

**Virginia Herpetological Society Survey of Back Bay NWR
and False Cape State Park**

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Introduction

Back Bay National Wildlife Refuge was established in 1938 and is located in the independent city of Virginia Beach. It is one of over 545 refuges in the National Wildlife Refuge System administered by the U.S. Fish and Wildlife Service. The Refuge contains 3,667 hectares (9,062 acres) of wildlife habitat on the Currituck Banks Peninsula and includes a barrier island typical of those found along much of the U.S. Atlantic and Gulf Coasts. Habitats include beach and large sand dunes, maritime forest, wooded swamp, fresh water marshes, ponds, and large impoundments. Many of the marshes are located in and around islands within Back Bay. The Refuge is an important location for migratory bird species on the mainstream of the Atlantic Flyway.

False Cape State Park was established in 1980 and is part of the Virginia State Park System. It has 9.5 km (5.9 miles) of beach front and contains 1,750 hectares (4,321 acres) of beach, sand dunes, maritime forest and marshes. It abuts Back Bay NWR to the north, the North Carolina border to the south and Back Bay to the west. False Cape earned its name due to its resemblance to Cape Henry, when seen from the ocean. The real Cape Henry is located 32.2 km (20 miles) to the north, at the entrance to the mouth of Chesapeake Bay. As many as 300 residents occupied the area within False Cape known as Wash Woods from the 1880s-1920s. Hurricanes prompted most of the population to leave by the end of the 1930s. Remnants of the previous human civilization are still visible within some sections of the park.

The Virginia Herpetological Society (VHS) chose Back Bay NWR and False Cape State Park for its spring survey because these areas had not been surveyed by the VHS for more than 20 years and they are near the northern national limit of the range of several reptile and amphibian species. We had approximately 42 volunteers participate in the survey on Saturday 04 May 2013 from 9:00 to 16:00h and were organized into seven groups to survey four zones within Back Bay NWR (Refuge) and three zones within False Cape State Park (Park). Turtle traps were pulled from several impoundments from 16:00 to 18:00h and 3 volunteers returned to the boardwalk area of Back Bay NWR after nightfall on Saturday to identify frog calls. Twenty four volunteers returned to survey four zones on Sunday. Four groups, comprised of 21 volunteers, participated from 08:30 to 12:30h and one group of 3 volunteers surveyed from 11:30 to 16:00h. Turtle Traps were pulled from E-Pool prior to the start of the Sunday surveys. Three of the zones surveyed on Sunday were also previously surveyed on Saturday and one zone (Black Gut-north of Sandbridge Road) was added.

Survey Sites

The following are general descriptions of the survey sites. Coordinates were either taken from the published maps for the Refuge or the Park or were specific GPS coordinates taken by the

Back Bay/False Cape Survey

group leaders. Due to weather and time constraints most of the sand dunes and beach areas within many of the zones were not surveyed.

Zone 1-Refuge-Long Island (N36° 39.654, W -75° 55.888)

This area is within Back Bay and is comprised of some dry woods on the eastern side of the island, freshwater marshes along the shore as well as some sandy spots. It was accessible by canoe and kayak.

Zone 2-Refuge-Visitor Contact Station (N36° 40.321, W-75° 54.942)

This area includes the boardwalk trail near the Visitor Contact Station, the marsh area along Back Bay and the bone yard/storage dump.

Zone 3-Refuge- C, G-Pools & C Storage Pool and surrounding areas (N36° 38.757, W-75° 54.717)

This area includes impoundments, freshwater marshes and maritime forest. Marshy areas contained reeds, cattails, greenbrier, blackberries and poison ivy. The maritime forest contained live oak, sweet gum, wax myrtle and loblolly pines.

Zone 4-Refuge/Park - A, B, H, J-Pools & B Storage Pool (N36° 37.837, W-75° 54.251)

This area includes impoundments, freshwater marshes and maritime forest. The forest contained many vernal pools.

Zone 5-Park-Barbour Hill/Sandy Point (N 36° 37.260, W-75° 54.019)

This area included maritime forest with vernal pools near the Barbour Hill and the Sand Ridge Trails and marshy areas near the South Inlet and Marsh Ridge Trail and the impoundments near Sandy Point and Teal Overlook.

Zone 6-Park-False Cape Landing (N 36° 35.799, W-75° 53.212)

This area included maritime forest near the Maple Leaf and Sand Ridge Trails and marshes along Tripps and Hammet Coves.

Zone 7- Park-Wash Woods/Dudley Island Loop Trail (N 36° 34.665, W-75° 53.351)

This area included the maritime forest and marshes near the Cemetery Trail, the southern portion of the Sand Ridge Trail, the Wash Woods Church Site and the Dudley Island Loop Trail.

