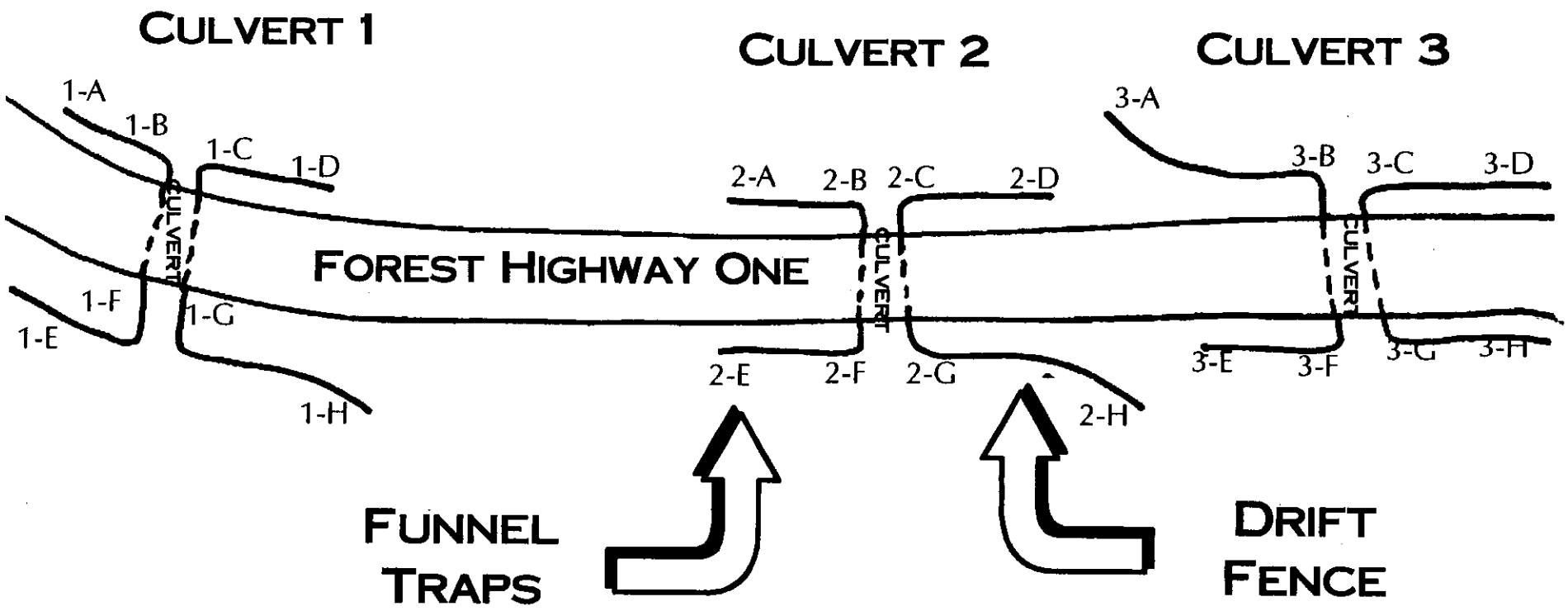
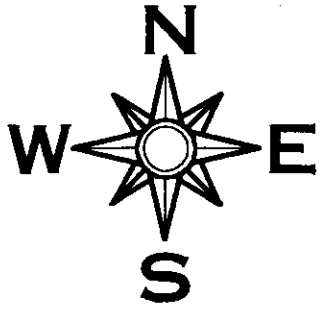


CULVERT 2
CULVERT 3
CULVERT 1
PROPOSED STUDY AREA BETWEEN DIAGONAL BARS
Hickory Ridge
Lookout Rocks
Cedar
Creek
Wolf Cr.
Hillis Ridge Sch.

Culvert Map Key

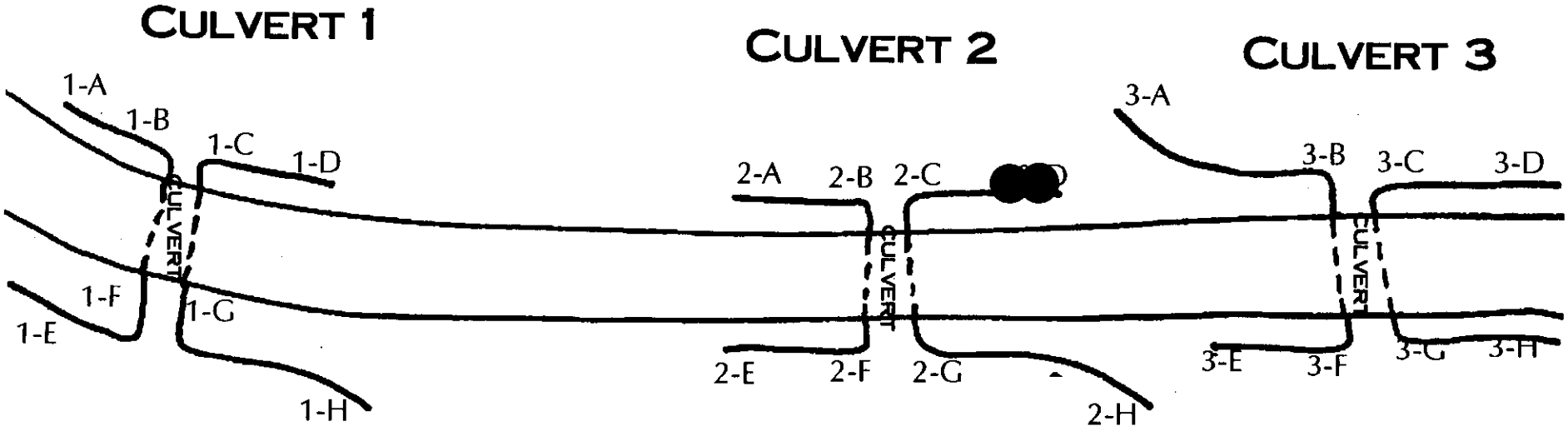
Map Not to Scale (Refer to Hickory Ridge road Map)

