

**INVENTORY AND MONITORING OF HERPETOFAUNA IN THE DISTRICT
OF COLUMBIA**

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ABSTRACT

The DC Wildlife Action Plan was developed in 2001 and the District Department of the Environment, Fisheries and Wildlife Division, is responsible for implementing the plan. The purpose of the District herpetofauna survey is to inventory and monitor the condition of herpetofauna populations in order to better conserve species of greatest conservation need (SGCN) and their habitats. Currently, there are a total of 38 reptile and amphibian species listed as SGCN in the District (22 and 16 respectively). The 2007 and 2008 surveys worked towards these objectives, but there is still limited information on the population and diversity of herpetofauna. The purpose of this study was to conduct several surveys that would aid in a more complete inventory of the herpetofauna in the District so that populations can be monitored and assessed more thoroughly. Throughout the 2009 field season, a total of 17 SGCN were documented between the eight study areas. During the frog call surveys at the National Arboretum, four SGCN were heard calling and *Bufo woodhousii fowleri* was observed alongside one of the pond areas. Only two salamander SGCN were found (*Plethodon cinereus* and *Eurycea bislineata*), both while conducting visual encounter surveys and one species of lizard (*Eumeces fasciatus*), which was found at 50% of the study areas. Turtles were documented both from visual encounter and from turtle trapping. A total of four SGCN were found, most notably *Clemmys guttata*, which was trapped in the National Arboretum and seen in Kenilworth Park and Aquatic Gardens. The majority of snake species were found during the artificial cover surveys, with five being SGCN. Theodore Roosevelt Island was the only study area where *Regina septemvittata* was documented and Fort Dupont was the only study area where *Carphophis amoneus amoneus* and *Diadophis punctatus punctatus* were located. These results indicate further surveys need to be conducted to attempt to document more SGCN and to gather more data to better determine species richness and abundance.

Keywords: Wildlife Action Plan, Herpetofauna, Surveys, Inventory

INVENTORY AND MONITORING OF HERPETOFAUNA IN THE DISTRICT OF COLUMBIA

Job Number and Title:

Job #1: Inventory and monitoring of herpetofauna.

Job #2: Turtle trapping mark-recapture population estimation.

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INTRODUCTION

Herpetofauna is a term to collectively group reptiles (snakes, lizards, and turtles) and amphibians (frogs, toads, salamanders, and sirens) of a given area. Both reptiles and amphibians are on a global decline due to many factors such as habitat loss and degradation, invasive species, environmental pollution, and disease (Gibbons et al. 2000). Reptiles and amphibians are key biological indicators as they are in close contact with water and soil; therefore, environmental toxins can be absorbed through the skin (especially in the highly permeable skin of amphibians). Also, most herpetofauna have small home ranges, which makes it hard to avoid habitat disturbance or contamination.

With a global decline of amphibians and reptiles, due to factors such as habitat loss, invasive species, environmental pollutants, and disease, much attention has been paid to conservation efforts of the species (Gibbons et al. 2000; Row and Blouin-Demeres 2006). And according to the DC Wildlife Action Plan (WAP), over half of the amphibian and reptile species located in the District are listed as species of greatest conservation need (SGCN) (Chapter 3, pp46-47). With their habitat being infringed upon by human activity, it is important to understand where these species live and the habitat they require to survive in order to prevent further decline (Corn and Bury 1990).

Locating amphibian and reptiles can be a complex task given their cryptic nature and as a result, monitoring their populations can be difficult (Mazerolle et al. 2007). The key to generating an inventory comes from knowing the habitat that each species requires and implementing a number of different sampling methods (Scott 1976). Once the species are located and documented, the task of monitoring the population and restoring habitat becomes slightly less daunting.

Along with the goals of identifying species and their habitats and increasing the understanding of these species, the goals of the WAP are to conserve species and their habitats. Additionally, other goals of the WAP aim to create partnerships with other leading conservation agencies educate and engage the public in the understanding of conservation needs, and to strengthen the current conservation actions and regulations (District Department of the Environment, WAP 2006). With these goals, the WAP acts to save species from becoming endangered or extinct and work towards getting funding to protect species that have not historically been given funding (District Department of the Environment, WAP 2006).

Objectives

1. To encompass a greater number of study areas throughout the District to fill herpetofauna data gaps.
2. To implement several different survey methods to obtain a greater understanding of herpetofauna diversity in the District.
3. To identify key habitats within study areas that support species diversity.
4. To identify and implement the best monitoring strategies to target species listed as SGCN in the WAP.