Zone 8-Refuge-Sanbridge Road North/Black Gut (N36° 44.711, W-75° 57.259)

This area is heavily wooded with increasing marshes moving north toward Black Gut. Water depth in the marsh ranged from 15 to 30 cm (6 to 12 inches).

Materials and Methods

Turtle Traps, each baited with sardines, were positioned in C-Pool and C&B Storage Pools in the Refuge in the late afternoon of Friday 03 May 2013.

About 42 volunteers participated in the survey for approximately seven hours (from 09:00 to 16:00h) in the field on Saturday 04 May 2013 for a total of about 294 man hours. Due to the large acreage and diverse habitat to be surveyed, seven groups were organized to survey seven zones within the Refuge and Park (Zones 1 through 7 as described above). Manpower and man hours for each of the survey groups, is contained in Table 1 (Groups # 1-7). Weather conditions were unfavorable for most of the day with rain, wind and drizzle in the morning hours followed by partly sunny but windy conditions in the afternoon. The US Government National Oceanic and Atmospheric (NOAA) weather station located in Virginia Beach recorded a temperature range of 11°C (51.8°F) to 15°C (59.0°F) during the hours of the survey with the high temperature occurring around 14:00h.

Survey participants used multiple collecting methods to find amphibians and reptiles, including visual observation, listening for calling anurans, hand capture, 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, and released at the point of capture. Digital photos were taken of many of the captured animals and GPS coordinates of the locations for several specimens were recorded. Survey group leaders summarized and submitted all relevant data on VHS survey group data sheets.

The turtle traps positioned in C- Pool, B Storage Pool and C Storage Pool were inspected by two volunteers between 16:00 -18:00h. Several other survey participants helped to photograph and document the turtles that were captured. The traps were removed and several were re-baited with sardines and positioned within E-Pool.

Three volunteers returned to the Boardwalk/Visitor Contact Station area within the Refuge after nightfall to listen for calling anurans.

Twenty four volunteers participated in the survey on Sunday 05 May 2013. Prior to the start, turtle traps positioned within E- Pool were inspected. Several survey participants helped to photograph and document the turtles that were captured. Twenty one volunteers were organized into four groups for the morning survey (8:30-12:30h). Group 8 surveyed Zone 8 within the Refuge north of Sandbridge Road, approaching Black Gut, while Group 9 re-surveyed Zone 2 the Boardwalk/Visitor Contact Station area. Zone 7, the Dudley Island Loop and Zone 5, Teal Overlook/Sandy Point area within the Park were surveyed again by Groups 10 and 11. Weather conditions remained cool and windy for the morning sessions with occasional sunshine. The NOAA weather station located in Virginia Beach recorded a temperature range of 12.2°C (54°F) to 15°C (59°F) over the period 09:00 to 13:00h on Sunday 05 May. However, Group 8 recorded a high temperature of 17.2°C (63°F) near Black Gut.

Group 12 also surveyed Zone 2 within the Refuge but in the afternoon from 11:30 to 16:00h. Weather conditions remained cool, partly cloudy and windy. NOAA temperature records from Virginia Beach ranged from 13.3°C (56°F) to 15°C (59°F) during this time period.

All Sunday survey groups continued to use visual observation, listening for calling anurans, hand capture and using snake hooks and field sticks to overturn objects. All captured animals

Back Bay/False Cape Survey

were again observed for any malformations, diseases, unusual markings or characteristics and released at the point of capture. Digital photos were taken of some of the captured animals and GPS coordinates were taken for some of the locations. Survey group leaders summarized and submitted all relevant data on VHS survey group data sheets.

Table 1 Summary of manpower deployment.

Refuge Group#	Survey/Zone	Number	Man Hrs
1	Long Island	5	35
2	Boardwalk/Visitor Contact Station	10	70
3	C, G-Pools C Storage Pool	6	42
4	A, B, H, & J-Pools B Storage Pool	4	28
Turtle Traps	C-Pool, C & B Storage Pools	2	4
Night Time Turtle Traps	Boardwalk/Visitor Contact Station E-Pool	3 2	6 2
8	Sandbridge Rd.-North/Black Gut	7	21
9	Boardwalk/Visitor Contact Station	6	18
12	Boardwalk/Visitor Contact Station	3	12
Total		48	238
Park Group#	Survey/Zone	Number	Man Hrs
5	Barbour Hill/Sandy Point	6	42
6	False Cape Landing	7	49
7	Wash Woods/Dudley Island Loop	9	63
10	Wash Woods/Dudley Island Loop	5	15
11	Teal Overlook/Sandy Point	3	12
Total		30	181