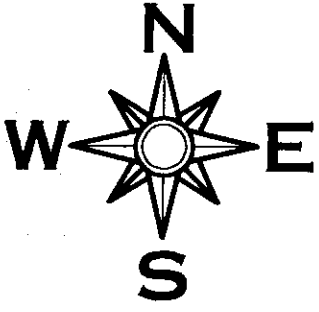




Species

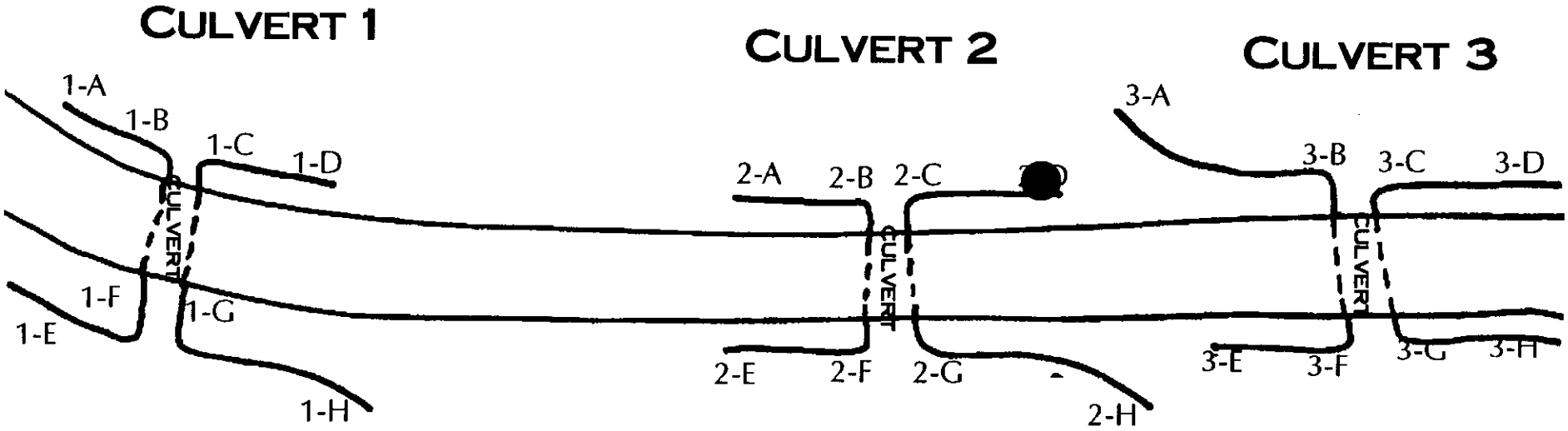
Forest Highway One
Species Dot Map

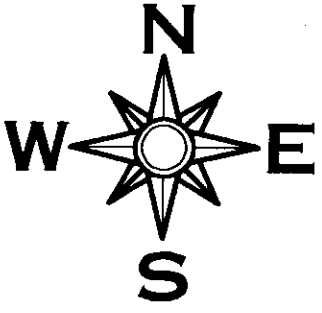




Ambystoma opacum

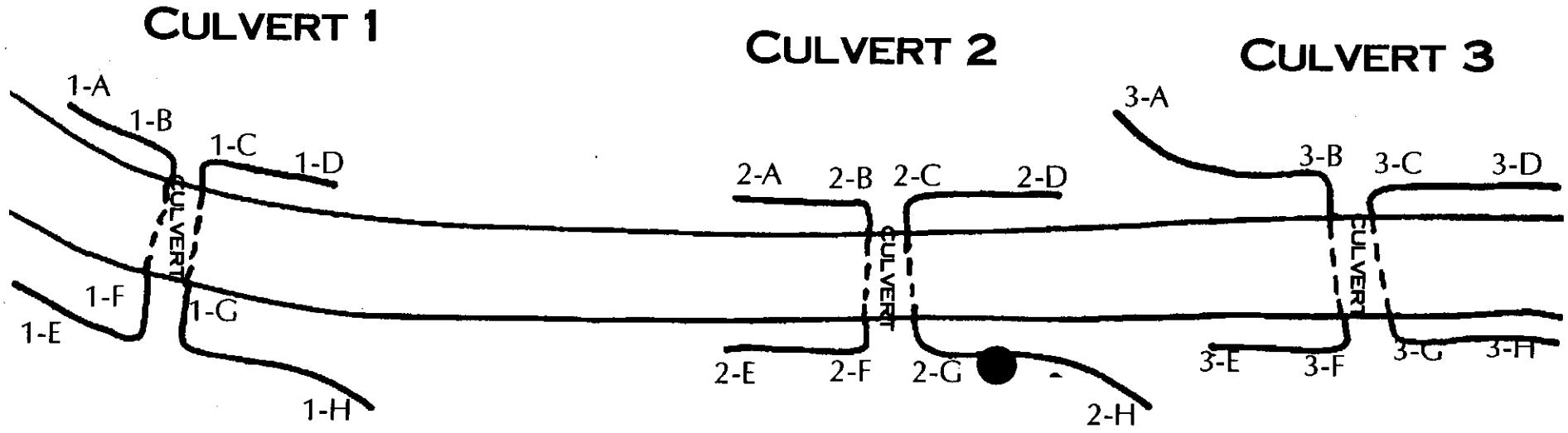
Forest Highway One
Species Dot Map

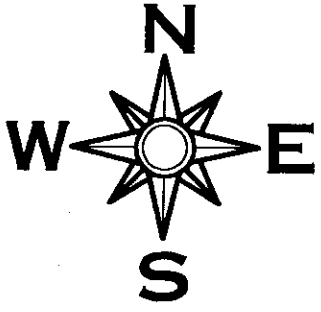




Ambystoma texanum

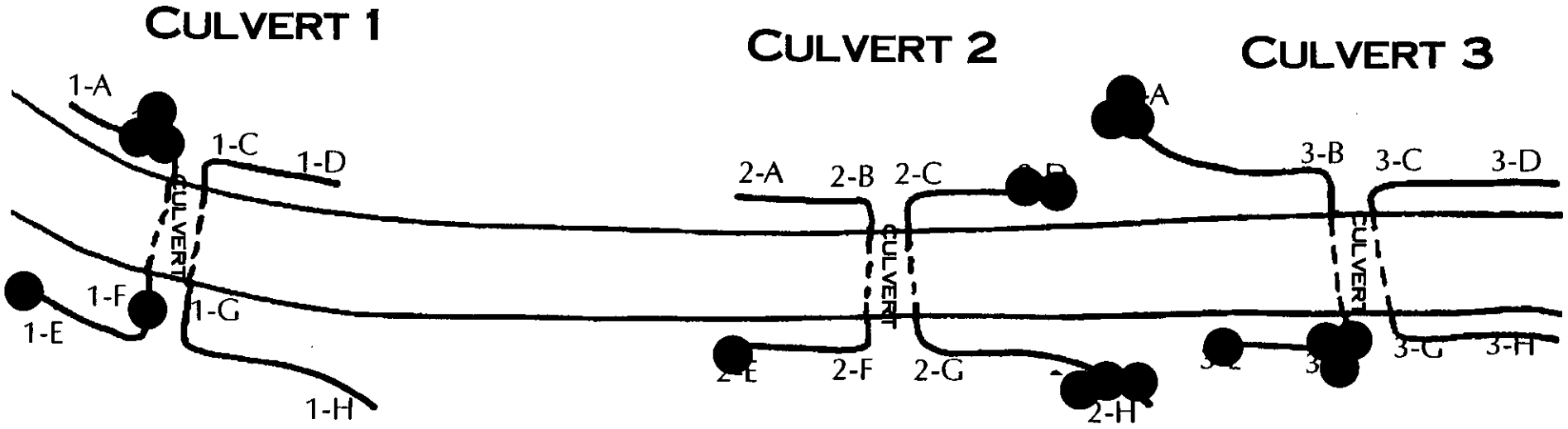
Forest Highway One
Species Dot Map

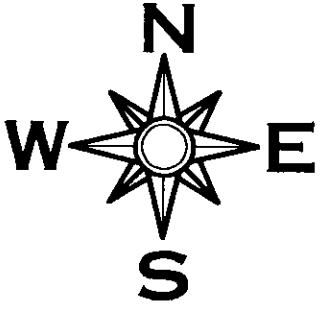




Notophthalmus viridescens

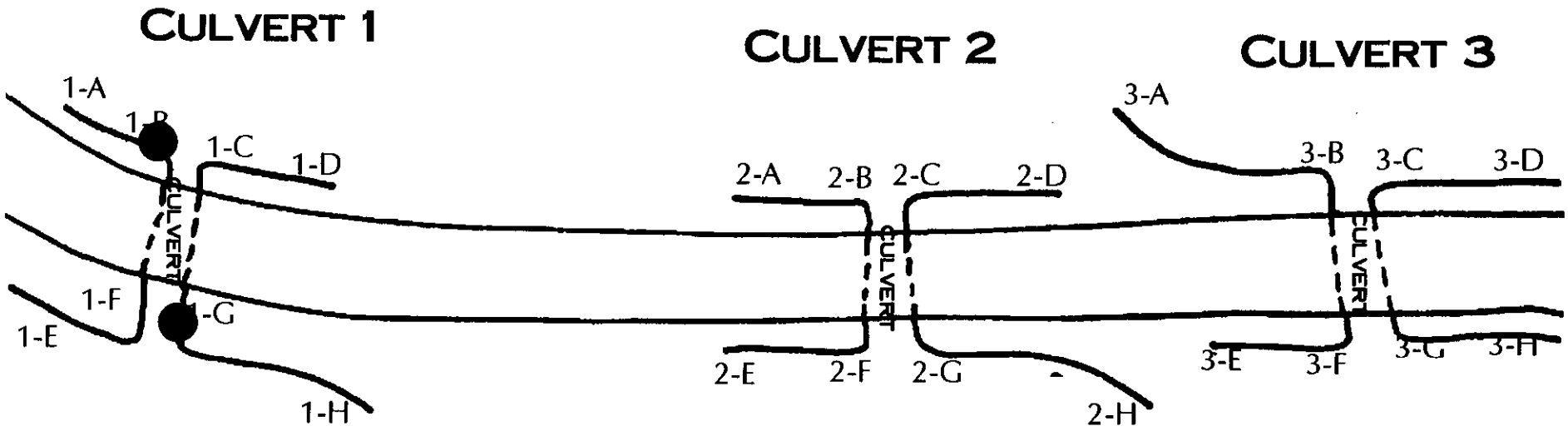
Forest Highway One
Species Dot Map

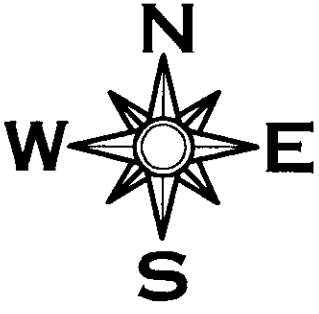




Bufo americanus

