

## Turtles of Waller Mill Lake

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### Introduction

Artificial freshwater lakes are constructed for a variety of purposes. They serve as storm water retention basins, drinking water reservoirs, and are used for a wide range of recreational activities (Cole 1994). In addition, these lakes provide important habitat to many vertebrate species, particularly fish, aquatic reptiles and amphibians. Of the approximately 450 herpetofaunal species found in the United States, half occur in the Southeast with about twenty percent endemic to the region (Conant and Collins 1998; Tuberville et al. 2005). Due to the abundance and diversity of herpetofauna in both terrestrial and freshwater ecosystems, they are considered an excellent ecological indicator of the health of a habitat (Tuberville et al. 2005). In fact, the biomass of the herpetofauna is typically significantly greater than that of endotherms (Iverson 1982; Tuberville et al. 2005). Often, turtles compose a major portion of the vertebrate biomass in freshwater habitats (Congdon et al. 1986). Since standing crop biomass of turtles can be so high, it is likely that they play a significant role in energy flow and nutrient cycling (Bury 1979). The success of turtles is due, in part, to the fact that some species are extremely tolerant of human-impacted ecosystems and thrive in highly modified habitats, even when other organisms are significantly negatively impacted (Mitchell 1988; Conner et al. 2005).

Several species of emydid turtles are known to inhabit lakes in southeastern Virginia. Three groups that have a significant presence are members of the genera *Trachemys*, *Pseudemys*, and *Chrysemys*. One of the more abundant species is *Trachemys scripta*, commonly referred to as the slider turtle (Mitchell 1994). It is a medium-sized turtle with a maximum carapace length of 28.9 cm (Conant and Collins 1991) and can be found in a wide variety of freshwater and brackish ecosystems (Mitchell 1994). There are three recognized subspecies of *T. scripta* (Seidel 2002), with *T. scripta scripta* (the Yellow-bellied Slider) and *T. scripta elegans* (the Red-eared Slider) being the subspecies that are particularly common in Virginia lakes (Mitchell 1994). *T. scripta* is typically the most abundant species when present (Bury 1979).

*Chrysemys picta* (the Painted Turtle) is another turtle that is abundant throughout Virginia. In

fact, *C. picta* is the most frequently observed basking turtle in Virginia (Mitchell 1994). This turtle tends to be smaller with a maximum carapace length of 18.2 cm (Conant and Collins 1991).

Three turtles from the genus *Pseudemys* can be found in Virginia. They are *Pseudemys concinna concinna* (the Eastern River Cooter), *Pseudemys rubriventris* (the Northern Red-bellied Cooter), and *Pseudemys concinna floridana* (the Coastal Plain Cooter) (Ernst et al. 1994; Mitchell 1994). Turtles from the genus *Pseudemys* are the largest of the three with a maximum carapace length ranging from 39.7 cm to 42 cm (Ernst and Barbour 1972; Conant and Collins 1991). *Pseudemys* turtles are known to actively hybridize with each other and in some cases it is extremely difficult to identify the individuals to species (Seidel and Palmer 1991).

Kinosternid turtles common to southeastern Virginia are *Stenotherus odoratus* (the Stinkpot or Common Musk Turtle) and *Kinosternon subrubrum subrubrum* (the Eastern Mud Turtle). Both of these species are small with maximum carapace length of 12 to 13 cm. *Stenotherus odoratus* is an abundant turtle that rarely ventures on land and basks sporadically (Ernst et al. 1994). Due to its highly aquatic lifestyle, the presence of this turtle could potentially be an indicator of freshwater habitat quality (Mitchell 1994).

Lastly, *Chelydra serpentina* (the Common Snapping Turtle) is abundant throughout the state of Virginia known to inhabit almost all aquatic systems (Ernst et al. 1994). It is an extremely large turtle with a maximum carapace length of 49.4 cm. This turtle is a game animal in Virginia and is actively harvested (Mitchell 1994).