Results

During the survey a total of 25 species were captured or positively identified, including 16 from the Class Reptilia and 9 from the Class Amphibia. The survey produced a total of 9 frog, 3 lizard, 8 snake and 5 turtle species. In addition some slider turtle intergrades were also captured and identified. No salamanders were observed in either the Refuge or the Park. A total of 200 animals were positively identified, 140 in the Refuge and 60 within the Park. No new Virginia Beach records were documented. Frogs were the most prominent animals captured or observed with 96 animals positively identified. Snakes were the most prominent reptiles with 59 animals positively identified. Table 2 summarizes the results for the Refuge and the Park. There may be some redundancy in reporting for Zone 2 in the Refuge (Boardwalk/Visitor Contact Station) as this zone was surveyed by three different daytime groups. Group 2 surveyed this zone for seven hours on Saturday. Group 9 surveyed this zone from 8:30 to 12:30h and Group 12 from 11:30 to

16:00h on Sunday. In addition the area was visited by three volunteers on Saturday after nightfall to listen for calling anurans.

Table 2. Summary of Reptiles and Amphibians observed at 8 localities in Back Bay National Wildlife Refuge and False Cape State Park. Zones 1-4 and 8 were in the Refuge, 5-7 were in the Park.

Zone	1	2	3	4	8	5	6	7	Total
Reptiles									
<i>Agkistrodon p. piscivorus</i>	4	7	3	2	2	1		1	20
<i>Coluber c. constrictor</i>	1	8	2			6		4	21
<i>Farancia e. erythrogramma</i>								1	1
<i>Nerodia e. erythrogaster</i>					1				1
<i>Nerodia s. sipedon</i>				1	1	1			3
<i>Nerodia taxispilota</i>		5				3		2	10
<i>Pantherophis alleghaniensis</i>		1							1
<i>Thamnophis s. sauritus</i>						1			1
<i>Chelydra s. serpentina</i>				1		5			6
<i>Chrysemys p. picta</i>		1							1
<i>Clemmys guttata</i>					1				1
<i>Pseudemys rubriventris</i>	3								3
<i>Trachemys s. scripta</i>		10	5		1	7		2	25
<i>Trachemys scripta x elegans intergrades</i>		3							3
<i>Aspidoscelis s. sexlineata</i>		2							2
<i>Plestiodon inexpectatus</i>					1				1
<i>Scincella lateralis</i>		3			1				4
Total Reptiles	8	40	10	4	8	24	0	10	104
Amphibians									
<i>Anaxyrus fowleri</i>	1	4		1		1		3	10
<i>Anaxyrus terrestris</i>	2	9	1				1	1	14
<i>Gastrophryne carolinensis</i>	3	3							6
<i>Hyla cinerea</i>	5	2	13					3	23
<i>Hyla squirella</i>				1				1	2
<i>Lithobates catesbeianus</i>		14	1					2	17
<i>Lithobates c. clamitans</i>					2				2
<i>Lithobates spenocephalus</i>		4	4			6	1	6	21
<i>Pseudacris crucifer</i>						1			1
Total Amphibians	11	36	19	2	2	8	2	16	96
Grand Totals	19	76	29	6	10	32	2	26	200

Annotated Check List-Refuge Reptiles

1. *Agkistrodon piscivorus piscivorus* (Eastern Cottonmouth) Eighteen Eastern Cottonmouths were positively identified during the survey. Four adults were observed on Long Island basking in the cattails. One of these appeared to be unhealthy with an enlarged left eye (N36° 39.542, W-75° 55.884) and was photographed (VHS Archive #268). Seven were observed in the vicinity of the Boardwalk and Visitor Contact Station. Among these 1 adult was observed swimming in the ditch alongside Sandpiper Road and another adult was observed swimming in Back Bay. Three juveniles were observed basking on stumps/reeds next to D-Pool. One adult was dead off the boardwalk trail (N36° 40.122, W-75° 55.154) and 1 adult was basking and gaping on the boardwalk and was photographed. A juvenile with a yellow tail was observed in a marsh area near the end of C Storage pool. Two other yellow-tailed juveniles were observed basking on a tree branch between A&B- Pools. Two adults were observed coiled, one on top of the other, in dormant vegetation within C- Pool and were photographed. Two juveniles were observed in the marsh area approaching Black Gut, coiled and resting.

2. *Coluber constrictor constrictor* (Northern Black Racer) Eleven Northern Black Racers were positively identified during the survey. One juvenile was observed on Long Island crawling in a forest clearing. Three adults, including one with a truncated tail, were found together on Saturday under a sign board (these were photographed) and another 2 adults were observed fleeing on Sunday from under a tipped board, all in the storage dump/trash pile near the Visitor Contact Station. Another adult was observed basking about 30 minutes after the sun appeared on the edge of a nearby wooded area. Two adults were observed basking in the reeds along the Bay Trail, one of these had some visible lesions. One adult was observed basking near the pump house near a Back Bay cove. One adult was found basking atop a small sandy hill along East Dike and was actively striking and photographed while holding its ground (N36° 39.808, W-75° 54.635). This specimen appeared to be healthy.

