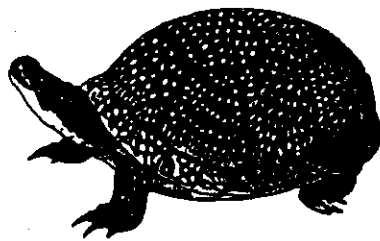


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***Herpetofauna of
Roosevelt-Vanderbilt National Historic Sites
Hyde Park, New York,
with emphasis on Blanding's Turtle
(Emydoidea blandingii)***

***Michael W. Klemens
Robert P. Cook
David J. Hayes***



Technical Report NPS/NAROSS/NRTR-92/08

***Department of the Interior
National Park Service
North Atlantic Region***



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**HERPETOFAUNA OF
ROOSEVELT-VANDERBILT NATIONAL HISTORIC SITES,
HYDE PARK, NEW YORK,
WITH EMPHASIS ON BLANDING'S TURTLE (Emydoidea blandingii)**

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ABSTRACT

In 1988, a study to determine population status and habitat use of Blanding's turtle (*Emydoidea blandingii*) was begun at Eleanor Roosevelt National Historic Site (ELRO) in Hyde Park (Dutchess County, New York). This report summarizes the first three years of this study (1988-90). Blanding's turtle is listed as a New York State threatened species.

Mark and recapture data from live-trapped turtles were used to determine which areas were used by Blanding's turtle, and to indicate seasonal movements. Based on these data, a map illustrating critical habitat for Blanding's turtle at ELRO was produced. Dredging has been proposed to restore the cultural landscape of the site, and thus the potential impact of dredging Upper Val-Kill Pond (an impoundment of the Fall Kill) was addressed.

A small but regionally significant population of Blanding's turtles occurs at ELRO. Blanding's turtles do not appear to use the main body and lower lobe of Upper Val-Kill Pond, however, this species inhabits the shrub swamp which fringes the north edge of Upper Val-Kill Pond as well as several disjunct ponds. Dredging methods that require drawdown of water could potentially damage the shrub swamp, with adverse effects on Blanding's turtles as well as other wetland-dependent species. Dredging methods that maintain water levels in the Upper Val-Kill Shrub Swamp are recommended. These include dredging without water drawdown, temporary emplacement of a dam between Upper Val-Kill Shrub Swamp and the pond's lower lobe, or a combination of these two techniques.

The nonselective nature of the live trapping techniques used facilitated an inventory of other aquatic turtles. In conjunction with this study, a herpetological inventory was conducted at ELRO, the Home of Franklin D. Roosevelt National Historic Site (HOFR), Vanderbilt Mansion National Historic Site (VAMA), and non-National Park Service sites in Hyde Park, New York. A total of 16 amphibian and 16 reptile species were documented. This represents 65 % of the total herpetofauna of the Hudson Valley, and highlights the importance of these sites in maintaining regional biodiversity.

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INTRODUCTION

General Information:

Blanding's turtle is a medium-sized (125-260 mm) turtle with a high-domed, black-gray carapace with varying amounts of white/yellow speckling. Similar to box turtles (*Terrapene spp.*), Blanding's turtle has a hinged plastron. Field marks are the solid lemon-yellow chin and throat, noticeable when the turtle basks in the sun and stretches out its long neck. This species inhabits shallow water with a soft bottom and abundant aquatic vegetation. Relatively little is known of its ecology and behavior.

Blanding's turtle is essentially a midwestern species, distributed from eastern Nebraska through the Great Lakes region, with an extension into the Northeast via the postglacial prairie peninsula (Schmidt 1938; Ernst and Barbour 1972; McCoy 1973; Conant and Collins, 1991.) In eastern North America, Blanding's turtles occur around the Great Lakes and have a disjunct, relictual distribution in three widely separated areas: the lower Hudson Valley (Dutchess Co., NY); northeastern Massachusetts through southeastern New Hampshire and into southwestern Maine; and Nova Scotia (Babcock, 1919; Hecht, 1943; Bleakney, 1958; Graham and Forsberg, 1987). (Figure 1).

In New York State, Blanding's turtle is listed by the Department of Environmental Conservation as a threatened species with two centers of distribution, the Saint Lawrence River drainage (part of the species' continuous Great Lakes range) and a disjunct population in Dutchess County, concentrated between the Hudson River and the Taconic Parkway (E. Kiviat, 1986).

During a natural resources inventory of the Eleanor Roosevelt National Historical Site (ELRO) conducted in 1978, a live Blanding's turtle was sighted in a woodland pool and a dead male was found on the dam of Upper Val-Kill Pond (Pandullo Quirk Associates, 1979). In 1983, Erik Kiviat tagged a turtle (Bard College Field Station No. 522) trapped in the Middle Woodland Pond. This turtle was subsequently recaptured twice in 1984 and 1985 outside the boundaries of ELRO, (E. Kiviat, pers comm).

Upper Val-Kill Pond was created by the construction of a concrete dam across the Fall Kill, a tributary of the Hudson River. This impoundment was used by President and Mrs. Franklin D. Roosevelt and their family for swimming, fishing, and boating. Rapid silt deposition prompted President Roosevelt to have the pond periodically dredged. Since the last known dredging in the 1950's, up to 4.2 m of silt has accumulated (Pandullo Quirk Associates, 1979; Allen and Bobinchock, 1986). Lower water levels, accompanied by rising nutrient loads (in part due to adjacent residential septic systems), have resulted in the establishment of emergent aquatic plants, both native species as well as purple loosestrife (*Lythrum salicaria*), an invasive exotic perennial. As the growing season progresses, increased plant growth reduces the amount of open water, which is gradually altering the character of the historic landscape. The National Park Service (NPS) is mandated to preserve cultural landscapes at historic sites, and further dredging has been proposed. However, before any plans of this type could proceed, additional information on the status, habitat use, and distribution of Blanding's turtle at ELRO was required.

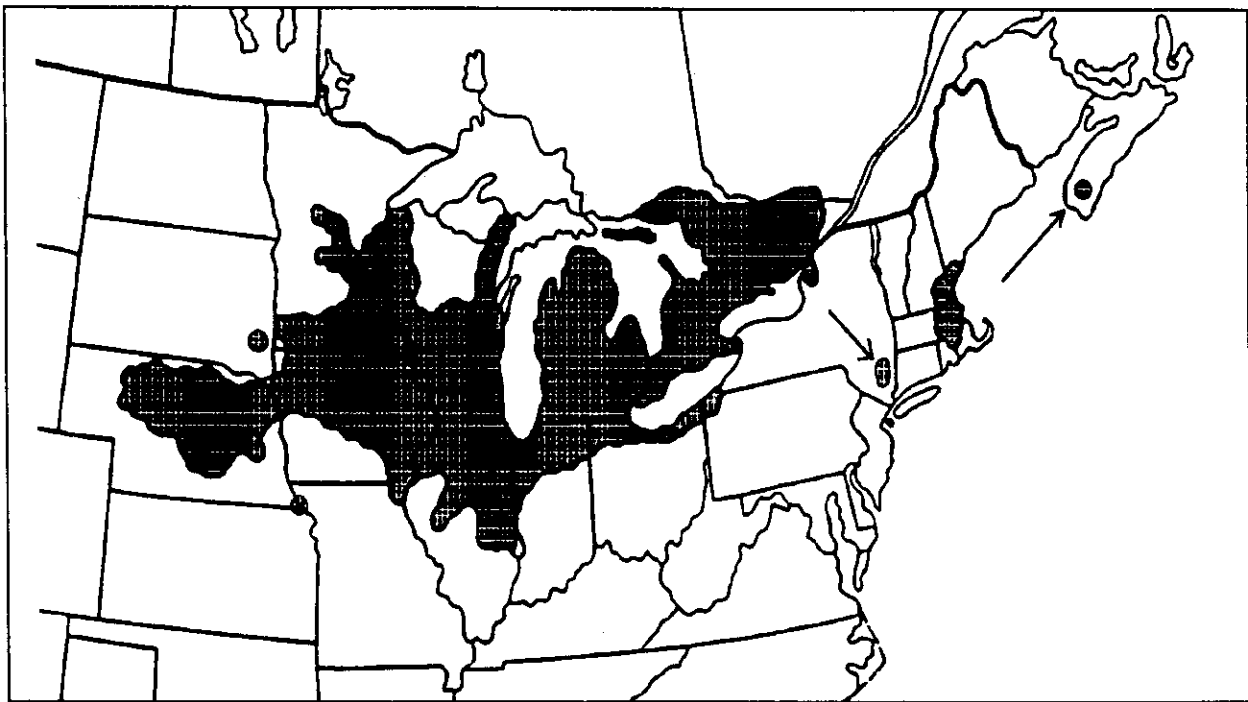


Figure 1. Range of Blanding's turtle in North America

In addition to the lack of basic information on Blanding's turtle, there was little documentation of the site's herpetofauna. In New York, amphibians and reptiles make up a disproportionate number of endangered, threatened, and special concern species. This may be due in part to the lack of distributional information on many secretive species, but also to their poor dispersal abilities and narrow ecological tolerances. The status and distribution of many species of amphibians and reptiles in Dutchess County are poorly known. The Hudson Valley corridor may serve as a northward extension for the range of many southern species that are absent from eastern Dutchess County (Klemens, 1990; in press). Stewart and Rossi (1983) noted this distributional phenomenon in the Hudson Valley and Klemens (1990, in press) reported a parallel situation in the Connecticut River Valley (Central Connecticut Lowland).

Objectives

Blanding's Turtle Population Status:

The primary objective of this study was to determine the population status and habitat use of Blanding's turtle at ELRO, with a focus on Upper Val-Kill Pond and the adjacent historical core.

Herpetological Inventory:

The secondary objective was to conduct a herpetological inventory of the three properties that compose Roosevelt-Vanderbilt National Historic Sites (ROVA), as well as other public and private land in the township of Hyde Park. Distributional data collected during this inventory not only benefits the NPS in making informed management decisions concerning their Hyde Park properties, but yields important data on the amphibians and reptiles of the region. Studies such as Klemens (1990, and in press) and Bogart and Klemens (in prep.) directly benefited from this inventory.

Study Area

General Site Description:

Roosevelt-Vanderbilt National Historic Sites (ROVA) consist of three sites located in Hyde Park, Dutchess County, NY (Figure 2). The percentages of cover types were calculated from 1990 aerial photographs.

The creation of the **Home of Franklin D. Roosevelt National Historic Site (HOFR)** was authorized by a Joint Resolution of Congress on July 18, 1939, with a designation order issued on January 15, 1944. It overlooks the Hudson River, with 118.5 hectares (292.8 acres) of the original estate under NPS management. The land cover breakdown is:

Forest:	67.1% (79.5 ha./196.5 ac.)
Wetland:	1.5% (1.8 ha./4.4 ac.)
Meadow:	16.3% (19.3 ha./47.7 ac.)
Open Water:	0.6% (0.7 ha./1.7 ac.)
Maintained Landscape:	14.5% (17.2 ha./42.5 ac.)

(Figures 3 & 4)

It should be noted that 67.1% of HOFR considered as "forest" cover type also included several small permanent and ephemeral woodland ponds which provide habitat for reptiles and amphibians. In addition, a freshwater tidal marsh, lying west of the park boundary and east of the railroad tracks, is not included in the area calculations. This 10-hectare wetland is owned by New York State, but is under the stewardship of the NPS in recognition of its importance to the overall biological integrity of the site.

The **Vanderbilt Mansion National Historic Site (VAMA)** was designated by Congress and President Roosevelt on December 18, 1940 under authority of the Historic Sites Act. It lies between U.S. Rt. 9 and the Hudson River. The National Park Service manages 85.7 hectares (211.65 acres) of the original estate. The land cover breakdown is:

Forest:	44.9% (38.4 ha./95.0 ac.)
Wetland:	0.5% (0.4 ha./1.0 ac.)
Meadow:	22.0% (18.9 ha./46.6 ac.)
Open Water:	2.2% (1.9 ha./4.7 ac.)
Maintained Landscape:	30.4% (26.1 ha./64.4 ac.)

(Figures 5 & 6)

The **Eleanor Roosevelt National Historic Site (ELRO)** is the 73.0 hectare (180.5 acre) site of Eleanor Roosevelt's former home, Val-Kill. It was established as a National Historic Site by Public Law 95-32 on 26 May 1977. The site lies 3.2 km east of the Hudson River, and approxi-

