

# Herpetological Survey of Ware Creek Wildlife Management Area 29 April and 6 May, 2018

David A. Perry

316 Taylor Ridge Way Palmyra, VA 22963

**ABSTRACT:** Ware Creek Wildlife Management Area includes over 1000 ha of forests, fields and wetlands. It was surveyed on 29 April and 6 May 2018. One hundred forty-seven individuals of 11 amphibian and 14 reptile species were recorded, including 3 species with DGIF conservation status tier II-IV status. If the observed *Pseudotriton* larvae could be confirmed as an Eastern Mud Salamander, it would represent a Tier IV species observation. No new records for New Kent County were documented, however, if *Acris gryllus* could be properly identified and vouchered it would have been a new record.

**Key words:** Herpetological Survey, Ware Creek WMA, New Kent County

## INTRODUCTION

Ware Creek Wildlife Management Area (WCWMA) is located in the community of Barhamsville in New Kent County, VA. WCWMA was acquired by the Virginia Department of Game and Inland Fisheries (VDGIF) in 2016 and is comprised of over 1052.2 hectares (2600 acres) of mixed hardwood and pine forest, open fields and extensive wetlands. WCWMA is located on the York River and is bounded by Philbates and Ware Creeks. The uplands of WCWMA are comprised of mixed pines and hardwood forests. Agricultural fields provide habitat diversity with small wildlife clearings. Wetlands include rich salt marshes as well as tidal freshwater marshes and creeks and a few interior ponds. These valuable ecosystems are a potential home to a variety of wildlife and have not been previously surveyed by the Virginia Herpetological Society (VHS). WCWMA is of particular interest to the VHS Conservation Committee because 13 herpetological species having a VDGIF conservation status of Tier II-IV have been documented for New Kent County. Due to the large area to be surveyed, two Sunday survey dates, 29 April and 6 May, 2018 were selected.

Sunday was the day chosen to avoid any safety concerns with spring turkey hunting season (Monday-Saturday). Fifteen participants surveyed WCWMA on 29 April and fourteen participants surveyed on 6 May.

## Survey Sites

The following is a general description of the survey sites (Figure 1). Coordinates are specific GPS coordinates provided by the group leaders at the survey starting point. GPS coordinates for the large pond within WCWMA were also recorded.

Site-1-Millers Road South (N 37° 27.426', W -76° 47.011') Site-1 is located south of Millers Road from the parking area to the abandoned buildings and a large pond at the southeastern end of WCWMA. This site is comprised of mixed woodlands, a creek, wet areas, open fields near the abandoned buildings and the aforementioned pond (N37° 26.885', W-76° 46.226'). This site was surveyed on 29 April. Four un-baited minnow traps and a turtle trap, baited with a slightly opened can of sardines, were placed in the north end of the pond on 5 May and were retrieved and inspected the afternoon of 6 May.

