

**Virginia Herpetological Society 2018 Annual Spring Survey  
Lake Anna State Park in Spotsylvania County, Virginia**

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**Abstract:** Lake Anna State Park is a 1,200 hectare park in Spotsylvania County with wetlands, woodland habitats, and open fields. It was surveyed 6 May 2018 for the pre-survey and 19-20 May 2018 for the main survey by approximately 70 volunteers. There were 445 individuals of 38 species of herpetofauna documented (19 amphibians and 19 reptiles) including 10 new records for Spotsylvania County. Of the 38 species documented, two were Virginia Department of Game and Inland Fisheries Tier IIIa and Tier IVa species, the Woodland Box Turtle and Common Ribbonsnake respectively. Future surveys of the park could uncover an additional 17 new species for Spotsylvania county.

**Key Words:** Herpetological Survey, Lake Anna State Park, Spotsylvania County, VDGIF Tier IIIa, VDGIF Tier IVa, Woodland Box Turtle, Common Ribbonsnake

### **INTRODUCTION**

The Virginia Herpetological Society (VHS) 2018 Annual Spring Survey was held at Lake Anna State Park in Spotsylvania County, Virginia. This was the first time the VHS had conducted a survey in Spotsylvania County. Lake Anna State Park is over 1,200 hectares (2,965 acres) and there were several different types of habitats: creeks, large ponds, lakes, open field, edge habitats, and forests. The park is located in the Piedmont province of Virginia (Tobey, 1985) which is defined by upland forests, well-drained soils, and rolling hills (Mitchell and Reay, 1999). Lake Anna State Park has an interesting past. It opened as a state park in 1983, but before then was known for different reasons (Maurer, 2013). The lake was created in 1971 as a source for cooling water for a nearby power plant (Maurer, 2013). Previously, the area was known as Gold Hill when gold was discovered in the early 1800's. Mining activity continued until the early 1900's (Maurer, 2013). Currently the park has heavy recreation use centered around the lake with camping sites and 24 kilometers

(>14 miles) of hiking trails. Lake Anna State Park was selected because the VHS had not previously conducted a survey within Spotsylvania County. Another reason Lake Anna State Park was selected was due to many potential county records that might be documented there. In addition to the 37 species that had previously been documented in Spotsylvania County (VHS database) it was estimated up to 27 more could be documented, if animals that were found in nearby counties are an indicator. The multitude of different habitats (aquatic, open fields, and upland forest habitats) would potentially help maximize the number of herp species encountered.

## Lake Anna State Park Survey

### Survey

The study sites for the VHS 2018 Annual Spring Survey at Lake Anna State Park are listed below and can be seen in Figure 1.

### Sites

#### **Site 1 (and P2 on the pre-survey) – Fisherman’s Trail** (38° 7' 4.8"N, 77° 50' 14.5"W)

Fisherman’s Trail started at the picnic area and followed the social trail adjacent to Lake Anna. The trail eventually headed off to higher ground away from the water and included mostly woodland habitat.

#### **Site 2 (and P1 on the pre-survey) – Sawtooth Trail** (38° 6' 59.8"N, 77° 49' 8.0"W)

This site started at the Trailhead of Sawtooth Trail and headed south towards Glenora Trail. The habitat was a mix of woodland with some wetlands.

#### **Site 3 – Mill Pond Trail** (38° 6' 59.8"N, 77° 49' 8.0"W)

This site started at the Trailhead of Mill Pond Trail (across the street from the Sawtooth Trailhead) and headed north towards Pigeon Run Trail. The habitat was woodland mixed with some wetland.

#### **Site 4 – Old Log Road** (38° 8' 21.0"N, 77° 48' 53.7"W)

This site started just through the gate of the Old Log Road. The northern most end included the Gold Hill Trail. The habitat was a mix of hardwood forest.

#### **Site 5 – Ware Field (Forest)** (38° 7' 53.2"N, 77° 50' 22.3"W)

This site is not publicly accessible. It was recently obtained by Lake Anna State Park and is disjunct from the main area of the park. The site started just through the gate off of Purcell Lane and the habitat surveyed was woodland forest.

#### **Site 6 – Ware Field (Field)** (38° 7' 20.3"N, 77° 50' 26.1"W)

This site is also in the recently obtained land disjunct from the main area of Lake Anna State Park. This area started next to a fenced cemetery and included open field and edge habitat as well as habitat along the shore of Lake Anna.