Study Areas

Rock Creek Park is the largest national park located in the District of Columbia (est. 1890). There are numerous pieces of property that are included in Rock Creek Park Management including Battery Kimble (Palisades Park), Glover Archbold Park, Fort Reno, Fort Totten, Dumbarton Oaks Park, Normanstone Parkway, Soapstone Valley Park, etc. It incorporates 2,820 acres of hardwood forest, grassland/managed meadows, and forested wetland/riparian forest/floodplain (District Department of Environment 2006).

Inventory Sampling Methods

Sampling for herpetofauna species took place from March through October 2009. Sampling for each species type involved various types of methods in order to generate a complete species list.

Job #1: Inventory and monitoring of herpetofauna

Introduction

Inventorying and monitoring of herpetofauna should begin in the spring when most species are starting to emerge, and continue through the summer and early fall months, when activity is greatest (Karns 1986). Species diversity and abundance largely depends on many other factors such as temperature, rainfall, time of day, and the habitat being surveyed (Karns 1986). For these reasons, baseline inventories of herpetofauna often require more than one type of survey to locate and document as many species as possible.

In the District, most herpetofauna information is limited to a few reports from the C&O Canal and Rock Creek Park in the National Park Service's NPSpecies database (<https://science1.nature.nps.gov/npspecies/web/main/start>). These studies have collected inventories that have focused primarily on amphibians and amphibian breeding. To narrow data gaps and develop a more comprehensive herpetofauna inventory, it is necessary to implement additional surveys.

The purpose of inventories was to incorporate several survey methods that encompassed a larger amount of herpetofauna species that may not all be attracted to similar types of traps or covers. Trap nights and search time during field visits were based around locating and documenting the greatest number of species possible. Although surveys targeted all species, SGCN and their habitats were significant finds.

Survey Protocol

Trap Arrays

Trap arrays consist of employing both pitfall traps and funnel traps with the use of drift fences in the form of an array. The design creates barriers that direct the animal into either a pitfall or a funnel trap (Corn 1994). Arrays have been used frequently to sample amphibians and reptiles and can be used for abundance data and habitat use of species (Corn 1994).

Snakes, lizards, frogs, toads, and salamanders were inventoried in Glover Archbold Park using trap array design methods similar to those in Corn and Bury (1990) and Row and Blouin-Demers (2006) and trap array set-ups in Crosswhite et al. (1999). The double ended funnel traps were designed using methods from Messmer and Wiscomb (1998), with a portion of the trap covered to prevent overheating and desiccation. Leaves and debris were piled around the funnel on either side as to blend with the habitat. Drift fences were constructed from 3 ft. x 100ft black silt fencing, and set in three directions off of a center two gallon pitfall trap, with pitfall traps at each of the other ends. Double ended funnel traps were placed in the center on either side of the drift fences. The trap array placements were pre-selected at random and were placed at least 75 m from edges (Corn and Bury 1990), in habitat best suited for species. Traps were checked daily and animals were measured (snout-vent-length and tail length) and recorded. Traps were open for 5 consecutive days at a time, throughout the summer, and were closed when not being used.

Artificial Cover

Reptiles and amphibians frequently take cover under objects such as logs, boards, rocks, etc., thus adding artificial cover to their habitats increases the probability of encountering many species (Fellers and Drost 1994; Kinkead 2006). Coverboards (0.6m x 0.6m cut pieces of plywood) were set up in randomly selected transects, in habitat most suitable for various reptiles and amphibians (Kinkead 2006). Transects can be useful in determining density of small reptiles and amphibians that have smaller home ranges (Fellers and Drost 1994; Houze and Chandler 2002).

Six random points were generated on GIS. Initially, two of those points were chosen in each park to set out transects of five plywood boards (0.6m x 0.6m), set 30 m apart. The locations of points were altered only if deemed necessary by park managers or there was no suitable habitat. Boards were set out between 30 April and 12 May and checked, on average, once a week. Checking included slowly lifting boards and searching the entire area underneath for any species. The boards were alternated to the other random points to cover more of the park if species detection was low. Species caught were sexed (if possible) and measured for snout-to-vent length (SVL). All boards were removed from study areas by 20 October.