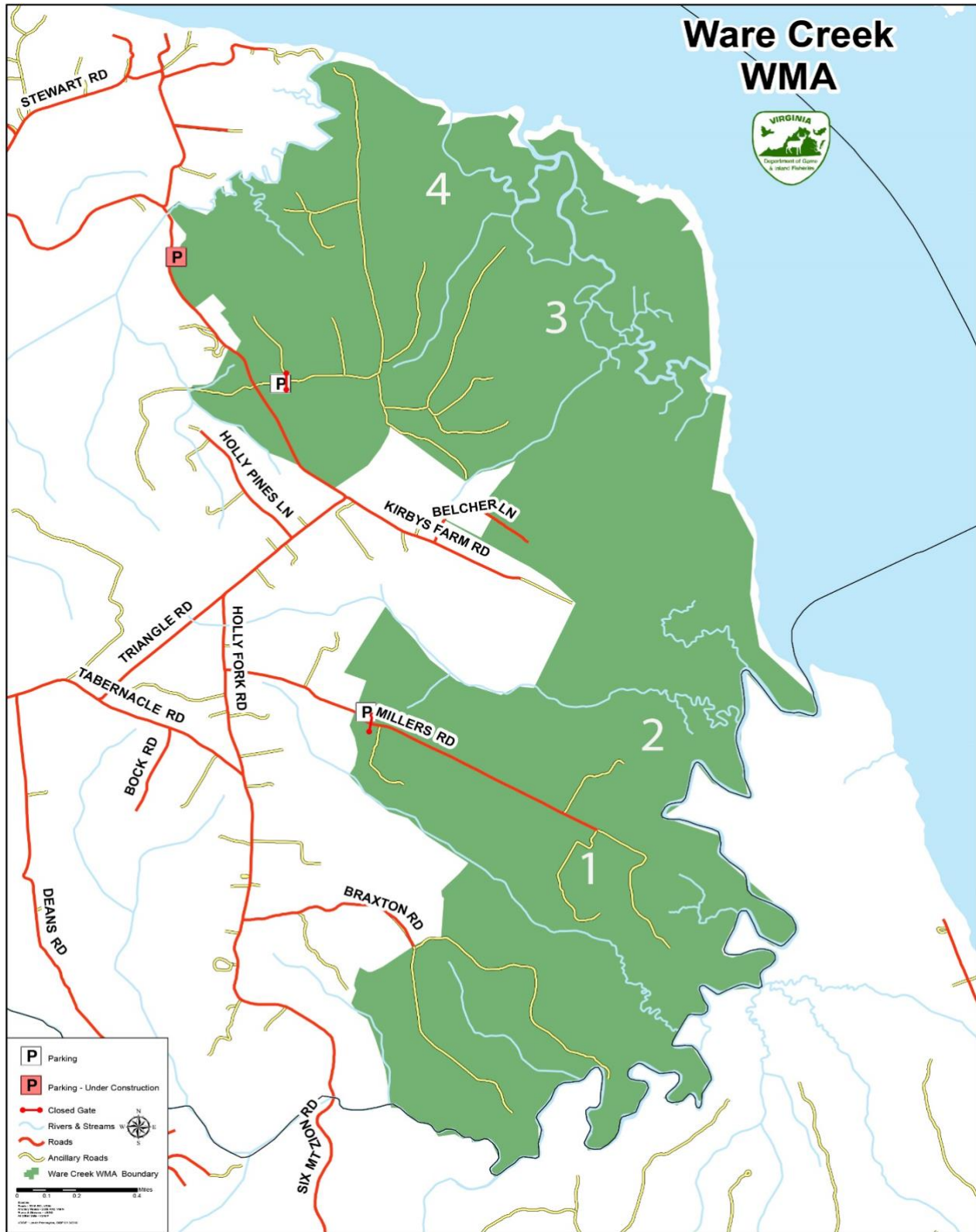


Figure 1. Survey sites within Ware Creek Wildlife Management Area.

Site-2-Millers Road North (N 37° 27.020', W-76° 46.106') Site-2 is the area north of Millers Road starting from a collapsed barn/shed at the southeastern end of WCWMA and includes open fields, wetlands leading to a tidal marsh, a dry gorge and mixed woodlands. This site was surveyed on 29 April.

Site-3- Duck Blind Road (N37° 28.356', W-76° 46.832') Site-3 includes mixed woods and the creek west of Duck Blind Road and the mixed woods and wet areas east of Duck Blind Road to the tidal marsh bordering the York River. Two unbaited minnow traps were positioned in a small seasonal pond near the start of Duck Blind Road the afternoon of 5 May. Site-3 was surveyed on 6 May and the minnow traps were retrieved and inspected at the end of the Site-3 survey.

Site-4-River Road (N37° 28.444', W-76° 47.247') Site-4 included the area east and west of River Road to the York River and includes pine forest, creeks, wet areas and tidal marsh. This site was surveyed on 6 May.

