

Survey of the Shenandoah River State Park

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Introduction

The Andy Guest/Shenandoah River State Park is named for Andy Guest, a state delegate representing Warren County for 28 years (1971-1999) who championed land and wildlife conservation. The Park consists of 650 hectares, all but 60 are forested with 9 km of riverfront along the South Fork of the Shenandoah River. The Park opened in May 1999. The terrain is a combination of low floodplains, rolling hills and mountains. There are scenic views of Massanutten Mountain to the west and Shenandoah National Park to the east. The Park lies in Warren County 12 kilometers south of Front Royal and 24 kilometers north of Luray, off Route 340 in Bentonville. There are 17 trails for a combined 38 km of interconnecting trails. The Virginia Herpetological Society had done little work in Warren County, so this survey added valuable information to our understanding of the herpetofauna of the county.

Methods and Materials

The Shenandoah River State Park was surveyed on 19-20 May 2012 by the Virginia Herpetological Society as part of the Spring Meeting. We had almost 50 volunteers come out to survey the park for amphibians and reptiles. On both days of the survey, groups performed visual surveys along various trails running through the park, searching the ground, under rocks and logs, listening for vocalizing anurans, and dip netting for aquatic amphibians. Several turtle hoop traps were set in the Shenandoah River and oxbow ponds in the floodplain. Animals that were hand captured were inspected for disease and parasites. Team leaders recorded the numbers and microhabitat where each species was found.

Study Sites:

Site 1. Cottonwood Trail

The Cottonwood Trail, located in the northeastern part of the park, was a raised boardwalk up to a meter above the ground, running in the floodplain of the Shenandoah River. It was characterized by an open habitat dominated by herbaceous plants including jewelweed, poison ivy and grasses. There were occasional marshy areas and depressions filled with shallow water.

Site 2. Wildcat Ledge Trail

The Wildcat Ledge Trail, located in the northeastern part of the park, ran through a dry upland mixed hardwood forest. Dominant trees included chestnut oak, hickory and a few pines. The understory was sparse, mostly consisting of blueberry bushes. The trail ascended Wildcat Ledge, accompanying an increase in elevation to a lookout area at the northeastern end of the park.

Site 3. Point Trail

Point Trail ran through dry upland hardwood forest dominated with oak, hickory, locust and maple in the eastern part of the park. The trail wound through hills and ravines. It crossed several streams, only one had water at the time of the survey. There was little understory.

Site 4. Allen's Mountain Trail

West of Point Trail is Allen's Mountain Trail, which ran through dry upland hardwood forest. It goes to the highest point in the Park, on Allen's Mountain. There was a stream crossed by the trail.

Site 5. Bluebell Trail

The Bluebell Trail ran along the floodplain of the Shenandoah River. It included a shallow oxbow pond about 50 meters from the river where turtle hoop traps were set. The trail was surrounded by hardwoods, mostly box elder. There were some low wet areas, but no deep pools. The elevation increased on the side of the trail opposite from the river where there were some areas of large flat shale. The trail led to the campground, where the habitat was open. There was an area of rip rap between culverts at the trail and the campground. There were open grassy areas between campsites, more rip rap, and a small pool of water at a culvert that ran under the campground road.

Site 6. Hemlock Hollow, Campground and Overlook Trails

These trails ran along the slope just above the floodplain of the Shenandoah River through mixed hardwood, mostly oak, and pine forest. These forest habitats did not have as much understory as the floodplain forest habitat. These trails led from the campground to the overlook, then to the Visitor Center and the picnic area parking lots. There was a stream in the forest habitat that the Campground trail went through (between the campground and the overlook). Habitat at the Visitor Center included the open area in front of the center where a small fish pond and flowing stream had been constructed. Some native plants had been planted around the stream.

Site 7. Bear Bottom Loop Trail

In the southwestern part of the park, the Bear Bottom Loop Trail ran through rolling hills containing a hardwood forest. Oak, hickory, maple and tulip trees were present. The understory was spotty in distribution and included raspberry, blueberry, cedars and grapevine. There were several streams which we followed from the trail down to the Shenandoah River.