#### **Site 7 – Old Pond Trail and Beach** (38°06'43.1"N,77°49'54.0"W)

This site started at the beginning of Old Pond Trail and looped around to the beach. This was primarily water edge habitat of Old Pond as well as flooded areas on the beach of Lake Anna.

#### **Site 8 (and P3 on the pre-survey) – Railroad Ford Trail** (38°06'44.7"N, 77°49'49.0"W)

This site started at the end of the Old Pond Trail and included streams, seeps, and vernal pools in a woodland habitat.

#### **Site 9 – Glenora Trail** (38°06'36.1"N, 77° 49'33.8"W)

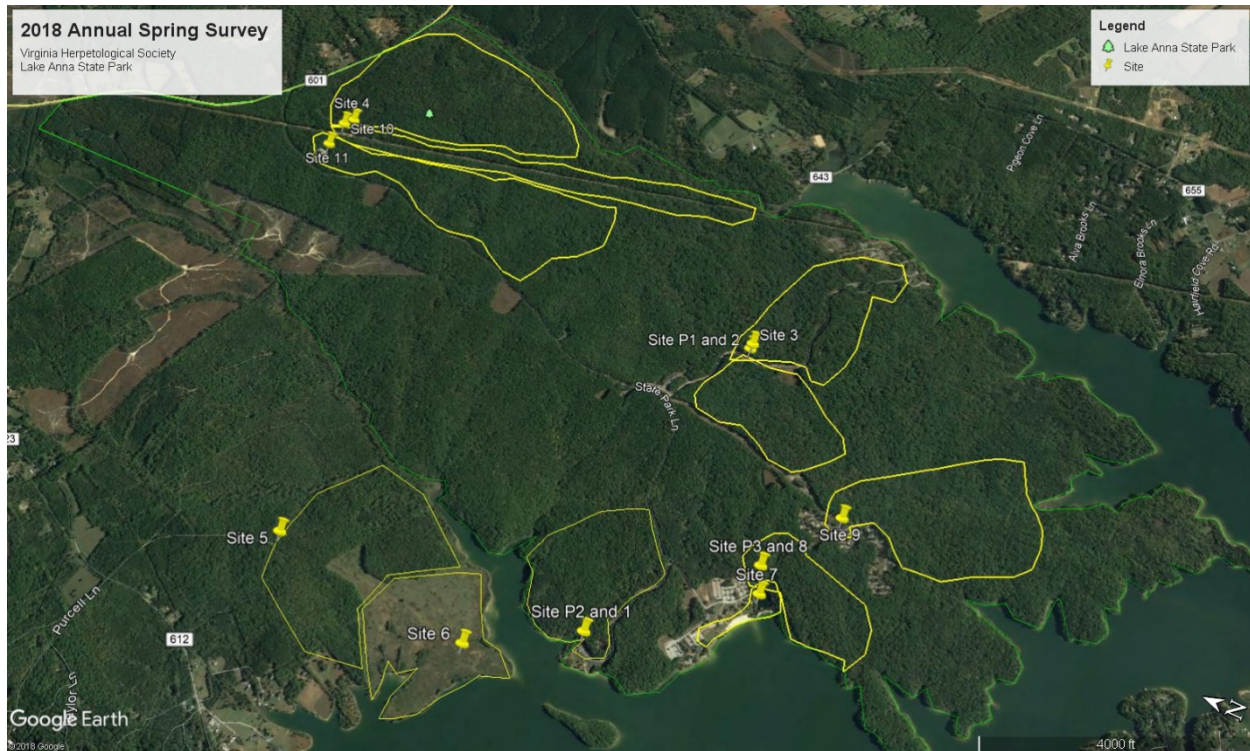
This site started at the Glenora Trail trailhead, near the campsites, and headed southeast towards the Big Woods Trail. The habitat at this site was primarily woodland with many streams.

#### **Site 10 – Power lines** (38°08'22.3"N, 77°48'55.3"W)

This area started at the parking area through the main entrance gate and continued southeast along the power lines. The habitat was primarily edge habitat between field and woodland.

#### **Site 11 – Forest adjacent to Power lines** (38°08'22.6"N,77°49'01.4"W)

The survey area started at the parking area of the park maintenance area and headed south into the wooded area between the power lines and the main park road.