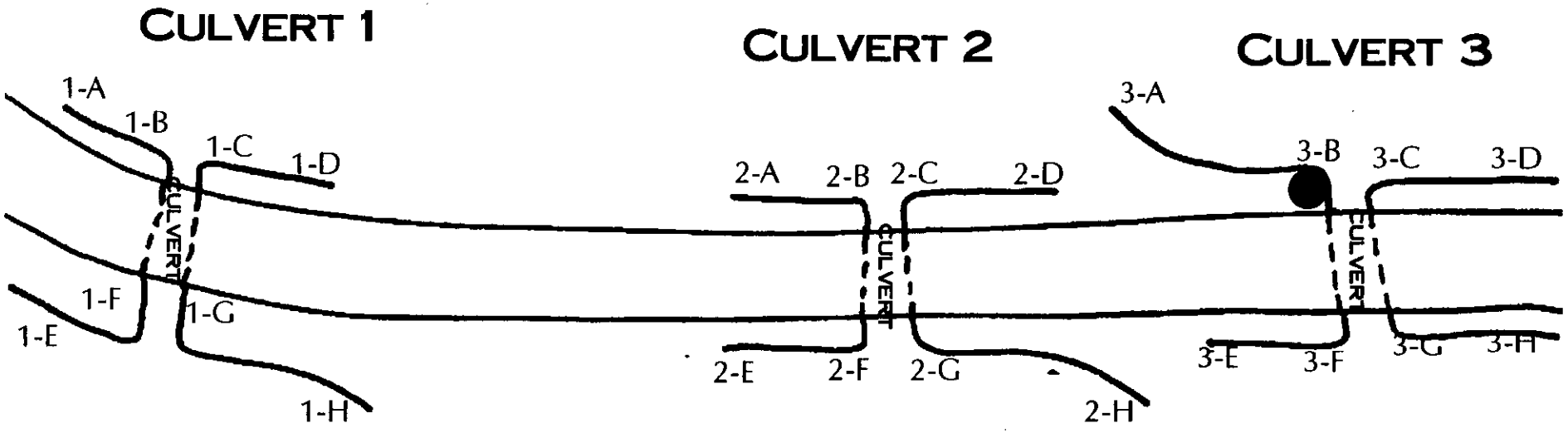
Forest Highway One
Species Dot Map

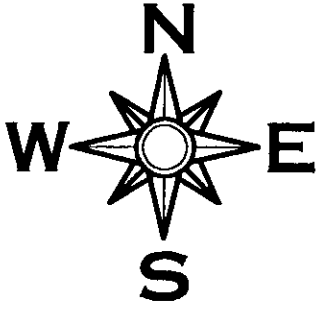




Bufo woodhousii

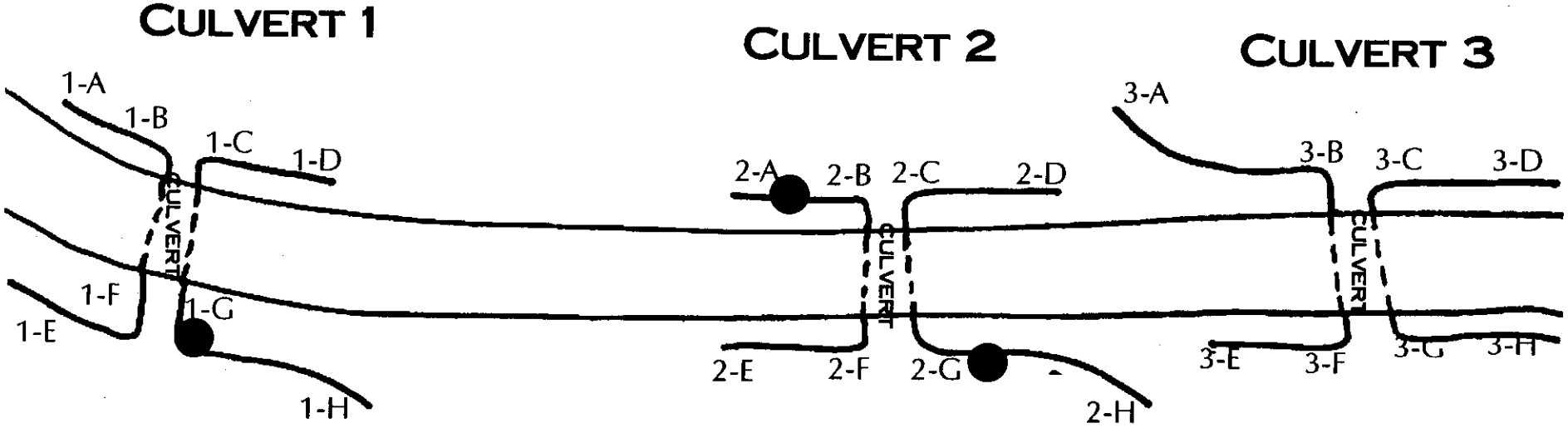
Forest Highway One
Species Dot Map

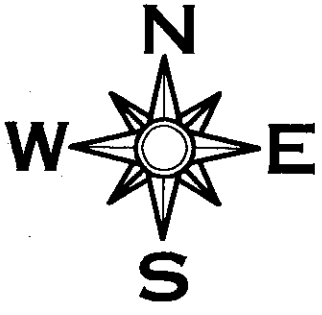




Acris crepitans

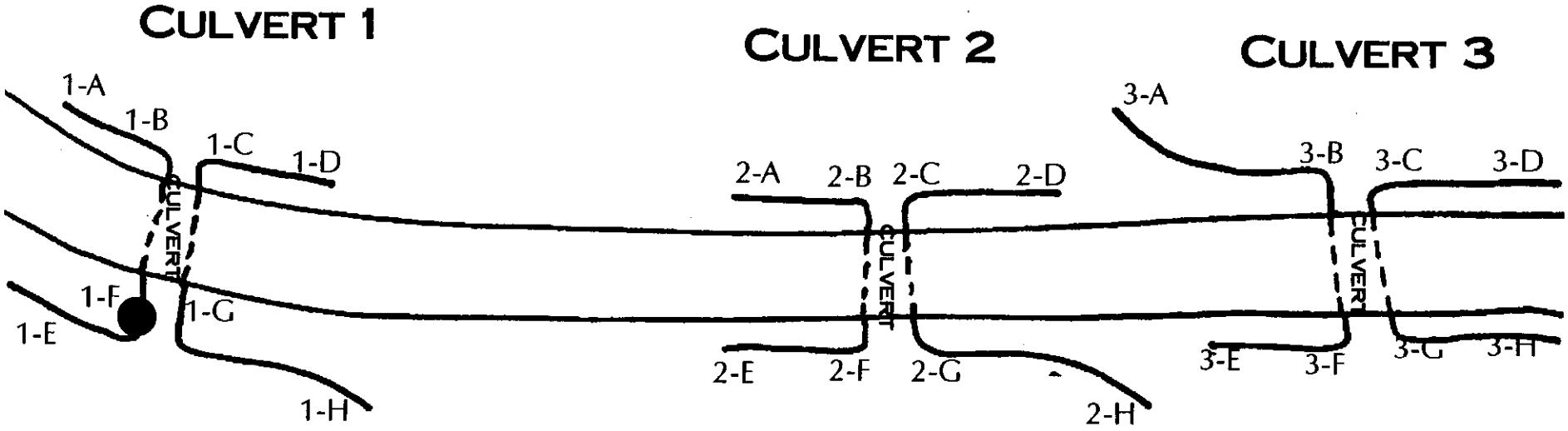
Forest Highway One
Species Dot Map

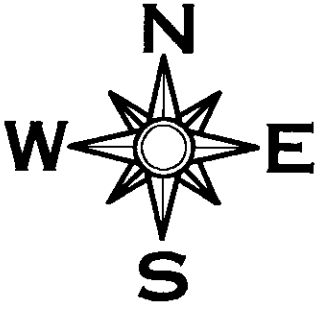




Hyla chrysocelis

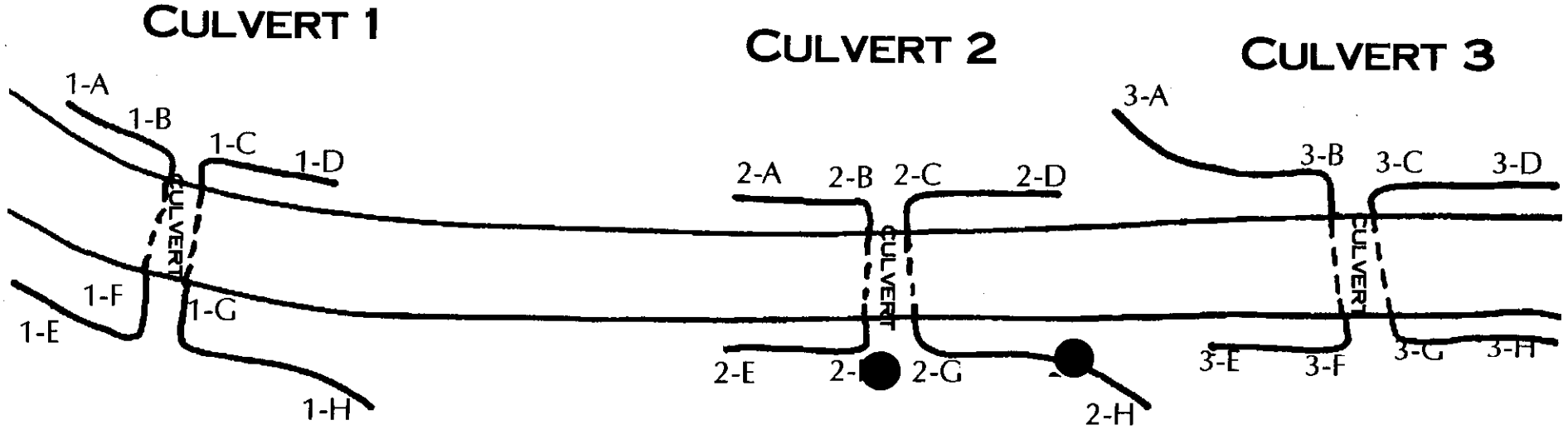
Forest Highway One
Species Dot Map

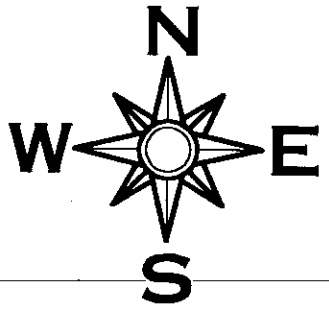




Hyla cinerea

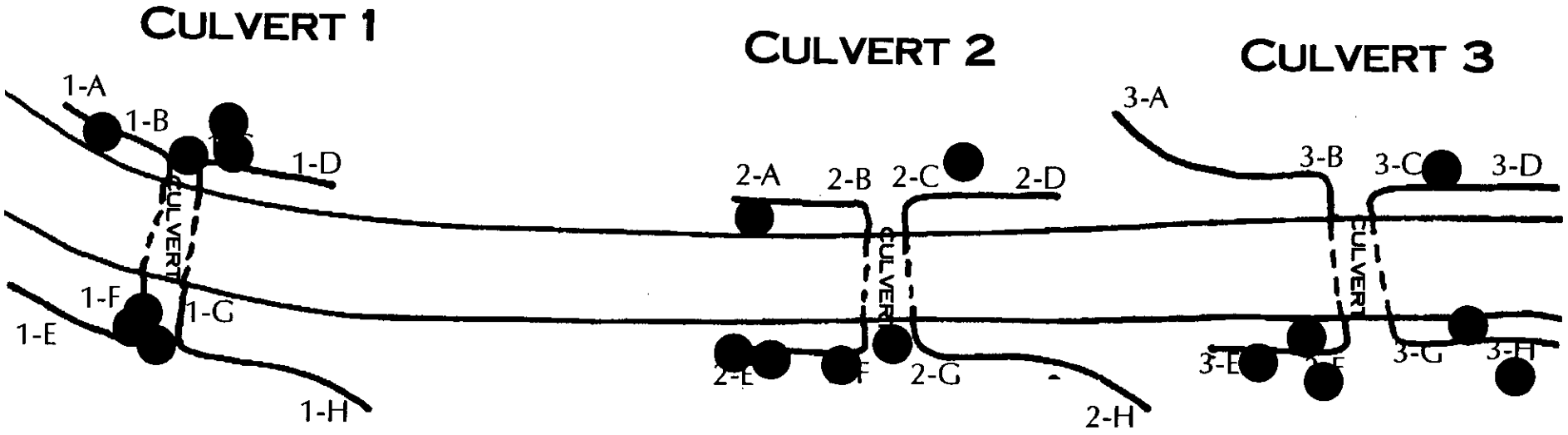
Forest Highway One
Species Dot Map