3. *Nerodia erythrogaster erythrogaster* (Plain-bellied Watersnake) One adult female Plain-bellied Watersnake was found basking and hand captured alongside the ditch on the north side of Sandbridge Road. This specimen had some scale rot and skin bumps and was photographed (N36° 44.711, W-75° 57.259).

4. *Nerodia sipedon sipedon* (Northern Watersnake) One healthy juvenile Northern Watersnake was found under artificial cover next to the intersection of B&H-Pools. One adult Northern Watersnake was observed basking on tree roots in the wooded marsh north of Sandbridge Road, approaching Black Gut.

5. *Nerodia taxispilota* (Brown Watersnake) Five Brown Watersnakes were positively identified in the vicinity of the Boardwalk/Visitor Contact Station. One adult and two sub-adult Brown Watersnakes were observed basking in and on rocks along Back Bay shoreline near the Visitor Contact Station. One adult Brown Watersnake was found dead beside the Boardwalk behind the Visitor Contact Station and one adult was observed crossing the road near the fishing pier.

6. *Pantherophis alleghaniensis* (Eastern Ratsnake) One adult Eastern Ratsnake was observed basking in the reeds at the edge of D-Pool. It was hand captured, and struck when handled and photographed. This specimen was healthy.
7. *Chelydra Serpentina* (Eastern Snapping Turtle) One adult Eastern Snapping Turtle was pulled from a turtle trap positioned in B Storage Pool (N36° 38.762, W-75° 54.537). This specimen was healthy but had two leeches attached.
8. *Chrysemys picta* (Painted Turtle) One adult Painted Turtle was observed and photographed (VHS Archive #271) in the pond near the Visitor Contact Station when the turtle traps were being positioned.
9. *Clemmys guttata* (Spotted Turtle) One adult Spotted Turtle was found dead on Sandbridge Road.
10. *Pseudemys rubriventris* (Northern Red-bellied Cooter) Three adult Northern Red-bellied Cooters were observed floating at the water surface in the pond near the Visitor Contact Station.
11. *Trachemys scripta scripta* (Yellow-bellied Slider) Sixteen Yellow-bellied Sliders and three Slider Intergrades were positively identified. Two adult Yellow-bellied Sliders were observed basking across the ditch alongside Sandpiper Road near the Visitor Contact Station and one neonate was found dead on Sandpiper Road. Three male and one female adult Yellow-bellied Sliders were pulled from turtle traps positioned within C-Pool (N36° 39.696, W-75° 54.947) and one adult female was removed from a trap in C Storage pool (N36° 38.938, W-75° 54.325). Each of the five Yellow-bellied Sliders were healthy specimens. Seven Yellow-bellied Sliders and 3 Slider Intergrades were removed from turtle traps positioned in E-Pool on Sunday morning prior to the start of the Sunday surveys. One of the Yellow-bellied Sliders had a deformed plastron and carapace and was removed from the Refuge for radiographs but there was no final conclusion on the cause of the deformation (VHS Archive #266). The deformed turtle was returned and released at E-Pool at about 16:15h. The other 9 specimens were all healthy adults, 6 females and 3 males, and were photographed then released (VHS Archive #269). The Intergrades were identified via photographic review after the survey and the sex distribution among the Yellow-bellied Sliders and the Slider Intergrades was not determined. One neonate Yellow-bellied Slider was found dead on Sandbridge Road.
12. *Aspidozelis sexlineata* (Six-lined Racerunner) Two adult Six-lined Racerunners were observed hiding in vegetation and quickly fleeing in a maritime forest/dune edge habitat in the storage dump area near the Visitor Contact Station.
13. *Plestiodon inexpectatus* (Southeastern Five-lined Skink) One juvenile Southeastern Five-lined Skink was captured under the bark of a fallen log in the woods north of Sandbridge Road. The Skink had small tail scales and some mites.
14. *Scincella lateralis* (Little Brown Skink) Three adult Little Brown Skinks were captured in the storage dump near the Visitor Contact Station. One was under a board, two were in a trash

pile and all were healthy. One adult Little Brown Skink was captured behind the bark of a dead tree limb and had a truncated tail.