Visual Encounters

Visual encounters involve walking through a study area and systematically searching for species (Zimmerman 1994). Time spent searching was based on person-hours, calculated at 30 minutes per two people searching equals to one hour total search time. While a

population estimate cannot be obtained from visual encounters/searches, the presence/absence of species and species richness can be determined.

In addition to trapping and the use of artificial cover, terrestrial turtles, snakes, lizards, frogs, toads, and salamanders were inventoried through visual encounter surveys (VES; Corn and Bury 1990). These searches were often executed while out in the field checking traps or coverboards, or independently, by flipping over cover objects. Additional time constrained searches for salamanders were conducted along streamsides in Glover Archbold. All searches were conducted between March and October. And while a population estimate cannot be obtained from visual encounters/searches, the presence/absence of species can.

Results

Trap Arrays

Of the total traps nights, only one *Plethodon cinereus* (red-back salamander) was caught in a funnel trap at Glover Archbold. Due to low capture success and the frequent dislodging of the pitfall traps, this survey method was discontinued.

Artificial Cover

There were no species documented under coverboards at Glover Archbold. Future studies will look at occupancy estimates and detection probabilities in the park, looking at factors that may affect the presence/absence of species.

Visual Encounters

A total of three species were found during the VES (see Table 1). Terrestrial species found included *P. cinereus* and *Terrapene carolina carolina* (eastern box turtle) and *Eurycea bislineata* (northern two-lined salamander) was found while searching the stream.

Indices of species diversity and population estimates were not able to be obtained from the data due to the fact that individuals were not marked for future recognition. Future surveys will focus on occupancy estimates and detection probabilities for monitoring species.

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Job #2: Aquatic turtle trapping mark-recapture population estimation

Introduction

Estimates for aquatic turtle populations are often obtained by visual observation of basking turtles or physical trapping. The downside to visually observing turtles is that many are shy and will move into the water before positive identification, and distinguishing between species can be difficult when the carapaces are dry. Also, there are several species of turtles that do not bask. For these reasons, population estimates were based solely on mark-recapture methods from trapping, allowing for future recognition during monitoring efforts.

During the 2007 field season, basking turtle surveys were conducted along the C&O Canal and at the National Arboretum (DDOE 2007). Results from those studies yielded a species list that included *Chelydra serpentina* (common snapping turtle), *Chrysemys picta picta* (eastern painted turtle), *Trachemys scripta elegans* (red-eared slider), *Kinosternon subrubrum subrubrum* (eastern mud turtle), and *Pseudemys rubriventris* (redbelly cooter). The 2008 survey involved trapping aquatic turtles with the using of basking traps only along the C&O Canal (DDOE 2008).

Survey Protocol

Aquatic turtles were trapped at Rock Creek, along Beach Drive using the mark-recapture method. Hoop nets (Sterling Net and Twine Co.) were placed parallel to the shoreline and submerged under water, leaving enough of the trap exposed so trapped turtles are able to come up for air. Traps were checked and put in a slightly different location in Rock Creek, to reduce trap shyness. Traps were baited with sardines or fish. Turtles were measured for plastron and carapace lengths and widths, weighed, sexed (if possible), marked, and released. Turtles were marked with a specific code on the marginal scutes, as in Kinkead (2006) with a three-edge taper file. Due the aggressive nature of *C. serpentina* while on land, a notch was put only on a single marginal scute near the tail end.

Data was analyzed using both the Schnabel population estimator and the United States Geological Survey (USGS) program CAPTURE (White and Burnham 1978 and Rexstad and Burnham 1991).

Results

Trapping took place between 18 May and 2 August 2009. A total of 18 turtles (with one recapture) were caught in 90 trap nights (Figure 1). Since only two *T. scripta elegans* were caught, no population estimator could be run in CAPTURE. With only one *C. serpentina* recapture, program CAPTURE estimated the population to be 60 ± 17.0128 ($n \pm se$).

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APPENDIX A
TABLES

Table 1. Species visually located in study areas during 2009 visual encounter surveys.