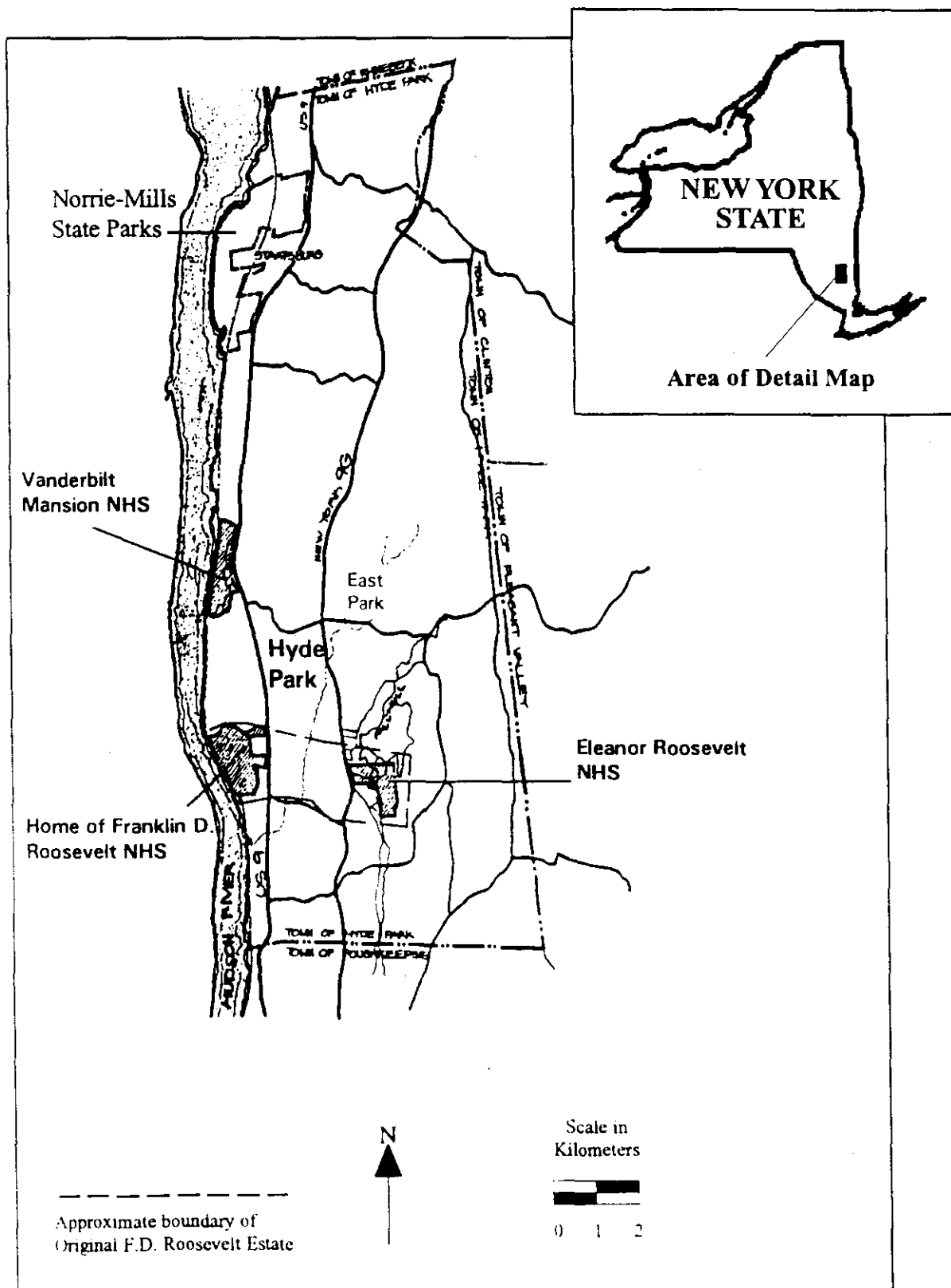


Figure 2. Vicinity Map, Roosevelt-Vanderbilt NHS, Hyde Park, NY

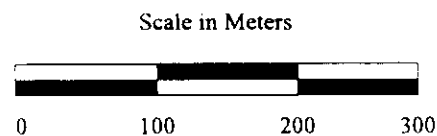
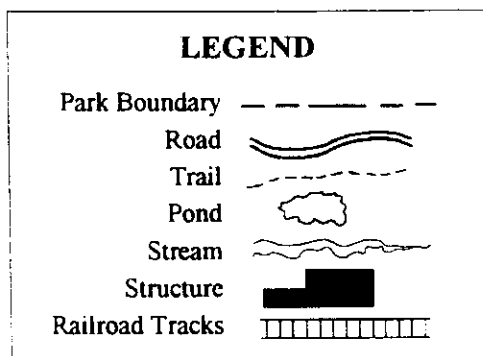
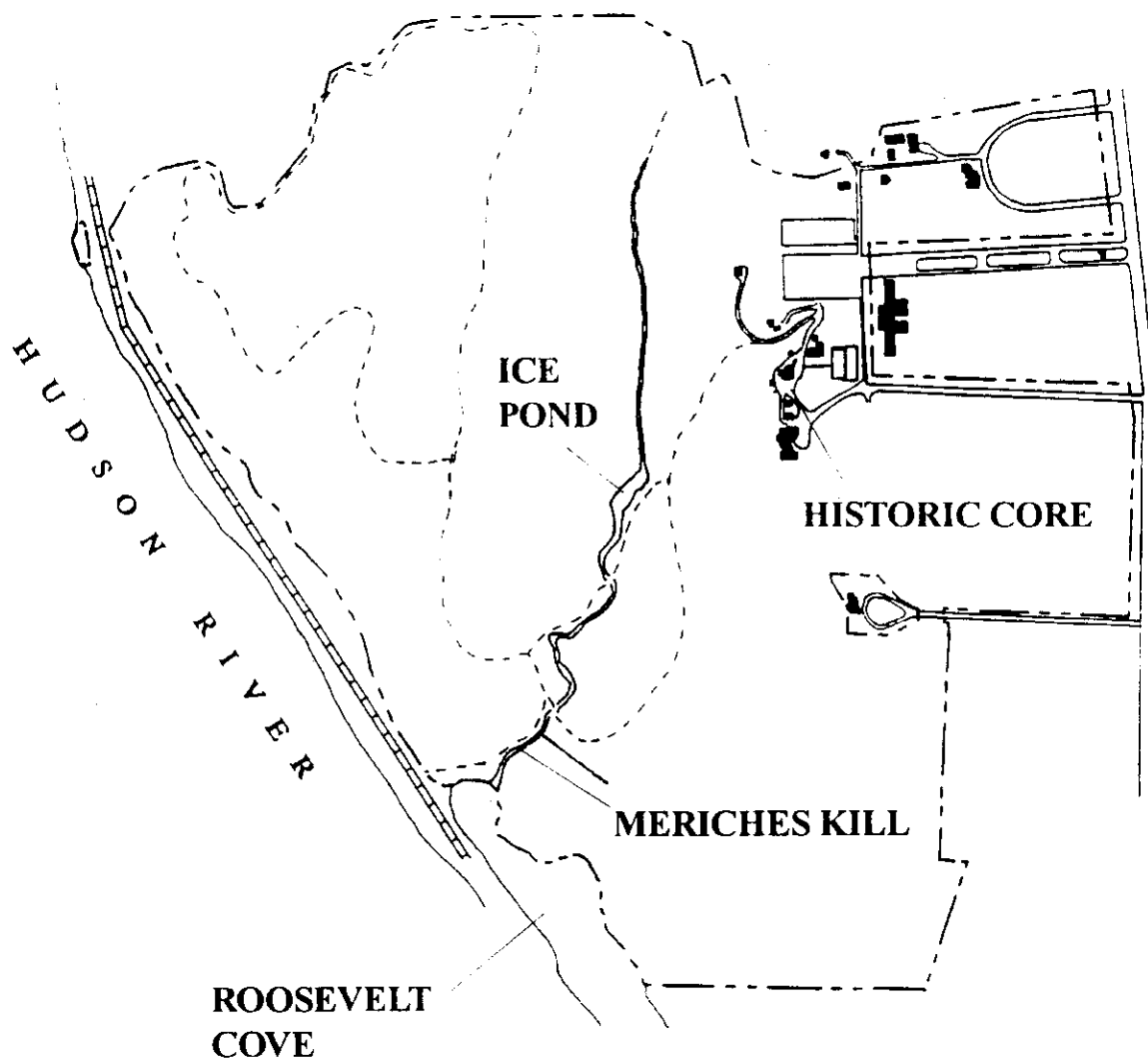


Figure 3. Site Map, Home of Franklin D. Roosevelt NHS

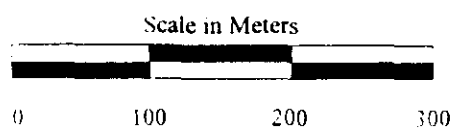
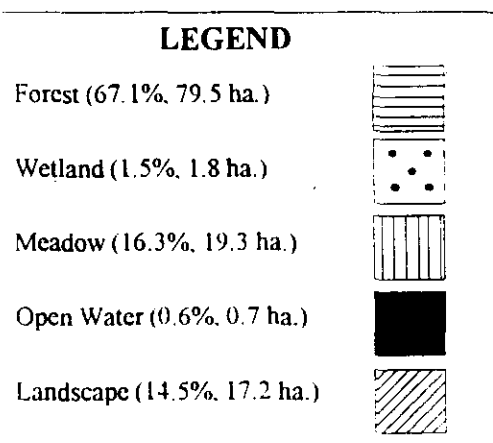
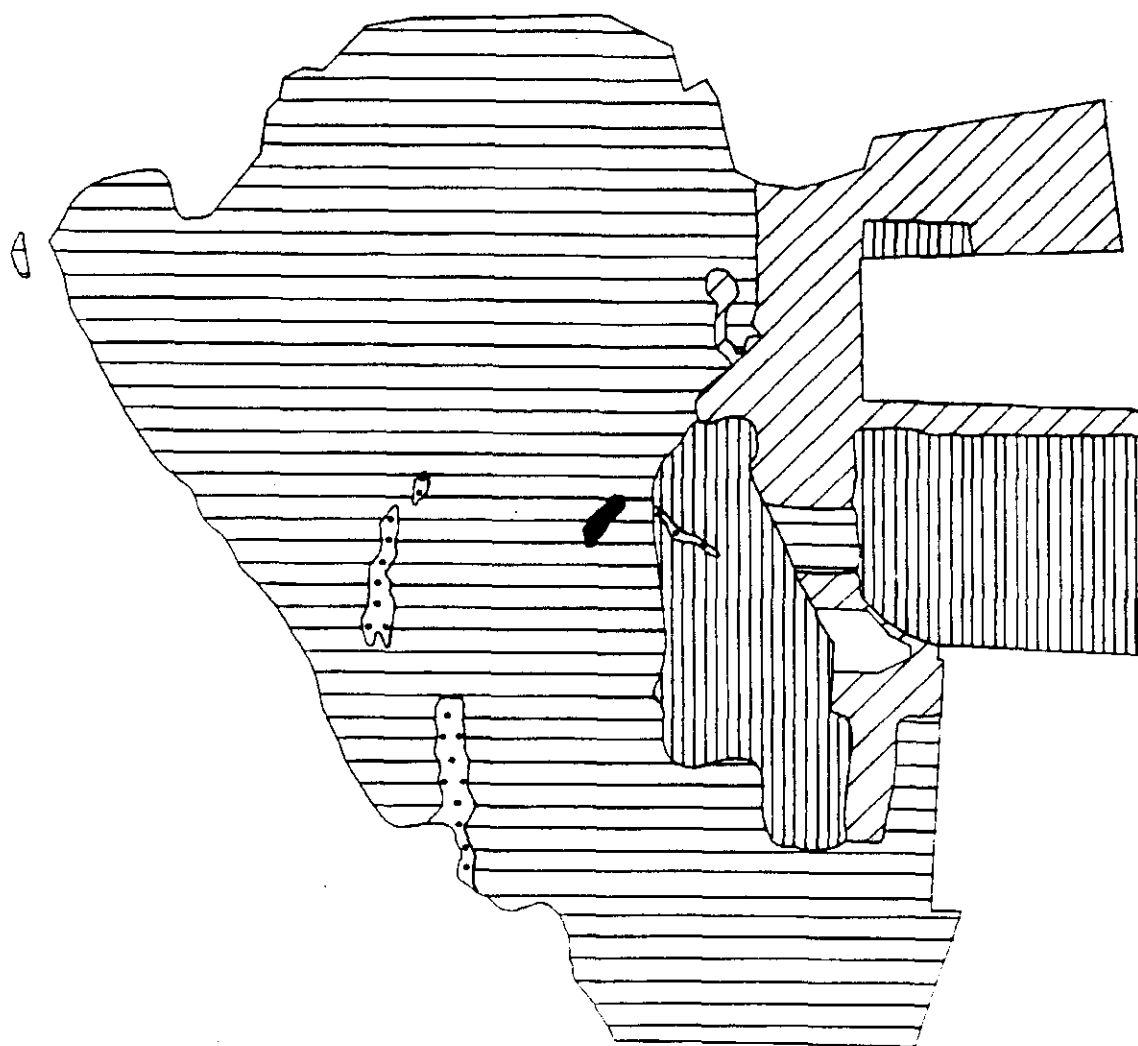
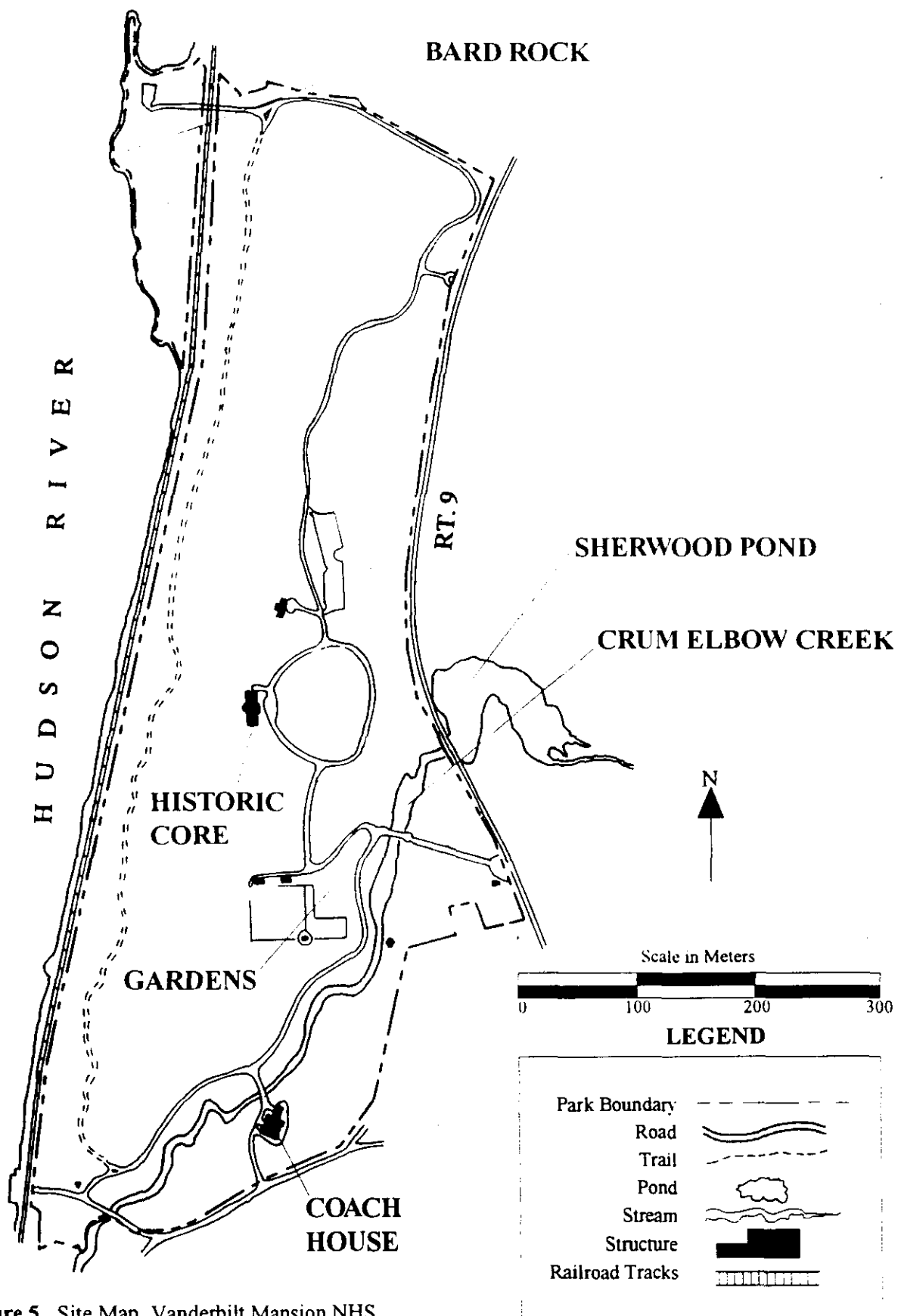