The turtle community has never been studied at Waller Mill Lake. The goal of this study was to document the composition of the turtle community inhabiting the lake.

## Methods

All turtles were collected from Waller Mill Lake located in Waller Mill Park, Williamsburg, Virginia. The turtles were captured using hoop nets baited with sardines in oil and bananas. Hoop nets were secured using 1.8 meter plastic garden stakes and were only partially submerged to prevent the drowning of captured turtles. The nets were checked and reset daily. The carapace length (cm) and mass (kg) of all turtles were recorded. The turtles were marked using fingernail polish so recaptures could be documented. All turtles were returned to the site of capture. Collection occurred at various areas around the lake and took place from 17 June 2012 through 8 September 2012.

## Results

A total of 129 turtles of five species were captured in the study (Table 1). *Stenotherus odoratus* was the most commonly encountered species with 54 individuals captured (42%

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Table 1. Total number of turtles captured at Waller Mill Lake by species.

Species	Total	Male	Female	Hatchling/Juvenile	Percentage of Total Captured
<i>Chelydra serpentina</i>	6	3	0	3	0.05
<i>Chrysemys picta</i>	9	4	2	3	0.07
<i>Pseudemys rubriventris</i>	38	21	12	5	0.29
<i>Sternotherus odoratus</i>	54	27	27	0	0.42
<i>Trachemys scripta</i>	37	5	8	24	0.29

of the total captured). The total captured for *Trachemys scripta*, *Pseudemys rubriventris*, *Chrysemys picta*, and *Chelydra serpentina* were 37 (29% of the total captured), 38 (29% of the total captured), 9 (7% of the total captured), and 6 (5 % of the total captured) respectively.

Descriptive statistics for carapace length and mass for adult turtles are shown in Table 2.

Table 2. Ranges and means of length and mass for adult turtles captured at Waller Mill Lake. ( $\pm$ ) indicates standard deviation. (\*) indicates insufficient data to compute the descriptive statistic.

Species	Sex	N	Range of Carapace Length (cm)	Mean Carapace Length (cm)	Range of Mass (kg)	Mean Mass (kg)
<i>Trachemys scripta</i>	Male	5	9.2 - 22.9	15.6 $\pm$ 5.21	*	*
	Female	8	16.2 - 26.7	23.1 $\pm$ 3.84	0.55 - 2.4	1.8 $\pm$ 0.56
<i>Pseudemys rubriventris</i>	Male	22	13.1 - 31.5	21.7 $\pm$ 5.85	0.3 - 2.8	1.12 $\pm$ 1.92
	Female	12	13.4 - 32.4	28.4 $\pm$ 5.38	0.3 - 3.4	2.5 $\pm$ 0.89
<i>Chrysemys picta</i>	Male	4	10.6 - 14.9	13.3 $\pm$ 1.92	0.15 - 0.4	0.3 $\pm$ 0.11
	Female	2	11.9 - 14.4	*	*	*
<i>Sternotherus odoratus</i>	Male	22	10.1 - 12.9	11.2 $\pm$ 0.78	*	*
	Female	27	9.3 - 12.7	10.6 $\pm$ 0.73	*	*
<i>Chelydra serpentina</i>	Male	6	*	14.3 $\pm$ 3.66	*	*
	Female	0	*	*	*	*