Site 8. River Trail

The River Trail followed the Shenandoah River at the southwestern end of the park. It included a tree line composed of oak, tulip, and pines. The river banks were steep and overgrown with weeds, shrubs and high grass. River access was difficult in most locations. An oxbow pond in the river's floodplain was also present.

Site 9. Culler's Trail

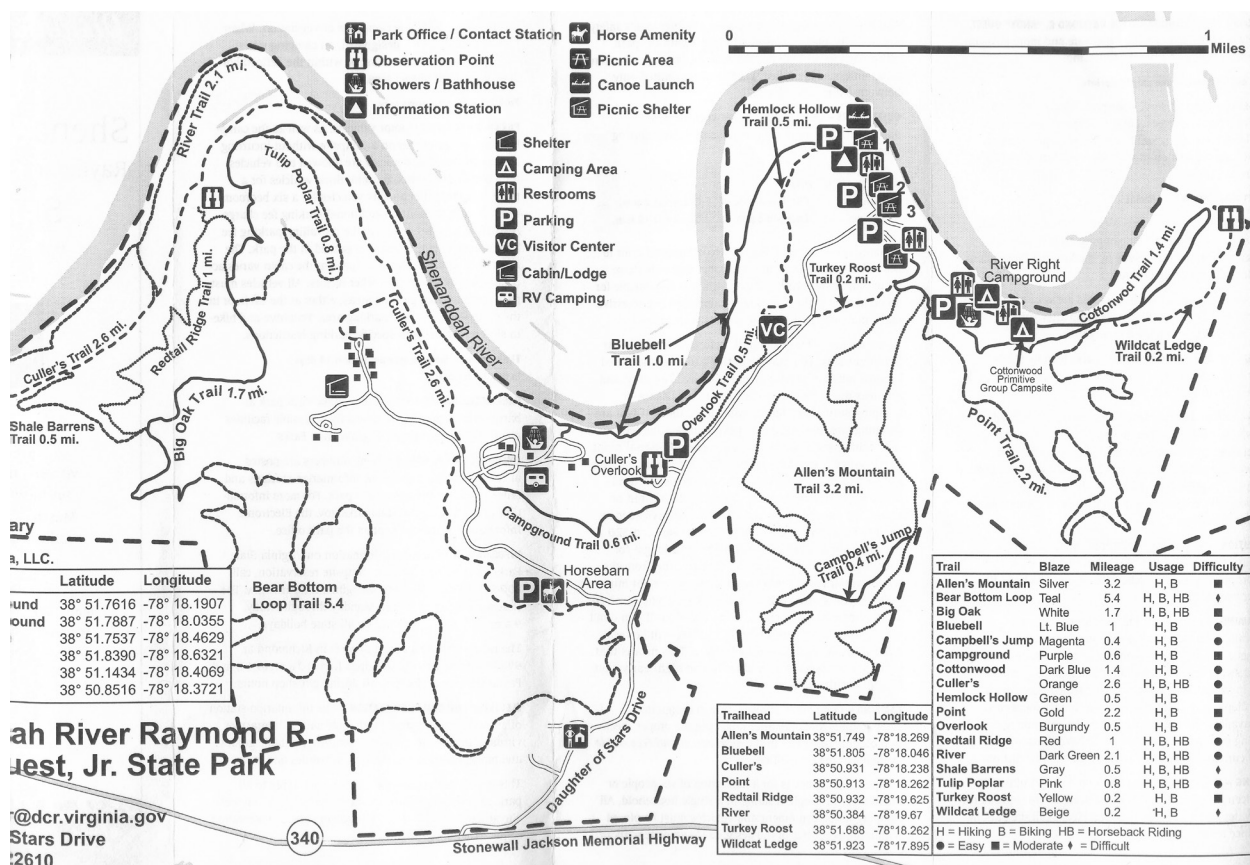
Culler's Trail ran between a hillside and upland of mixed hardwood/ pine forest and a large meadow with high grasses. Dominant hillside trees included oak, pine, hickory and tulip.

Shenandoah River State Park Survey

Site 10. Shale Barrens Trail

The Shale Barrens Trail ran through dry upland hardwood forests. This trail wound around a ridge that cut through shale deposits on a steep hillside. The soil was thin and the exposed shale deposits made for an arid habitat.