Figure 4. Cover Type Map, Home of Franklin D. Roosevelt NHS



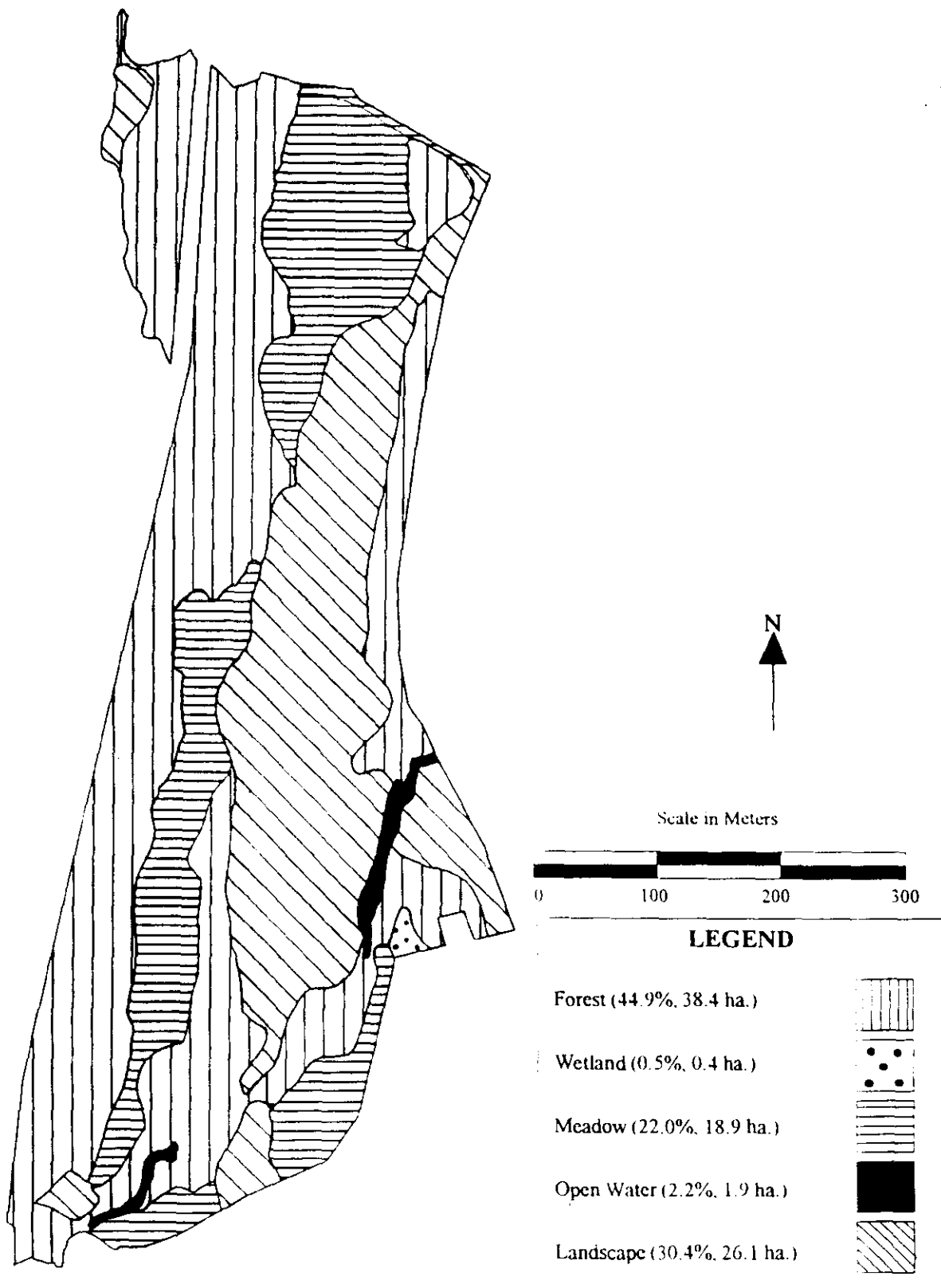


Figure 6. Cover Type Map, Vanderbilt Mansion NHS

mately 1.6 km east of HOFR. The land cover breakdown is:

Forest:	45.9% (33.5 ha./82.9 ac.)
Wetland:	22.6% (16.5 ha./40.8 ac.)
Meadow:	16.5% (12.1 ha./29.8 ac.),
Open Water:	8.0% (5.8 ha./14.4 ac.),
Maintained Landscape:	7.0% (5.1 ha./12.6 ac.)

(Figures 7 & 8)

Before President Roosevelt's death, his 486 hectare (1200+ acre) estate encompassed HOFR and ELRO, as well as the intervening property between Rts. 9 and 9G. (Figure 2). Since President Roosevelt's death in 1945, the intervening property between Rts. 9 and 9G has passed into private ownership.

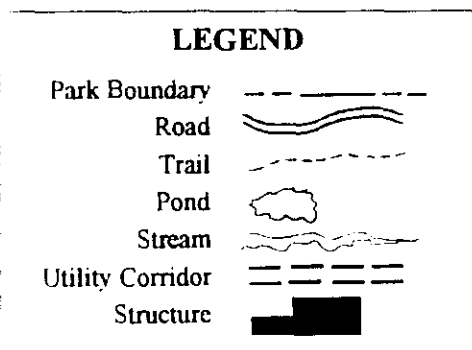
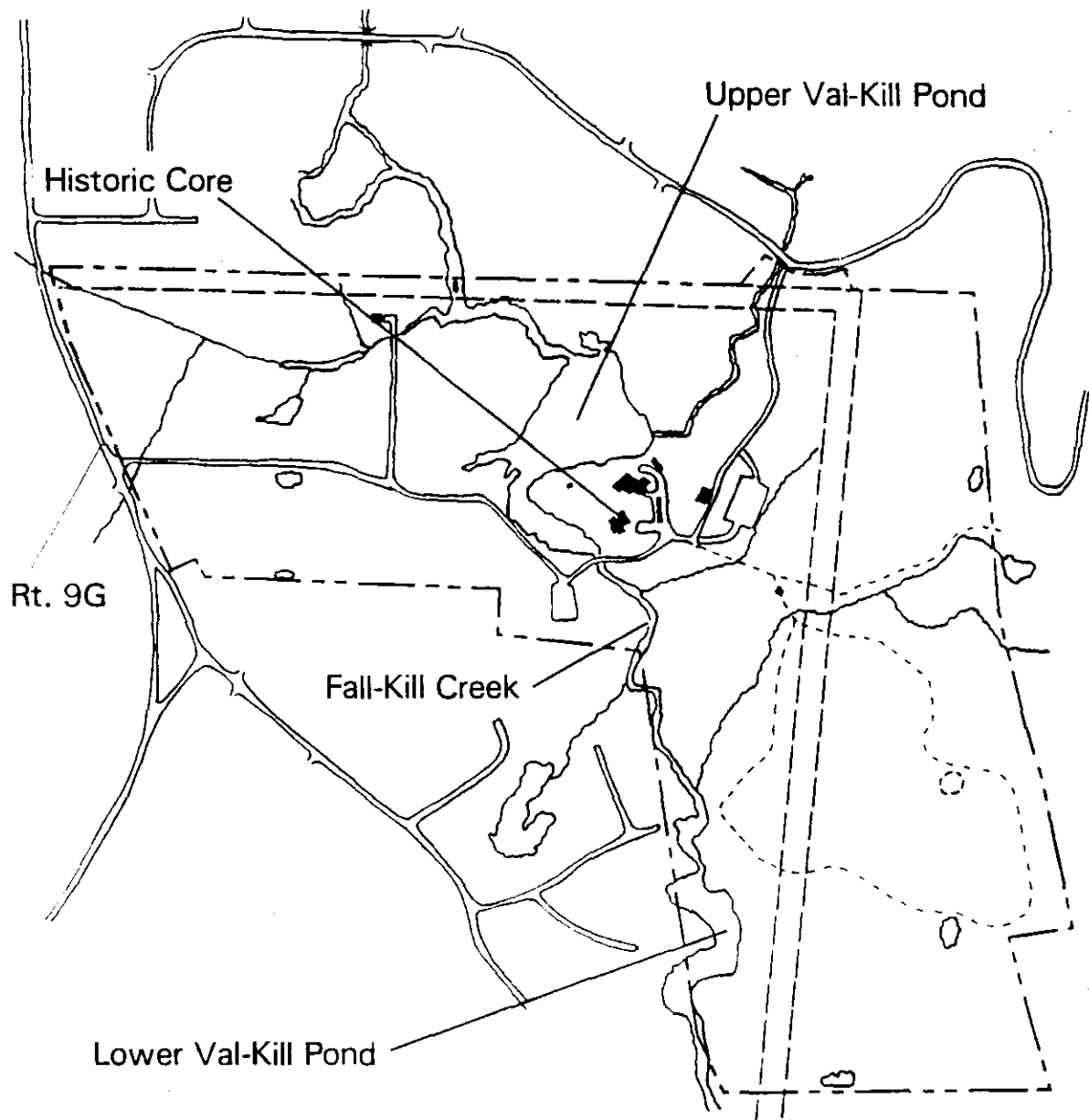
At ELRO, the historically significant buildings are centrally located, and are referred to as the "historic core". These include the Stone Cottage, Val-Kill Cottage, Doll House, and Playhouse. Other noteworthy structures within the "historic core" are the stable/garage, tennis court, swimming pool, and outdoor fireplace. Val-Kill Cottage served as Mrs. Roosevelt's home during the latter part of the historic period until her death in 1962.

The major stream on site is the Fall Kill, which flows from north to south, through the center of the property, draining directly into the Hudson River estuary at Poughkeepsie. The Fall Kill was dammed in 1925, just prior to the construction of the Stone Cottage, forming a 2.8 hectare (7 acre) pond located due west of the "historic core", herein referred to as Upper Val-Kill Pond. Several small, unnamed tributaries and ditches drain into this pond. Discrete woodland ponds, vernal pools, and swamps occur in the upland wooded area on the southeastern corner of the property. The site is 22.6% wetland, and the location of these wetlands are depicted in Figure 9.

The topography of ELRO varies from nearly level to steeply graded. The western portion of the site is characterized by gentle slopes with elevations ranging from 67 m (219 ft) above sea level in the low, wet areas to 71 m (234 ft) at the historic core. The eastern portion of the site is hilly and characterized by 8-30% slopes with elevations ranging from 72 m (235 ft) near the Fall Kill to a high point of 121 m (397 ft) at the southeastern corner of the property (Figure 10).

The bedrock geology of the site is composed of sedimentary rocks, including soft, exfoliating Graywacke, shales, and slates. Pleistocene glacial deposits of sand and gravel overlay the bedrock in the central and western portions of the site. Recent alluvial deposits are found along the Fall Kill and its tributaries, overlying the glacial deposits.

A wide variety of vegetational associations are found on site, including upland mixed hardwood forest (eastern portions of the site), old field (power line right of way), orchards, open field (north and south of the main entry road), red maple (*Acer rubrum*) riparian communities (along the Fall Kill), various wetland communities including shrub swamp (primarily associated with the Fall Kill), conifer plantations, and lawn and shade tree vegetation within the historic core.



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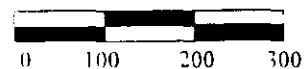
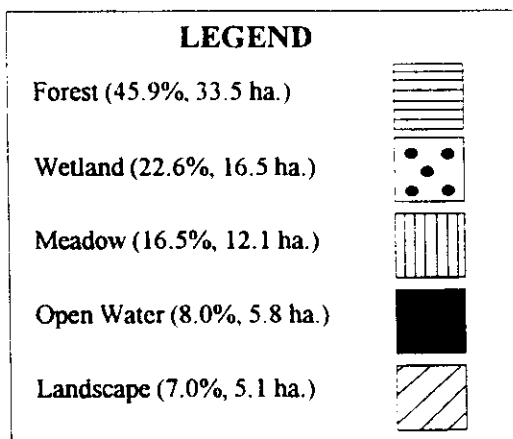
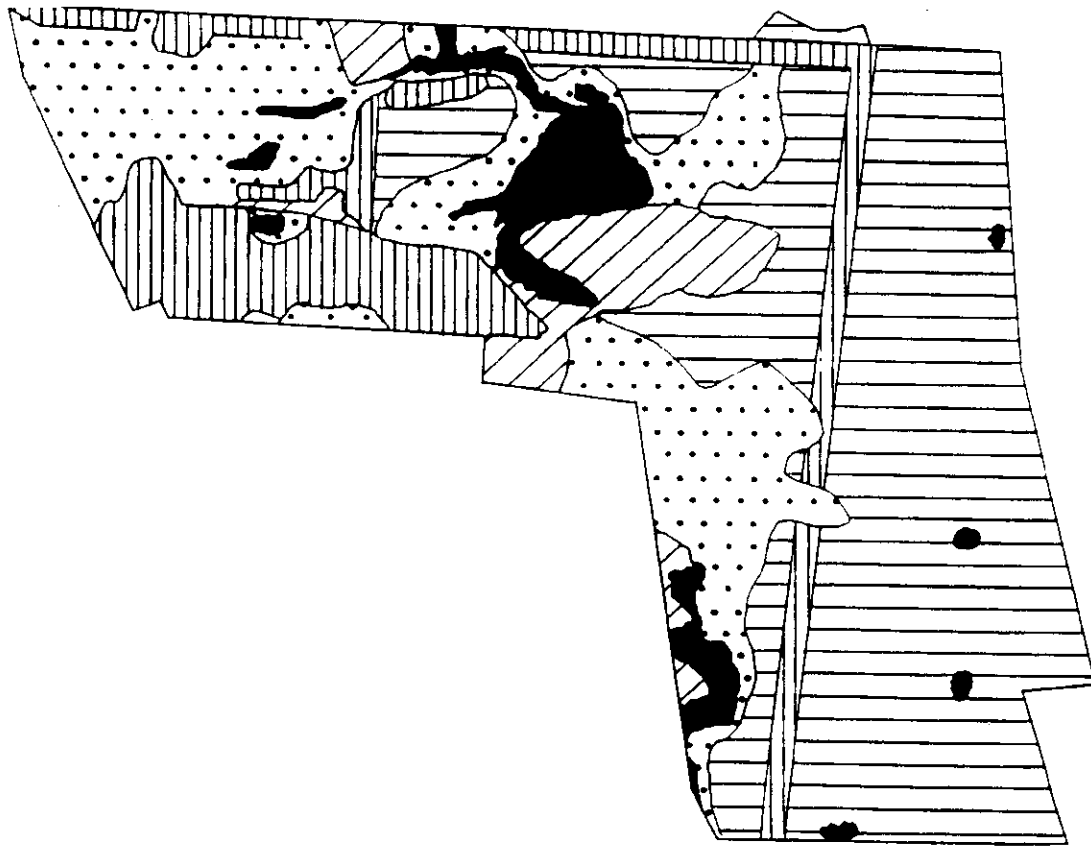