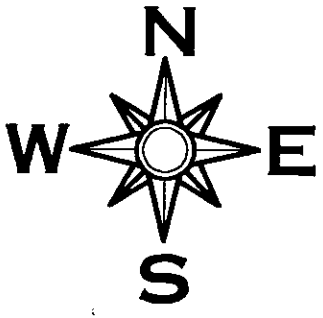




Pseudacris feriarum

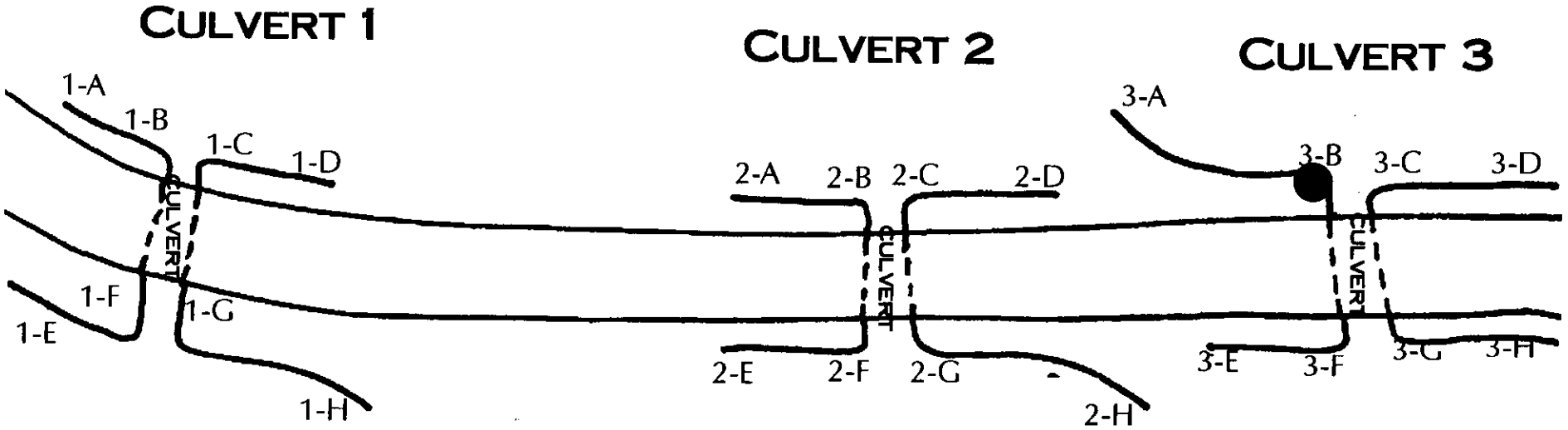
Forest Highway One
Species Dot Map

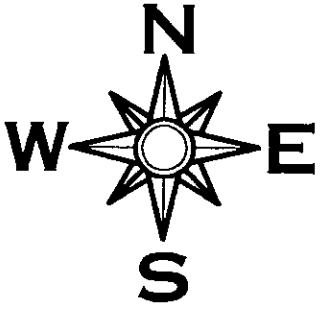




Rana sphenocephala

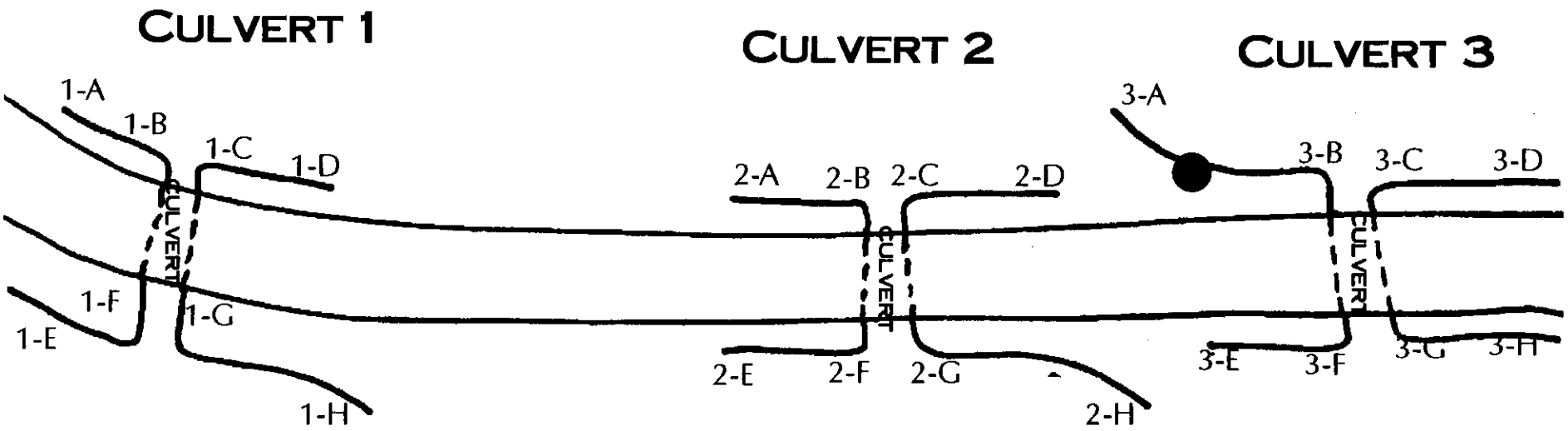
Forest Highway One
Species Dot Map

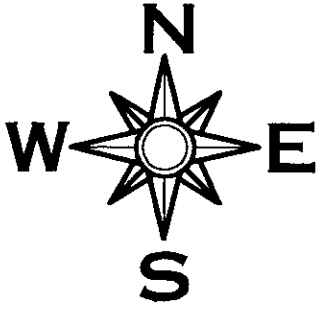




Terrapene carolina

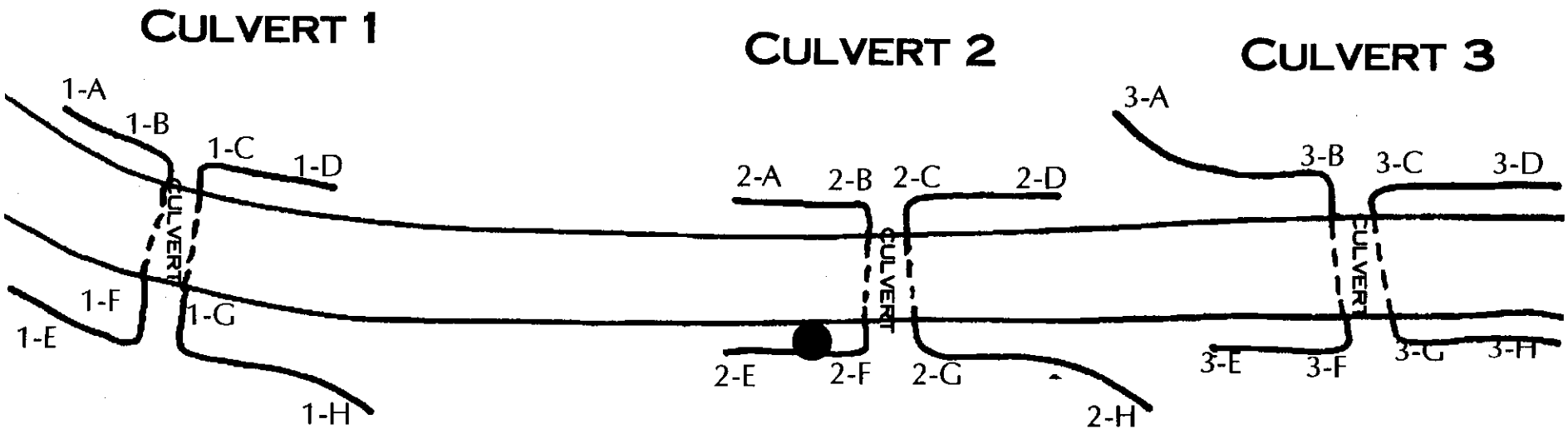
Forest Highway One
Species Dot Map

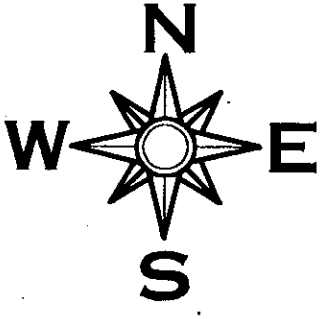




Sceloporus undulatus

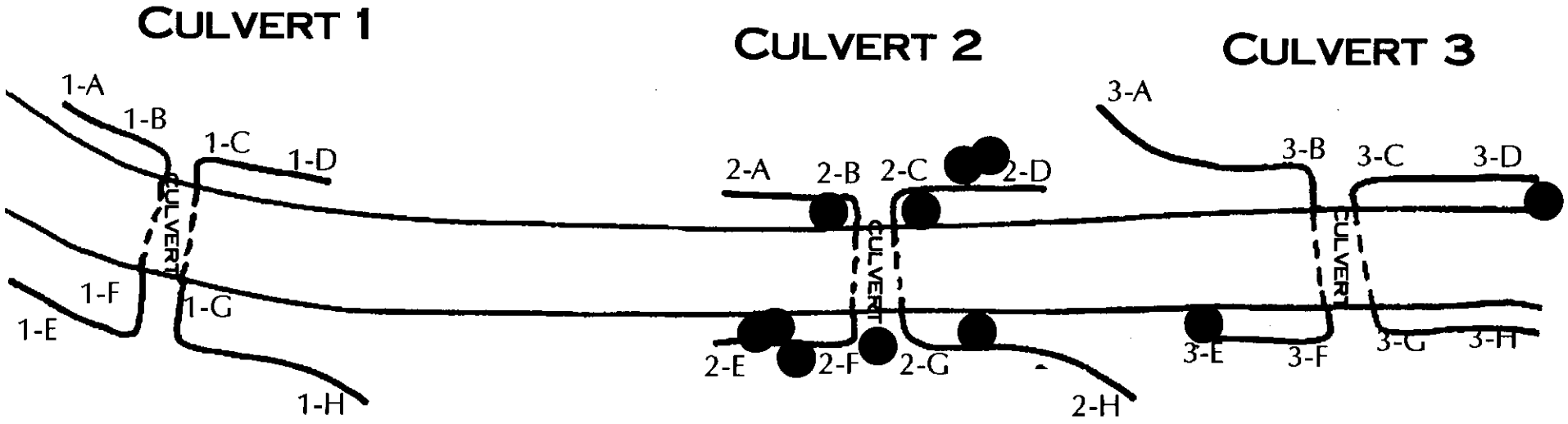
Forest Highway One
Species Dot Map

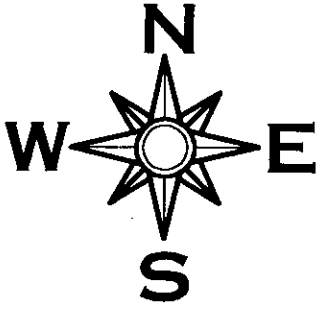




Eumeces spp.