Figure 1. Map of the Shenandoah River State Park Trails (taken from the State Park brochure).



Results

Previous to our survey, there had been 41 species of amphibians and reptiles reported for Warren County (VADGIF FWIS Database). This included 9 anurans, 13 salamanders, 2 lizards, 5 turtles and 12 snake species. There were 16 species of amphibians observed at the VHS survey of Shenandoah River State Park, including 7 species of anurans and 9 species of salamanders. There were 18 species of reptiles observed, including 3 species of lizards, four species of turtles, and eleven species of snakes. Altogether, we found 31 (Table 1) of the previously reported 41 species, or 73% of the known species, which makes this one of the most successful VHS surveys. We also added three species to the known herpetofauna (*Ambystoma opacum*, *Plestiodon laticeps* and *Regina septemvittata*) of the county. Interestingly, others had discovered records for Warren County (*C. amoenus* and *P. rubiventris*) just prior to our survey (Milner, 2011; Saik, 2012).

Table 1. Amphibians and Reptiles of Shenandoah River State Park. * = County Records.

Amphibians/Site	1	2	3	4	5	6	7	8	9	10	Total
Anurans											
<i>Anaxyrus americanus</i>	1			1		1				1	4
<i>Anaxyrus fowleri</i>			1		1	3	1		1		7
<i>Hyla versicolor</i>	1	1					2		1		5
<i>Lithobates catesbeianus</i>						2					2
<i>Lithobates clamitans</i>						7	2				9
<i>Lithobates palustris</i>							2				2
<i>Pseudacris crucifer</i>	1										1
Salamanders											
<i>Ambystoma maculatum</i>					1						1
<i>Ambystoma opacum</i> *		1									1
<i>Desmognathus fuscus</i>			5	4			3				12
<i>Eurycea bislineata</i>			1				2				3
<i>Eurycea longicauda</i>							6				6
<i>Notopthalmus viridescens</i>		2									2
<i>Plethodon cinereus</i>	1		5	5	23	1	19		11	1	66
<i>Plethodon cylindraceus</i>							1				1
<i>Pseudotriton ruber</i>							1				1
Reptiles											
Lizards											
<i>Plestiodon fasciatus</i>		2	2		3		3		9	3	22
<i>Plestiodon laticeps</i> *			1							1	2
<i>Sceloporus undulatus</i>	1	6	4	2	7		8		2	11	41
Turtles											
<i>Chelydra serpentina</i>					2						2
<i>Chrysemys picta</i>					2	1		1	1		5
<i>Pseudemys rubiventris</i>								2	1		3
<i>Terrapene carolina</i>	1		1	3	1		5		1		12
Snakes											
<i>Agkistrodon contortrix</i>							1		2		3
<i>Carphophis amoenus</i>		4	5	2	7	7	6		1	2	34
<i>Coluber constrictor</i>									3		3
<i>Diadophis punctatus</i>		3					10		1	2	16
<i>Lampropeltis triangulum</i>									1		1
<i>Nerodia sipedon</i>					2		1	1			4
<i>Opheodrys aestivus</i>							1				1

Shenandoah River State Park Survey

<i>Pantherophis alleghaniensis</i>	2						1		1		4
<i>Pantherophis guttatus</i>									2		2
<i>Regina septemvittata</i> *							1				1
<i>Thamnophis sirtalis</i>		1									1
Total	8	21	24	17	49	22	76	4	39	21	281

Annotated Species List:

(Numbers in parenthesis are the sites where individuals were observed.)

Anurans

Anaxyrus americanus (American Toad) (1, 4, 6, 10)

American Toads were found at several sites. Most were out in the open foraging on the forest floor.

Anaxyrus fowleri (Fowler's Toad) (3, 5, 6, 7, 9)

Fowler's Toads were observed at several sites. Some were out foraging on the forest floor. Others were secluded under rocks, logs and boards.

Hyla versicolor (Gray Treefrog) (1, 2, 7, 9)

Gray Treefrogs were heard calling at several sites. The calls allowed identification as *Hyla versicolor* rather than *H. chrysoscelis*.

Lithobates catesbeianus (American Bullfrog) (6)

Bullfrogs were observed in the man-made stream at the Visitor's Center.