Figure 7. Site Map, Eleanor Roosevelt NHS



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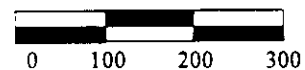
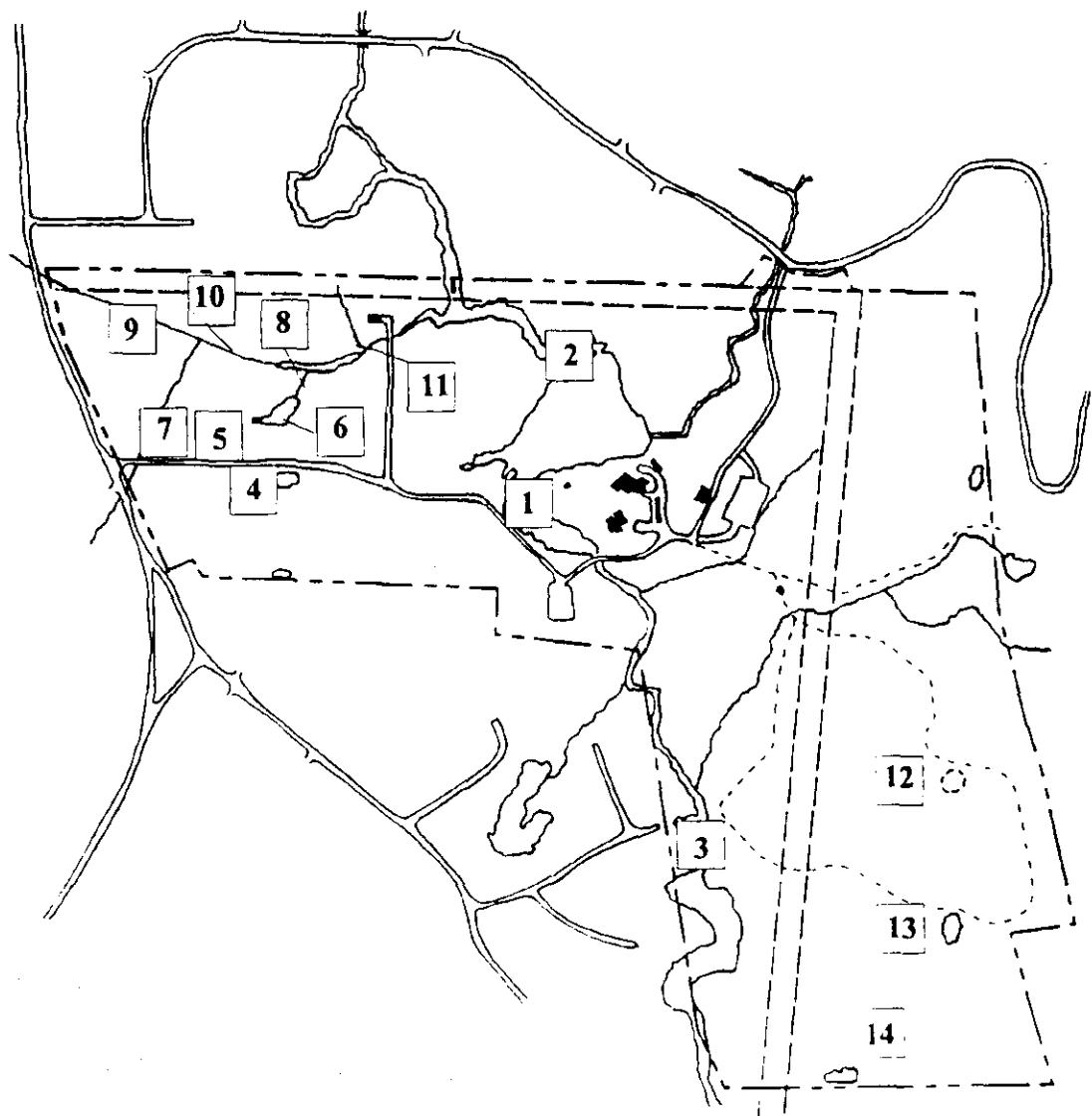


Figure 8. Cover Type Map, Eleanor Roosevelt NHS



Trapping Sites:

- | | |
|--------------------------------|--|
| 1. Historic Core | 9. Wet Meadow |
| 2. Upper Val-Kill Shrub Swamp | 10. Drainage from Wet Meadow to Caretaker's House |
| 3. Lower Val-Kill Shrub Swamp | 11. Drainage from Caretaker's House to Fall-Kill Creek |
| 4. Buttonbush Pond | 12. North Woodland Pond |
| 5. Sphagnum Shrub Swamp | 13. Middle Woodland Pond |
| 6. Caretaker's House Pond | 14. South Woodland Pond |
| 7. Buttonbush/Loosestrife Pond | |
| 8. Caretaker's House Drainage | |

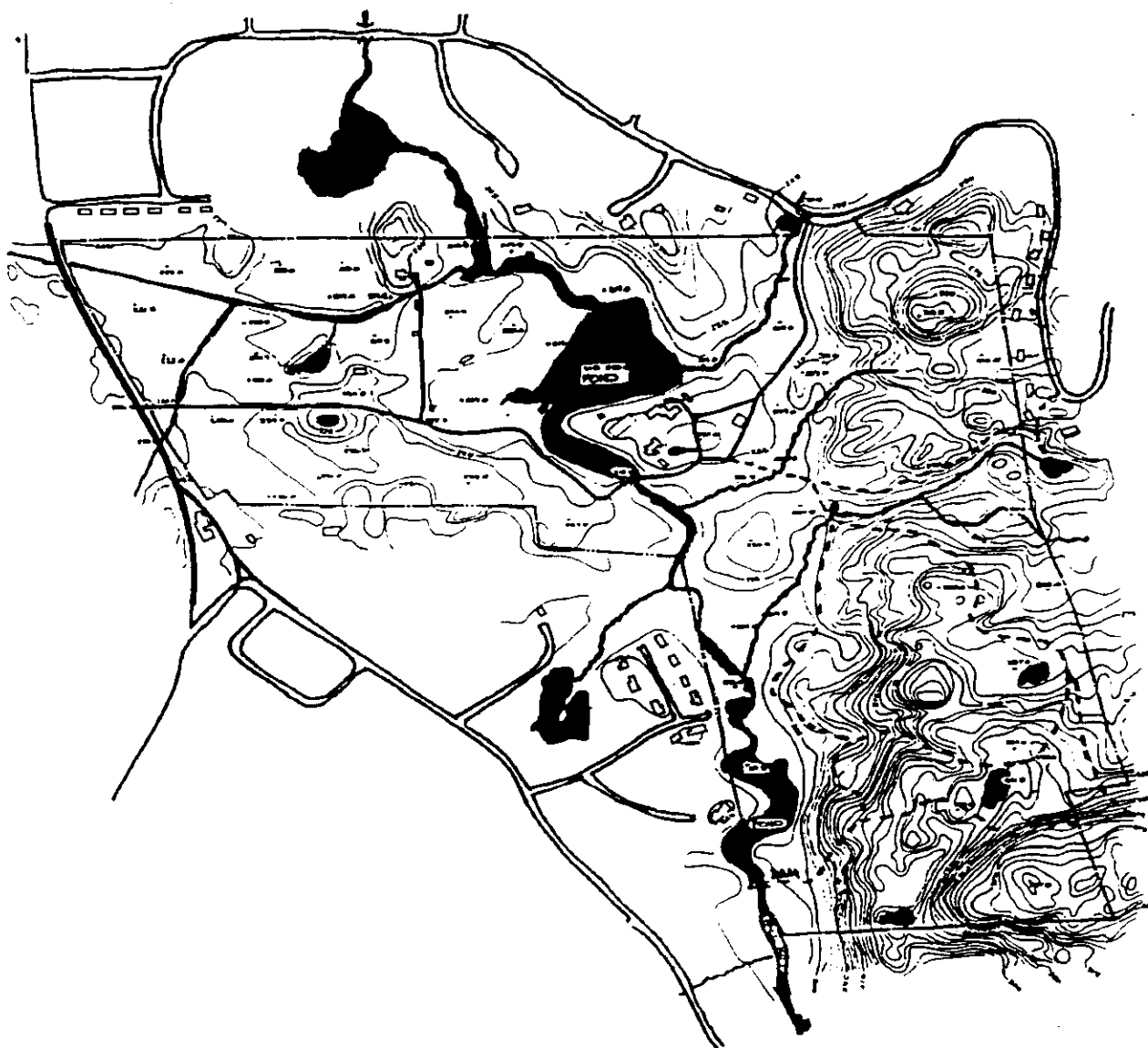


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Figure 9. Wetlands map showing trapping locations, Eleanor Roosevelt NHS



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Figure 10. Topographic Map, Eleanor Roosevelt NHS

Habitats adjacent to the site consist of a mixture of upland mixed hardwood forest and lowland red maple swamp, interspersed with housing developments

ELRO Wetlands

The following wetlands were the primary focus of the Blanding's turtle component of this study (Figure 9):

1. Historic Core:

The "historic core" includes the lower end of Upper Val-Kill Pond between the dam and the Doll House. A concentration of trapping effort was expended at this site as this was where dredging had been proposed. The substrate was silt over gravel. Further upstream, toward the Doll House, the silt becomes very deep. From late April through June, aquatic vegetation in this area was limited to a few emergent plants along the manicured edges of the lawn, algae mats, and water lilies (*Nuphar luteum* and *Nymphaea odorata*). By July, plant growth makes navigation by boat difficult or impossible, depending on water level.

2. Upper Val-Kill Shrub Swamp:

The shrub swamp lies on the western side of Upper Val-Kill Pond, between the Fall Kill and the main entrance road, and extending westward to the entrance road to the Caretaker's House. The vegetation is quite diverse, with red maple saplings and other shrubs growing atop grassy hummocks. Small areas of open water are dominated by water lilies. The canopy is quite open, and the wetland surface receives considerable insolation. Heavy silt conditions made access difficult, even by boat. Once inside the shrub swamp, the muddy substrate was relatively firm and walkable.

3. Lower Val-Kill Shrub Swamp:

At the southwest corner of ELRO the Fall Kill is impounded a second time. A 0.8 hectare (2 acre) pond was created when this dam was constructed in the 1960's. This pond is primarily open, with pond lilies and a muddy substrate over gravel. In some areas the muck is very deep. The pond is bordered on the west by a residential development with lawns extending down to the water's edge. A small and narrow shrub swamp fringes the north and east sides of this pond.

4. Buttonbush Pond:

The Buttonbush Pond is located on the south side of the main entrance road. It is a small, kettle-type depression, filled with emergent buttonbush (*Cephalanthus occidentalis*), bordered by a narrow buffer of trees. The pond is surrounded by mowed, gently rolling fields. The underlying substrate is sand and gravel with a very thin layer of leaves and organic debris. The pond was shallow, and finding sufficient water to set a funnel trap was problematic. A depression was often dug into the bottom of the pond to submerge the funnel of the trap. During drought periods, this pond dried up. The canopy is almost completely closed.

5. Sphagnum Shrub Swamp:

Across the entrance road from the Buttonbush Pond lies a small red maple and sphagnum swamp, draining into the Caretaker's House Pond. A small, open area at the western edge of the swamp is dominated by purple loosestrife. Trapping occurred in the open area and in channels between the sphagnum/red maple hummocks. The substrate was muck over sand/gravel.

6. Caretaker's House Pond:

Downstream from the sphagnum/red maple swamp is a small, elongate impoundment which exits into a drainage ditch flowing into the Fall Kill near the Caretaker's House. The pond is open with submergent aquatic vegetation and quite clear water. One shore of the pond is a manicured lawn, the other side is a berm, created when the pond was dug, covered with shrubs and small trees. The substrate of the pond is clay. Ample depth exists for trapping.

7. Buttonbush/Loosestrife Pond:

Across the berm from the Caretaker's House Pond is a small, open pond filled with buttonbush and purple loosestrife with a muddy bottom over sand and gravel. A small, open area in the center was deep enough to allow trapping.

8. Caretaker's House Pond drainage ditch:

Water exits from the Caretaker's House Pond via a small drainage ditch cut through a wooded swamp where it joins a larger drainage ditch/stream which flows eastward from Rt. 9G to the Fall Kill. This small ditch is shaded and extremely muddy with shallow water. Trapping is difficult, but not impossible.

9. Wet Meadow:

The wet meadow lies between the main entrance road and the powerline right-of-way, bordered on the west by Rt. 9G and on the east by red maple swamp. It is drained by an intermittent stream which flows under the entrance road, and a permanent ditch/stream which flows under Rt. 9G eastward to the Fall Kill. The meadow is seasonally wet with many small depressions holding water. A diverse vegetational community occurs in these wet pockets. The drainage ditch/stream is choked with aquatic vegetation. This ditch was trapped near the interface with the red maple swamp, and the wet meadow was searched for turtles.

10. Drainage ditch between wet meadow and outflow ditch from Caretaker's House Pond:

The drainage ditch/stream leaves the wet meadow and flows through a red maple woodland. The ditch is narrow, partially shaded, and in areas completely covered over with debris, notably purple loosestrife stalks. The water is shallow, 30-60 cm in depth (depending on amount of recent rainfall) and the substrate is clay. By digging out small depressions in the bottom of the ditch, sufficient depth was gained to set traps.

11. Drainage ditch between outflow ditch from Caretaker's House Pond and Fall Kill:

The narrow, wooded drainage ditch changes abruptly at the confluence with the Caretaker's House Pond outflow ditch. The ditch widens and deepens to several feet and submergent aquatic plants dominate the water. Shrubs border both sides of the ditch, but the ditch is wide enough to get full sunlight for most of the day. The substrate is clay.

12. North Woodland Pond:

The North Woodland Pond was the most ephemeral of the woodland ponds, and periodically dries completely. The surrounding woodland is a mix of two cover types: sugar maple and white oak-black oak-northern red oak (Pandullo-Quirk Associates, 1979; Eyre, 1980). Scattered pockets of eastern hemlock (*Tsuga canadensis*) and eastern white pine (*Pinus strobus*) are also present. The surrounding topography is quite steep, with rock outcrops and exfoliated talus. Several large dead trees have fallen into the pond. The bottom is leaves and organic debris over gravel. Due to water fluctuations, the site does not support aquatic vegetation. The deepest part of the pond had sufficient water (ca. 30 cm) to allow trapping throughout a portion of the study.