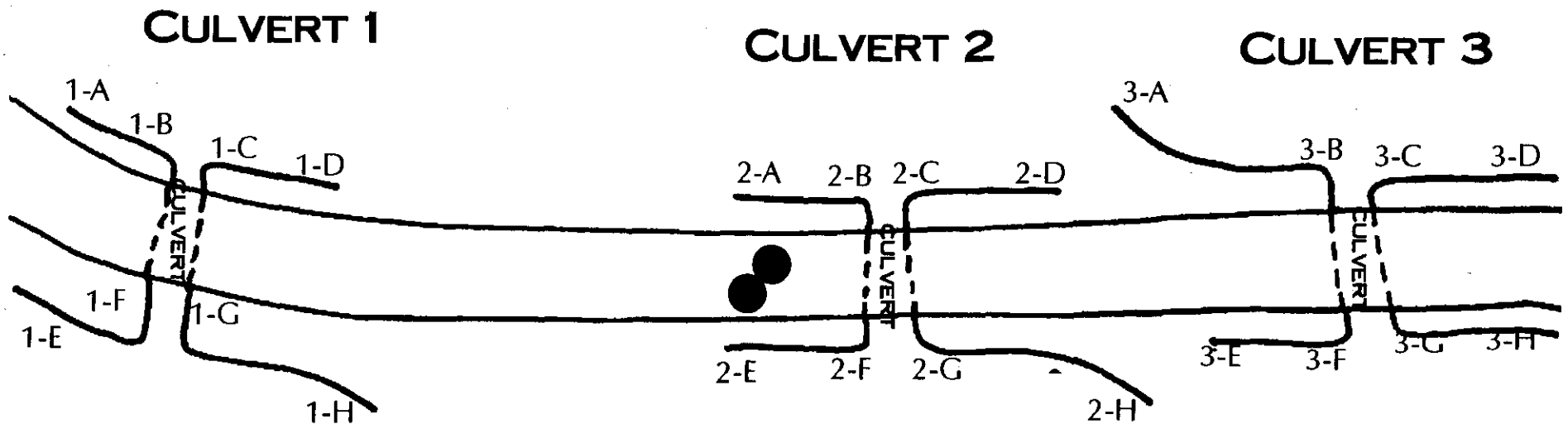
Forest Highway One
Species Dot Map

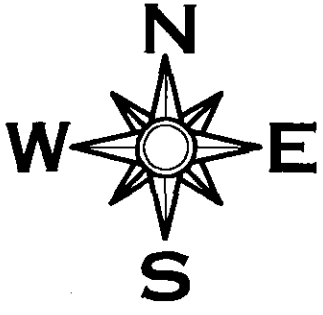




Scincella lateralis

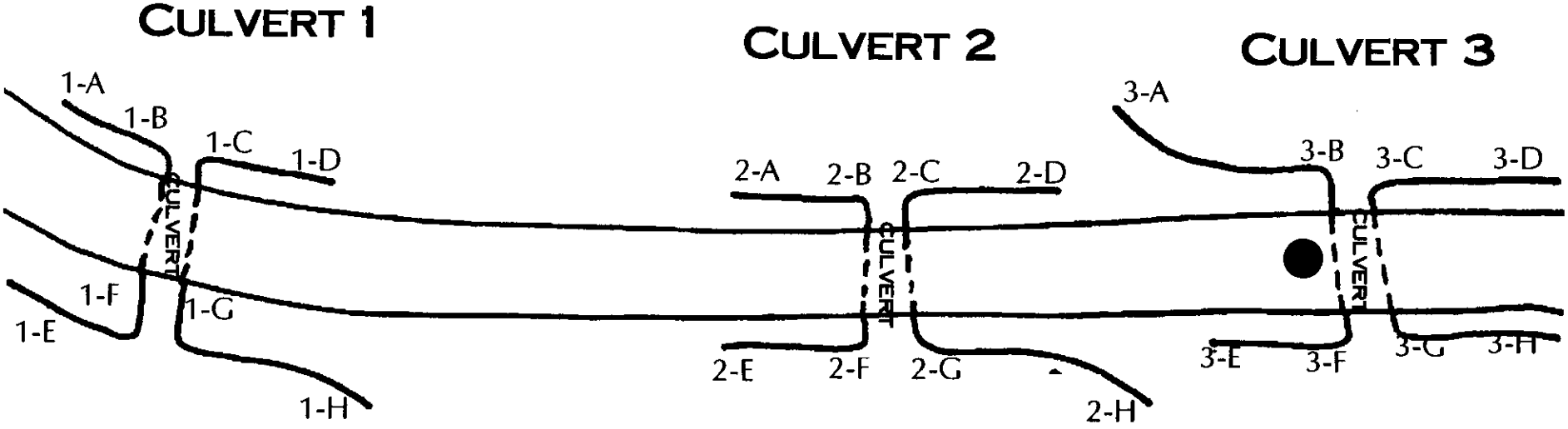
Forest Highway One
Species Dot Map

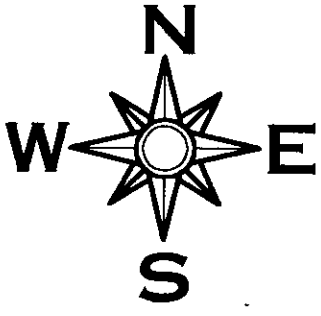




Storeria occipitomaculata