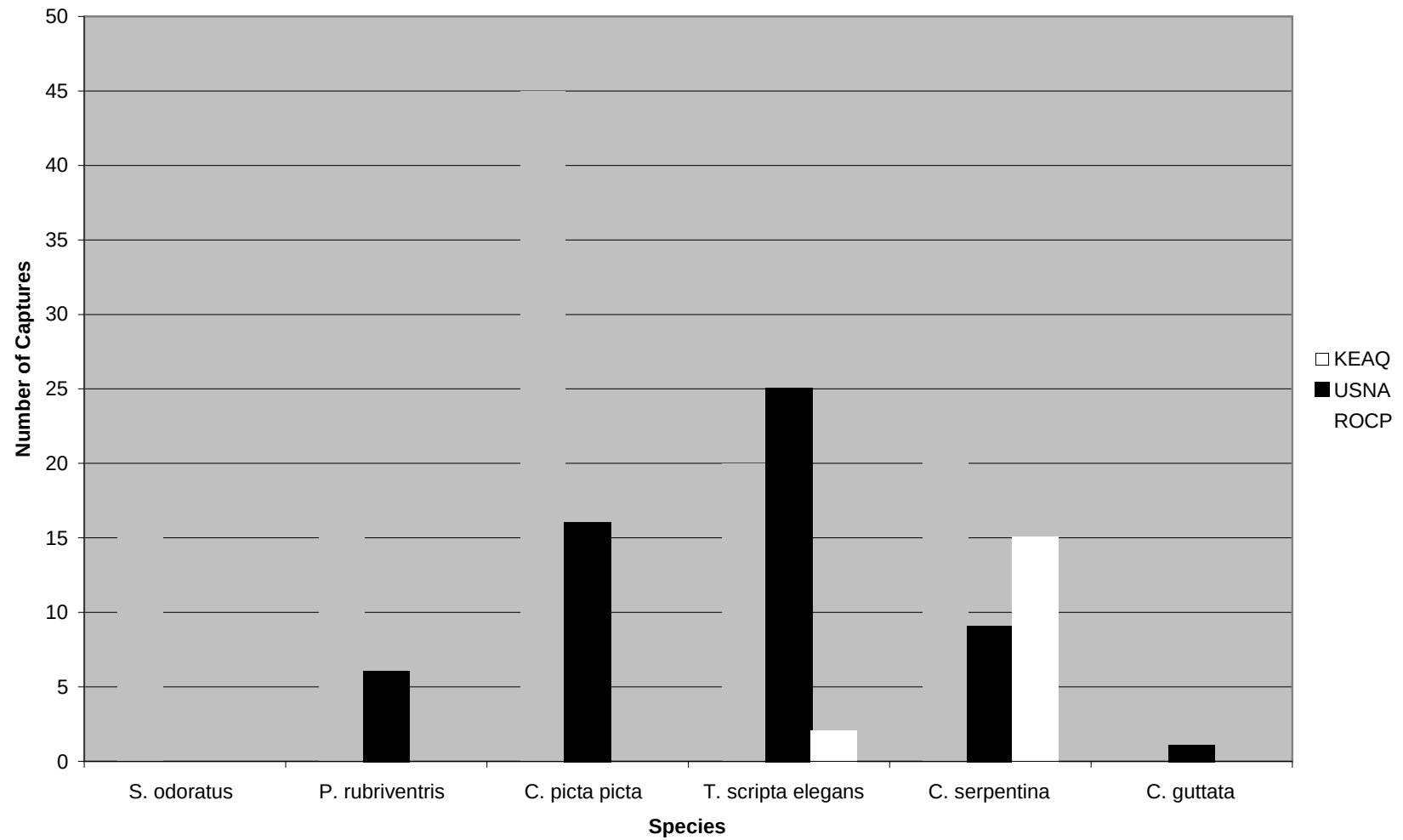
***denotes SGCN**

Study Area	Species	No. Occurrences	Habitat
Fort Dupont	Redback Salamander (<i>Plethodon cinereus</i>)*	1	Hardwood forest
	Northern Two-lined Salamander (<i>Eurycea bislineata</i>)*	1	Streamside
	Eastern Worm Snake (<i>Carphophis amoenus amoenus</i>)*	1	Early successional shrub-scrub/edge
	Northern Brown Snake (<i>Storeria dekayi dekayi</i>)*	1	Early successional shrub-scrub/edge
Glover Archbold	Redback Salamander (<i>Plethodon cinereus</i>)*	5	Hardwood forest
	Northern Two-lined Salamander (<i>Eurycea bislineata</i>)*	2	Streamside
	Eastern Box Turtle (<i>Terrapene carolina carolina</i>)*		Hardwood forest
Kenilworth	Black Rat Snake (<i>Elaphe obsoleta obsoleta</i>)	3	Emergent non-tidal wetland/Pond edge
	Five-lined Skink (<i>Eumeces fasciatus</i>)*	1	Pond edge
	Green Frog (<i>Rana clamitans melanota</i>)	1	Pond edge
	Bullfrog (<i>Rana catesbeiana</i>)*	2	Pond edge
	Southern Leopard Frog (<i>Rana utricularia</i>)*	6	Emergent non-tidal wetland/Pond edge/Marsh edge
	American Toad (<i>Bufo americanus</i>)*	1	Marsh edge
National Arboretum	Redback Salamander (<i>Plethodon cinereus</i>)*	1	Hardwood forest
	Green Frog (<i>Rana clamitans melanota</i>)	10	Road/Corridor/Pond edge
	Pickrel Frog (<i>Rana palustris</i>)*	1	Road/Corridor
	Fowler's Toad (<i>Bufo woodhousii fowleri</i>)*	2	Pond edge
Pope Branch	Redback Salamander (<i>Plethodon cinereus</i>)*	8	Riparian forest
Poplar Point	Five-lined Skink (<i>Eumeces fasciatus</i>)*	2	Road/Corridor

	Southern Leopard Frog (<i>Rana utricularia</i>)*	4	Road/Corridor
	Eastern Garter Snake (<i>Thamnophis sirtalis sirtalis</i>)*	1	Early successional shrub-scrub/edge
	Red-eared Slider (<i>Trachemys scripta elegans</i>)	1	Emergent non-tidal wetland
Theodore Roosevelt Island	Northern Brown Snake (<i>Storeria dekayi dekayi</i>)*	1	Riparian forest
	Eastern Garter Snake (<i>Thamnophis sirtalis sirtalis</i>)*	6	Riparian forest/Emergent tidal wetland/Hardwood forest
	Queen Snake (<i>Regina septemvittata</i>)*	1	Riparian Forest
	Black Rat Snake (<i>Elaphe obsoleta obsoleta</i>)	2	Forested wetland