## MATERIALS AND METHODS

Fifteen volunteers participated in the survey for approximately three hours (from 09:00 to 12:00h) within Site-1 and 13 volunteers participated for an additional two hours (13:00 to 15:00h) in the field within Site-2 on 29 April for a net survey total of about 71 person hours (Table 1). Due to the limited number of participants, one survey group was organized to survey two sites within WCWMA (Sites-1 and 2 as described above). Weather conditions were sunny, windy and cool for most of the morning, with temperatures ranging from 10° to 17° C. Afternoon temperatures ranged from 17° to 19° C and winds had subsided.

Prior to each survey, all participant footwear and survey gear (snake hooks, field sticks, dip nets etc.) were disinfected using Nolvasan® Solution (chlorhexidine diacetate). Survey participants on both survey days used multiple collecting methods to find amphibians and reptiles, including visual observation, listening for calling anurans, hand capture and over-turning objects with snake hooks and field sticks. All captured animals were observed to identify possible malformations, injuries or disease and other unique markings and characteristics. Digital photos were taken of many of the captured animals prior to their release at the site of capture. Survey group leaders summarized and submitted all relevant data on VHS survey group data sheets.

On the afternoon of Saturday 5 May, a hoop turtle trap baited with sardines and four minnow traps were placed in the large pond at the east end of Site-1. Two minnow traps were also positioned in the small pond off Duck Blind Road within Site-3.

Fourteen volunteers participated in the survey on 6 May from 09:00 to 15:30 for a net survey total of about 70 person hours, subtracting time for lunch breaks (Table 2). Due to the large area to be surveyed, the volunteer participants were split into groups. One group surveyed Site-3 and the other group surveyed Site-4. Skies were mostly overcast although there was some spotty sunshine in the afternoon. Temperatures ranged from 14 to 24 °C.

At the end of the 6 May survey two minnow traps were retrieved from the small pond near Duck Blind Road within Site-3 and the hoop turtle trap and four minnow traps were retrieved from the large pond at east end of Site-1.

The following tables summarize the survey effort.

Table 1. Summary of the survey effort on 29 April 2018.

Survey Site	No. of Surveyors	Hours	Estimated Person Hours
1-Millers Road South	15	3	45
2-Millers Road North	13	2	26
Total			71

Table 2. Summary of the survey effort on 6 May 2018.

Survey Site	No. of Surveyors	Hours	Estimated Person Hours
3-Duck Blind Road	7	5	35
4-River Road	7	5	35
Total			70

## RESULTS

During the two days of survey a total of 25 species were captured or positively identified, including 11 amphibians and 14 reptiles (Table 3). More than 50 *Anaxyrus* tadpoles in a mud puddle on Millers Road could not be positively identified. The survey produced a total of seven anuran, four salamander, five snake, five turtle and four lizard species. One hundred forty seven animals were captured or positively identified. However, at least three or possibly four of the previously documented 13 New Kent County species with VDGIF conservation status tier II-IV were found (Tier III *Clemmys guttata*, *Terrapene c. carolina* and Tier

IV *Thamnophis s. sauritus*). The *Pseudotriton* larva could not be positively identified but might be *Pseudotriton m. montanus*, which has Tier IV conservation status. *Pseudotriton m. montanus* and *Pseudotriton r. ruber* have been previously documented in New Kent County. Two adult *Acris gryllus* were captured during the survey within Site-3. This species has not been previously documented for New Kent County although it has been documented in Henrico County, adjacent to the southwest and in James City County adjacent to the southeast. However, these specimens were not photographed during the survey on 6 May. Table 3 summarizes the results for both survey dates.

Table 3. Amphibians and reptiles observed at Ware Creek WMA.