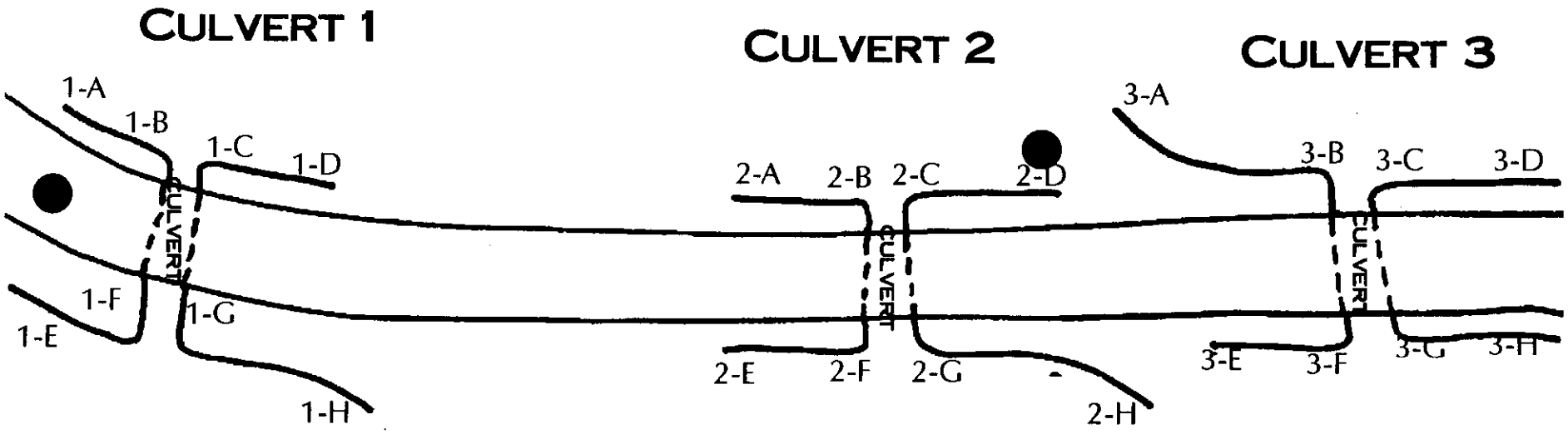
Forest Highway One
Species Dot Map

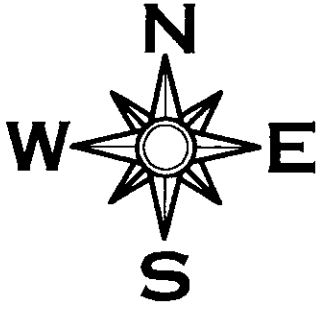




Virginia valeriae

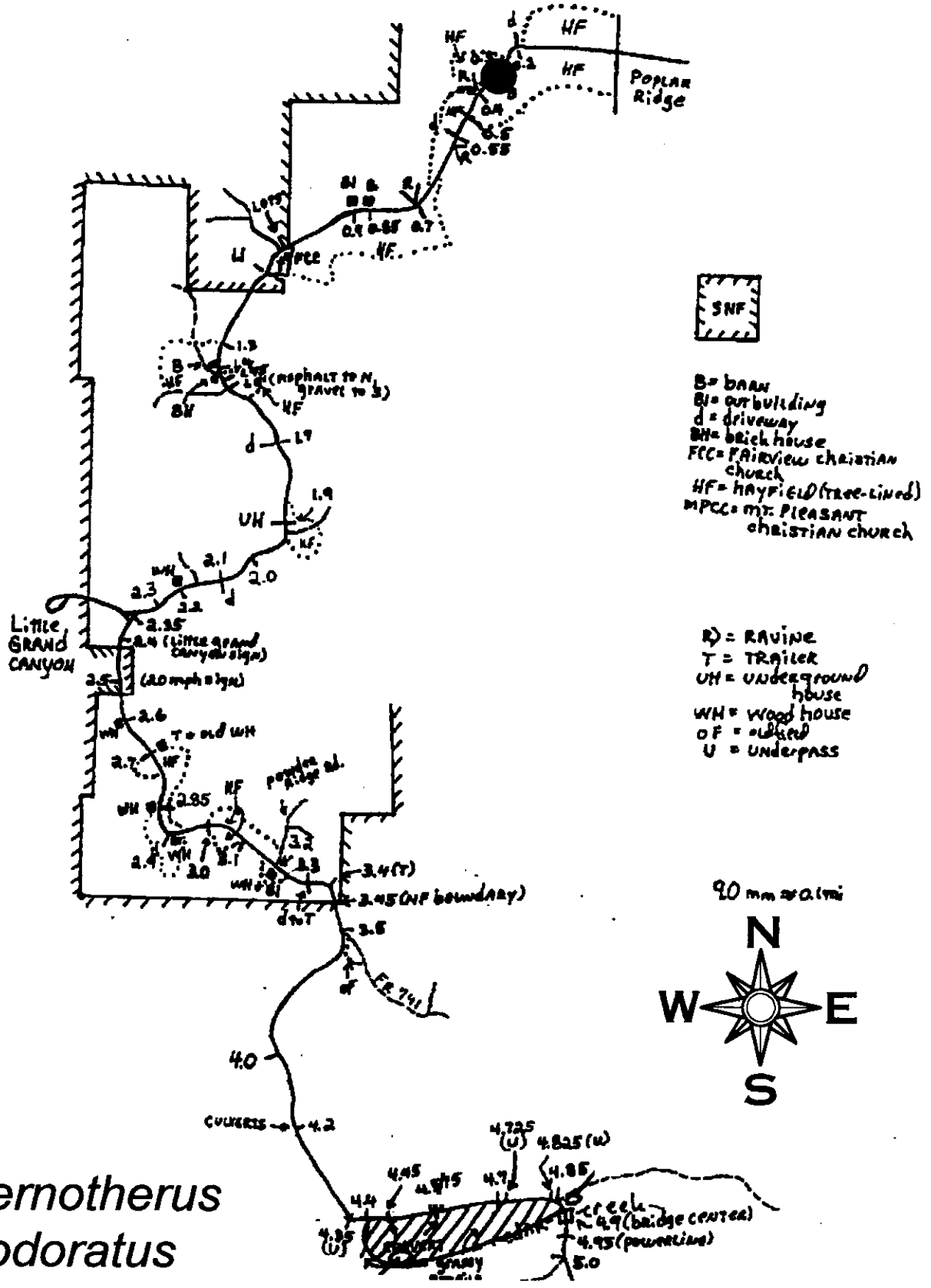
Forest Highway One
Species Dot Map





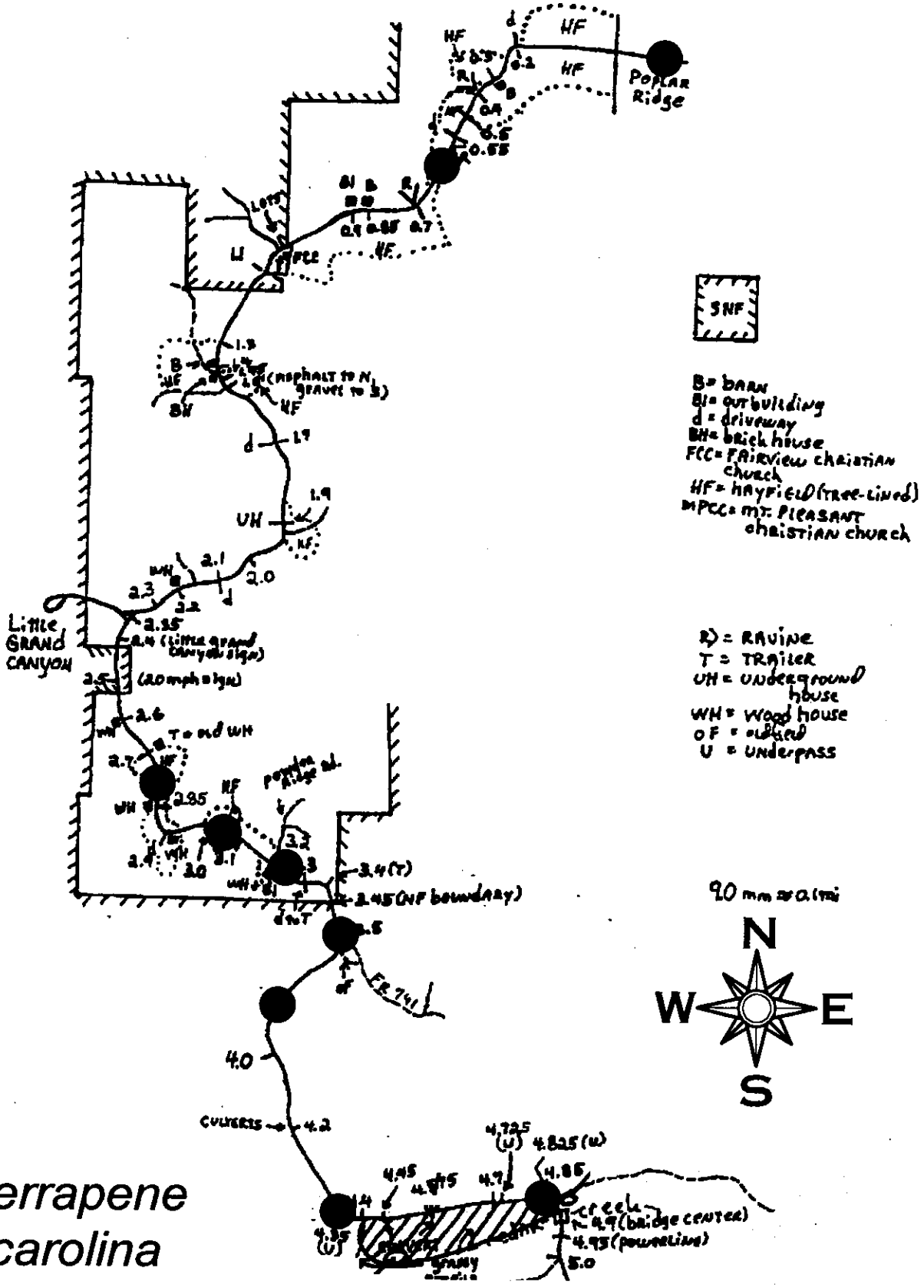
Crotalus horridus

HICKORY RIDGE ROAD
"FOREST HIGHWAY ONE"