Lithobates clamitans (Northern Green Frog) (6, 7)

Green Frogs were observed along streams at Site 7, and along the man-made stream at the Visitor's Center at Site 6. Males were calling both by day and at night at the Visitor's Center.

Lithobates palustris (Pickerel Frog) (7)

Pickerel Frogs were found along streams at Site 7 only.

Pseudacris crucifer (Spring Peeper) (1)

A larval Spring Peeper was found in a vernal pond along the Cottonwood Trail on the north end of the Park.

Salamanders:

Ambystoma maculatum (Spotted Salamander) (5)

A single adult Spotted Salamander was found under a log in a wetland at the edge of the Shenandoah River.

Ambystoma opacum (Marbled Salamander) (2)

An adult female was found under a log at N38° 52' 07.2" W78° 17' 47.9". The salamander was photographed and a digital voucher of this new county record deposited in the VHS Archive (#238).

Desmognathus fuscus (Northern Dusky Salamander) (3, 4, 7)

Dusky Salamanders were found under rocks along streams at several sites. They were found most typically in wet seeps.

Eurycea bislineata (Northern Two-lined Salamander) (3, 7)

An adult Two-lined Salamander was found under a log beside the Point Trail. Two adults were found under rocks along a stream bed near the Bear Bottom Loop Trail.

Eurycea longicauda (Long-tailed Salamander) (7)

Long-tailed Salamanders were found under leaf litter, rocks, and logs along streams at Site 7.

Notophthalmus viridescens (Red-spotted Newt) (2)

A red eft was found under a log beside the Wildcat Ledge Trail.

Plethodon cinereus (Red-backed Salamander) (1, 3, 4, 5, 6, 7, 9, 10)

Red-backed Salamanders were found in as many of the different survey sites as any species observed during the survey, and was the most frequently observed salamander, total numbers found exceeding all the other salamander species combined (Table 1). They were found primarily under logs, but also under the bark of fallen logs and under rocks on the forest floor. They were more prevalent in the ravines where moisture was higher. Most specimens' colors were red-backed, but there were a few "lead-backed" color phases found as well.

Plethodon cylindraceus (White-spotted Slimy Salamander) (7)

A Slimy Salamander was found under debris in a junk pile in the woods.

Pseudotriton ruber (Northern Red Salamander) (7)

The only Red Salamander found was an adult under the bark of a log.

Reptiles:

Lizards:

Plestiodon fasciatus (Common Five-lined Skink) (2, 3, 5, 7, 9, 10)

Five-lined Skinks were found at many sites in the Park. Many were on fallen logs and wood piles; one was under a roll of garden fabric.

Plestiodon laticeps (Broad-headed Skink) (2, 10)

Broad-headed Skinks were observed on standing trees. To confirm the identity from scale counts, an adult male was photographed with a telephoto lens. Digital Photographs were deposited in the VHS Archive (#239) as a voucher of this new county record. The specimen from site 10 was captured and a scale count made directly from the specimen.

Shenandoah River State Park Survey

Sceloporus undulatus (Eastern Fence Lizard) (1, 2, 3, 4, 5, 7, 9, 10)

Most Fence Lizards were observed basking on trees, although some were foraging on the forest floor or fallen logs, and then retreated up trees when approached. A juvenile was found with a tick attached to its head.

Turtles:

Chelydra serpentina (Eastern Snapping Turtle) (5)

An adult Snapping Turtle was caught in a hoop trap set in one of the Oxbow ponds beside the Shenandoah River along the Bluebell Trail. A juvenile was found in a small stream along the Trail.

Chrysemys picta (Eastern Painted Turtle) (5, 6, 8, 9)

Painted Turtles were observed at several locations in the Shenandoah River and its Oxbow ponds, both swimming and basking. Two adult females were caught in a hoop trap set in one of the Oxbow ponds along the Shenandoah River. A juvenile was found in the man-made stream of the Visitor's Center.

Pseudemys rubiventris (Northern Red-bellied Cooter) (8, 9)

Red-bellied Cooters were observed basking on logs in the Oxbows along the Shenandoah River, and one was captured in fresh cut grass near Culler's Trail.