Species/Site	1 Millers Road South	2 Millers Road North	3 Duck Blind Road	4 River Road	Total
<u>Class Amphibia</u>					
<u>Anuran Species</u>					
<i>Acris crepitans</i>	3				3
<i>Acris gryllus</i>			2		2
<i>Anaxyrus americanus/fowleri</i>	>50				>50
<i>Anaxyrus fowleri</i>			2		2
<i>Hyla versicolor</i>			1	1	2
<i>Lithobates catesbeianus</i>	3		1		4
<i>Lithobates clamitans</i>	38		1	1	40

Ware Creek WMA Survey

<i>Lithobates</i>					
<i>sphenocephalus</i>	1		3		4
<i>utricularis</i>					
Total Anurans	>95	0	10	2	>107
<u>Salamander species</u>					
<i>Desmognathus fuscus</i>	4	1			5
<i>Eurycea cirrigera</i>			2		2
<i>Plethodon cylindraceus</i>		2		1	3
<i>Pseudotriton (m. montanus/r.ruber)</i>	1				1
Total Salamanders	5	3	2	1	11
<u>Class Reptilia</u>					
<u>Snake Species</u>					
<i>Carphophis a. amoenus</i>	6	13		7	26
<i>Coluber c. constrictor</i>		3	1		4
<i>Diadophis punctatus edwardsii</i>				1	1
<i>Pantherophis alleghaniensis</i>		2	1	2	5
<i>Thamnophis s. sauritus</i>	1				1
Total Snakes	7	18	2	10	37
<u>Turtle species</u>					
<i>Chelydra serpentina</i>		1	1		2
<i>Chrysemys p. picta</i>	1				1
<i>Clemmys guttata</i>	1		1	1	3
<i>Kinosternon s. subrubrum</i>	4	3			7
<i>Terrapene c. carolina</i>	3	1	5	6	15
Total Turtles	9	5	7	7	28
<u>Lizard Species</u>					
<i>Plestiodon fasciatus</i>	1		1	1	3
<i>Plestiodon inexpectatus</i>				1	1
<i>Sceloporus undulatus</i>		6			6
<i>Scincella lateralis</i>	2			2	4
Total Lizards	3	6	1	4	14
Total Amphibians & Reptiles	>119	32	22	24	>197

## ANNOTATED CHECKLIST

### Amphibians

1. *Acris crepitans* (Eastern Cricket Frog) Three adult Eastern Cricket Frogs were captured and photographed within Site-1 in or near a creek during the morning of 29 April. All appeared to be healthy.

2. *Acris gryllus* (Southern Cricket Frog) Two adult Southern Cricket Frogs Toad were captured in a stream within Site-3 on 6 May. No diseases, injuries or parasites were found on either individual. This species has not been previously documented for New Kent County. The two adult Southern Cricket Frogs were not photographed on 6 May.

3. *Anaxyrus americanus/fowleri* (American/Fowler's Toad) More than 50 *Anaxyrus* tadpoles were observed and photographed in a large mud puddle in Millers Road just before the parking area on 5 May within Site-1 prior to placement of traps. They could not be positively identified. Literature sources indicate that the breeding of American Toads occurs in March and April and often continues into late summer (Kleopfer et. al. 2011). Breeding of Fowler's Toads may occur from April to August. The observed tadpoles could be either species, although no adult American Toads were observed during the survey.

4. *Anaxyrus fowleri* (Fowler's Toad) Two adult Fowler's Toads were captured in pine woods habitat within Site-3 on 6 May. Each individual appeared to be healthy.

5. *Hyla versicolor* (Grey Treefrog) Two adult male Grey Treefrogs were heard calling on 6 May. One was heard in a mixed woods forest within Site-3 and the other was heard calling in a pine forest within Site-4.

6. *Lithobates catesbeianus* (American Bullfrog)

Four adult American Bullfrogs were observed during the survey. Three adult male American Bullfrogs were heard calling from the large pond at the east end of Site-1 on 29 April. One adult bullfrog was captured in a stream within Site-3 on 6 May. This individual appeared to be healthy.

7. *Lithobates clamitans* (Green Frog) Forty Green Frogs were observed during the survey. Three adult males could be heard calling from the large pond and one adult Green Frog was captured near this pond at the east end of Site-1 on 29 April. The captured adult appeared to be healthy. Thirty four Green Frog tadpoles were retrieved from four minnow traps placed in the large pond on 6 May. All tadpoles appeared to be healthy. One adult male Green Frog was captured in a stream within Site-3 on 6 May and another adult Green Frog was captured using a dip net from a wet area within Site-4. Both of the captured Green Frogs appeared to be healthy and the Green Frog from Site-4 was photographed.

