#### **Results of the Survey of Pocahontas State Park**

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#### Introduction

The Annual Survey and business meeting of the Virginia Herpetological Society was held on 20 - 22 May 2011, at Pocahontas State Park. The Park had numerous advantages for a VHS survey. At nearly 3,237 ha (8,000 ac), the park is the largest Virginia State Park and has been in a state of conservation since it was first purchased in 1934, which is nearly 8 decades. The park is situated at the interface of the Piedmont and Coastal Plain physiographic regions, potentially providing a greater species richness from the combination of different habitats.

Located in the County of Chesterfield, the Park is located just 32 km (20 miles) from the state capitol in Richmond. This location also filled in a large gap of areas in Virginia that had not been previously surveyed by the VHS. In addition, a BioBlitz was conducted by the Virginia Natural History Society at the park in 2002, but the results were never published. This report will serve to provide the results of the VHS survey, and also compile the data from the 2002 BioBlitz and the Park's records for reptiles and amphibians.

The 2011 survey coincided with the 75th anniversary of the Virginia State Park's inception. Conducting the annual survey of Virginia's largest state park helped promote the Virginia State Parks.

#### **Study Sites**

Vegetation types are provided by Pocahontas State Park GIS. All sites contained approximately 100 feet in elevations, from 150 feet to 250 feet.

Site 1: 37.38478, -77.58293

This site was reserved for children and their chaperones because of the relatively easy and welltraveled trails that went around Beaver Lake. This is a popular trail that is used often, and it is near the main park road. Topography slopes steeply towards the lake. There are 3 to 4 streams that the trail crosses, including Third Branch Creek and its floodplain that is the main feed from the west into Beaver Lake. Vegetation is mixed upland hardwoods to the south of Beaver Lake, and pine hardwood to the north.

Site 2: 37.38427, -77.58552

This site included the trail following the south side of Beaver Lake and the surrounding forest. The vegetation was upland hardwood forest. Site 3: 37.38671, -77.58489

This site consisted of the trail along the north side of Beaver Lake and the surrounding mixed pine hardwood forest. One major spring and a small stream flowing from the spring were found adjacent to the walking trail.

Site 4: 37.38890, -77.57320

This site was ideal for those wanting to get deeper into the woods and farther away from human traffic and was centered to the north of Swift Creek Lake and followed loosely Hawkins Road and Loop Road. Approximately 4 streams were encountered in the site. Approximately 70 ha (175 ac) was covered by the groups surveying the site. Due to the large area surveyed, multiple vegetation types were encountered including mixed upland and bottomland hardwoods, and stands of loblolly pine and stands of other types of pine. These vegetation types were not clustered in large groupings, rather they were arranged in striations that the groups crossed frequently. Topography encountered including deep ravines with streams, and sharp slopes leading to Swift Creek Lake.

Site 5: 37.38320, -77.53968

The site was centered around a cluster of rental cabins at the eastern side of the park along the Swift Creek Group Camp Road. The group also investigated the area east beyond the Swift Creek Lake spillway and along Fendley Station Trail. Two main streams were encountered, including the streams draining Swift Creek Lake. Approximately 21 m (70 ft) of topography was encountered in this area. The vegetation was limited to mostly loblolly pine with a smaller area of mixed upland hardwoods.

Site 6: 37.38300, -77.56280

This site's western boundary was the Algonquian Forest Trail, and the site continued north towards Swift Creek Lake and followed the Lakeview Mountain Bike Trail. There were approximately 3 to 4 ravines draining north towards Swift Creek Lake. Vegetation included pine, hardwoods, mixed upland hardwoods, and small stands of loblolly pine,

Site 7: 37.37920, -77.57510

This site was based around the campground where many of the survey attendees were lodged, therefore opportunistic encounters were documented. The campgrounds are situated south of Swift Creek Lake, and between the main park road to the west, and the Algonquian Camp Road to the east. No streams are documented for this site. Vegetation types include mixed upland hardwoods to the east, and pine and hardwood to the west.

Site 8: 37.39060, -77.58250

This site was based around the Box Turtle Mountain Bike Trail that is located north of the

Crostic Forest Trail and the south of Swift Creek which feeds into Swift Creek Lake to the east. The Mountain Bike Trail forms a dense network of regularly traveled trails that lead the group towards Swift Creek and its large floodplain swamp. Several small streams were encountered, and the vegetation consisted entirely of mixed upland hardwoods where the trail occurs, and bottomland hardwoods associated with the Swift Creek floodplain.