13. Middle Woodland Pond:

This largest of the three woodland ponds (0.18 ha./0.45 ac.) is permanent, and always contained ample water for trapping. It has well developed aquatic vegetation community including algae, duckweed (*Lemna* sp.), water lilies, and emergent shrubs, including buttonbush (*Cephalanthus occidentalis*). Many large algae-covered logs float on or just below the surface. The substrate is very mucky, but relatively firm. The water is quite deep; at no time were we able to walk more than one or two meters from the shoreline. The pond is located in steeply graded deciduous woodland with patches of conifers, and exfoliating rock outcrops. The canopy is partially open.

14. South Woodland Pond:

This pond is perched on a ledge overlooking the Fall Kill in an extremely steep, rocky area. It lies southwest and slightly downhill from the Middle Woodland Pond. A dry, shrubby ravine may serve as a corridor for turtles moving between these two ponds. This pond is permanent and vegetatively similar to Middle Woodland Pond. However, it is shallower, muckier, and has much more shrub vegetation, stumps and hummocks. A small trickle flows out of western side of the pond downhill toward the Fall Kill. This site has elements of both a vernal pond and a wooded swamp. Perched on westward facing ledges of the Fall Kill valley, this pond receives strong sunlight before the deciduous trees leaf out.

METHODS

Blanding's Turtle Population Status

Between 1988 and 1990, field work was conducted at ELRO during the spring, early summer, and fall. Inclusive dates were 30 April-20 June 1988; 30 April-24 September 1989; and 14 May-9 September 1990.

Turtles were located and captured using a variety of techniques. Visual techniques involved scanning appropriate areas of wetlands, including algae mats, basking, and nesting areas with binoculars. Visual techniques were employed both from land and a small rowboat. Hand collection included searching for turtles on land and simply picking them up, or dip netting from shore or a boat. Muddling for turtles was employed in some of the smaller pools. This technique involves feeling through underwater mud and leaves for turtles. The north-south powerline cut was searched for turtles in the area where a small stream and an ephemeral wetland traversed the open area.

Trapping was the primary method used to collect aquatic turtles. Three-hoop turtle traps 0.45 meters in diameter (Memphis Net and Twine) with a 2.5 centimeter mesh were used. All traps were treated to preserve the nylon netting and darken the trap. The traps had a single funnel opening. Traps were staked out with tubular metal rods. Traps varied in submersion depth. In shallow ponds, the trap was set in as little as thirty centimeters of water. In deeper wetlands, only the top five centimeters of the trap were exposed. Care was taken to leave adequate nonsubmerged space for turtles to come to the surface to breathe. Whenever possible, traps were set in partially shaded areas to avoid heat stress. Traps were checked on a 24 hour cycle. In a few instances traps were checked on a 48 hour cycle. Traps on a 48 hour cycle were always set in deep, shaded, water. All trapping was conducted under a Scientific Collector's Permit from the New York State Department of Environmental Conservation.

Traps were baited with sardines packed in soybean oil. The can of sardines was suspended in the rear of the trap, near the end of the funnel opening, in a small, nylon mesh bag. Traps were not checked in the early morning or late afternoon in order to avoid disrupting the turtles' feeding activity. A "trap-day" consisted of one trap set between 1000 h to 1500 h (mid-day), left overnight, and checked the following mid-day. Traps were set at 14 wetland sites described above for a total of 1006 trap-days (Table 1).

Turtles captured at ELRO were marked with notches filed into the marginal scutes of the carapace, a modification of the technique of Cagle (1939). Each Blanding's turtle, as well as musk turtle (*Sternotherus odoratus*), spotted turtle (*Clemmys guttata*), wood turtle (*Clemmys insculpta*), and box turtle (*Terrapene carolina*), was assigned a unique numerical code, which enabled individual recognition upon recapture. The following data were collected for each individual: date, time, location, and turtle's behavior at each capture/recapture. In addition, sex, reproductive condition, straight line carapace length, straight line plastron length, maximum width, maximum height, weight, annuli count, method of capture, injuries and/or deformities were recorded. Recording these data required approximately ten minutes per individual. The following is a description of these

SITE	TRAP DAYS 1988	TRAP DAYS 1989	TRAP DAYS 1990	TOTAL
1: Historic Core	100	113	5	218
2: Upper ValKill Shrub Swamp	50	25	6	81
3: Lower ValKill Shrub Swamp	0	3	4	7
4: Buttonbush Pond	40	42	10	92
5: Sphagnum Swamp	25	15	0	40
6: Caretaker's House Pond	30	12	4	46
7: Buttonbush/Loosestrife Pond	20	3	0	23
8: Caretaker's House Drainage	25	18	0	43
9: Wet Meadow	20	3	6	29
10: Drainage: Meadow to Caretaker's House	35	6	4	45
11: Drainage: Caretaker's House to Fall-Kill	25	6	0	31
12: North Woodland Pond	20	36	0	56
13: Middle Woodland Pond	100	78	15	193
14: South Woodland Pond	75	28	0	103
TOTAL:	565	388	54	1006

Table 1. Trapping Intensity, 1988-90

parameters. Turtles possess between 11-13 small plates (=scutes) on the periphery of the carapace called marginals. They are numbered Left 1-13 and Right 1-13. Thus a turtle known as L-1, L-3, R-2 has notches filed on the first and third left marginal and the second right marginal. Reference points are always the turtle's left and right side. In order to avoid confusion, the turtle should not be turned over but held in one's hand, the turtle's head facing forward, i.e. away from the person holding the turtle.

Date and time of capture are self explanatory. Location is a general description such as stream bank, submerged in shallow water or in turtle trap. Terrestrial and semi-terrestrial turtles are sexually dimorphic. Most adult spotted, wood, Blanding's, and box turtles can be sexed by a combination of tail size, location of vent, and plastral concavity. Claw size and eye coloration may be helpful. Sexually dimorphic characters for these species are listed in Ernst and Barbour (1972). Musk turtles are sexed by tail size, size of unplated suture areas on the midline of the plastron, and spinous nuptial pads on the inner hind legs of the male. Females were palpated to determine the presence of eggs.

Four measurements were taken with calipers. Depending on the size of the turtle either a Mitutoyo 200 mm dial caliper or a Haglof forestry caliper were used. Straight line carapace (SLC) is taken in a straight line parallel to the long axis of the turtle from the extremes of the anterior and posterior marginals. Straight line plastron (SLP) is taken in a straight line from the extremes of the anterior and posterior plastron parallel to the long axis of the turtle. This measurement was omitted on turtles with plastral hinges, i.e. Blanding's turtles and box turtles. Maximum width (MW) was taken in a straight line at a right angle to the long axis of the turtle from the widest extensions of the posterior left and right marginals. Maximum height (MH) was taken in a straight line at a right angle to the long axis of the turtle at the greatest height of the carapace. On plastrally concave male turtles this measurement is subject to some error. Weight to the nearest five grams was taken with a Pesola spring suspension scale. Plastral growth annuli may give an indication of the turtle's age as a single annulus is deposited at the end of each growing season. Annuli counts are generally unreliable on aquatic turtles such as painted turtles which shed their scutes each year. Annuli counts were useful as rough age indicators on spotted, wood, Blanding's, and box turtles.

Injuries and deformities were recorded for several reasons. They served as additional identifying marks and give indications as to the types and frequencies of predatory injuries for each species. Missing limbs, tail tips, claws, as well as gnaw marks to the edges of the shell occurred on many turtles. These were all recorded by location on the turtle's body. Each Blanding's turtle has a unique plastral pattern (Kiviat, 1986). Photographs were taken of each Blanding's turtle plastron to aid in future identification.

In order to streamline handling of the two common turtle species, the painted turtle (*Chrysemys picta*) and snapping turtle (*Chelydra s. serpentina*), captured turtles were marked as follows: low elevation areas of ELRO, specifically the Fall Kill and associated wetlands, were marked with a single notch on the right carapace bridge; Middle Woodland Pond were marked with two notches on the right bridge; South Woodland Pond with three notches on the right bridge. We were only interested in obtaining a count of individuals and their distribution; however, when-

ever possible the sex of the turtle was recorded. In this manner, painted or snapping turtle could be handled in as little as 30 seconds.

Herpetological Inventory

General inventory methods varied dependent on target species. Methods included hand collection (log and debris turning), careful examination of sunny edges and rock outcrops and potential basking sites, dip nettings, and as detailed above, use of funnel traps. Techniques for obtaining amphibians included examination of roadways and ground surfaces on rainy nights and night-time examination of woodland pools for breeding activity. Distinctive frog vocalizations identified species breeding at certain sites. Voucher specimens were collected of all species, except those considered endangered or threatened in New York. These specimens are deposited at the American Museum of Natural History in New York (AMNH) (Appendix I). Apart from providing verifiable proof of a species occurrence at a given place and point in time, these specimens have provided data on reproduction, genetic variation, and food habits of the herpetofauna of Hyde Park (Klemens, 1989a, 1990, in press; Bogart and Klemens, in prep).

RESULTS

Blanding's Turtle Population Status

A total of four individuals (numbered 1 - 4) were captured and marked in the course of this study at three distinct ELRO sites. One of these, (number 3), a female captured in the Middle Woodland Pond, had been captured and tagged at this location in 1983 by Erik Kiviat. Table 2 details capture data.

The Middle Woodland Pond was the most productive habitat, yielding five trap captures of two individuals plus several visual observations. These turtles appear to be resident in the Middle Woodland Pond. The Upper Val-Kill Pond Shrub Swamp yielded a single capture. The Button-bush Pond yielded a single individual captured three times. Blanding's turtles ranged in size from 198-228 mm SLC and weighed between 1000-1875 gm. The smallest and largest individuals were females. Most captures took place between early May and early June, with one capture occurring in early September. On 25 April 1990 a Blanding's turtle was found on Roosevelt Road, adjacent to ELRO, but was not examined by the authors. However, plastron photographs taken by William Urbin (NPS) indicate that it was a different individual than those turtles marked during the study.

Herpetological Inventory

A total of 16 amphibian and 16 reptile species were documented. The distribution of species between sites, and the basis for their inclusion is summarized in Tables 3 and 4. Turtle captures at ELRO are summarized in Table 5.

Amphibia: Caudata (Salamanders)

Jefferson Salamander complex (*Ambystoma jeffersonianum* x *A. laterale*)

Hybrids between the Jefferson salamander and blue-spotted salamander breed at three sites at ELRO: the North, Middle, and South Woodland Ponds. Karyological and biochemical analyses revealed these salamanders to be all females, either triploids or tetraploids, most closely allied genetically and ecologically with *Ambystoma jeffersonianum*. The triploids possessed two sets of chromosomes from *A. jeffersonianum* and one set from *A. laterale*. The tetraploids have either two sets of chromosomes from each parental species or three sets of *A. jeffersonium* chromosomes and one set of *A. laterale*. One of us (RPC) observed a large dark salamander swimming in a ledge-top vernal pool above Roosevelt Cove at HOFR and identified it as belonging to this complex. Subsequent investigation of this and other pools at HOFR did not yield adults or larvae of this species. Jefferson complex salamanders have a localized distribution within Dutchess County. Hybrids are the common form observed, with numerous genetic combinations recorded (Klemens, 1989a; Bogart and Klemens, in prep). New York State has listed the Jefferson salamander complex as a Species of Special Concern.

Capture No.	Individ. Code	Date	Sex	Recapture? 0 = no, 1 = yes	SLC (mm.)	MW (mm.)	MH (mm.)	Weight (gm.)	Location	Capture Method	Annuli/Comments
BLANDING'S TURTLE (<i>Emydoidea blandingii</i>)											
1988 DATA:											
1	1	08 MAY 88	M	0	217	UNK	UNK	1200	Upper Val-Kill Shrub Swamp	TRAP	24
2	2	08 MAY 88	M	0	222	UNK	UNK	1325	Middle Woodland Pond	TRAP	WORN
3	3	08 MAY 88	F	0	228	UNK	UNK	1720	Middle Woodland Pond	TRAP	WORN; BARD TAG #522
4	4	28 MAY 88	F	0	198	UNK	UNK	1000	Buttonbush Pond	TRAP	21/22 + 1987
5	2	19 JUN 88	M	1	UNK	UNK	UNK	UNK	Middle Woodland Pond	TRAP	SEE ABOVE
1989 DATA:											
6	4	21 MAY 89	F	1	198	129	77	1025	Buttonbush Pond	HAND	21/22
	UNK	27 MAY 89	UNK	UNK	UNK	UNK	UNK	UNK	Middle Woodland Pond	N/A	VISUAL OBS. ONLY
	UNK	28 MAY 89	UNK	UNK	UNK	UNK	UNK	UNK	Buttonbush Pond	N/A	VISUAL OBS. ONLY
	UNK	28 MAY 89	UNK	UNK	UNK	UNK	UNK	UNK	Middle Woodland Pond	N/A	VISUAL OBS. ONLY
7	3	04 SEP 89	F	1	227	153	96	1875	Middle Woodland Pond	TRAP	WORN (157), BARD TAG
MISSING											
1990 DATA:											
8	4	09 JUN 90	F	1	227	153	96	1875	Buttonbush Pond	TRAP	23; NOT GRAVID

Table 2. Summary of Blanding's turtles captured or observed at ELRO

Common Name	Scientific Name	ELRO	VAMA	HOFR
✓ Jefferson Salamander complex	<i>Ambystoma jeffersonianum</i> x <i>A. laterale</i>	S	NR	U
Spotted Salamander	<i>Ambystoma maculatum</i>	S	NR	S
Marbled Salamander	<i>Ambystoma opacum</i>	NR	NR	V
Northern Dusky Salamander(1)	<i>Desmognathus f. fuscus</i>	NR	NR	NR
Northern Two-lined Salamander	<i>Eurycea bislineata</i>	V	NR	V
Four-toed Salamander	<i>Hemidactylium scutatum</i>	S	NR	NR
Redback Salamander	<i>Plethodon cinereus</i>	S	S	S
Northern Slimy Salamander	<i>Plethodon glutinosus</i>	S	NR	S
Red-spotted Newt	<i>Notophthalmus v. viridescens</i>	S	NR	S
Eastern American Toad	<i>Bufo a. americanus</i>	S	NR	U
Northern Spring Peeper	<i>Pseudacris c. crucifer</i>	S	V	V
Gray Treefrog	<i>Hyla versicolor</i>	S	S	NR
Bullfrog	<i>Rana catesbeiana</i>	S	S	NR
Green Frog	<i>Rana clamitans melanota</i>	S	S	S
Pickerel Frog	<i>Rana palustris</i>	S	NR	S
Wood Frog	<i>Rana sylvatica</i>	S	S	S

NR = no record

S = voucher specimen prepared

V = confirmed visual record

U = Unconfirmed visual record

(1) Northern Dusky Salamander collected from tributary stream to Staatsburg Reservoir, not on NPS land.

Table 3. Amphibians recorded at the three ROVA sites, 1988-1990.