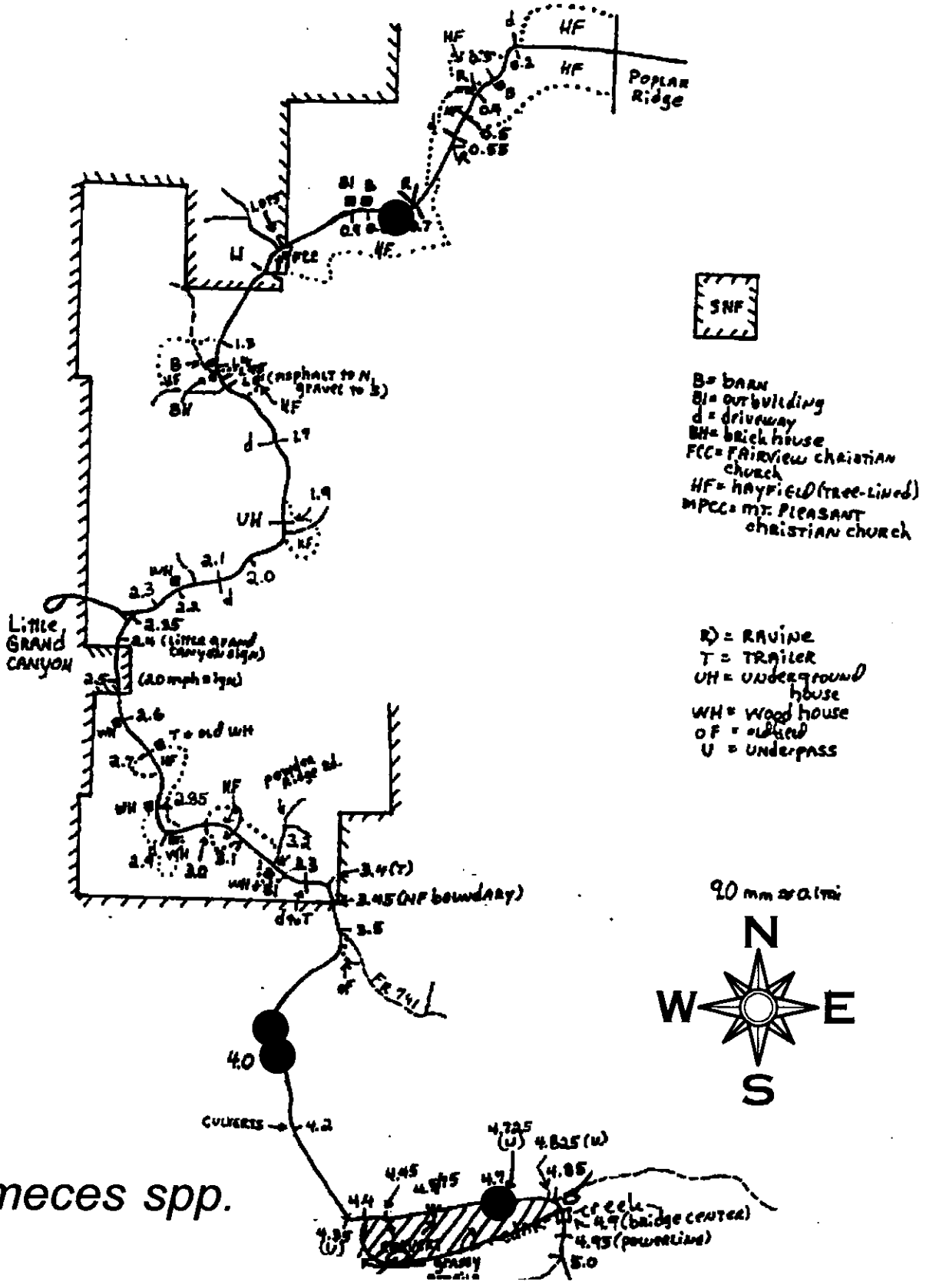
Sternotherus odoratus

HICKORY RIDGE ROAD
"FOREST HIGHWAY ONE"



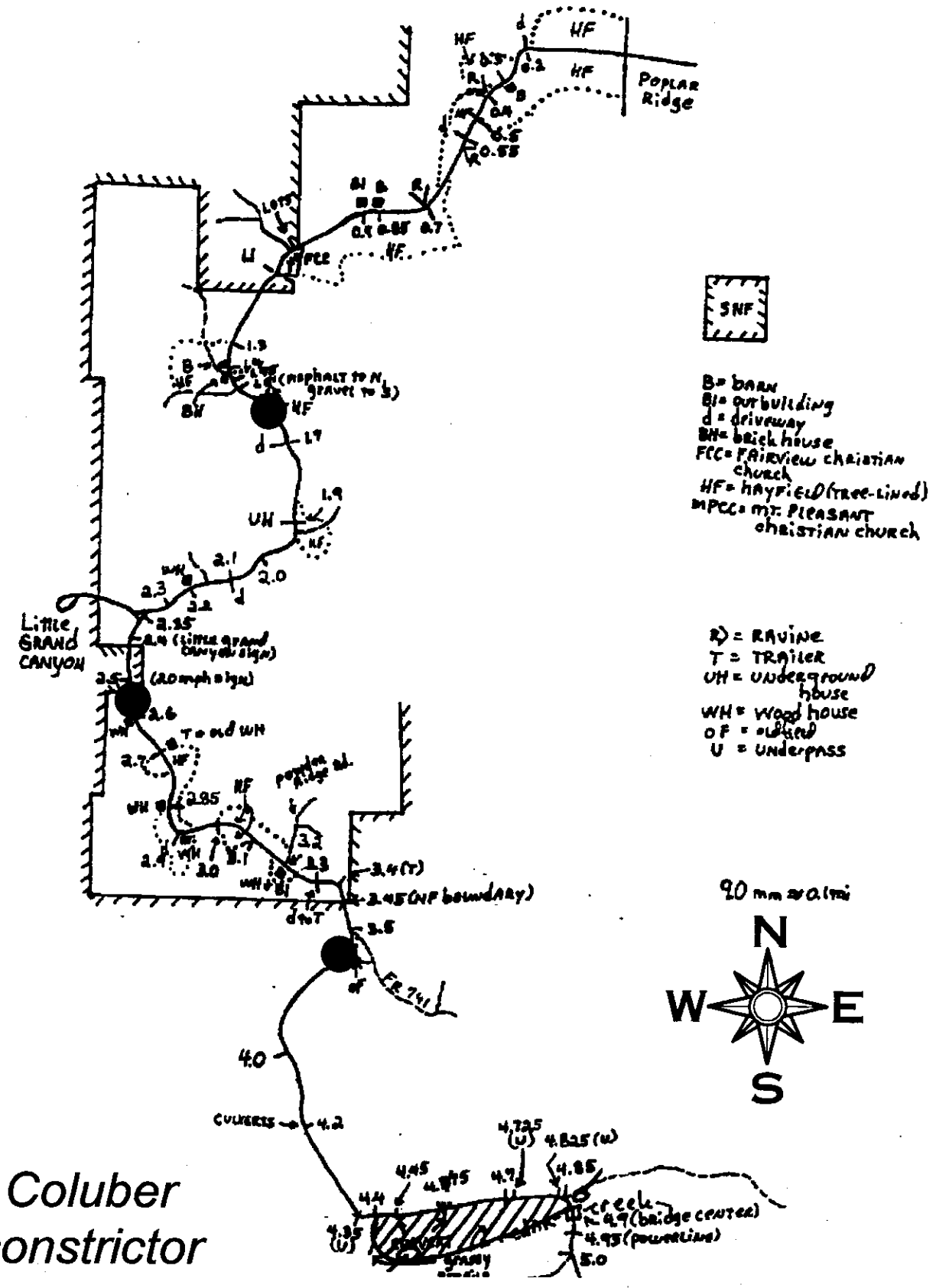
Terrapene carolina

HICKORY RIDGE ROAD
"FOREST HIGHWAY ONE"



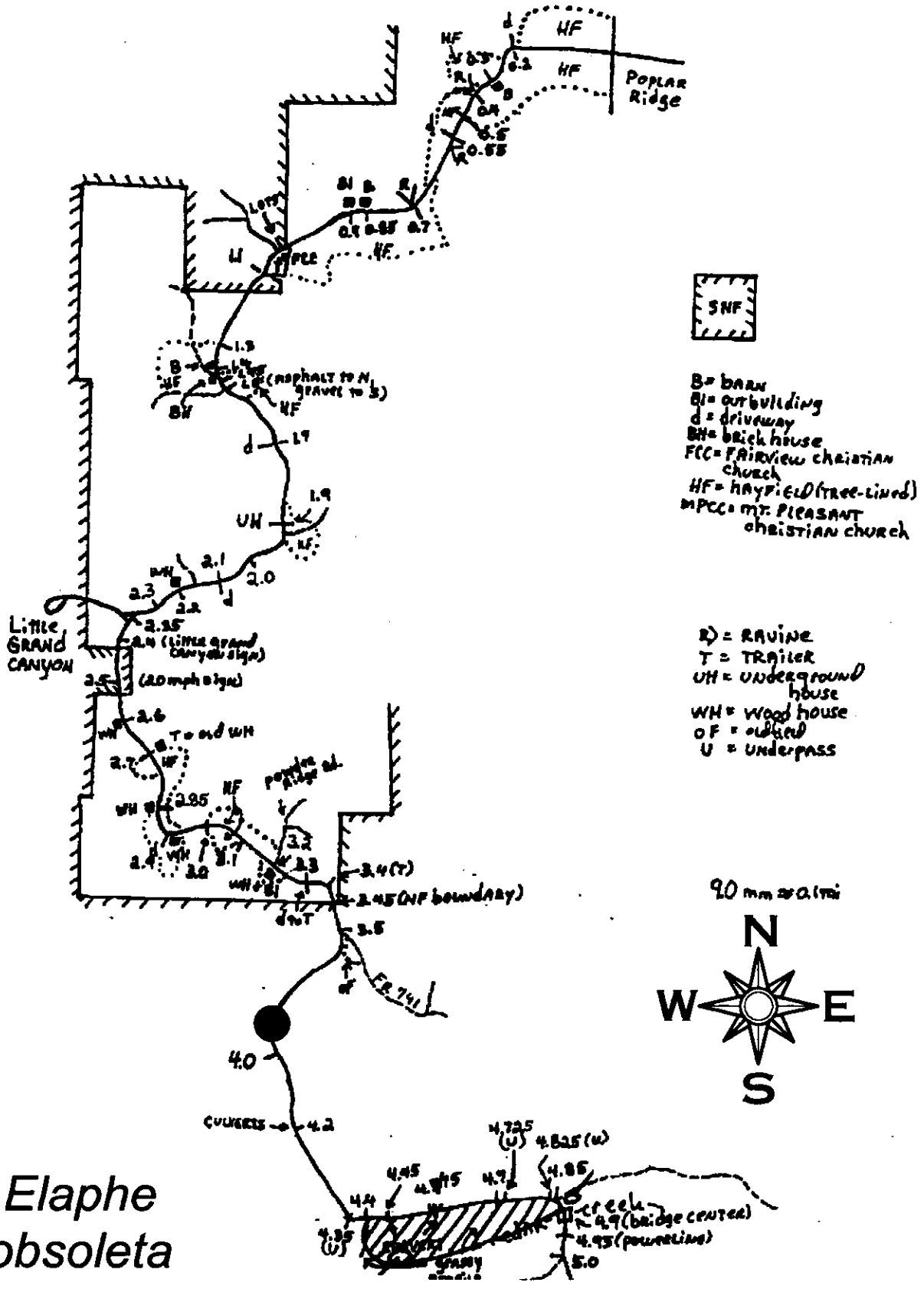
Eumeces spp.