8. *Lithobates sphenoccephalus utricularis* (Coastal Plains Leopard Frog) Four leopard frogs were observed during the survey. One adult Coastal Plains Leopard Frog was captured in the large pond at the east end of Site-1 on 29 April, was photographed, and appeared to be healthy. Three leopard frog tadpoles were captured in two minnow traps in the small pond near Duck Blind Road within Site-3 and all appeared to be healthy.

9. *Desmognathus fuscus* (Northern Dusky Salamander) Five Northern Dusky Salamanders were observed during the survey. One adult and three sub-adult Northern Dusky Salamanders were captured under logs in a muddy wet area in mixed woods within Site-1 on 29 April. All specimens were photographed and appeared to be healthy. One adult Northern Dusky Salamander was found under bark near a stream in mixed woods within

Site-2 on 29 April. This individual was also photographed and appeared to be healthy.

10. *Eurycea cirrigera* (Southern Two-lined Salamander) Two Southern Two-lined Salamanders were observed within Site-3 on 6 May. These adult Southern Two-lined Salamanders were captured in a stream and appeared to be healthy.

11. *Plethodon cylindraceus* (White Spotted Slimy Salamander) Three adult White Spotted Slimy Salamanders were observed during the survey. Two adult White Spotted Slimy Salamanders were captured under logs in a wooded area within Site-2 on 29 April. Each individual was photographed and appeared to be healthy. One adult White Spotted Slimy Salamander was captured under a log in pine woods within Site-4 on 6 May and also appeared to be healthy.

12. *Pseudotriton sp.* (Eastern Mud/ Northern Red Salamander) One *Pseudotriton* salamander larva was captured under a log in a muddy creek area within Site-1 on 29 April. This specimen was bagged, appeared to be healthy and was photographed. However, it could not be determined if it was an Eastern Mud or Northern Red Salamander larva. Both species have been previously documented in New Kent County.



## Reptiles

13. *Carphophis a. amoenus* (Eastern Wormsnake) Twenty-six Eastern Wormsnakes were observed during the survey. Four adult and two juvenile Eastern Wormsnakes were captured under logs, bark and debris in mixed pine and hardwood forests within Site-1 on 29 April. All appeared to be healthy and several were photographed. Thirteen Eastern Wormsnakes were captured within Site-2 on 29 April. Four juveniles and one adult were found under debris near a collapsed shed. Eight adults were captured under logs and bark in mixed woods. All thirteen specimens observed within Site-2 appeared to be healthy and some were photographed. Seven adult Eastern Wormsnakes were captured in and under logs in pine forest within Site-4 on 6 May. All appeared to be healthy.

14. *Coluber c. constrictor* (Northern Black Racer) Four adult Northern Black Racers were observed during the survey. Three of these were observed basking in open areas within Site-2 on 29 April. One adult Northern Black Racer was observed basking in an open field near the edge of woods and quickly retreated into a brushy area. Another adult was observed basking in Millers Road near the edge of the woods and then disappeared. A third adult Northern Black Racer was observed basking in a grassy area near Millers Road and escaped into a tree to a height of about 4-5 meters and was photographed. One adult Northern Black Racer was captured on a wooded hillside within Site-3 on 6 May. This specimen appeared to be healthy.

15. *Diadophis punctatus edwardsii* (Northern Ring-necked Snake) One adult Northern Ring-necked Snake was captured under a log in pine forest within Site-4 on 6 May. This specimen was photographed and appeared to be healthy.

16. *Pantherophis alleghaniensis* (Eastern Ratsnake) Five Eastern Ratsnakes were observed during the survey. One juvenile Eastern Ratsnake was captured on the ground beneath a tree and one adult was observed basking on a bluff overlooking a creek within Site-2 on 29 April. The captured juvenile was photographed and appeared to be healthy. One adult Eastern Ratsnake was captured in a wooded area within Site-3 on 6 May and appeared to be healthy. Two adult Eastern Ratsnakes were captured while basking on the ground in pine forest within Site-4 on 6 May. Each specimen was photographed and appeared to be healthy.