Annotated Checklist-Refuge Amphibians

1. *Anaxyrus fowleri* (Fowler's Toad) One healthy juvenile Fowler's Toad was found on the ground in a forest clearing on Long Island. Two healthy adult Fowler's Toads were captured in the grass at the storage dump. Two other healthy adults were captured next to the pond near the Visitor Contact Station. One healthy juvenile Fowler's Toad was captured in a sandy and wet area on the dyke near H-Pool.
2. *Anaxyrus terrestris* (Southern Toad) Two healthy juvenile Southern Toads were captured in a forest clearing on Long Island. Six dark colored but healthy juvenile and sub-adult Southern Toads and three healthy adults were captured under boards, tires and tin in the storage dump near the Visitor Contact Station (N36° 39.836, W-75° 54.699). One healthy sub-adult was captured while resting under a log in the maritime forest near C-Pool.
3. *Gastrophryne carolinensis* (Eastern Narrow-mouthed Toad) Three healthy juvenile Eastern Narrow-mouthed Toads were found on logs and bark in a wooded section of Long Island (N36° 39.654, W-75° 55.888). Two juvenile and one adult Narrow-mouthed Toads were captured under debris in the storage dump near the Visitor Contact Station. One juvenile appeared to have injuries near its mouth while the other juvenile and the adult were healthy.
4. *Hyla cinerea* (Green Treefrog) Five healthy juvenile and sub-adult Green Treefrogs were captured under bark in a wooded section of Long Island (N36° 39.654, W-75° 55.888). One adult green tree frog was observed sitting at the bottom of the boardwalk and one juvenile was on a board near the Visitor Contact Station. Nine Green Treefrogs, 7 sub-adults and 2 adults, were observed within grasses, reeds, shrubs and trees in marsh areas near Back Bay (36° 38.603, W-75° 55.004). One adult Green Treefrog was observed sitting on poison ivy in the maritime forest (N36° 38.739, W-75° 54.765) but jumped away. Three adult Green Treefrogs were observed resting on reeds and grasses at the edge of a Back Bay cove (N36° 38.895, W-75° 54.740).
5. *Hyla squirella* (Squirrel Treefrog) One adult Squirrel Treefrog was observed and photographed attached to reeds in a scrub/dune environment on the dyke near H-Pool.
6. *Lithobates catesbeianus* (American Bullfrog) Four healthy adult American Bullfrogs were observed in the vicinity of the Visitor Contact Station. One was located in the pond in front of the bird watch, another was seen in the pond north of the bird watch and two were observed in the pond along the Bay Trail. The night time group identified the calls of 10 American Bullfrogs. Three of these were located near the Visitor Contact Station. There may be some redundancy between American Bullfrogs seen during the day and heard at night near the Visitor Contact Station. Seven American Bullfrogs were heard by the night time group from the ditch/canal alongside Sandpiper Road. One sub-adult American Bullfrog was observed in the marsh near the maritime forest close to the Back Bay (N36° 38.605, W-75° 54.903).

7. *Lithobates clamitans melanota* (Northern Green Frog) One healthy adult and one healthy juvenile Northern Green Frog were captured from within the ditch on the north side of Sandbridge Road.

8. *Lithobates sphenoccephalus* (Southern Leopard Frog) Four adult Southern Leopard frogs were observed in the vicinity of the Visitor Contact Station. One adult was in the pond by the bird watch (N36° 39.646, W-75° 54.903). A second adult was observed alongside the boardwalk. Two juveniles were observed in the ditch on the ocean side of Sandpiper Road. Four adult Southern Leopard Frogs were observed in the marsh near the maritime forest close to Back Bay (N36° 38.605, W-75° 54.903).

Annotated Checklist-Park Reptiles

1. *Agkistrodon piscivorus piscivorus* (Eastern Cottonmouth) One adult Eastern Cottonmouth was observed and photographed basking on branches in the marsh alongside Marsh Ridge Trail. One juvenile Eastern Cottonmouth was observed basking on a board by the old house in the Wash Woods section. (N36° 38.245, W-75° 54.755).

2. *Coluber constrictor constrictor* (Northern Black Racer) Ten Northern Black Racers were either observed or captured during the survey. Two Northern Black Racers were observed mating on a rocky embankment in the area of Sandy Point. As they fled together, they continued their mating efforts. Another Northern Black Racer was within a few meters on the same rock embankment, possibly a second male in pursuit of the female. One healthy male Northern Black Racer was captured by hand attempting to flee in a grassy area near Widgeon Overlook. A photograph was taken of this specimen. One Northern Black Racer, in ill health, was observed moving near the Church Steeple area (N36° 33.647, W-75° 52.673). There was obvious injury to its face and the snake was shedding. This specimen was photographed (VHS Archive #265). One adult Northern Black Racer was seen basking in the sun on Dudley Island Loop Trail (N36° 33.427, W-75° 52.723) and one adult was observed basking on the Church Trail (N36° 34.595, W-75° 53.063). One adult was observed on lower tree branches near a Back Bay inlet. One adult Northern Black Racer was observed at Teal Point where the water drains under the road (N36° 37.733, W-75° 54.413) and one adult Northern Black racer was observed with its head sticking out from a rock which it quickly withdrew as it was approached (N36° 37.615, W-75° 54.323).

3. *Farancia erytrogramma erytrogramma* (Common Rainbow Snake) One healthy but shedding adult Common Rainbow Snake was captured while active in the vicinity of the muddy and rocky shore by the boat ramp and near the maintenance shed. (N36° 34.803, W-75° 53.405). A photograph was taken of this specimen.