Turtle Traps site: 37.38518, -77.58360

Turtle hoop traps were placed along the eastern shore of Beaver Lake. There were limited habitats available for the ideal placement of turtle hoop traps, and this site was the only habitat that met the practical requirements such as shallow enough water to keep a portion of the traps above water, but deep enough to submerge the openings for turtle entry. The site consisted of emergent vegetation and pine hardwoods at the shore.

### **Materials and Methods**

Surveyors utilized usual collecting techniques including visual observation, listening for calling anurans, overturning cover objects, hand capture, and dipnetting. All captured animals were given a visual inspection to identify any malformations, disease or injuries. Digital photos were taken of any species considered county records or with injuries or disease. Group leaders were required to record all relevant data on data sheets. Animals were then released at the site of capture. Seven hoop turtle traps were deployed at the turtle trap site, near site one. These traps were baited with canned sardines. Table 1 indicates how much survey time was spent at each survey site.

	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Turtle Traps
No. Hoop Traps set									7
No. Surveyors	15	8	20	13	5	11	8	12	
Hours Surveyed	3	4	6	6	7	4.5	1	3	
Person Hrs. Survey Effort	45	32	120	78	35	49.5	8	36	

Table 1: The amount of survey effort per research site.

### Results

A total of 16 amphibians (nine anurans and seven salamanders) and 21 reptiles (four turtles, four lizards and 13 snakes) were observed during the survey time period. All the survey teams combined collected 455 total animals. There were no county records or invasive species found at the park. Table 2 summarizes the species and the number of animals captured at each survey site.

Sites	1	2	3	4	5	6	7	8	TT
Species									
Amphibians									
Acris creptians	2	73	15	13		8		4	
Anaxyrus americanus		5	1	9		4	1	1	
Anaxyrus fowleri	1	20	11	12	14	17	1	6	
Hyla chrysoscelis		1	1	2	1			1	
Lithobates catesbeianus		1							
Lithobates clamitans		2		2	1		1		
Lithobates palustris		1	2			1	1	1	
Lithobates sphenocephalus				1					
Pseudacris crucifer			4	1				4	
Ambystoma maculatum		12L	3			1		2	
Ambystoma opacum		1			1	2		4	
Eurycea cirrigera		3							
Eurycea guttolineata				2				1	
Notophathalumus viridescens		1						1	
Plethodon chlorobryonis				1				2	
Pseudotriton sp.			3L						
Reptiles									
Chelydra serpentina		1		1					1
Chrysemys picta picta		1		2				2	2
Kinosternon subrubrum				1					1
Terrapene carolina carolina	2	1		10	5			2	
Plestiodon fasciatus	2	6	13	5					
Plestiodon laticeps				2	2	1			
Scincella lateralis			2	2		7			
Scleoporus undulatus			2	13	2	4			
Agkistrodon contortrix mokasen		1							
Carphophis amoenus amoenus		1	7	6	1	6	4	4	
Coluber constrictor constrictor		1		3				1	
Diadophis punctatus		2		3	1			3	
Heterodon platirhinos	1							1	
Nerodia sipedon sipedon		1							
Opheodrys aestivus	1	1		1					

Table 2. Summary of the number of animals observed at each site.

Pantherophis alleghaniensis		3	1	6				3	
Storeria dekayi dekayi	1		1	2			1		
Storeria occipiomaculata				1			1		
Thamnophis sauritus sauritus		1							
Thamnophis sirtalis sirtalis		1	1						
Virginia valeriae valeriae			1						
Total Number of animals by site	8	141	68	101	28	51	10	43	4

#### Annotated Checklist Amphibians

### 1. Acris crepitans (Northern Cricket Frog)

Northern Cricket Frogs were found in a variety of microhabitats including wetlands around creeks, in leaf litter on the forest floor, on hiking trials, on the banks of streams, and along the margin of Beaver Lake. Numerous choruses of males were heard especially beside the lake.

### 2. Anaxyrus americanus (American Toad)

American Toads were encountered on the forest floor in leaf litter, in grass, and one was found at the base of a tree. One juvenile found at site 4 was observed to have a damaged paratoid gland.

### 3. Anaxyrus fowleri (Fowler's Toad)

The survey of Fowler's Toads yielded a mixture of adults and sub-adults. Animals were found under rocks, in leaf litter, in grass, on a tree stump, and under bark. Two sub-adult toads were found to be parasitized by chigger mites. One found at site 5 had two mites and the other found at site 2 had 4 mites.

### 4. Hyla chrysoscelis (Cope's Gray Treefrog)

Only calling *Hyla chrysoscelis* males were encountered during the survey. Males were heard vocalizing by the lake and in the woods.

### 5. Lithobates catesbeianus (American Bullfrog)

A small number of male bullfrogs were heard calling from the margin of Beaver Lake at site 2.