	Five-lined Skink (<i>Eumeces fasciatus</i>)*	20	Riparian forest/Forested wetland
	Red-eared Slider (<i>Trachemys scripta elegans</i>)	1	Emergent tidal wetland
	Green Frog (<i>Rana clamitans melanota</i>)	1	Forested wetland
	American Toad (<i>Bufo americanus</i>)*		Forested wetland

APPENDIX B
FIGURES

Figure 1. 2009 Aquatic Turtle Trapping Data



APPENDIX C

Data from visual encounter surveys, 2009.

Study Area	Date	Habitat	Species	Temp (°C)	SVL (mm)	Sex	Location	Substrate
Fort Dupont	5/5/2009	Hardwood Forest	<i>P. cinereus</i>	55	20	U	Under log	Leaf litter
	5/6/2009	Streamside	<i>E. bislineata</i>	60	27.5	U	Under log	Leaf litter
	5/8/2009	Hardwood Forest/Road/Corridor	<i>C. amoenus amoenus</i>	65	-	U	Under board	Mud
	8/11/2009	Hardwood Forest/Road/Corridor	<i>Storeria dekayi dekayi</i>	87	83	U	Road/Corridor	Veg
Poplar Point	5/14/2009	Road/Corridor	<i>Eumeces fasciatus</i>	75	-	J	Road	Veg
		Road/Corridor	<i>Eumeces fasciatus</i>	75	-	U	Road	Veg
	5/19/2009	Road/Corridor	<i>R. utricularia</i>	72	-	U	Road	Water
		Road/Corridor	<i>R. utricularia</i>	72	-	U	Road	Water
	5/28/2009	Road/Corridor	<i>R. utricularia</i>	69	-	U	Road	Water
	6/2/2009	Forested Wetland	<i>T. scripta elegans</i>	75	-	F	Wetland	Water
	6/10/2009	Road/Corridor	<i>R. utricularia</i>	69	-	U	Road	Water
National Arboretum	4/28/2009	Hardwood Forest	<i>P. cinereus</i>	80	30	U	Under log	Leaf litter
		Pond	<i>R. clamitans melanota</i>	80	-	U	Pond	Water
	5/1/2009	Pond	<i>R. palustris</i>	-	37.5	U	Pond	Water
	6/11/2009	Grassland/Meadow	<i>B. woodhousii fowleri</i>	73	61	U	Grass	Veg
Theodore Roosevelt Island	4/24/2009	Forested Wetland	<i>Eumeces fasciatus</i>	63	-	U	On log	Veg
		Forested Wetland	<i>Eumeces fasciatus</i>	63	-	U	On log	Veg
		Forested Wetland	<i>Eumeces fasciatus</i>	63	-	U	On log	Veg
		Forested Wetland	<i>Eumeces fasciatus</i>	63	-	U	On log	Veg
		Riparian Forest	<i>T. sirtalis</i>	63	-	U	Wetland	Leaf Litter
		Riparian Forest	<i>S. dekayi dekayi</i>	63	190	U	Under log	Mud
	4/28/2009	Forested Wetland	<i>Eumeces fasciatus</i>	80	-	U	On log	Veg
		Forested Wetland	<i>Eumeces fasciatus</i>	80	-	U	On log	Veg