4. *Nerodia sipedon sipedon* (Northern Watersnake) One healthy female adult Northern Watersnake was photographed imbedded in a rock pile near the boat ramp. This Specimen was captured, had an overall length of 91 cm (36 inches) and was photographed.

5. *Nerodia taxispilota* (Brown Watersnake) Five Brown Watersnakes were positively

Back Bay/False Cape Survey

identified during the survey. Three adult Brown Watersnakes were observed basking on the rock embankment just beyond and on the same side as Swan Overlook near Sandy Point (N36° 62.829, W-75° 54.807). All had either injuries or health issues. The smallest adult had an enlarged head and facial scale rot (VHS Archive #267). The two larger adults had body lesions 3-4 cm long. Photographs were taken. Two adult Brown Watersnakes were observed, captured and photographed at the muddy, rocky shore near the boat ramp (N36° 34.803, W-75° 53.405).

6. *Thamnophis sauritus sauritus* (Common Ribbon Snake) One adult Common Ribbon Snake was observed basking on branches above the marsh adjacent to Marsh Ridge Trail. The Common Ribbon Snake quickly fled into the water when approached.

7. *Chelydra Serpentina* (Eastern Snapping Turtle) Five adult Eastern Snapping Turtles were observed from Teal Point due to low water levels where the wind had pushed the water out (N36° 37.770, W-75° 54.448).

8. *Trachemys scripta scripta* (Yellow-bellied Slider) Nine Yellow-bellied Sliders were positively identified during the survey. However, several of these were remnants of deceased turtles. One deceased juvenile was located at the entrance to the Park. Two adult shells were found near the Church Steeple (N36° 33.847, W-75° 52.730 and N36° 33.308, W-75° 52.673) and one adult shell was found near Teal Overlook. Five adult Yellow-bellied Sliders were observed basking at Teal Overlook and Sandy Point.

Annotated Check List-Park Amphibians

1. *Anaxyrus fowleri* (Fowler's Toad) One adult Fowler's Toad was observed actively moving on the forest floor within the Greenhill Maritime Forest (N36° 38.138, W-75° 54.489). Three adult Fowler's Toads were observed near the Dudley Island Loop Trail at the edge of the woods and a field (N36° 33.300, W-75°). Each exhibited normal behavior.

2. *Anaxyrus terrestris* (Southern Toad) One adult Southern Toad was observed at the base of a pine tree near the False Cape Landing Trail (N36° 35.792, W-75° 53.009). One adult Southern Toad was observed in open field near the Dudley Island Loop Trail.

3. *Hyla Cinerea* (Green Treefrog) Two juvenile Green Treefrogs were observed near the Dudley Island Loop Trail. One was under bark (N36° 38.247, W-75° 54.755) and the other was observed in tall grass in a swampy area. One adult was observed along the same trail within a marsh near a forest edge (N36° 33.300, W-75° 52.870).

4. *Hyla Squirella* (Squirrel Treefrog) One adult Squirrel Treefrog was observed under the bark of a pine tree near Teal Overlook (N36° 37.477, W-75° 54.353).

5. *Lithobates catesbeianus* (American Bullfrog) One adult American Bullfrog was in the water at a Back Bay inlet near the Dudley Island Loop Trail (N36° 33.282, W-75° 52.891). One adult was observed in the impoundment near Teal Overlook (N36° 37.955, W-75° 54.428).

6. *Lithobates sphenoccephalus* (Southern Leopard Frog) A total of 13 Southern Leopard Frogs were positively identified during the survey. Six juvenile and sub-adult Southern Leopard Frogs were observed in wetland and vernal pools in the Greenhill Maritime Forest (N36° 38.138, W-75° 54.489). One adult Leopard frog was observed in a marsh near False Cape Landing Trail (N36° 35.637, W-75° 53.262). Two adults, including a very large bright green specimen, were observed along Sand Ridge Trail near the electric line (N36° 39.737, W-75° 53.013). Three adult Southern Leopard Frogs were observed in a small pool near Teal Overlook (N36° 37.733, W-75° 53.413). One adult Southern Leopard Frog was observed at the end of an impoundment near Sandy Point.

7. *Pseudacris crucifer* (Spring Peeper) One juvenile Spring Peeper was captured by the roadside brook not far from the Visitor Center. This frog was photographed (VHS Archive #270).

Discussion

During the two day survey of the Back Bay National Wildlife Refuge and False Cape State Park, the VHS survey positively identified 200 specimens representing 25 species (see Table 2). There were 16 species of reptiles (8 snakes, 5 turtles and 3 lizards) and 9 species of amphibians, all of which were anurans. No salamanders were observed. All of the species identified had previously been documented for Virginia Beach.