**Figure 1.** Map showing area surrounding Lake Anna State Park and survey sites at the park

## METHODS

For the pre-survey on Sunday, 6 May 2018 survey participants were split into two groups in the morning and combined to form one in the afternoon. For the main survey on Saturday, 19 May and Sunday, 20 May 2018 participants were split into 11 groups. Prior to surveying, participants disinfected footwear and snake hooks in either a Novalsan or 10% bleach solution. Methods used to find animals included hand capture, visual observation, listening for calling anurans, turtle traps, nets, and flipping over cover objects. All animals that could be photographed as voucher specimens were and animals with signs of disease or injury were especially noted. Group leaders completed survey data sheets to record all animals encountered on standardized sheets. Data sheets included information on: the physical environment, weather, animal health, and microhabitat. Other data collected included morphometric

measurements of rare species, age, and sex. On Sunday, 6 May the temperature ranged from 18.3°C to 22.8°C with an overcast sky. On Saturday, 19 May the temperature ranged from 15.6°C to 21.1°C with rain throughout the day. On Sunday, 20 May the temperature was 22.8°C to 25.6°C with partly sunny to sunny skies. There was a total of 419.5 person hours per survey effort between all of the survey dates - 35.5 person hours during the pre-survey (Table 1), 286.5 person hours on Saturday 19 May (Table 2), and 97.5 person hours on Sunday, May 20 (Table 3).

## Lake Anna State Park Survey

Table 1. Summary of Survey effort per site on Sunday, 6 May 2018.

Survey Site	No. of Surveyors	Hours	Estimated Person Hours
P1	4	2.25	9
P2	4	2.5	10
P3	6	2.75	16.5
Sub-Total			35.5

Table 2. Summary of Survey effort per site on Saturday, 19 May 2018.

Survey Site	No. of Surveyors	Hours	Estimated Person Hours
1	4	4.75	19
2	8	6	48
3	9	6	54
4	11	5	55
5	9	4	36
6	10	4	40
7	23	1.5	34.5
Sub-Total			286.5

Table 3. Summary of Survey effort per site on Sunday, 20 May 2018.

Survey Site	No. of Surveyors	Hours	Estimated Person Hours
8	6	3.25	19.5
9	8	3	24
10	16	3	48
11	2	3	6
Sub-Total			97.5

### Results

The pre-survey of Lake Anna State Park was conducted Sunday, 6 May 2018. There were eight people in attendance and sites P1, P2 and P3 were surveyed. There were 51 individual animals of 20 species of herpetofauna (9 amphibians and 11 reptiles) recorded, including 5 new county records:

*Hemidactylum scutatum*, *Pseudacris feriarum*, *Coluber constrictor constrictor*, *Plestiodon inexpectatus*, and *Plestiodon laticeps*. On the Annual Spring Survey conducted on Saturday, 19 May and Sunday, 20 May 2018 there were 62 people in attendance and sites 1 to 11 were surveyed. There were 394 individual animals of 33

Table 4. Summary of the number of amphibians observed at each site.

Species/Site	P1	P2	P3	1	2	3	4	5	6	7	8	9	10	11	Total
<i>Acris crepitans</i>	8	2	10		3	6		5		1	5	7	8		55
<i>Ambystoma maculatum</i>	1														1
<i>Ambystoma opacum</i>	2		1		1						1	3	1		9
<i>Ambystoma sp.</i>												1			1
<i>Anaxyrus a. americanus</i>					2		3		4	10			1		20
<i>Anaxyrus fowleri</i>									1	1			1		3
<i>Desmognathus fuscus</i>											1		1		2
<i>Eurycea cirrigera</i>			5				1				3	2			11
<i>Hemidactylium scutatum</i>	2														2
<i>Hyla chrysoscelis</i>				1						100	6				107
<i>Hyla versicolor</i>										50	1				51
<i>Lithobates clamitans</i>			1	1		2				7	1				12
<i>Lithobates palustris</i>										2					2
<i>Lithobates sylvaticus</i>						1									1
<i>Notophthalmus v. viridescens</i>						2	2		1	3	2	1			11
<i>Plethodon cinereus</i>			3			6	7	1				2			19
<i>Plethodon cylindraceus</i>	2						1		1		1				5
<i>Pseudacris crucifer</i>				2	1				1						4
<i>Pseudacris feriarum</i>	2			1								4			7
<i>Pseudotriton r. ruber</i>							3				2			1	6
Total	17	2	20	5	7	17	17	6	8	174	23	20	12	1	329

Table 5. Summary of the number of reptiles observed at each site.