		Forested Wetland	<i>Eumeces fasciatus</i>	80	-	U	On log	Veg
		Forested Wetland	<i>Eumeces fasciatus</i>	80	-	U	On log	Veg
		Forested Wetland	<i>Eumeces fasciatus</i>	80	-	U	On log	Veg
		Forested Wetland	<i>Eumeces fasciatus</i>	80	-	U	On log	Veg
		Forested Wetland	<i>Eumeces fasciatus</i>	80	-	U	On log	Veg
		Forested Wetland	<i>Eumeces fasciatus</i>	80	-	U	On log	Veg
		Forested Wetland	<i>Eumeces fasciatus</i>	80	-	U	On log	Veg
		Forested Wetland	<i>Eumeces fasciatus</i>	80	-	U	On log	Veg
		Forested Wetland	<i>Eumeces fasciatus</i>	80	-	U	On log	Veg
	5/5/2009	Forested Wetland	<i>T. scripta elegans</i>	55	-	F	Wetland	Water
		Forested Wetland	<i>T. sirtalis</i>	55	-	U	Wetland	Veg
	5/8/2009	Forested Wetland	<i>R. septemvittata</i>	71	-	U	Boardwalk	Boardwalk
		Forested Wetland	<i>Eumeces fasciatus</i>	71	-	M	Boardwalk	Boardwalk
		Forested Wetland	<i>Eumeces fasciatus</i>	71	-	J	Boardwalk	Boardwalk
	5/28/2009	Forested Wetland	<i>Eumeces fasciatus</i>	71	-	M	Boardwalk	Boardwalk
		Forested Wetland	<i>T. sirtalis</i>	77	-	M	Wetland	Veg
		Forested Wetland	<i>T. sirtalis</i>	77	-	F	Wetland	Veg
		Hardwood Forest/Road/Corridor	<i>T. sirtalis</i>	77	-	U	Under log	Veg
	6/2/2009	Forested Wetland	<i>Eumeces fasciatus</i>	85	110	M	Boardwalk	Boardwalk
		Forested Wetland	<i>E. obsoleta obsoleta</i>	85	680	U	Wetland	Veg
	8/3/2009	Forested Wetland	<i>E. obsoleta obsoleta</i>	82	-	U	Wetland	Veg
		Forested Wetland	<i>B. americanus</i>	82	-	U	Wetland	Veg
		Forested wetland	<i>R. clamitans melanota</i>	82	-	U	Wetland	Veg
		Hardwood Forest	<i>T. sirtalis</i>	82	-	U	On tree	Veg
Glover Archbold	4/29/2009	Stream	<i>P. cinereus</i>	55	20	U	Under rock	Leaf Litter
		Stream	<i>P. cinereus</i>	55	50	U	Under rock	Leaf Litter
		Stream	<i>P. cinereus</i>	55	40	U	Under rock	Leaf Litter
	4/30/2009	Stream	<i>E. bislineata</i>	57	35	U	Under rock	Leaf Litter
		Stream	<i>E. bislineata</i>	57	35	U	Under rock	Leaf Litter
	5/5/2009	Hardwood Forest	<i>P. cinereus</i>	55	30	U	Under log	Leaf Litter