### 6. Lithobates clamitans (Green Frog)

Green Frogs were observed along the bank of a stream, in a stream, and on the shoreline of the lake. A few males were heard calling along a stream.

### 7. Lithobates palustris (Pickerel Frog)

Streams and along the bank of streams was the microhabitat most preferred by Pickerel Frogs according to our observations.

# 8. Lithobates sphenocephalus (Southern Leopard Frog)

The only leopard frogs discovered during the weekend was a small chorus of calling males at a pond at site 4.

### 9. Pseudacris crucifer (Spring Peeper)

Adult and newly emerged spring peepers were found in leaf litter on the forest floor at three sites.

### 10. Ambystoma opacum (Marbled Salamander)

*Ambystoma opacum* adults were found in four locations. Each of these locations was near vernal areas. Most animals were captured under logs.

### 11. Ambystoma maculatum (Spotted Salamander)

Spotted Salamanders were also found at four sites. Each of these sites had access to vernal pools. One vernal pool was dipnetted and around 12 larvae were captured. All adults were found under logs. One adult found at site 3 was observed to have a missing left eye and an eye infection.

### 12. Eurycea cirrigera (Two-lined Salamander)

Only three Two-lined Salamanders were found during the survey period. All were found near streams and under logs. One adult at site 2 was found .76 m (2.5 ft) off the ground under bark of a fallen tree.

### 13. Eurycea guttolineata (Three-lined Salamander)

Three-lined Salamanders were found under logs in a stream and in a stream foraging. One animal found exhibited a clear, non-mottled belly.

### 14. Plethodon chlorobryonis (Atlantic Coast Slimy Salamander)

*Plethodon chlorobryonis* adults were found at two sites. Animals were found under bark and under logs.

### 15. Pseudotriton sp.

Three larvae were dipnetted in a spring at site three. Upon close inspection we determined that the larvae were *Pseudotrition* but we could not definitely identify the species.

### 16. Notophathalumus viridescens viridescens (Red-spotted Newt)

One adult and one eft stage newt were found during the weekend. The eft was found in leaf litter and the adult was found swimming in a stream flowing into Beaver Lake.

# Reptiles

### 17. Chelydra serpentina (Snapping Turtle)

Turtle trapping yielded two captured snapping turtles, one adult female and the other was not sexed. Two additional turtles were found in streams at sites 2 and 4.

# 18. Chrysemys picta picta (Eastern Painted Turtle)

Two Eastern Painted Turtles were observed laying eggs (0837 h and 0840 h respectively) by Beaver Lake and another was digging a nest (1034 h). Later during the day the nesting site of the previously observed turtle digging was investigated. The nest was empty but a measurement of the nest was taken. The nest was 50 mm deep and 38 mm wide. An additional turtle was captured in a turtle trap.

### 19. Terrapene carolina carolina (Eastern Box Turtle)

Twenty box turtles were found at five sites. Microhabitat surrounding the observation included beside stagnant water, in leaf litter, at the base of a fallen tree, in streams, and near streams. A female found at site 8 was blowing bubbles out of its nose and it had an eye infection. One adult found at site 4 was found dead in a stream.

### 20. Kinosternon subrubrum subrubrum (Eastern Mud Turtle)

One Eastern Mud Turtle was captured in a turtle trap. The other mud turtle was found in a floodplain at site 4.

### 21. Plestiodon fasciatus (Five-lined Skink)

Five-lined Skinks were the most commonly observed lizard with a total of 26 animals being found. They were seen under bark, basking on logs, and on the ground.

### 22. Plestiodon laticeps (Broad-headed Skink)

*Plestiodon laticeps* adults were found basking on trees and basking on rocks. One male female pair was seen basking together on the same tree.

### 23. Scincella lateralis (Little Brown Skink)

Eleven Little Brown Skinks were found on the ground in leaf litter and under logs at multiple sites.

### 24. Sceloporus undulatus (Fence Lizard)

Twenty-one Fence Lizards were observed basking on logs, on wood piles, and on the trunks of trees. A few males were observed displaying, doing pushups, and chasing females.

# 25. Agkistrodon contortrix mokasen (Northern Copperhead)

The one subadult Northern Coppperhead was found when a survey member stepped on it. It was found on the forest floor at the edge of a stream. The survey member did not injure the snake.

### 26. Carphophis amoenus amoenus (Eastern Wormsnake)

A total of 29 Eastern Wormsnakes were captured at seven survey sites. They were found under logs, under bark, in logs, and between logs.