Species/Site	P1	P2	P3	1	2	3	4	5	6	7	8	9	10	11	Total
<i>Agkistrodon c. contortrix</i>														1	1
<i>Carphophis amoenus</i>		1	1	1	6	5	2	3	2		2	4	2		29
<i>Chelydra serpentina</i>										1	3				4
<i>Chrysemys p. picta</i>											2		1		3
<i>Clemmys guttata</i>													1		1
<i>Coluber c. constrictor</i>		1											2		3
<i>Diadophis punctatus edwardsii</i>							3		1						4
<i>Nerodia s. sipedon</i>						1				7			2		10
<i>Pantherophis alleghaniensi</i>														1	1
<i>Plestiodon sp.</i>					1				1		1	2	6		11
<i>Plestiodon fasciatus</i>	1					1	1							1	4
<i>Plestiodon inexpectatus</i>		1													1
<i>Plestiodon laticeps</i>		1											2		3
<i>Sceloporus undulatus</i>	1											3	1		5
<i>Scincella lateralis</i>		1													1
<i>Storeria occipitomaculat</i>		1			1		1								3
<i>Terrapene c. carolina</i>		1			2	3	2	2			4	2	8	3	27
<i>Thamnophis s. sauritus</i>													1		1
<i>Trachemys scripta elegans</i>										1	2				3
<i>Virginia v. valeriae</i>			1												1
Total	2	7	3	1	10	9	9	5	4	9	14	11	26	6	116

species of herpetofauna (17 amphibians and 16 reptiles) recorded, including 5 new county records: *Desmognathus fuscus*, *Lithobates sylvaticus*, *Pseudotriton ruber ruber*, *Thamnophis sauritus sauritus*, and *Trachemys scripta elegans*. Between both surveys, 445 individuals of 38 species of herpetofauna were recorded – 19 amphibians (Table 4) and 19 reptiles (Table 5).

### Annotated Checklist

**Note:** for the accounts below numbers in parentheses are animals accounted for at each site listed

#### Amphibians

1. *Acris crepitans* (Eastern Cricket Frog) Fifty-five *A. crepitans* were found across 10 survey sites. They were found either in or close to an aquatic habitat – on the bank of a seep, creek, or pond – at sites: P1 (8), 2 (3), 5 (5), 7 (1), 8 (5), 9 (7), and 10 (8). The remaining individuals were found in lowland habitats away from water at sites: P2 (2), P3 (10), and 3 (6).

2. *Ambystoma maculatum* (Spotted Salamander) One *A. maculatum* was found under a log in a woodland habitat at site P1.

3. *Ambystoma opacum* (Marbled Salamander) Ten *A. opacum* were found across six sites. They were found under logs in woodland habitats at sites P1 (2), P3 (1), 2 (1), 8 (1), and 9 (3). A single unidentified *Ambystoma spp.* was documented. It was found under a log at site 9 in a woodland habitat. It could likely be a Marbled Salamander due to three other individuals being found at site 9, but it was not verified when it was documented.

4. *Anaxyrus americanus americanus* (Eastern American Toad) There were 20 *A. a. americanus* found across 5 sites. At site 2 two individuals were found, one on the

ground in leaf litter and the other on a creek bank. At site 4 three individuals were found, one in a stump and the other two in close proximity to the stream. At site 7, 10 were heard calling around the vernal pools of the flooded beach area. At site 10 a single *A. a. americanus* was seen at the edge habitat of a power line cut and forest.

5. *Anaxyrus fowleri* (Fowler's Toad) There were three *A. fowleri* found across 3 sites: 6, 7, and 10. At sites 6 and 10 they were seen at edge habitats of open area and forest. At site 7 they were heard calling around the flooded beach vernal pool areas.

6. *Desmognathus fuscus* (Northern Dusky Salamander) There were two *D. fuscus* found at sites 8 and 10. Both individuals were found in a stream in a woodland habitat. This was the first time that *D. fuscus* had been verified in Spotsylvania County and this photo was submitted as a voucher (VHS Archives #208).