Terrapene carolina (Eastern Box Turtle) (1, 3, 4, 5, 7, 9)

Box Turtles were found at several sites foraging on the forest floor. One female had fly larvae on either side of her neck.

Snakes:

Agkistrodon contortrix (Northern Copperhead) (7, 9)

Copperheads were found at two sites during the survey. One was found near the Bear Bottom Trail, basking in a leaf pile beside a log pile. One was under the same rock as a Cornsnake along Culler's Trail. Another was at the base of a rock at the forest edge.

Carphophis amoenus (Eastern Wormsnake) (2, 3, 4, 5, 6, 7, 9, 10)

Worm Snakes were found under logs and rocks, and inside decaying logs on the forest floor. They were observed at 8 of the 10 Sites. This was the most frequently observed snake, both from the standpoint of numbers of individuals observed and the number of sites where the species was found (Table 1).

Coluber constrictor (Northern Black Racer) (9)

Black Racers were observed in a grassy area beside Culler's Trail, on a rocky hillside and a rocky ledge. A juvenile and two adults were seen, one of the adults was nearly ready to shed.

Diadophis punctatus edwardsii (Northern Ring-necked Snake) (2, 7, 9, 10)

Ring-necked Snakes were found under logs, rocks, and the bark of fallen logs on the forest floor. There were four subadults found under the bark of the same log at Site 7.

Lampropeltis triangulum (Eastern Milksnake) (9)

An adult Eastern Milksnake was found under a rock. It had four areas of damage to its body with several old scars.

Nerodia sipedon (Common Watersnake) (5, 7, 8)

Watersnakes were observed at several localities along the Shenandoah and its Oxbow ponds. Juveniles were found coiled under rocks and basking beside streams. Adults were found in a rock pile around a culvert between the campground and the river.

Opheodrys aestivus (Rough Greensnake) (7)

A Rough green snake was found moving on the leaf litter of the forest floor just north of the Bear Bottom Loop Trail.

Pantherophis alleghaniensis (Eastern Ratsnake) (1, 7, 9)

Eastern Ratsnakes were observed at several locations in the Park. A subadult was observed in the hollow of a log. A subadult was caught basking on a branch along the Cottonwood Trail. An adult was observed on a tree branch in the Picnic area of the Campground.

Pantherophis guttatus (Red Cornsnake) (9)

Cornsnakes were observed near Culler's Trail. One was under the same rock as a copperhead, the other was coiled in a shaded area near the edge of the forest.

Regina septemvittata (Queensnake) (7)

A juvenile Queensnake was found under a rock along a stream at Site 7.

Thamnophis sirtalis (Eastern Gartersnake) (2)

A large adult was captured while it was basking in a grassy area behind a wood pile at a campground.

Discussion

The Shenandoah River State Park VHS survey was one of the most successful if measured by finding the species known to be present in the county. Thirty-one of the forty-one species (73%) known to be in Warren County were observed in the park (VADGIF FWIS Database). This is a high number for a two day survey. This could be in part due to a low number of species found in Warren County. Warren County lacks the high number of anurans found in the southeastern part of Virginia, nor the large number of endemic salamanders found in the southwest. The majority of species documented for the county are those which are widespread and common in Virginia.

Frogs species not found on the survey but were expected, are *Acris crepitans* and *Lithobates sylvaticus* (VADGIF FWIS Database). Wood frogs are fairly sparse in habitats where they are found, so documenting their presence can be harder than other ranids. It was also outside their February/March breeding season (Martoff et al., 1980), therefore aural surveys would not be able to detect the Wood Frog. *Hyla versicolor* was documented only on the basis of their call and were

Shenandoah River State Park Survey

never seen. The Cricket Frog is not common in north central Virginia. There are few records in Mitchell and Reay (1999) and only one entry in the state database, from very northern Warren County, at the opposite end of the county from our survey. It is likely they are not present in the park.