	6/4/2009	Hardwood Forest	<i>P. cinereus</i>	64	30	U	Under log	Leaf Litter
	7/7/2009	Hardwood Forest	<i>T. carolina carolina</i>	81	-	M	Veg	Veg
Kenilworth	5/15/2009	Non-tidal Wetland	<i>E. obsoleta obsoleta</i>	-	-	U	In tree	Veg
		Pond	<i>E. obsoleta obsoleta</i>	-	-	U	Grass	Veg
		Pond	<i>E. obsoleta obsoleta</i>	-	-	U	Grass	Veg
	5/19/2009	Pond	<i>Eumeces fasciatus</i>	55	-	U	On log	Leaf litter
	7/22/2009	Non-tidal Wetland	<i>R. utricularia</i>	85	34	U	Wetland	Water
		Non-tidal Wetland	<i>R. utricularia</i>	85	39	U	Wetland	Water
		Non-tidal Wetland	<i>R. utricularia</i>	85	41	U	Wetland	Water
		Non-tidal Wetland	<i>R. utricularia</i>	85	-	U	Wetland	Water
		Pond	<i>R. utricularia</i>	85	-		Pond	Water
	9/15/2009	Marsh (edge)	<i>R. utricularia</i>	83	-	U	Grass	Veg
		Marsh (edge)	<i>B. americanus</i>	83	56	U	Grass	Veg
Pope Branch	3/16/2009	Hardwood Forest	<i>P. cinereus</i>	48	38.1	U	Under log	Leaf litter
	3/19/2009	Hardwood Forest	<i>P. cinereus</i>	54	38.1	U	Under log	Leaf litter
		Hardwood Forest	<i>P. cinereus</i>	54	44.5	U	Under log	Leaf litter
		Hardwood Forest	<i>P. cinereus</i>	54	25.4	U	Under log	Leaf litter
		Hardwood Forest	<i>P. cinereus</i>	54	44.5	U	Under log	Leaf litter
		Hardwood Forest	<i>P. cinereus</i>	54	25.4	U	Under log	Leaf litter
		Hardwood Forest	<i>P. cinereus</i>	54	31.8	U	Under log	Leaf litter
		Hardwood Forest	<i>P. cinereus</i>	54	38.1	U	Under log	Leaf litter

Data for turtle trapping at Rock Creek Park, 2009.

Date	Pond/Point	Trap Type	Species	Carpac e Length (cm)	Carapac e Width (cm)	Plastro n Length (cm)	Plastro n Width (cm)	Sex	Wt. (g)	ID	Notes/Basking Structures
7/7/2009	RCP-9	Hoop	<i>C. serpentina</i>	-	-	-	-	-	-	-	Not in trap
7/8/2009	RCP-4	Hoop	<i>C. serpentina</i>	30.6	26.4	-	-	U	-	K	Notched scute K
7/10/2009	RCP-3	Hoop	<i>C. serpentina</i>	25.4	17.1	-	-	U	-	K	Notched scute K
7/11/2009	RCP-2	Hoop	<i>T. scripta elegans</i>	25.1	18.3	23.7	12.5	F	2800	BKN	
	RCP-2	Hoop	<i>C. serpentina</i>			-	-	-	-	-	Got out of trap
7/14/2009	RCP-2	Hoop	<i>C. serpentina</i>	36.3	29.7	-	-	U	-	N	
	RCP-2	Hoop	<i>C. serpentina</i>	26.1	21.7	-	-	F	-	N	
	RCP-5	Hoop	<i>C. serpentina</i>	33.1	27.2	-	-	U	-	K	
7/15/2009	RCP-10	Hoop	<i>C. serpentina</i>	28.3	23.2	-	-	F	-	K	
	RCP-11	Hoop	<i>C. serpentina</i>	28.1	24.3	-	-	U	-	K	
7/31/2009	RCP-14	Hoop	<i>C. serpentina</i>	20	16.8	-	-	F	-	K	
	RCP-14	Hoop	<i>T. scripta elegans</i>	21.9	17.2	20.2	10.4	F	2100	BKO	
	RCP-16	Hoop	<i>C. serpentina</i>	35.1	28.1	-	-	U	-	K	
	RCP-17	Hoop	<i>C. serpentina</i>	21.5	18.4	-	-	F	-	K	
	RCP-18	Hoop	<i>C. serpentina</i>	20.9	18.7	-	-	F	-	K	
8/2/2009	RCP-13	Hoop	<i>C. serpentina</i>	-	-	-	-	U	-	-	Released
	RCP-17	Hoop	<i>C. serpentina</i>	-	-	-	-	U	-	-	Released