HICKORY RIDGE ROAD
"FOREST HIGHWAY ONE"



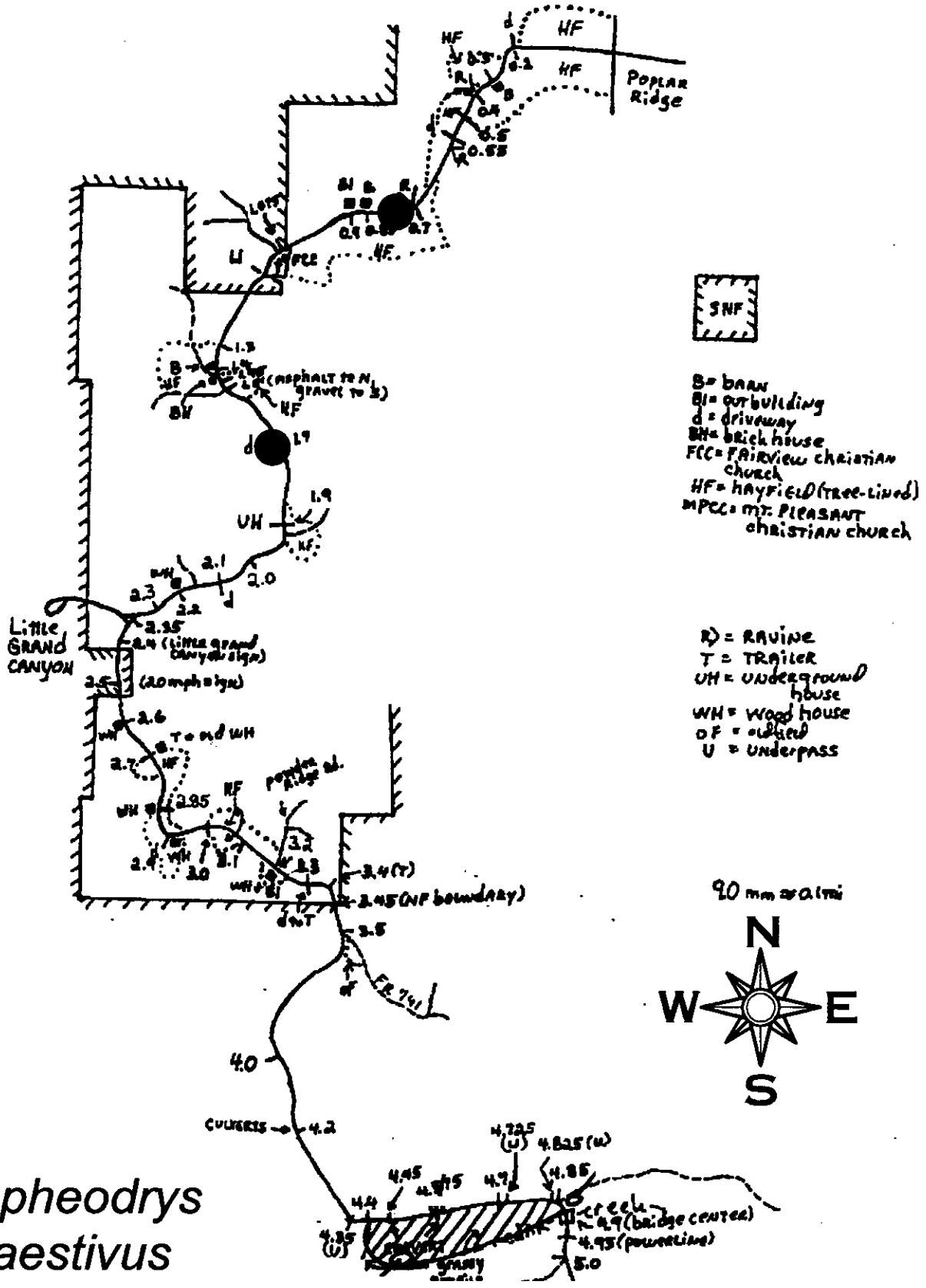
Coluber constrictor

HICKORY RIDGE ROAD
"FOREST HIGHWAY ONE"



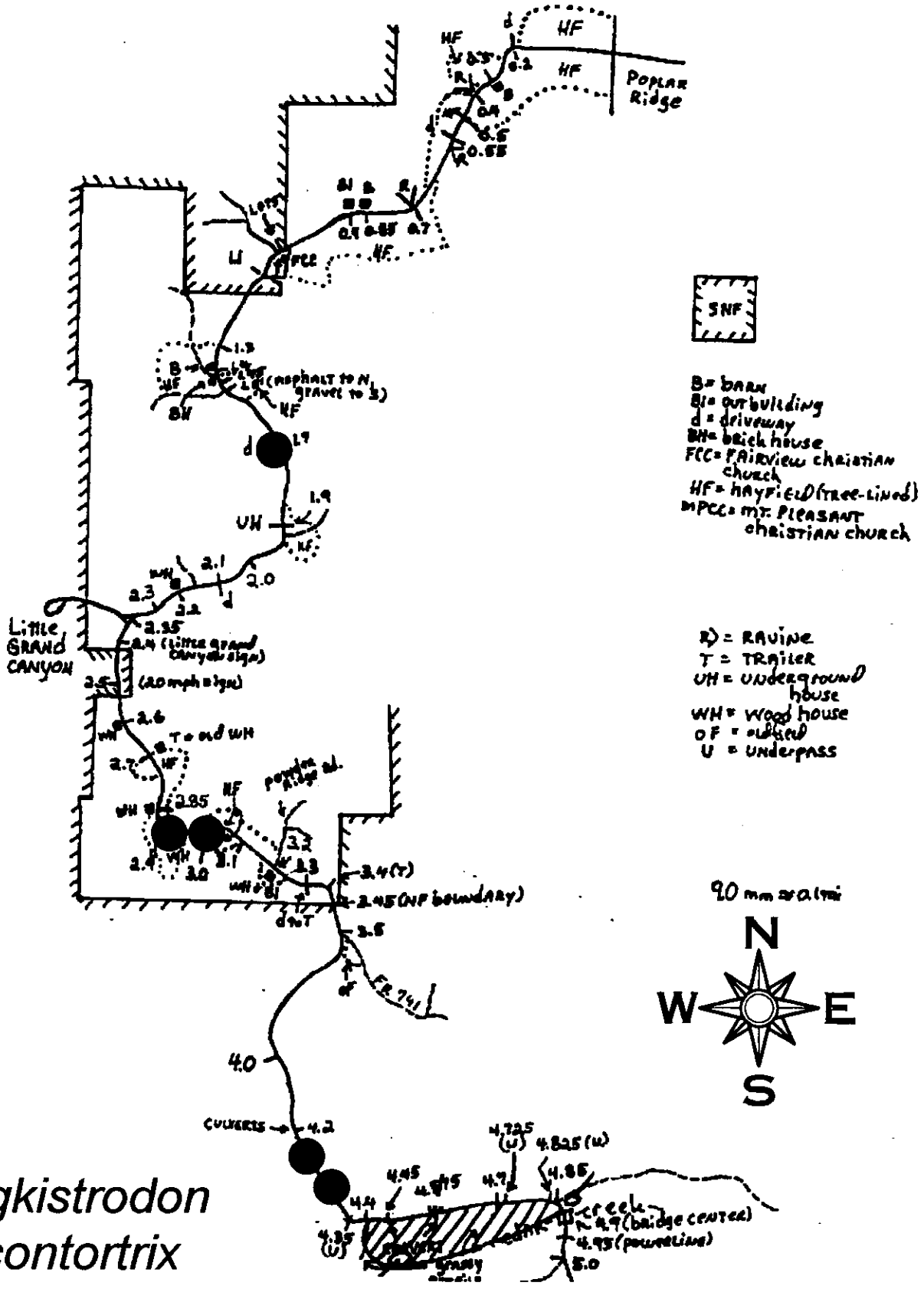
Elaphe obsoleta

HICKORY RIDGE ROAD
"FOREST HIGHWAY ONE"



Opheodrys aestivus

HICKORY RIDGE ROAD
"FOREST HIGHWAY ONE"



Agkistrodon contortrix