7. *Eurycea cirrigera* (Southern Two-lined Salamander) Eleven *E. cirrigera* were found across four sites. At sites P3 (3) and 8 (2), they were found in a seep or stream. At sites 4 (1) and 8 (2) there were found under a log away from water. An interesting note, on the pre-survey at site P3 over 80 eggs were guarded by 2 female *E. cirrigera* within 10 meters of each other.



8. *Hemidactylium scutatum* (Four-toed Salamander) Two *H. scutatum* were found at site P1. Both individuals were juveniles no longer than 5 cm (2 inches). One was found under a log in a woodland forest away from water and another was found in sphagnum moss near a vernal pool. This was the first time that the Four-toed Salamander had been documented in Spotsylvania County and a photo was entered into the archives (VHS Archives #209).



9. *Hyla chrysoscelis* (Cope's Gray Treefrog) The most abundant animal found during the survey was *H. chrysoscelis*; 107 individuals were found across three sites. Seven males were heard calling at sites 1 (1) and 8 (6) during the day in a wooded area near a body of water. An estimated 100 were heard calling and seen mating around the flooded areas of the beach at site 7.

10. *Hyla versicolor* (Gray Treefrog) Roughly 50 *H. versicolor* were found at site 7. All were congregated around flooded vernal pools along the beach calling, and some were in amplexus. An additional male was observed calling during the day at site 8 in a wooded area near a stream.

11. *Lithobates clamitans* (Green Frog) Twelve *L. clamitans* were found across 5 sites. They were found near a body of water at every site they were recorded: P3 (1), 1 (1), and 7 (6). Tadpoles of this species were also caught by net at sites 2 (2), 7 (1), and 8 (1).

12. *Lithobates palustris* (Pickerel Frog) Two *L. palustris* were found at site 7 at the water's edge of Old Pond.

13. *Lithobates sylvaticus* (Wood Frog) There was one young *L. sylvaticus* found at site 3. This individual was found in leaf litter near a vernal pool. This was the first time a Wood Frog has been documented in Spotsylvania County. A photo was submitted as a voucher (VHS Archives #210).



14. *Notophthalmus viridescens viridescens* (Red-Spotted Newt) Eleven *N. v. viridescens* were found across six sites. Six of the newts found were adults located in a stream at sites 6 (1), 7 (3), 8 (1), and 9 (1). The rest were the eft form found in leaf litter or under cover



objects in a woodland habitat at sites: 3 (2), 4 (2), and 8 (1).

15. *Plethodon cinereus* (Eastern Red-Backed Salamander) There were 19 *P. cinereus* found across five sites: P3 (3), 3 (6), 4 (7), 5 (1), and 9 (2) in woodland habitat under cover objects. One interesting specimen found at site 5 was on moss inside a discarded glass jar on the forest floor.

16. *Plethodon cylindraceus* (White-spotted Slimy Salamander) There were 5 *P. cylindraceus* found across four sites: P1 (2), 4 (1), 6 (1), and 8 (1) under logs in a woodland habitat. The two adults found at site P1 were a male and a female due to the presence and absence of a mental gland respectively.

17. *Pseudacris crucifer* (Spring Peeper) Four *P. crucifer* were found across three sites: 1 (2), 2 (1), and 6 (1). All sightings were auditory observations in the woods not necessarily near water.

18. *Pseudacris feriarum* (Upland Chorus Frog) Seven *P. feriarum* were found across three sites. At sites P1 (2) and 9 (4), they were observed under logs or in the leaf litter. At site 1 a single male was heard calling in a woodland habitat. This was the first time *P. feriarum* was verified in Spotsylvania County and a photo was entered into the database (VHS Archives #211) as a voucher.



19. *Pseudotriton ruber ruber* (Northern Red Salamander) There were six *P. r. ruber* found across three sites. At sites 4 (1) and 11 (1) the animals were adults found under a log away from water. At sites 4 (2) and 8 (2) they were found under cover objects next to or in the stream. One of the individuals found at site 8 was a larval specimen found under a rock. This was the first verified *P. r. ruber* in Spotsylvania County and a photo was submitted as a voucher (VHS Archives #214).



## Reptiles

20. *Agkistrodon contortrix* (Eastern Copperhead) One *A. contortrix* was found at site 11. It was found coiled next to a log out of the sun.