Weather conditions over the 3-5 May 2013 weekend were at times rainy and overcast with occasional periods of sunshine. The highest air temperatures recorded by NOAA in Virginia Beach were 15°C (59°F) for both survey days. VHS survey group 8 recorded a high temperature of 17.2°C (63°F) for Zone 8 (Sandbridge Road North/Black Gut) on 5 May. The low weekend temperatures made the search for reptiles and amphibians more challenging.

Fifty-nine snakes representing 8 species were documented. A few additional snakes were encountered but fled prior to proper identification. A total of 20 *Agkistrodon piscivorus piscivorus* (Eastern Cottonmouths), or almost 34% of all snakes identified, were observed in all but one of the zones surveyed (not seen in Zone 6-False Cape Landing). This is a high ratio of venomous to non-venomous snakes. Twenty-one *Coluber constrictor constrictor* (Northern Black Racers), or almost 36% of all snakes identified, were present in 6 of 8 survey zones (not observed in Zones 6 or 8). Ten *Nerodia taxispilota* (Brown Watersnakes) were identified within Zones 2 (Boardwalk/Visitor Contact Station), 5 (Barbour Hill/Sandy Point) and 7 (Wash Woods/Dudley Is. Loop). Three *Nerodia sipedon sipedon* (Northern Watersnakes) were observed in Zones 4 (A, B, H & J pools), 5 and 8 (Sandbridge North/Black Gut). One positive identification of *Farancia erythrogramma erythrogramma* (Common Rainbow Snake), *Nerodia erythrogaster erythrogaster* (Red-bellied Watersnake), *Pantherophis alleghaniensis* (Eastern Ratsnake) and *Thamnophis sauritus sauritus* (Common Ribbon Snake) were made in Zones 7, 8, 2 (Boardwalk/Visitor Contact Station) and 5 respectively.

No small snake species were encountered. Several snake species previously documented for the Refuge and the Park (Pague and Mitchell, 1981, Williamson and Roble, 1999) were not observed during the survey including: *Farancia abacura abacura* (Eastern Mudsnake), *Heterodon*

Back Bay/False Cape Survey

platyrhinos (Eastern Hognose Snake), *Lampropeltis getulus getulus* (Eastern Kingsnake), *Opheodrys aestivus* (Rough Greensnake) and *Storeria dekayi dekayi* (Northern Brownsnake).

Three snakes were observed to be in poor health. One specimen of *Agkistrodon piscovorus piscovorus*, *Coluber constrictor constrictor* and *Nerodia taxispilota* had a visual appearance that could either be indicative of Snake Fungal Disease (SFD) or scale rot due to emergence from hibernacula. Photographs and GPS coordinates for each of these specimens were taken and forwarded to Refuge and Park personnel.

The National Wildlife Health Center (NWHC) of the U. S. Geological Survey (USGS) have identified SFD as *Ophidiomyces ophiodiicola*. NWHC reports that SFD has been documented in at least 7 species of snakes in at least 9 eastern and mid-west states. It has not yet been documented in Virginia. It has been documented for *Coluber constrictor constrictor* but not yet for *Agkistrodon piscovorus piscovorus* or *Nerodia taxispilota*. NWHC states “The most consistent clinical signs of SFD include scabs or crusty scales, premature separation of the outermost layer of the skin from the underlying skin, white opaque cloudiness of the eyes (not associated with molting), or localized thickening or crusting of the skin (hyperkeratosis), skin ulcers, swelling of the face, and nodules in deeper tissues of the head have also been documented”. Each of the snakes identified above exhibited at least some of those potential signs. Snake populations within the Refuge and the Park should be monitored in the future for the potential presence of SFD.

Thirty nine turtles representing five species were documented. At least three of the 39 were believed to be Slider turtle intergrades. Many more turtles were observed basking near the Back Bay or within impoundments at a distance that did not permit positive identification. Twenty-five *Trachemys scripta scripta* (Yellow-bellied Slider) were positively identified. Five of these were found deceased primarily within the Park and 12 were retrieved from traps positioned within C-Pool, C Storage Pool, and E- Pool. One adult Yellow-bellied Slider retrieved from E-Pool had a deformed shell. This specimen was removed from the Refuge for several hours and radiographs were taken. There was no final conclusion on the cause of the deformation and the turtle was returned and released in E-Pool. Six *Chelydra serpentina* (Eastern Snapping Turtles) were positively identified. Five were observed in the mud and shallow water within Zone 5 near Teal Overlook and one healthy adult was retrieved from a trap positioned in B Storage Pool. Three *Pseudemys rubriventris* (Northern Red-bellied Cooters) were observed in Zone 2 floating in the pond near the Visitor Contact Station. One adult *Chrysemys picta picta* (Painted Turtle) was observed and photographed when turtle traps were positioned in the pond near the Visitor Contact Station. One *Clemmys guttata* (Spotted Turtle) was found dead on Sandbridge Road within Zone 8. This was one of the most interesting turtle observations of the survey. *Clemmys guttata* have a Virginia Wildlife Action Plan Rating of Tier III-High Conservation Need. By definition Tier III means: Extinction or extirpation is possible. Populations of this species are in decline or have declined to low levels, or are in a restricted range. Management action is needed to stabilize or increase populations. The area within the Refuge north and south of Sandbridge Road should be closely monitored for *Clemmys guttata*.