17. *Thamnophis s. sauritus* (Common Ribbonsnake) One adult Common Ribbonsnake was observed basking on a grassy patch next to a creek within Site-1 on 29 April. This snake quickly disappeared into leaves and brush and could not be captured.

18. *Chelydra serpentina* (Snapping Turtle) The shell remains of one adult Snapping Turtle were in a muddy wet area within Site-2 on 29 April. The carapace of the deceased turtle was split horizontally. One neonate Snapping Turtle was captured in one of the minnow traps retrieved from the small pond near Duck Blind Road within Site-3 on 6 May. The neonate Snapping Turtle appeared to be healthy.

19. *Chrysemys p. picta* (Eastern Painted Turtle) One adult Eastern Painted Turtle was observed basking on a log within the large pond at the east end of Site-1 on 29 April.

20. *Clemmys guttata* (Spotted Turtle) Three adult Spotted Turtles were captured during the survey. One adult male Spotted Turtle was captured in a creek within Site-1 (N37° 27.179', W-76° 46.993') on 29 April. Another adult male was captured in a wetland area within Site-3 on 6 May. A third adult male was captured in a creek within Site-4 on 6

May. All three specimens were photographed and appeared to be healthy.



21. *Kinosternon s. subrubrum* (Southeastern Mud Turtle) Seven adult Southeastern Mud Turtles were captured during the survey on 29 April. Three adults were captured in the creek and one was captured on a log in the creek within Site-1. Two adult Southeastern Mud Turtles were found together in a muddy area, possibly mating, and one adult was captured in a wet area within Site-2. All seven specimens were photographed and appeared to be healthy.

22. *Terrapene c. carolina* (Woodland Box Turtle) Fifteen Woodland Box Turtles were observed during the survey and were present within all the survey sites. Two adult male and one adult female Woodland Box Turtles were captured in leaves and on the forest floor within Site-1 and One Adult male Woodland Box Turtle was found in leaves within Site-2 on 29 April. All four specimens were photographed and appeared to be healthy. Three female and two male adult male Woodland Box Turtles were captured near a stream in a wooded upland area within Site-3 on 6 May and all appeared to be healthy. Six adult Woodland Box Turtles, 3 males and 3 females, including one mating pair, were observed in pine needles within Site-4 on 6 May. One large male had some carapace scute damage, while the other five specimens all appeared to be healthy.



23. *Plestiodon fasciatus* (Common Five-lined Skink) Three common Five-lined Skinks were observed during the survey. One Common Five-lined Skink was captured under a log in pine woods within Site-1 on 29 April. The specimen was photographed and appeared to be healthy. One juvenile Five-lined Skink was captured in a wooded area within Site-3 on 6 May and appeared to be healthy. One adult Common Five-lined Skink was captured under a log in pine woods within Site-4 on 6 May, was photographed and appeared to be healthy.

24. *Plestiodon inexpectatus* (Southeastern Five-lined Skink) One adult Southeastern Five-lined Skink was captured under a log in pine woods within Site-4 on 6 May. This skink was photographed and appeared to be healthy.

25. *Sceloporus undulatus* (Eastern Fence Lizard) Six adult Eastern Fence Lizards were observed within Site-2 on 29 April. Most of the specimens were observed on the forest floor or climbing trees. One individual was captured, photographed and appeared to be healthy.

26. *Scincella lateralis* (Little Brown Skink) Four adult Little Brown Skinks were observed during the survey. Two adult Little Brown Skinks were captured under logs in mixed woods within Site-1 on 29 April. Each specimen was photographed and appeared to be healthy. Two adult Little Brown Skinks were observed under logs in pine woods within Site-4 on 6 May but were not captured.