Common Name	Scientific Name	ELRO	VAMA	HOFR
Common Snapping Turtle	<i>Chelydra s. serpentina</i>	S	S	V
Painted Turtle	<i>Chrysemys p. picta</i> x <i>p. marginata</i>	S	S	V
Spotted Turtle	<i>Clemmys guttata</i>	S	NR	NR
Wood Turtle	<i>Clemmys insculpta</i>	S	NR	V
Blanding's Turtle	<i>Emydoidea blandingii</i>	S	NR	NR
Common Map Turtle	<i>Graptemys geographica</i>	NR	NR	S
Common Musk Turtle	<i>Sternotherus odoratus</i>	S	S	NR
Eastern Box Turtle	<i>Terrapene e. carolina</i>	S	S	S
Copperhead	<i>Agkistrodon contortrix mokasen</i>	NR	NR	V
Northern Black Racer	<i>Coluber c. constrictor</i>	S	S	S
Smooth Green Snake(1)	<i>Ophiodrys vernalis</i>	NR	NR	NR
Northern Ringneck Snake	<i>Diadophis punctatus edwardsii</i>	NR	NR	S
Black Rat Snake	<i>Elaphe o. obsoleta</i>	NR	V	NR
Eastern Milk Snake	<i>Lampropeltis t. triangulum</i>	S	S	NR
Northern Water Snake	<i>Nerodia s. sipedon</i>	S	U	S
Eastern Garter Snake	<i>Thamnophis s. sirtalis</i>	S	NR	S

NR=no record
S=voucher specimen prepared

V=confirmed visual record
U=unconfirmed visual record

(1) Smooth Green Snake collected from intersection of Rts. 39 and 41 in Hyde Park, not on NPS property.

Table 4. Reptiles recorded at the three ROVA sites, 1988-1990.

Summary of Turtle Captures¹ at ELRO, 1988-90.

Species	# of Captures	% of Total	Captures/TrapDay ²
Painted turtle	716	82.7	0.712
Common snapping turtle	38	4.4	0.038
Spotted turtle	36	4.2	0.036
Common musk turtle	43	5.0	0.043
Blanding's turtle	8	1.0	0.008
Box turtle	10	1.2	N/A
Wood turtle	15	1.7	N/A
Total	866	100.2	

1. Captures refer to capture events, not distinct individuals.

2. Total # trap-days 1988-90 is 1006.

N/A - not applicable

Table 5. Summary of turtle captures at ELRO, 1988-90

Spotted Salamander (*Ambystoma maculatum*)

This abundant but secretive mole salamander was recorded at ELRO breeding in all three woodland ponds as well as in the wetlands at the rear service gate. At HOFR spotted salamanders were found breeding in the vernal pools and wetlands situated in the ledges above Roosevelt Cove. Additional specimens were collected at several sites off of NPS property. Although wetland habitats are limited, spotted salamanders may occur at VAMA.

Marbled Salamander (*Ambystoma opacum*)

The marbled salamander has an irregular distribution in Dutchess County, where it is near its northern range limit. One of us (RPC) observed marbled salamander larvae in vernal swales near the landfill area of HOFR in 1987. Peter Warny (pers. comm.) observed one adult and two newly transformed individuals in this area on 23 September 1987. No marbled salamanders were observed in these swales in 1988. However, the water level was extremely low and successful reproduction may not have occurred that year.

Northern Dusky Salamander (*Desmognathus f. fuscus*)

Although ample rocky stream habitat exists at HOFR and VAMA, no dusky salamanders were observed. This species was collected at one site in Hyde Park, a tributary stream to the Staatsburg Reservoir. Kiviat (pers. comm.) considers the dusky salamander to have declined throughout Dutchess County in the last fifty years and Klemens (1990; in press) has documented their decline in Westchester County (NY) and Fairfield County (CT).

Northern Two-lined Salamander (*Eurycea bislineata*)

This widespread, common stream salamander, which has replaced the dusky salamander in many southern New York streams (Klemens, 1990; in press), is notably rare at all three NPS sites. One of us (RPC) observed a single specimen at the edge of the North Woodland Pool at ELRO in 1987 and Peter Warny (pers. comm.) observed one at HOFR in 1987. Despite intensive searching in 1988 this species was found at only one site in Hyde Park, the tributary stream to the Staatsburg Reservoir where northern dusky salamander also occurs.

Four-toed Salamander (*Hemidactylium scutatum*)

This secretive, wooded swamp salamander is undoubtedly more widespread than published records, reports, and preserved specimens indicate. Klemens (1991) found over twenty five localities for this salamander in Connecticut where it was previously considered rare. In Dutchess County, this species was reported from Red Hook by Bishop (1941) and from a single specimen collected at Clinton Hollow by Kiviat in July 1962 (AMNH Catalog #68421). In 1988 a breeding population was documented at ELRO's South Woodland Pond and several individuals were observed alive on the road during a nocturnal rainstorm near the Staatsburg Reservoir.

Redback Salamander (*Plethodon cinereus*)

Both striped and unstriped morphs of this extremely abundant woodland salamander were found throughout the town of Hyde Park, including all three NPS properties.

Northern Slimy Salamander (*Plethodon glutinosus*)

Slimy salamanders were common at ELRO, HOFR, and several sites off of NPS property. Collection sites were characterized by large quantities of dry, exfoliated rock with moist pockets of duff and rotten logs. This large relative of the redback salamander is near its northeastern range limit along the east bank of the Hudson River. Although locally common in western Dutchess County, it becomes progressively rarer eastward. Slimy salamanders are absent from most of eastern Dutchess County and western Connecticut (Klemens, 1990; in press)

Red-spotted Newt (*Notophthalmus v. viridescens*)

The aquatic newt and its terrestrial stage, the red eft are common and widely distributed in Hyde Park. Efts were found in the deciduous and coniferous woodland at ELRO and HOFR. Adult newts were found in the North, Middle, and South Woodland Pools at ELRO and in the vernal pools on the ledges above Roosevelt Cove (HOFR). Newts were also collected outside NPS property.

Amphibia: Anura (Frogs)**Eastern American Toad (*Bufo a. americanus*)**

American toads were found at ELRO breeding in the wet meadow and adjacent wooded swamp. A few individuals were observed crossing roads during wet nights off of NPS property. Toads were surprisingly scarce in Hyde Park. An eastern American toad (AMNH 108360), incorrectly identified as a Fowler's toad (*Bufo woodhousii fowleri*) was collected in 1975 at "Roosevelt-Vanderbilt NHS".

Northern Spring Peeper (*Pseudacris c. crucifer*)

This small treefrog is widely distributed at Hyde Park, breeding in vernal pools, swamps, marshes, and ditches. All three NPS sites contain breeding populations. Peepers even bred on the submerged cover of the swimming pool near the Stone Cottage at ELRO.

Gray Treefrog (*Hyla versicolor*)

The gray treefrog breeds in wooded swamps at ELRO. Like the spring peeper, this species bred on the flooded swimming pool cover at the stone cottage. Additional individuals were observed at night on wet roads at VAMA and near the Staatsburg Reservoir.

Bullfrog (*Rana catesbeiana*)

At ELRO, bullfrogs were frequently observed at Upper Val-Kill Pond and in the Middle and South Woodland Ponds. A young individual was observed in the North Woodland Pond. Bullfrogs generally occur in permanent bodies of water, though young individuals are migratory, using other types of wetland habitat. Bullfrogs were also found in the impoundments on Crum Elbow Creek at VAMA and other sites in Hyde Park.

Green Frog (*Rana clamitans melanota*)

This is the most conspicuous frog at Hyde Park, occurring in ponds, streams, woodland pools, swamps, ditches, and Hudson River marshes. This species was observed at all NPS

sites and other areas in Hyde Park. It is the most common frog in permanent bodies of water, far outnumbering the bullfrog.

Pickerel Frog (*Rana palustris*)

Pickerel frogs were locally common in grassy areas near streams and other wetlands at ELRO and HOFR, as well as other sites in Hyde Park. They breed in the shrub swamp area of Upper Val-Kill Pond.

Wood Frog (*Rana sylvatica*)

Wood Frogs were found in moist, deciduous woods on all three NPS sites and other sites within Hyde Park. Breeding sites included the North, Middle, and South Woodland Pools at ELRO and the ledge pools above Roosevelt Cove at HOFR. In 1988, a garter snake was observed eating a wood frog near the Middle Woodland Pool. An individual with a dorsal stripe was collected at ELRO and reported by Klemens (1990; in press).

Reptilia: Testudinata (Turtles)

Common Snapping Turtle (*Chelydra s. serpentina*)

Twenty-two snapping turtles were captured at ELRO during 1988 and marked with a nonsequential code on the right bridge. One of these was recaptured during that same year. Snapping turtles occurred most frequently in the shrub swamp section of Upper Val-Kill Pond and in the drainage ditch between the wet meadow and Caretaker's House. Snapping turtles did not enter the lower portion (historic core) of Upper Val-Kill Pond until mid-June. Most snapping turtles were trapped, though a few were hand captured. In 1989-1990, due to time constraints, snapping turtles were not marked. However, of interest were three snapping turtle captures in the Middle Woodland Pond and one juvenile and one adult capture in the South Woodland Pond.

Snapping turtles are widespread in Hyde Park. In addition to those captured at ELRO, snapping turtles were observed in Roosevelt Cove and the Ice Pond at HOFR. At VAMA snapping turtles were found in the impoundments on Crum Elbow Creek. Snapping turtles were observed in the Fall Kill at the junction of Rts. 39 and 41, crossing Rte. 41 near Cardinal Road, and in a shrub swamp near Victory Lake.

Painted Turtle (*Chrysemys p. picta* x *p. marginata*)

Painted turtles at Hyde Park are an intergrade population between the eastern (*picta*) and mid-land (*marginata*) subspecies. Individual turtles may resemble either subspecies or appear intermediate. A detailed review of this problem may be found in Klemens (1978). At ELRO in 1988, a total of 353 painted turtles were marked with a non-sequential code on the right bridge. Of these, 332 were captured in the Fall Kill or its tributaries and adjacent wetlands, twenty were captured in the Middle Woodland Pond, and one in the South Woodland Pond. Turtles were collected by hand, with dip net, crossing roads, and in traps. Once marked, a recaptured turtle could not be distinguished from other previously marked individuals. There were 87 recaptures of marked turtles in 1988, including eight in the Middle Woodland Pool, but these do not necessarily represent 87 different individuals. Thus population estimates using multiple recapture are not possible. "Captures" in 1988 include all first time captures plus recaptures, and total 440. Due to the time constraints of marking such a numerous species, painted turtles were not marked in 1989 or 1990. In 1989, there were 265 painted turtle "captures" (not necessarily 265 different individuals), 102 of which were "recaptures" of animals marked in 1988. In 1990, there were a total of eleven painted turtle "captures", three of which were recaptures. From the 1989 and 1990 data, it is clear that the 353 individuals marked in 1988 were a fraction of the total population.

While a number of theoretical assumptions are not met, using these data to derive a population estimate provides some sense of the population's magnitude. An estimate of the painted turtle population using the Lincoln Index yields 917 individuals with a standard error of +/- 71 (Davis and Winstead 1980). This estimate does not include individuals too small to be trapped (hatchlings and yearlings) and assumes that all animals marked in 1988 were alive to be recaptured in 1989. Because of the likelihood of some mortality among the marked individuals, 917 is an overestimate.

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This is the most abundant species at ELRO, accounting for 82.7% of all turtle captures (table 5), and was found in all the bodies of water sampled except the North Woodland Pond. Of 716 painted turtle captures, 656 were in the Fall Kill and tributary and adjacent wetlands. Fifty-nine were collected in the Middle Woodland Pond, and one was collected in the South Woodland Pond.

Painted turtles are extremely abundant at ELRO, especially in Upper Val-Kill Pond and its tributaries. At VAMA they occur in the impoundments on Crum Elbow Creek. At HOFR, painted turtles were observed in the Ice Pond in 1987 and 1989, but were not observed at Roosevelt Cove. Kiviat (pers. comm) considers painted turtles uncommon in the freshwater tidal wetlands of the Hudson River. They are common in most of the ponds, impoundments, and slow moving streams of Hyde Park.

Spotted Turtle (*Clemmys guttata*)

At ELRO, spotted turtles were captured by hand and trap from late April through late June. Between 1988 and 1990, twenty-four spotted turtles were marked. Some marked turtles were recaptured each year. Spotted turtles had two centers of abundance at ELRO. One was the extensive system of drainage ditches, wet meadow, and wooded swamp flowing from Rt. 9G east to Upper Val-Kill Pond. The second area was the Buttonbush Pond near the entrance road. Surprisingly, no spotted turtles were taken in any of the three woodland ponds. We marked one juvenile, thirteen males, and ten females. This population consisted of a mixture of young, middle aged, and older turtles. Males ranged in size from 96.2-116.5 mm SLC and in weight from 125-200 gm. Females ranged in size from 93-115 mm SLC and in weight from 115-225 gm. Sixteen of these turtles had well-healed predation injuries, some quite extensive.

Spotted turtles are localized in Dutchess County, where they are near their northern range limit. It is encouraging to find a large, viable population at ELRO in the wet meadow and adjoining wooded swamps and kettle ponds. Another large population occurs near Victory Lake in an area undergoing residential development. Potential habitat exists for this species at HOFR, in the small wet meadow below the house and the swamps near the Hudson River, but this species has not been recorded there. In 1988, a male spotted turtle was reported at VAMA, crossing the road near the lower gate house. The surrounding habitat appears unsuitable for spotted turtles and as the specimen was not collected or photographed, we could not verify this report. Therefore, we do not consider this species confirmed at VAMA. New York State lists the spotted turtle as a Species of Special Concern.

Wood Turtle (*Clemmys insculpta*)

At ELRO, wood turtles were captured by hand from early May through June. Between 1988 and 1989, eleven wood turtles were marked. Some marked turtles were recaptured each year. Wood turtles had a single center of abundance at ELRO, located between the "historic core" and the series of small streams and wetlands located on the power line cut due east of the "historic core". One of us (DJH) observed a wood turtle near the North Woodland Pond in 1987.

We marked four males and seven females. The four males ranged in size from 171-200 mm SLC and weighed between 775-1000 gm. The seven females ranged in size from 159-189.5 mm SLC

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and weighed between 650-1000 gm. Five turtles were young, in their late teens and early twenties, six were worn smooth and therefore older. Eight turtles had well healed predation injuries, some quite extensive.

Wood turtle populations have undergone a long term decline in many sections of the Northeast (Klemens, 1989b). Wood turtles occur in many small and medium-sized streams, such as the Fall Kill, which have deep pools and overhanging banks for hibernation, but also areas of woods and fields adjoining these streams. Wood turtles become terrestrial during the summer, returning to watercourses in the autumn. A healthy population of wood turtles occurs at ELRO, which provides both stream and woodland habitat. At HOFR a single wood turtle was observed in the Ice Pond on 27 March 1987 by RPC, and a second observation was made in 1988. Wood turtles were collected in the vicinity of the Maritje Kill near Rt. 9 and near Victory Lake. A female was observed dead on Creek Road, south of the ELRO boundary. New York State lists the wood turtle as a Species of Special Concern.