### 27. Coluber constrictor constrictor (Northern Black Racer)

*Coluber constrictor constrictor* adults were found in leaf litter on the forest floor, in grassy meadows, and along the margin of Beaver Lake. All animals were basking.

### 28. *Diadophis punctatus* (Ring-necked Snake)

Ring-necked Snakes were found in leaf litter, under pine bark, and under logs. Most snakes had full neck bands and ventral belly spots. One adult did have a full neck band and no spots on its ventrum.

# 29. Heterodon platirhinos (Eastern Hog-nosed Snake)

A dark patterned Eastern Hog-nosed Snake was found on the forest floor at site 8.

### 30. Nerodia sipedon sipedon (Northern Watersnake)

Despite abundant water sources only one Northern Watersnake was observed. This one snake was found under a log by a stream at site 2.

#### 31. Opheodrys aestivus (Rough Greensnake)

The two Rough Greensnakes found during the weekend survey were found on a trail and in a grassy meadow by a stream.

### 32. Pantherophis alleghaniensis (Eastern Ratsnake)

Thirteen ratsnakes were found in a variety of locations including the forest floor and on trails. One dead adult was found at site 4. An adult male found at site 4 had reddish coloration.

### 33. Storeria dekayi dekayi (Northern Brownsnake)

Northern Brownsnakes were found in four locations. Most were found under cover objects but one adult was found on the surface of leaf litter. An adult found at site 4 had a bump on its back.

34. *Storeria occipitomaculata occipitomaculata* (Northern Red-bellied Snake) One juvenile snake was found under leaf litter near a wood pile and another adult snake was observed basking on a log.

### 35. Thamnophis sauritus sauritus (Common Ribbonsnake)

One ribbonsnake was captured along the margin of Beaver Lake. When first handled the animal commenced to enter into a dead roll. What was interesting about this was the strobe-like effect that the stripes along its body made as it turned round and round. This appeared to be an effective technique to confuse predators.

36. *Thamnophis sirtalis sirtalis* (Eastern Gartersnake) Eastern Gartersnakes were found at sites 2 and 3. Both were found basking on the forest floor.

37. *Virginia valeriae valeriae* (Eastern Smooth Earthsnake) One earth snake was found under pine bark at site 3.

### Discussion

Pocahontas State Park has over 3,237 ha (8,000 ac) of land within its borders. This survey sent groups out to many sites but only a small portion of land was adequately assessed. Where the park is bisected by Beach Road, our surveys were only concentrated in the northern section of park property. The southern portion is less developed and has fewer trails. To more adequately assess the biodiversity of the park more surveys going into new areas and surveys done during different seasons will likely increase the documented species list.

Pocahontas State Park (PSP) now has documented 55 species of amphibians and reptiles (Table 3). Not only does it have a large number of species but many of the species seem to be abundant. The status of one species, *Hyla gratiosa* is still uncertain. There are other species that have been collected in previous surveys but were not found during the VHS survey in 2011. Since some of the differences come from older observations, further intensive surveys are warranted

to check on the status of those species. It would be nice to have corroborating observations of very similar species like Acris creptians and Acris gryllus and Hyla versicolor and Hyla chrvsoscelis. These species can be very similar in phenotype and vocalization. Acris gryllus and *Hyla versicolor* are both listed on the reptile and amphibian database for the park but our survey did not yield observations of either, despite finding 115 cricket frogs and hearing many choruses. Lampropeltis elapsoides has also been documented for the park but genetic analysis on park specimens has not been conducted to confirm this observation. To date the only unequivocal Scarlet Kingsnakes have been documented in Bedford County, Virginia (Roble et al., 2007). Thirteen species of anurans are now known for Pocahontas State Park (Table 3). According to the VDGIF Species Observation (SppObs) Database (formerly the VDGIF Collections Database) and published records in *Catebeiana*, the following anurans are documented for Chesterfield County: Gastrophryne carolinensis, Hyla femoralis, Pseudacris brimleyi, and Scaphiopus holbrookii. Two other species, Hyla cinerea and Pseudacris nigrita are possible candidates for finding in future surveys. Hyla cinerea is documented to the north and west of PSP and *Pseudacris nigrita*, which was recently added to the state herpetafaunal list, and still needs its distribution defined, may well be found in PSP. Eight species of salamanders are currently recognized as residing in PSP with one additional species' status in the genus Pseudotriton uncertain (Table 3). Two additional species have been documented in Chesterfield County but have not been discovered in the park boundaries. These include *Hemidactylium scutatum* and Pseudotriton ruber. Pseudotriton montanus is documented in surrounding counties as is Amphiuma means, Siren intermedia intermedia, and Siren lacertina. The latter three species would require special trapping methods and correct seasonal surveying to find. Eight native species and one invasive species of turtles are known for PSP (Table 3). Clemmys guttata and Kinosternon baurii are the only turtles found in Chesterfield County and which might be added to the PSP species list. Lizards in PSP are represented by six species. Aspidoscelis sexlineata has been documented for Chesterfield County and therefore might be added to the PSP list if surveys during hot summer days are conducted.