## DISCUSSION

During the two-day survey of “WCWMA”, the VHS survey groups positively identified 147 specimens representing twenty-five species (Table 3). There were eleven species of amphibians (seven frogs and four salamanders) and fourteen species of reptiles (five snakes, five turtles and

four lizards). More than 50 *Anaxyrus* tadpoles observed in a large mud puddle in Millers Road could not be positively identified. All of the species encountered, except *A. gryllus* had been previously documented for New Kent County, although *A. gryllus* has been previously documented in Henrico County, which is adjacent to the southwest, and in James City County, which is adjacent to the southeast. Unfortunately, the two captured *A. gryllus* specimens were not photographed.

Anuran species were the most frequently encountered animals during the survey with more than 107 observations. However, most of the observed animals (>87) were tadpoles, only 20 adult anurans were observed. This seems like a low number of observations relative to the available wetland habitat and the number of snakes (37) and turtles (28) encountered.

There were at least three and possibly four species, captured and photographed, with designated conservation status as defined in “Virginia’s 2015 Wildlife Action Plan” published by VDGIF, *Clemmys Gutatta* (Spotted Turtle), *Terrapene c. carolina* (Woodland Box Turtle) and *Thamnophis s. sauritus* (Common Ribbon Snake) were positively identified. The *Pseudotriton* larva could not be positively identified but could be *P. m. montanus*. *Thamnophis. s. sauritus* and *P. m. montanus* have a conservation status of “Tier IV Moderate Conservation Need.” *Clemmys guttata* and *T. c. carolina* have a conservation status of Tier III High Conservation need.

In addition, VDGIF (2015) gives each tiered species a conservation opportunity ranking of A, B or C. An A ranking indicates “on the ground” species or habitat management strategies have been identified that are expected to benefit this species, at least some of which can be implemented with existing resources and have a reasonable chance of improving the species conservation status. A and B rankings indicates only research needs have been identified for this

species or “on the ground” conservation actions cannot be implemented due to resource constraints. A and C rankings indicates no “on the ground” conservation actions or research needs that could benefit this species have been identified or all identified conservation opportunities for a species have been exhausted. *C. guttata*, *P. m. montanus*, *T. c. carolina* and *T. s. sauritus* all have an A ranking. For each of these species habitat conservation and restoration are underway (wetlands preservation and water quality improvement for the aquatic species and open canopy forest and meadows preservation for *T. c. carolina*).

Nine other species with VDGIF conservation status Tier II-IV, which had previously been documented for New Kent County, were not observed during the survey. These are *Cemophora coccinea copei* (Northern Scarletsnake), *Fernandina a. abacura* (Eastern Mudsnake), *Fernandina e. erythrogramma* (Common Rainbow Snake), *Heterodon platirhinos* (Eastern Hog-nosed Snake), *Liodytes r. rigida* (Eastern Glossy Swampsnake), *Malaclemys t. terrapin* (Northern Diamond-backed Terrapin), *Ophisaurus attenuatus longicaudus* (Eastern Slender Glass Lizard), *Scaphiopus holbrookii* (Eastern Spadefoot) and *Trachemys s. scripta* (Yellow-bellied Slider).

The International Union for Conservation of Nature and Natural Resources (“IUCN”) publishes “The IUCN Red List of Threatened Species”. The conservation status of *C. guttata*, *P. m. montanus*, *T. c. carolina* and *T. s. sauritus* have been evaluated by the IUCN Red List of Threatened Species across the known historic range for each species. Hammerson (2008) rated *P. m. montanus* as a threatened species of least concern because of its wide distribution, presumed large population and because it is not likely declining fast enough to be listed in a more threatened category. Hammerson (2007) also evaluated *T. s. sauritus* as a threatened species of least concern with a presumed

population in excess of 100,000 that is either relatively stable over the historic range or declining at a rate of less than 10% over 10 years or three generations. The six sub-species of *T. carolina*, including *T. c. carolina*, were evaluated by van Dijk (2011) as a threatened species that are vulnerable due to a widespread and persistent gradual population decline which probably exceeds 30% over three generations, conservatively considered as 50 years. A variety of factors are cited as possible explanations for the decline of *T. Carolina* including habitat destruction, pollution, pesticide effects and vehicle strikes among others. *C. guttata* was also evaluated by van Dijk (2011) and rated endangered over its historic range. It is estimated with a generation time of probably over 25 years, the species is likely to have suffered more than 50% overall reduction, much of this being irreversible through habitat loss. *C. guttata* requires specialized wetlands, such as marshes, bogs, small streams, swamps and wet meadows. Most localized populations are very small and highly vulnerable to wetlands habitat destruction.