Adult female *Trachemys scripta* ranged in size from 16.2 cm to 26.7 cm carapace length (CL) (mean =  $23.1 \pm 3.84$ ; n = 8) and weighed 0.55 kg to 2.4 kg (mean =  $1.8 \pm 0.56$ ; n = 7). Adult male *T. scripta* ranged in size from 9.2 cm to 22.9 cm CL (mean =  $15.6 \pm 5.21$ ; n = 5). Insufficient data were collected on male *T. scripta* to compute descriptive statistics on mass. Adult female *Pseudemys rubriventris* ranged in size from 13.4 cm to 32.4 cm CL (mean =  $28.4 \pm 5.38$ ; n = 12) and weighed 0.3 kg to 3.4 kg (mean =  $2.5 \pm 0.89$ ; n = 12). Adult male *Pseudemys rubriventris* ranged in size from 13.1 cm to 31.5 cm CL (mean =  $21.7 \pm 5.85$ ; n = 22) and weighed 0.3 kg to 2.8 kg (mean =  $1.1 \pm 0.79$ ; n = 22). Only two adult female *Chrysemys picta* were collected and measured 11.9 cm and 14.4 cm CL. Adult male *C. picta* ranged in size from 10.6 cm to 14.9 cm CL (mean =  $13.3 \pm 1.92$ ; n = 4) and weighed 0.15 kg to 0.4 kg (mean =  $0.3 \pm 0.11$ ; n = 4). Adult female *Sternotherus odoratus* ranged in size from 9.3 cm to 12.7 cm CL (mean =  $10.6 \pm 0.73$ ; n = 27). Adult male *S. odoratus* ranged in size from 10.1 cm to 12.9 cm CL (mean =  $11.2 \pm 0.78$ ; n = 22). Due to equipment limitations, *S. odoratus* were too small to be accurately measured in terms of mass. Six juvenile male *Chelydra serpentina* were collected with a mean CL of  $14.3 \text{ cm} \pm 3.66$ .

### Discussion

The turtle community structure of Waller Mill Lake was typical for lakes in southeastern Virginia. In addition, the composition was found to be very similar to Lake Maury, Newport News, Virginia (Demnicki 2007) and Bethel Reservoir, Hampton, Virginia (Galvez et al. 1998). However, *T. scripta* was the dominant species collected from Lake Maury comprising 65% of the total captures (Demnicki 2007) whereas *Sternotherus odoratus* was encountered most often at Waller Mill Lake. Additionally, the introduced *Graptemys pseudogeographica kohnii* (Mississippi Map Turtle) is known to inhabit Lake Maury (Demnicki 2007) but was not encountered at Waller Mill Lake.

Another distinction between the turtle communities of Waller Mill Lake and Lake Maury were the large number of hatchlings collected at Waller Mill Lake. A total of 35 hatchlings were encountered. While both studies were conducted during the same time of year, this is in stark contrast to Lake Maury where no hatchlings were captured or observed (Demnicki 2007). The apparent reproductive success at Waller Mill Lake may be due, in part, to the presence of an invasive aquatic plant that is not present at Lake Maury. The plant, which appears to be *Najas minor* (Waternymph), has invaded much of the shallow depths in and around the more popular areas of the lake. Not only were hatchlings collected in traps placed in these areas, but a large number of hatchlings were observed swimming and basking in the areas where the invasive plant was present (Zahn, personal observation). It is also important to note that the turtles at Waller Mill Lake appear to be consuming large amounts of the invasive *N. minor* based on cursory observations of their feces during feeding trials (Zahn, personal observation).

During this study, a single individual of *Trachemys scripta scripta* was collected compared to 36 *Trachemys scripta elegans*. Populations of the native *T. scripta scripta* are being impacted by intergradation with the non-native *T. scripta elegans*, which threatens the genetic integrity of *T. scripta scripta* (Mitchell 1994). Mitchell (1994) predicts that most populations of the native *T.*

*scripta scripta* in Virginia will be replaced with populations of intergrades in the future. During a field investigation conducted at Lake Maury, Newport News, Virginia, only 2 *T. scripta* captured out of 69 were diagnosable as *T. scripta scripta* (Demnicki 2007). Most of the *T. scripta* captured appeared to be intergrades of varying degree and most were phenotypically indistinguishable from pure *T. scripta elegans* (Demnicki 2007). This result is consistent with Mitchell's (1994) prediction. In fact, the Red-eared Slider is considered one of the 100 worst invasive species worldwide (Lowe et al. 2000).

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