The snake diversity at PSP hosts a healthy 19 species (Table 3). Three possible species already documented for Chesterfield County, which could be added to the PSP snake fauna are *Agkistrodon piscivorus*, *Nerodia taxispilota*, and *Virginia striatula*. *Farancia abacura* and *Farancia erytrogramma* are species documented in surrounding counties and *Lampropeltis triangulum* has a general statewide distribution. Not much is known about the distribution of *Tantilla coronata* so it should be placed in a list of possible species which could be found within park boundaries.

Pocahontas State Park is a very well maintained and managed park. Despite this fact, the VHS in this section of the paper offers suggestions for better managing the park for reptiles and amphibians. Please keep debris piles and fallen logs in the forest and surrounding areas. These serve as habitat for all reptiles and amphibians. A second suggestion is to not use horticultural netting for either erosion control or wrapping wood for sale to campers. The damaging effect of this netting to snakes has been well documented (Mitchell et al., 2006). Educational plaques outlining the usefulness of snakes and generally amphibians and reptiles would also be suggested. These could be posted around Beaver Lake. This is the most likely place people would come in contact with nesting turtles and watersnakes. As the park grows in its interest of its biodiversity it is important that accurate written records in addition to voucher photos and digital recordings of vocalizing males be meticulously collected and archived. Observations on abundance and health should also be taken. Decades from now this information will be invaluable to future managers and conservation biologists.

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Table 3. Comparison of three sources of amphibian and reptile species data from Pocahontas
State Park.

	Sites	VB	VHS	PSP
Species				
Amphibians				
Acris creptians		*	*	*
Acric gryllus		*		*
Anaxyrus americanus		*	*	*
Anaxyrus fowleri		*	*	*
Hyla chrysoscelis		*	*	*
Hyla gratiosa				*
Hyla versicolor				*

# Survey of Pocahontas State Park

Lithobates calcesceanus	Lithebates establisher	*	*	*
Lithobates palustris******Lithobates sphenocephalus****Pseudacris crucifer****Pseudacris feriarum****Ambystoma anaculatum****Ambystoma opacum****Desmognathus fuscus****Eurycea cirrigera****Eurycea cirrigera****Pseudorito regra****Pethodon cinereus****Plethodon chlorobryonis****Pseudoriton sp.****Pseudoriton sp.****Chrysenys picta picta****Sternotherus odoratus****Stenotherus odoratus****Pseudenys concinna****Pseudenys cripta elegans****Sternotherus odoratus****Pseudenys concinna****Pseudenys concinna****Pseudenys concinna****Pseudenys cripta elegans****Pseudenys cripta elegans****Pseudon inexpectatus****Psetiodon inexpectatus****Psetiodon concririx mokasen****Psetiodon inexpectatus****Psetiodon inexpectatus****Psetiodon inexpectatus****Psetiodon inexpectatus****Psetiodon inexpectatus****Psetiodon inexpectatus** </td <td>Lithobates catesbeianus</td> <td></td> <td></td> <td></td>	Lithobates catesbeianus			
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Intervotion platininos Image: Constraint of the second s	Diadophis punctatus	*	*	*
Lampropeltis elapsoides *   Lampropeltis getula getula *	Heterodon platirhinos		*	*
Lampropeltis getula getula *	Lampropeltis calligaster rhombomaculata			*
	Lampropeltis elapsoides	*		
Nerodia sipedon sipedon * * *	Lampropeltis getula getula			*
	Nerodia sipedon sipedon	*	*	*

Opheodrys aestivus		*	*
Pantherophis alleghaniensis		*	*
Pantherophis guttatus			*
Regina septemvittata	*		
Storeria dekayi dekayi	*	*	
Storeria occipiomaculata		*	*
Thamnophis sauritus sauritus		*	
Thamnophis sirtalis sirtalis		*	*
Virginia valeriae valeriae		*	*
Total Number of Species	31	37	50

- VB = Virginia BioBlitz amphibian and reptile survey results. This survey was conducted at Pocahontas State Park on May 11 and 12, 2002.
- VHS = The Virginia Herpetological Society amphibian and reptile survey conducted on May 20-22, 2011.
- PSP = Amphibians and reptiles of Pocahontas State Park. This list was downloaded from a park database on 5-4-2011 by I.C. Frentz.