The species of salamanders we did not document are *Ambystoma jeffersonianum*, *Desmognathus monticola*, *Eurycea guttolineata*, and *Gyrinophilus porphyriticus* (VADGIF FWIS Database). The Jefferson Salamander is hard to find, except adults during the breeding season, and larvae during the summer. They were only recently documented for the park and the county (Widmer, 2011). The Seal Salamander is relatively common where found. In Warren County, the VADGIF FWIS database has only five entries, all near or east of Front Royal. This survey was farther south of that part of the county. It is possible, although unlikely, they are not present in the southern part of the county. The Long-tailed and Three-lined Salamanders are rarely sympatric (Carlin, 1997). We found the Long-tailed Salamander, making it unlikely the Three-lined Salamander would be found in the same area. There is in fact only a single record of the Three-lined Salamander for Warren County. It was reported from farther north, just south of Front Royal. It is unlikely the Three-lined Salamander is present in the park. The Spring Salamander is widely spread throughout the mountains of western Virginia. They are more common in the southern and central parts of the state (Mitchell and Reay, 1999). In Warren County, there is only a single record of the Spring Salamander, from farther north near Front Royal. During our survey, many of the temporary streams in the park were dry, making it likely that if Spring Salamanders were present, they were underground. If they are present in the park, they are not common and it would be easy to miss them.

We did document the presence of *Ambystoma opacum*, the Marbled Salamander. A single adult was found under a log along the Wildcat Ledge Trail. There are very few records in Mitchell and Reay (1999) for the northwest part of Virginia. There are a number of records in the Virginia DGIF FWIS database for the west and northern part of Page County, just to the south of Warren. It is likely there is at least a presence in northwest Virginia and additional finds could be sought in surrounding counties.

Only two lizards, the Common Five-lined Skink and the Eastern Fence Lizard were documented for Warren County (Mitchell and Reay, 1999; VADGIF FWIS Database). We found both species and *Plestiodon laticeps*, the Broad-headed Skink as well. Broad-headed Skinks were seen along the Wildcat Ridge Trail where one was photographed with a telephoto lens to get a good scale count for positive identification, and the Shale Barrens Trail where the animal was captured. The Broad-headed Skink is probably not uncommon in the park, but hard to identify because of their similarity to the Common Five-lined Skink and their propensity to escape capture and positive identification by retreating up trees.

There were five turtles documented for Warren County. We found four of these but not *Glyptemys insculpta*, the Wood Turtle. Given the rarity of Wood Turtles in northern Virginia, and their elusive nature, it is not surprising we missed this observation.

There are 12 species of snakes documented for Warren County (VADGIF FWIS database). We found nine of these plus the Queen Snake. A juvenile Queen Snake was found under a rock along a stream near the Bear Bottom Loop Trail and represents a new record for Warren County. Queen Snakes are found scattered throughout northern Virginia with records in several counties surrounding Warren (Mitchell and Reay, 1999), so this find is not unexpected. We did not find *Crotalus horridus*, *Heterodon platirhinos* or *Lampropeltis getula*. These species have been found in Warren County and probably occur within the Shenandoah River State Park, but like most snakes are not common and can be difficult to locate. An interesting note is that one of the northern copperheads found (site #9) was resting under a rock with a red cornsnake. Although it is known that copperheads den with other snakes such as timber rattlesnakes and rat snakes (Ernst, 1992; Gloyd and Conant, 1990; and Drda, 1968), it is rare to see them sharing refugia outside the hibernacula with other species. As snakes leave the hibernacula, different species may be found close together near the hibernacula, however this may be the first recorded account of a copperhead and a red cornsnake sharing a hiding space.

The Shenandoah River State Park is a beautiful park located in the mountains of northern Virginia. It has lovely forested hills overlooking scenic valleys and crossed by extensive hiking trails. The Visitor's Center has a stream and nice displays which seek to educate the public on the benefits of natural areas. Given that the majority of the County's herpetofauna occurs within the park boundaries, it is also in a unique position to preserve these species, so the public will be able to observe, photograph and enjoy them for decades to come. The new distribution records reported by this survey, plus those recent published in *Catesbeiana* (Widmer et al., 2011; Milner, 2012; and Saik, 2012) indicate that it is likely there are additional species that are left to be documented for Warren County. We encourage others to keep looking and report any new distribution records. The work in Warren County is not yet finished.

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Shenandoah River State Park Survey

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Ambystoma opacum
from Shenandoah
River State Park