Blanding's Turtle (*Emydoidea blandingii*)

Four Blanding's turtles were marked at ELRO and discussed in detail elsewhere in this report. Kiviat (1986) reported Blanding's turtles from the East Park section of Hyde Park. Blanding's turtle is listed by New York State as a Threatened Species.

Common Map Turtle (*Graptemys geographica*)

Kiviat (1977) first reported this large riverine turtle nesting at Hyde Park along the railroad tracks. One of us (MWK) observed at least one map turtle in Roosevelt Cove and found a female searching for a nest site on 18 June 1988 on the railroad tracks adjacent to Roosevelt Cove. This species is uncommon in the Hudson Valley and its occurrence on areas under NPS steward ensures the turtle and its habitat a measure of protection. A study of habitat utilization and population parameters of map turtles at Roosevelt Cove would make an worthwhile research project.

Common Musk Turtle (*Sternotherus odoratus*)

At ELRO, musk turtles were captured by hand and dip net from early May through June, and in September. Between 1988 and 1989, thirty-nine musk turtles were marked, and some marked turtles were recaptured each year. At ELRO, musk turtles are concentrated in Upper Val-Kill Pond and the Caretaker's House Pond and their associated drainage ditches. We anticipate that musk turtles occur in Lower Val-Kill Pond.

We marked 23 males, and 16 females. The males ranged in size from 78-118 mm SLC and weighed between 75-250 gm. The females ranged in size from 69-112 mm SLC and in weighed between 50-240 gm. Many of these turtles were affected by a shell disease of unknown etiology which caused severe pitting, sloughing, and subsequent scarring of the shell.

Musk turtles favor small, muddy bottomed rivers such as the Fall Kill. Where these rivers are impounded musk turtles can attain high population densities. Musk turtles are common in Upper Val-Kill Pond, the impoundments on Crum Elbow Creek at VAMA, and the impoundment on the Fall Kill located at the junction of Rts. 39 and 41.

Eastern Box Turtle (*Terrapene c. carolina*)

Five eastern box turtles were marked at ELRO, one juvenile female, two adult females and two adult males. Some of these turtles were recaptured at least once. All captures and recaptures were on or near the wet powerline cut due east of the historic core. The males measured 141 and 164 mm SLC and weighed 450 and 675 gm respectively. The females were 147 and 151 mm SLC, and weighed 725 and 650 gm respectively. The juvenile female was 103 mm SLC and weighed 190 gm. Three turtles were young, between eight and fifteen years old, and two were older based upon their worn shells. Two turtles had minor well-healed predation injuries.

Box turtles occur at all three ROVA sites. A small population was found at ELRO; a juvenile was found on the shoulder of Rt. 9 at HOFR and a female was found on a dirt road near the James R. Roosevelt Coach House; two males were found at VAMA in the perched skunk cabbage swamp directly below the the mansion and near the gardens. A gravid female was observed near the intersection of Rt. 9 and Saint Andrews Road.

Box turtles approach their northern range limit in Dutchess County although they have been historically reported as far north as the Albany Pine Bush (Stewart and Rossi 1983). Box turtles become progressively rarer as one moves eastward in Dutchess County. They are rarely found in the Harlem Valley north of Pawling (Klemens, 1990 and in press). In the central valley of Dutchess County box turtles occur at least as far north as Baird State Park. In the Hudson Valley the northernmost recent records of box turtles are from Red Hook, near the Columbia County line (Klemens, 1990, and in press).

Several adult turtles examined were large, over 140 mm straight line carapace length. Klemens (1990; in press) noted this trend in other box turtle populations in New England, where the species reaches its northeastern range limit. Milstead (1969) noted this phenomenon in Michigan, at the species' northwestern range limit. Box turtles are a protected game species in New York State.

REPTILIA: Squamata: Serpentes (Snakes)

Northern Copperhead (*Agkistrodon contortrix mokasen*)

Despite the tendency of people to confuse milk and water snakes with copperheads, some reports are authentic. At HOFR, one was observed (by RPC) in 1987, on the east side of NPS property, behind the James Roosevelt house. Another observation, in 1988 was made (by DJH) at HOFR. It is likely that copperheads occur at VAMA, and possibly at ELRO, though ELRO lacks extensive ledges and outcrops favored by this species. Copperheads have been reported consistently from Hyde Park for many years, and specimens have found their way into various museum collections (AMNH Catalog # 4007, 4009, 4012, 4129-31).

Northern Black Racer (*Coluber c. constrictor*)

Black racers are locally common in Hyde Park. At ELRO they are concentrated on the open, rocky areas under the powerlines. At HOFR, they are concentrated in the talus areas of the railroad cut at the north end of Roosevelt Cove. A single individual was found in dappled sunshine on dense forest floor along the river road at VAMA. Another individual was observed

alongside Saint Andrews Road near the intersection of Rt. 9G, and a road kill was found on White Oaks Road.

Northern Ringneck Snake (*Diadophis punctatus edwardsii*)

Despite large areas of exfoliated rock and a rich salamander fauna (favorite hiding spots and food for ringneck snakes), very few individuals were found at Hyde Park. None were found at ELRO, one at the edge of Saint Andrews Road near Rt. 9, one at the north end of Roosevelt Cove (HOFR), and one dead on River Road, just south of the Hyde Park train station.

Black Rat Snake (*Elaphe o. obsoleta*)

Numerous reliable reports were received of large, black snakes in the trees at VAMA, as well as a report of four large black snakes crawling up the stucco side of VAMA visitor's center heading for a nest of starlings. The only snake capable of this climbing feat is a black rat. This large, semi-arboreal snake appears confined to a narrow strip of land bordering the Hudson River. A specimen in the American Museum's collection (AMNH Catalog #120078) was found dead on Rt. 9 near Norrie Heights. In 1988 a small juvenile was collected dead on Reservoir Road (near Mills Road), less than a quarter of a mile east of Rt. 9.

Eastern Milk Snake (*Lampropeltis t. triangulum*)

Three milk snakes were collected in the course of this inventory. A dead on road adult near the Stone Cottage at ELRO, a dead on road juvenile at VAMA, and a live adult under cover at the edge of a shrub wetland near Victory Lake.

Northern Water Snake (*Nerodia s. sipedon*)

Despite the abundance of wetlands, water snakes were not abundant at Hyde Park. Two individuals were collected at ELRO, one near the dam at Upper Val-Kill Pond and one at the North Woodland Pool. Several others were sighted at Upper Val-Kill Pond and a single individual at the Middle Woodland Pool. At HOFR a large specimen was collected on the roadway skirting the south end of Roosevelt Cove. An unconfirmed report of a dead on road specimen near Crum Elbow Creek at VAMA was received. Several water snakes were observed in the Fall Kill impoundment at the junction of Rts. 39 and 41. A juvenile was collected in a dry field adjacent to the Maritje Kill, near the junction of Rt. 9 and Saint Andrews Road.

Smooth Green Snake (*Opheodrys vernalis*)

One of the significant finds of this inventory was a gravid female smooth green snake, found in a grassy area near the Fall Kill at the intersection of Rts. 39 and 41. Smooth green snakes are rare in Dutchess County and, to the best of our knowledge, this is the only recent sighting in western Dutchess County. Green snakes have undergone a drastic decline in the Northeast due to the loss of open field habitat and possibly insecticide spraying (Klemens, 1990; in press).

Eastern Garter Snake (*Thamnophis s. sirtalis*)

Garter snakes were found throughout Hyde Park, but were nowhere abundant. Specimens were collected at ELRO and HOFR, as well as several areas off of NPS property.

Potentially Occurring Species:

The following species though not observed in the course of this survey may occur at Hyde Park, as they have been recorded in the Hudson Valley both south and north of Hyde Park.

Fowler's Toad (*Bufo woodhousii fowleri*)

Northern Leopard Frog (*Rana pipiens*)

Klemens, et al 1987, report populations along the Hudson River in Dutchess and Columbia counties.

Eastern Worm Snake (*Carphophis a. amoenus*)

Eastern Hognose Snake (*Heterodon platirhinos*)

Northern Brown Snake (*Storeria d. dekayi*)

Eastern Ribbon Snake (*Thamnophis s. sauritus*)

Ribbon snakes resemble garter snakes, especially when "on the move". Therefore we do not accept the Pandullo Quirk Associates (1979) record from ELRO without a voucher specimen or photograph.

DISCUSSION

Blanding's Turtle Population Status

Blanding's turtles are reported to occur at low densities at many sites throughout their range, giving unusual importance to the survival and reproductive success of individual turtles as components of the population. This was borne out at ELRO where the population is small.

For example, female #3 was initially captured in the Middle Woodland Pond on 12 August 1983 by Erik Kiviat and marked with Petersen Disc #522, Bard College Field Station. She was recaptured in the Middle Woodland Pond twice during the course of this study. Her measurements were:

12 August 1983:	SLC 228 mm Weight 1790 gm
8 May 1988:	SLC 228 mm Weight 1720 gm
4 Sept 1989:	SLC 227 mm Weight 1875 gm

This female was also captured outside the park by adjacent property owners: on 14 June 1984 in the driveway of 1 Roosevelt Road (near Franklin Road), approximately 25 m west of the Fall Kill by Mrs. Devens; and on 17 June 1985 at Lawrence Road, approximately the seventh house in from Roosevelt Road by Mr. and Mrs. Jessup. This documents movements in excess of 1300 m on at least two occasions, indicating that some Blanding's turtles are capable of relatively long distance travel.

Previous literature reported a small home range for Blanding's turtles of less than 100 m (Ernst and Barbour 1972; DeGraaf and Rudis 1983). Eckler and Breisch (1988) reported similar long distance movements (up to 1100 m) in another Dutchess County population of Blanding's turtle. These movements were undertaken by females in early June for purposes of nesting. Nesting took place in a general area towards which several females undertook forays. The long distance movements of female #3 are likely to have been associated with nesting, but this has not been confirmed. However, these movements suggest a primary activity center at the Middle Woodland Pond with episodic, relatively long-distance forays.

Both the male and female marked in the Middle Woodland Pool had their annuli worn smooth, indicating they were relatively old. The male and female found in the Val-Kill Pond Shrub Swamp and nearby Buttonbush Pond were younger individuals, in their early twenties. Blanding's turtles were found in the same habitat (and traps) as painted turtles (all three sites), musk turtles and snapping turtles (Val-Kill Pond), and spotted turtles (Buttonbush Pond).

Eight captures of four individual Blanding's turtles in 1006 trap days of effort contrasts poorly when compared to Kiviat's work at the Overlook Preserve and adjoining wetlands in La Grange. Kiviat (pers. comm.) trapped 21 Blanding's turtles in 177 trap days. The ratio of captures to trap days is 0.008 at ELRO (table 5) in comparison to 0.12 at Overlook. The Overlook Preserve is

the "most consistently productive Blanding's turtle site in Dutchess County" as well as one of the least impacted by development (Kiviat, pers. comm.).

The ELRO Blanding's turtle population is put into better perspective when one considers the entire Dutchess County situation. To date, Kiviat (1988) has documented close to 100 Blanding's turtles in a period spanning 13+ years. Apart from three large populations of 15-30 turtles, there are seven smaller populations including ELRO. The remaining turtles are isolated sightings, partially due to lack of follow up field work. Therefore ELRO is a regionally significant site and the only area in the 49.2 km² Fall Kill basin where multiple sightings of Blanding's turtles have occurred since 1979.

We cannot make population estimates based on eight captures. Kiviat has made some rough estimations based on his experience studying Blanding's turtle populations in Dutchess County. He estimates that when studying a site for two consecutive seasons, some individuals will be recaptured but one will also find as many unmarked individuals in the second season as the first. Based on this reasoning there should be at least four more unmarked Blanding's Turtles at ELRO, plus a number of juveniles. However, two additional years of field work have only documented one new individual (based on plastron photographs examined by DJH) since 1988.

Several other factors could account for our lack of documentation of additional turtles at ELRO. Several wetlands of the Fall Kill drainage system empty into or near NPS property. These were not trapped as they were considered outside the scope of this study. Blanding's turtles may move between these wetlands and NPS property. Female #4 has been captured three times in Buttonbush Pond: on 28 May 1988, 21 May 1989, and 9 June 1990. This pond has completely dried up for several weeks or months by mid-August in both 1989 and 1990. Since habitat in Buttonbush Pond is unsuitable for a semi-aquatic turtle for substantial portions of the year, the captures of female #4 in this location may have been during episodic forays for nesting, feeding, or other purposes. If this presumption is correct, female #4 is using other habitat for a substantial portion of the year. While she may inhabit other areas within ELRO, the proximity of Buttonbush Pond to wetlands outside NPS property raises the suspicion that she is moving outside the park.

The large shrub swamp and wetland associated with a second, smaller impoundment downstream of Val-Kill Pond were not as heavily trapped as the areas near the historic core of the park, with only 7 trap-days during 1989-90. (A property survey in 1990 documented NPS ownership of 2 small woodland ponds and a small marsh previously thought to be on private lands; investigation of these sites for the presence of Blanding's turtles took place in 1991, but yielded captures of painted turtles only.)

Kiviat (1986) suggested that Blanding's turtles in Dutchess County may function as a metapopulation comprised of small demes, with individual turtles mobile and an overall low population density. This appears consistent with our data at ELRO. The anomalous population structure and density of this species presents unique problems in interpretation of capture data, preserve design, and conservation programs. Once adult, Blanding's turtles are long-lived, taking on an individual importance to the survival of the population not often associated with lower vertebrates.

At ELRO, Blanding's turtles were found in two types of wetlands: disjunct permanent and semi-permanent ponds and shrub swamps. Blanding's turtle could occur as transient in any wooded swamps, ponds, or wetlands associated with the Fall Kill at ELRO. We do not anticipate their occurrence in non-vegetated open canopy wetlands such as Caretaker's House Pond and Upper Val-Kill Pond near the historic core. The latter site was heavily trapped as the proposed dredging of this area was the initial impetus for this study.

Although Blanding's turtles do not utilize the lower lobe of Upper Val-Kill Pond, they do occur in the shrub swamp across the pond from the Doll House. The small size of Upper Val-Kill Pond and the presence of a New York State threatened species in the fringing shrub swamp, will complicate obtaining permits to dredge the lower section of the pond. The cycle of silt deposition is well advanced with emergent loosestrife islands in the main body of the pond accelerating the process through reduction of water velocity. Eventually the pond will cease to exist as a functioning entity, altering the "historic setting" of the site.