21. *Carphophis amoenus amoenus* (Eastern Wormsnake) The most abundant reptile was *C. a. amoenus*. Twenty-nine individuals were found across 11 sites. Twenty were found under a rock or a log at sites: P2 (1), P3 (1), 2 (3), 3 (4), 4 (2), 5 (1), 6 (2), 9 (4), and 10 (2). Two were under man-made litter at site 5. Individuals were found in a log at sites 2 (3) and 8 (2). At site 1, one was found on top of a log. At site 3 another was found dead in a stream with an injury to its tail.

22. *Chelydra serpentina* (Eastern Snapping Turtle) Four *C. serpentina* were found at sites 7 (1) and 8 (3). A young snapper was seen near one of the crayfish traps during the 19 May evening survey at site 7. Three snapping turtles were removed from the crayfish traps at site 8 on Sunday 20 May.

23. *Chrysemys picta picta* (Eastern Painted Turtle) Three *C. p. picta* were found at sites 8 (2) and 10 (1). One painted turtle was removed from the crayfish traps on Sunday 20 May and it had several leeches present on its body and a stained plastron from the tannic water. Another was found at site 8 basking by the rocks at the outfall of Old Pond. At site 10 a painted turtle was seen in the river.

24. *Coluber constrictor constrictor* (Northern Black Racer) Three *C. c. constrictor* were found at sites P2 (1) and 10 (2). At site P2 the racer was observed basking in leaf litter. At site 10, two were observed at the edge of forest habitat and the open area of power lines. This was the first time *C. c. constrictor* was found in Spotsylvania County and a photo was entered in the VHS archives as a voucher (VHS Archive #507 from site P2).



25. *Diadophis punctatus edwardsii* (Northern Ring-necked Snake) Four *D. p. edwardsii* were observed at sites 4 (3) and 6 (1). At site 4, one was found in a stump, the other two under a log. One of the individuals under the log was observed eating termite larvae. The lone individual at site 6 was under a log.

26. *Nerodia sipedon sipedon* (Northern Watersnake) Ten *N. s. sipedon* were found at sites P3 (1), 7 (7), and 10 (2). The individual found at P3 was a deceased juvenile with no obvious trauma. Six of the seven *N. s. sipedon* at site 7 were juveniles or sub-adults observed in the water near frogs that were calling. The remaining individual at site 7 was a large adult seen on the shore at the beginning of the night survey on 19 May. The two individuals seen at site 10 were adults in the water.

27. *Pantherophis alleghaniensis* (Eastern Ratsnake) A single *P. alleghaniensis* was found at site 11 in the forest.

28. *Plestiodon fasciatus* (Common Five-lined Skink) Four *P. fasciatus* were found across four different sites: P1, 3, 4, and 11. At sites 3 and 4 individuals were noted under the bark of a dead tree. At site 11 the lone individual was noted as being on a fallen log.

29. *Plestiodon inexpectatus* (Southeastern Five-lined Skink) A single *P. inexpectatus* was documented at site P2 under a rock. The tip of the tail was missing on this individual. This was the first verified *P. inexpectatus* in Spotsylvania County. A photo was entered into the VHS archives (#212) as a voucher.





30. *Plestiodon laticeps* (Broad-headed Skink) Three *P. laticeps* were documented at sites P2 (1) and 10 (2). The scalation on this large adult can be verified as a Broad-headed Skink and it's the first time it has been documented in Spotsylvania County. A photo was entered in the VHS archives (VHS Archive #213) as a voucher. It should be noted that 11 unidentified *Plestiodon spp.* were found across five sites: 2 (1), 6 (1), 8 (1), 9 (2), and 10 (6). Since the skinks could not be captured, scalation could not be counted and in turn the specific species could not be verified.



31. *Sceloporus undulatus* (Eastern Fence Lizard) There were five *S. undulatus* found, at sites P1 (1), 9 (3), and 10 (1). Across all of the sites *S. undulatus* were seen at edge habitats. At sites P1 and 9 they were noted to be basking.

32. *Scincella lateralis* (Little Brown Skink) A single *S. lateralis* was found at site P2 in a lowland habitat near the lake under bark.

33. *Storeria occipitomaculata* (Red-bellied Snake) Three *S. occipitomaculata* were found at sites P2, 2, and 4. At sites P2 and 2 they were found under logs. At site 4 *S. occipitomaculata* was observed on the ground near a stream.