All of the turtle species that were positively identified, except *Clemmys guttata* were previously documented in the Refuge and the Park (Pague and Mitchell 1981). Pague and Mitchell updated

their census in a 1991 report (The Amphibians and Reptiles of Back Bay, Virginia Pp. 159-166 in H.G. Marshall and M. D. Norman (eds.). Proceedings of the Back Bay Ecological Symposium Old Dominion University, Norfolk, Virginia) However, this report can only be accessed at the Old Dominion University Library.

Turtle species previously documented that were not observed during the survey include: *Kinosternon subrubrum subrubrum* (Eastern Mud Turtle) and *Terrapene carolina carolina* (Eastern Box Turtle).

Seven lizards representing three lizard species were positively identified during the survey. All of the identified lizards were either in Zone 2 or 8 within the Refuge. There were no lizards observed within the Park. Two *Aspidoscelis sexlineata* (Six-lined Racerunner) and three *Scincella lateralis* (Little Brown Skinks) were observed in the Storage Dump area of Zone 2. The Racerunners were observed fleeing in a sand dune/maritime forest edge and the skinks were captured under debris. One skink was captured under the bark of a dead tree limb in Zone 8. One *Plestiodon inexpectatus* (Southeastern Five-lined Skink) was captured under the bark of a fallen log in Zone 8.

Neither *Scinella lateralis* nor *Plestiodon inexpectatus* were documented in the 1980-81 surveys by Pague and Mitchell, although their 1991 updated census might include these species. *Ophisaurus ventralis* (Eastern Glass Lizard) which has been previously documented within the Refuge and the Park was not observed during this survey.

A total of 96 amphibians representing 9 species were positively identified during the survey. All of the amphibians were anurans and no salamanders were observed. Salamanders were also not observed in the 1980-81 surveys by Pague and Mitchell. Ten *Anaxyrus fowleri* (Fowler's Toad) were positively identified within five survey zones with most of the observations occurring in Zones 2 and 7. Fourteen *Anaxyrus terrestris* (Southern Toads) were also observed in five survey zones but with the majority of observations occurring within Zone 2. Six *Gastrophryne carolinensis* (Eastern Narrow-mouthed Toads) were documented within the Refuge survey Zones 1 & 2 but none were seen within the Park. Twenty-three *Hyla cinerea* (Green Treefrog) were documented in five survey zones with the highest concentration within Zone 3. Two *Hyla squirella* (Squirrel Treefrogs) were positively identified in forested and dune areas of Zones 4 and 5. Seventeen *Lithobates catesbeianus* (American Bullfrogs) were identified in four survey zones. Fourteen of these were located in Zone 2 and 10 were identified through calls after sunset. Two *Lithobates clamitans melanota* (Northern Green Frog) were positively identified within Zone 8 but were not observed elsewhere. Twenty-one *Lithobates sphenoccephalus* (Southern Leopard Frogs) were observed in five survey zones with the highest number of documented sightings occurring in Zone 5. One *Pseudacris crucifer* (Spring Peeper) was captured and photographed in Zone 5.

Warmer conditions would have certainly produced higher specimen counts and most likely additional species observations throughout the Refuge and the Park. The least amount of time was spent surveying Zone 8 (21 man-hours). However, the habitat within Zone 8 is different than the other areas and four species were documented there that were not observed

Back Bay/False Cape Survey

in any of the other survey zones (*Clemmys guttata*, *Lithobates clamitans melanota*, *Nerodia erythrogaster erythrogaster*, *Plestiodon inexpectatus*). *Pantherophis alleghaniensis* is one of the most frequently observed snakes in Virginia, but only one specimen was documented during the survey (Zone 2). Single species observations were also recorded in the Park within Zone 5 (*Pseudacris crucifer*, *Thamnophis sauritus sauritus*) and Zone 7 (*Farancia erythrogramma erythrogramma*).

Recommendations

A program to monitor the health of snake species within the Refuge and the Park should be implemented to determine if SFD is an issue.

The 2013 species count should be compared with the 1991 census update prepared by Pague and Mitchell and on file at the Old Dominion University library in Norfolk.

Another VHS survey should be conducted during warmer temperature conditions to contrast species observations and specimen counts with this survey.

The area within the Refuge that is north and south of Sandbridge Road should be monitored for populations of *Clemmys guttata*.

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