The Northeast Regional Office of the U.S. Fish and Wildlife Service, which is responsible for 13 U.S. states ranging from Maine to Virginia, has developed a conservation program for three turtle species, including *C. guttata*, which are threatened to be classified as endangered. Dalaba (2017) reports that a major mile marker looms ahead in 2023, when the U.S. Fish and Wildlife Service plans to determine if Spotted, Blanding’s (*Emydodea blandingii*) or Wood Turtles (*Glyptemys insculpta*) need to be listed under the Endangered Species Act. These turtles use large tracts of land crossing roads and agricultural operations to reach their favorite spots year after year. While roads turn their home ranges into a dangerous maze, landscape changes for agriculture and housing further degrade wetlands and natural areas. Efforts are underway across the range of each species to avoid the need to list them under the Endangered Species Act. With around 75% of

## Ware Creek WMA Survey

remaining wetlands being privately owned, private landowners have a lot of influence. The U.S. Fish and Wildlife Service's program "Partners for Fish and Wildlife" works with landowners to protect and restore wetlands, as well as streams and grasslands, for the greater benefit of the people and wildlife that live on them.

The 2016 VDGIF acquisition of the acreage that now encompasses WCWMA will help protect habitat for many Virginia species, including the threatened *C.guttata*.

### LITERATURE CITED

- Dalaba, J. 2017. The Slow Race to Save Three Turtle Species. U.S. Fish and Wildlife Service Northeast Region. Hadley, MA 1,3,4,6, 7.
- Hammerson, G.A. 2007. *Thamnophis sauritus*: The IUCN Red List of Threatened Species. Gland Switzerland e. T63991A12727431.
- Hammerson, G.A. 2008. *Pseudotritron montanus*: The IUCN Red List of Threatened Species. Gland Switzerland e.T59403A11927703.
- Kleopfer, J.D. and C.S. Hobson. 2011. A Guide to the Frogs and Toads of Virginia. Bureau of Wildlife Resources Special Publication Number 3, Virginia Department of Game & Inland Fisheries. Richmond, VA. 25, 34, 35.
- Mitchell, J.C. and Reay.K. K. 1999. Atlas of Amphibians and Reptiles in Virginia. Virginia Department of Game and Inland Fisheries Special Publication Number One. Richmond, VA 27pp.
- van Dijk P.P. 2011. *Clemmys guttata*: The IUCN Red List of Threatened Species. Gland Switzerland e.T4968A97411228.
- van Dijk P.P. 2011. *Terrapene Carolina*: The IUCN Red List of Threatened Species. Gland Switzerland e.T21641A97428179.

Virginia Department of Game and Inland Fisheries. 2015. Virginia's Wildlife Action Plan. Henrico, VA. 2-2, 26-126, 26-127, 26-130.

### ACKNOWLEDGEMENTS

Special thanks to David Garst Supervisor of WCWMA and VDGIF for permitting these surveys and to the editorial reviewers of this document.

29 April Survey Participants: Liz Allan, Audrey Boraski, Luca Cantanzaro, Jill Card, Bill Feeney, Todd Georgel, Jason Kaufman, Sam Kaufman, Anna Kim, Brian Kim, Jordan Kim, Karl Kratzer, Catey Lavagnino, Dave Perry, and David Van Gelder.



6 May Survey Participants: Travis Anthony, Dane Conley, Samantha Dillon, Jeff Dragon, Robert Frezza, Rosemary Frezza, Todd Georgel, David Hart, Karl Kratzer, Vinny Passaro, Michael Pauli, Dave Perry, David Van Gelder and Patrick Wamsley.