34. *Terrapene carolina carolina* (Woodland Box Turtle) Twenty-seven *T. c. carolina* were found across 9 sites: P2 (1), 2 (2), 3 (3), 4 (2), 5 (2), 8 (4), 9 (2), 10 (8), and 11 (3). They were found in a variety of habitats. Twelve *T. c. carolina* were found in woodland habitats at sites P2 (1), 3 (3), 5 (1), 8 (3), 9 (1), and 11 (3). Notably a pair was seen mating at site 8 and a deceased individual was also found at site 8. Seven individuals were found in a field or edge habitat at sites 4 (1), 5 (1), and 10 (5). The individual found at site 5 was deceased. Four *T. c. carolina* were found in aquatic habitats such as a puddle, pond, or stream at sites 2 (2), 4 (1), and 8 (1). Four individuals were also observed on the road at sites 9 (1) and 10 (3). The Woodland Box Turtle is a VDGIF Tier IIIa species.

35. *Thamnophis saurita saurita* (Common Ribbonsnake) A single *T. s. saurita* was found at site 10. This is the first time *T. s. saurita* was documented in Spotsylvania County. The Common Ribbonsnake is a VDGIF Tier IVa species. A photo has been entered into the VHS archives (#215) as a voucher.



36. *Trachemys scripta elegans* (Red-Eared Slider) Three non-native *T. s. elegans* were found between sites 7 (1) and 8 (2). The one found at site 7 was a deceased juvenile on the edge of a vernal pool on the beach. This is the first time this invasive species has been documented in Spotsylvania County and a photograph was submitted as a voucher (VHS Archive #216).



37. *Virginia valeriae valeriae* (Eastern Smooth Earthsnake) A single *V. v. valeriae* was documented at site P3 under a 2 x 4 board in woodland habitat.

### Discussion

Lake Anna State Park was selected as a survey location due to the different types of habitats available such as aquatic (lakes, ponds, vernal pools, and streams), woodland habitat, edge habitat, and open fields. Spotsylvania County, where Lake Anna State Park is located, had not previously been surveyed by the Virginia Herpetological Society. Prior to this survey Spotsylvania County had 37 documented species of herpetofauna. After the completion of the Spring Survey, Spotsylvania County now has 47 species as a result of the 10 new records documented. There are still many outstanding species that are likely to be found in the county - 17 if all are eventually documented. The remaining 17 species of herpetofauna that are expected to be found in Spotsylvania County will be discussed in detail below.

There are three anurans expected to be found at Lake Anna State Park, but were not documented. *Gastrophryne carolinensis* (Eastern Narrow-mouthed Toad) is likely in Spotsylvania County. It has been found to the southeast in Caroline County and to the south in Hanover County. It is also expected in Louisa County to the southwest (VHS database). There was ample habitat for this species, such as shelter objects like logs and rocks and moist soil to burrow into and bodies of water to breed in (Beane et al, 2010). *Lithobates catesbeianus* (American Bullfrog) and *Lithobates sphenoccephalus* (Coastal Plains Leopard Frog) are also likely in Spotsylvania County. They have been or are likely found in all the surrounding counties (VHS database). Their preferred habitat is wetland environments (Mitchell

and Gibbons, 2010) which are plentiful within several survey sites at Lake Anna. Venturing into other wetland areas in the park or conducting nighttime frog call surveys across several sites could help locate these additional species.

There are three species of salamanders that were thought to be found on this survey: *Siren lacertina* (Greater Siren), *Siren intermedia intermedia* (Eastern Lesser Siren), and *Pseudotriton montanus montanus* (Eastern Mud Salamander). *Siren lacertina* is thought to be likely found in Spotsylvania and is found just over the border in nearby Caroline County and thought to be found in Stafford County to the northeast (VHS database). Although *S. i. intermedia* is found in neighboring Caroline and Hanover Counties to the southeast, it is thought to be possible but not likely in Spotsylvania (VHS database). There is plenty of slow-moving water habitat that is preferred by both species (Mitchell and Gibbons, 2010) within Lake Anna. More turtle traps should be set in smaller wetland areas to have better success finding them. *Pseudotriton m. montanus* is found Caroline and Hanover to the southeast and Stafford to the northeast. There were plenty of slow-moving streams with decaying vegetation, which is their preferred habitat (Petranka, 1998) across sites 2, 3, 8, and 9.

Seven species of snakes were expected to be found in Spotsylvania County: *Cemophora coccinea copei* (Northern Scarletsnake), *Farancia erytrogramma erytrogramma* (Common Rainbowsnake), *Heterodon platirhinos* (Eastern Hog-Nosed Snake), *Lampropeltis triangulum* (Eastern Milksnake), *Opheodrys aestivus* (Rough Greensnake), *Pantherophis guttatus* (Red Cornsnake), and *Regina septemvittata* (Queensnake). *Cemophora coccinea copei* is found in Hanover County to the south (VHS database) and is likely in Stafford County to the north (VaFWIS database). *Farancia e.*

*erytrogramma* is found in Caroline County to the southeast (VHS database). *Heterodon platirhinos* is found in almost all the surrounding counties including: Stafford, Caroline, Hanover, Louisa, and Culpepper Counties (VHS database). *Lampropeltis triangulum* is considered likely in Spotsylvania (VaFWIS database) and many of the counties surrounding Spotsylvania, but has only been documented in Fauquier County to the north (VHS database). *Pantherophis guttatus* has been documented in Caroline, Hanover, Louisa, Orange Counties (VHS database) and is likely in Culpeper and Stafford Counties to the north (VaFWIS database). *Opheodrys aestivus* is found in all of the counties surrounding Spotsylvania: Stafford, Caroline, Hanover, Louisa, Orange, and Culpepper Counties (VHS database) and is likely in Spotsylvania (VaFWIS database). *Regina septemvittata* is found in Caroline and Hanover Counties to the southeast and Culpeper and Stafford to the north (VHS database). There are ample aquatic habitats such as streams, vernal pools, and marshy areas that would attract both *F. e. erytrogramma* and *R. septemvittata* (Linzey and Clifford, 1981) at sites 2, 3, 8, and 9. For the remaining five snakes likely found in Spotsylvania County (*C. c. copei*, *H. platirhinos*, *L. triangulum*, *O. aestivus*, *P. guttatus*, and *R. septemvittata*) there is potential habitat at almost all of the sites on the survey. The five aforementioned snakes prefer cover objects such as rocks and logs and forested habitat (Linzey and Clifford, 1981). There was also edge habitat where snakes like *H. platirhinos*, *L. triangulum*, *O. aestivus* and *P. guttatus* could be able to bask. Another way to go about sampling for these species is putting out cover-boards beforehand to try to document these sometimes hard to find species. This is something the VHS should discuss with landowners and park managers in advance of future surveys to find more snake species.

There is one species of lizard that was expected to be found in Spotsylvania County that was not; *Aspidoscelis sexlineata sexlineata* (Eastern Six-lined Racerunner). *Aspidoscelis s. sexlineata* is found in three counties to the south of Spotsylvania: Caroline, Hanover, and Louisa (VHS database). Although they are not as commonly found in the Piedmont when compared to the Coastal Plain, their preferred habitat is sandy soil with lots of grass that enables them to hide when encountered by predators (Beane et al., 2010). These lizards could be expected in the loamy, grassy habitats at sites 5 and 6 and potentially in the open, edge habitat of site 10.

Three turtles that were not encountered on this survey, but are thought to be in Spotsylvania County are: *Clemmys guttata* (Spotted Turtle), *Kinosternon subrubrum subrubrum* (Southeastern Mud Turtle), and *Pseudemys concinna concinna* (Eastern River Cooter). *Clemmys guttata* is found in Stafford County to the northeast and Hanover and Louisa Counties to the south. *Kinosternon s. subrubrum* is found in four counties surrounding Spotsylvania: Stafford, Caroline, Hanover, and Louisa (VHS database). Both *C. guttata* and *K. s. subrubrum* prefer slower-moving bodies of water such as creeks, marshes, and ponds (Beane et al., 2010) which was present at sites 3, 7, and 8. *Pseudemys c. concinna* is found in Stafford County to the northeast and is likely in Caroline, Hanover, and Louisa Counties. Typical habitat for this species includes large ponds and lakes with areas for basking (Beane et al., 2010) which are present at sites 1, 6, 7, and 8.

Additional surveys of Lake Anna State Park and working with park staff to take additional steps may uncover more species that have yet to be documented. Different actions could be taken to help uncover the remaining 17 species of herpetofauna in Spotsylvania

County such as: placing coverboards in ideal locations could help unveil some additional snakes in the park; setting more aquatic hoop traps in different bodies of water could help uncover turtles and salamanders that weren't documented; and conducting nighttime frog call surveys during different times of the year could help uncover frogs that haven't been documented yet.

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