Innovative techniques to control this problem must be devised. Simply opening the dam and allowing the mud flats to dry and be dug out, the most common method of cleaning small impoundments, would damage the water-dependent shrub swamp.

The majority of Blanding's turtle management concerns at ELRO are a function of this species' large home range. It is appropriate that these concerns are taken into account in ELRO's management. Apart from the preservation of a rare species, one also preserves an integral part of the historic setting. Many turtles marked at ELRO were alive in the historic period. One cannot but wonder if Eleanor Roosevelt herself had stopped to observe some of these individuals while walking her dog (dogs invariably are attracted to turtles). Other than trees and humans, no other individual biotic elements remain at ELRO from the historic period.

General Herpetological Inventory

The results reported herein indicate more than two-thirds of the mid-Hudson Valley amphibian and reptile species occur at ROVA. Several of these species are currently listed by the New York State Department of Environmental Conservation as Special Concern or Threatened. Considering the continuing trend of urbanization in Dutchess County, sites such as ROVA will become increasingly more important as a refuge for many of these species. It is conceivable that the park will become the last or most important refuge in Hyde Park for several of these species. It is important, therefore that park managers recognize the significance of ROVA in preserving the local herpetofauna and that management activities within the park continue to be conducted so as to minimize negative impacts to these species.

CONCLUSIONS

Management Considerations

Critical Areas:

Although ELRO serves as habitat for a variety of species, certain areas provide primary habitat for threatened/declining species or contain significant vegetational communities. Activities including mowing, trail cutting, or even interpretive programs should receive careful consideration prior to implementation. These areas are the North, Middle, and South Woodland pools, the Buttonbush Pond, Upper Val-Kill Pond Shrub Swamp, Sphagnum Shrub Swamp, Wet Meadow, and the section of powerline cut due east of the historic core. The approximate boundaries of these areas are outlined on Figure 11.

Dredging Activities:

While trapping data indicate that Blanding's turtles do not utilize those sections of Upper Val Kill Pond requiring dredging, any dredging that does occur should be done in a manner that does not draw down the water from the Upper Val Kill Shrub Swamp. The possibility of using drag lines or a hydraulic excavator to remove vegetation and silt (without drawing down water) should be considered. Although dredging through standing water makes the process sloppier, it allows materials to be excavated. As an alternative approach, the lower lobe of Upper Val-Kill Pond (immediately above the dam) could be isolated from the remainder of the pond by sheet piling enplaced across the pond at its narrowest point. Water could then be drained from this lower lobe while water level behind the sheet piling was maintained. Regardless of the approach selected, dredging will require permits from the New York State Department of Environmental Conservation and U.S. Army Corps of Engineers. Dredging should be conducted between April and September, when turtles are not hibernating in the mud. Care must also be exercised to minimize the numbers of turtles caught up in the dredging. Beginning two weeks prior to any dredging, as many turtles as possible should be trapped from the pond and placed in a temporary holding pen until the job is completed.

Water Level:

When field work began at ELRO in April 1988, large sections of the shrub swamp were dry. This was caused by the removal of the thirty-centimeter flashboard on the dam. The shrub swamp is now considered critical habitat for Blanding's turtle and should not be allowed to dry out. The water level should never be lowered after September or before May as a decrease in protective water cover may kill turtles hibernating in the mud of the shrub swamp. Park policy has since been modified to leave the flashboard in the dam at all times unless destructive flooding is imminent. Despite several major precipitation events, this has not been necessary.

Mowing:

The park maintains two large areas as open fields, either by periodic mowing by NPS personnel or by hay harvesting under an Agricultural Special Use Permit. This historic practice must continue in order to maintain the cultural landscape of the site. Mowing is also an integral part of the management regime at ELRO to maintain habitat diversity. The fact that Blanding's turtles have been repeatedly trapped in Buttonbush Pond indicates that hay harvest or mowing opera-

tions must be undertaken in a manner sensitive to the turtle's seasonal use of this habitat. We recommend that mowing or haying begin no earlier than July 1 to avoid injuring turtles moving to or from nest sites. This management regime should also be applied to the herbaceous meadow north of the main entrance road, where spotted turtles congregate from late April through June. In 1988, mowing occurred in mid-June, at the peak of turtle nesting activity. Since 1989, the park has adopted a policy of deferring mowing activities until July 1 or later. This practice should continue.

Traffic:

Public use of Val-Kill is increasing. Traffic on the entrance and rear service road poses a threat to turtles. Painted turtles are regularly killed by cars. Since the shuttle bus service from HOFR was discontinued in 1990, all access is by private vehicle and bus. A spotted turtle was found crushed on the road near the Buttonbush Pond in 1991. This increase in traffic greatly increases the number of potential encounters between wildlife and vehicles. Strict enforcement of the posted 15 mile per hour speed limit will help to reduce these incidents. Turtle crossing signs should be erected and two speed bumps constructed on the entrance road adjoining Buttonbush Pond, where the possibility of killing Blanding's and spotted turtles is greatest.

Visitors:

Visitors may be unaware that plants and animals at National Historic Sites are afforded as much protection as they are in National Parks. A small sign at the entrance states NPS policy. Due to the high visibility of turtles at the historic core, entrance, and service roads, the NPS policy needs to be prominently displayed. The temptation (especially for children) to take home a turtle found wandering around is quite strong. Possibly the "turtle crossing" sign and NPS policy notice can be incorporated into one sign to avoid cluttering the entrance and service roads.

Adjacent Landowners:

Blanding's turtles leave NPS property and enter surrounding housing developments. It is important to enlist the support and cooperation of neighboring landowners to protect transient turtles. Local publicity regarding this study has been very positive, and we have received excellent cooperation from landowners who often call park headquarters when turtles are found on their land. The distribution of an illustrated brochure describing the turtles, and what the NPS is doing to ensure their survival, may make the difference between a Blanding's turtle ending up a pet or being assisted across a road.

Additional Inventory and Monitoring:

Three years of field work have resulted in a great deal of preliminary data. Additional population monitoring should focus on inventory and habitat utilization at wetlands adjacent to NPS property and other areas within ELRO that have not been widely censused. Efforts should be made to recapture turtles marked during this study to obtain growth and movement data. Data collection on painted, snapping, and musk turtles should be eliminated unless additional personnel resources become available. Despite efforts to streamline data processing on these species, excessive time was required to notch and count these species in 1988. Starting in 1989, full data was only collected on Blanding's, spotted, musk, wood and box turtles.

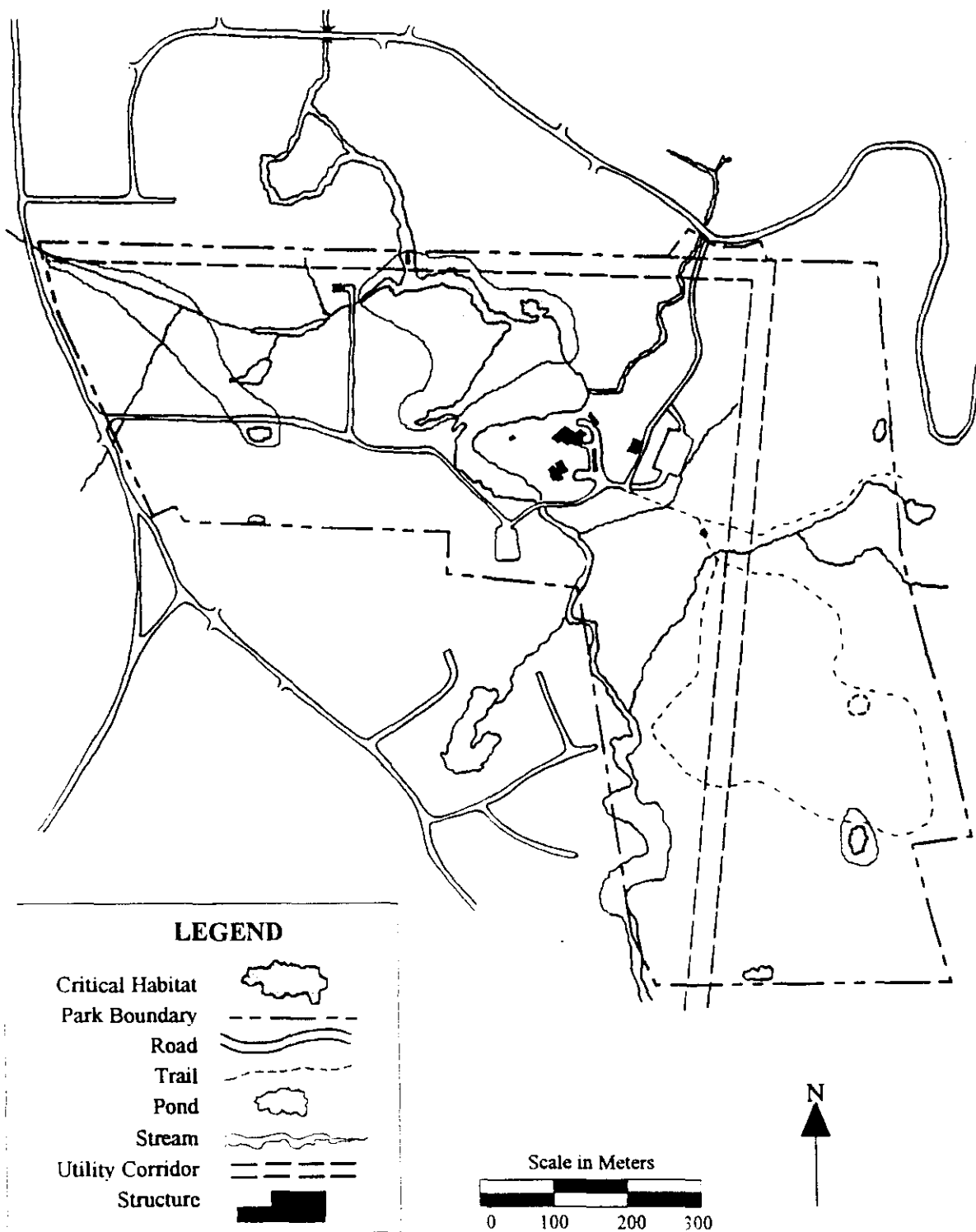


Figure 11. Critical Habitat Map for Blanding's Turtle at Eleanor Roosevelt NHS

Land Protection Issues:

The ideal preservation scenario for a wide ranging species such as Blanding's turtle is preservation of its entire home range. This goal is impossible anywhere in Dutchess County. Several privately owned wetlands and areas of open space adjoin ELRO providing additional habitat and buffer. Field work in these contiguous wetlands is discussed in the previous paragraph under inventory. Some wetlands adjacent to ELRO are locked between NPS property and housing developments. Most notable is the large marsh and swamp along the Fall Kill between the Roosevelt Road bridge and the north NPS boundary. In 1990, a permit was sought by the landowner to construct a driveway to gain access to the site. This driveway would be built across 150 meters of wetlands designated by New York State as Class A, the most protective classification. Representatives from the New York State Department of Environmental Conservation (the agency responsible for overseeing wetland regulations in New York State) contacted the NPS regarding this proposal, and a meeting with the landowner ensued. Mitigating measures to protect any Blanding's turtles in this area will be prescribed as part of any permit granted. In addition, the Lower Hudson Chapter of the Nature Conservancy has contacted the landowner regarding the sale of the property or the placement of a conservation easement upon it. This issue is still pending.

Another large tract of wetland lies between Upper Val-Kill Pond and Creek Road, including a small tributary stream and pond near Surico Drive. The Middle and South Woodland Pools are close to the NPS boundaries. This adjoining land is developable via East Dorsey Lane. Protection of these and other important sites through conservation easements or fee purchase is appropriate. The NPS will address these concerns when the Land Protection Plan for HOFR is updated.

Protection of Habitat:

All identified actual and potential Blanding's turtle habitat must be protected from adverse impacts of internal and external activities. Any action likely to adversely affect these areas would be subject to environmental review and permitting requirements under the New York State Environmental Quality Review Act (SEQR). This would include in-house activities such as road construction, application of pesticides, and dredging.

Protection of Water Quality:

Adequate measures must be taken to ensure the quality of water resources upon which this species depends. The park should institute a water quality monitoring program to detect changes that could impact the Blanding's turtle population, especially in light of the high level of residential and commercial development in the immediate vicinity.

Education:

Where appropriate, visitors and staff should be informed about Blanding's turtles and NPS efforts to protect them. This information could be included in interpretive programs or posted in public areas.

Remaining Questions:

The study did not produce any information on breeding activity or nest locations, although the female Blanding's turtle that was repeatedly captured north of ELRO was likely enroute to or from a nesting area. Without radiotelemetry data, movements outside capture zones are unknown. It is difficult to gauge the impacts of external land use practices and local residential development on the population, since the overall population structure of Blanding's turtles in the ELRO vicinity is unclear. The long-term, cumulative impacts resulting from the loss of small wetlands over an extensive area in Dutchess County is suspected to be a major factor in the decline of Blanding's turtles.

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APPENDIX A: SPECIMEN DOCUMENTATION

AMNH=American Museum of Natural History, New York, NY 10024-5192

BCFS=Bard College Field Station, Annandale, NY 12504

Ambystoma "cf" jeffersonianum

ELRO: AMNH 132762-64 (132762=16 larvae, 132763=8 larvae, 132764=3 larvae)

Ambystoma jeffersonianum x *A. laterale*

ELRO: AMNH 131560-68 (triploids) AMNH 129288-89, 131569 (tetraploids)

Ambystoma maculatum

ELRO: AMNH 132743-49, 132751-52 (132752=3 larvae)

HOFR: AMNH 132753-57, 132761

other sites in Hyde Park: AMNH 132750, 132758-60

Desmognathus f. fuscus

other sites in Hyde Park: AMNH 132769-70

Eurycea bislineata

other sites in Hyde Park: AMNH 132771-73

Hemidactylium scutatum

ELRO: AMNH 132777-81

other sites in Hyde Park: AMNH 132782-84

Notophthalmus v. viridescens

ELRO: AMNH 132847-56

HOFR: AMNH 132835-46

other sites in Hyde Park: AMNH 132857

Plethodon cinereus

ELRO: AMNH 132790-94

HOFR: AMNH 132795-99

VAMA: AMNH 132800-01

other sites in Hyde Park: 132802-09

Plethodon glutinosus

ELRO: AMNH 132819-24

HOFR: AMNH 132825-27

other sites in Hyde Park: AMNH 132828-34

Bufo a. americanus

ELRO: 132867-68 "Roosevelt-Vanderbilt National Historic Site": AMNH 108360

other sites in Hyde Park: 132869-72

Hyla versicolor

ELRO: AMNH 132885-89

VAMA: AMNH 132884

other sites in Hyde Park: AMNH 132883

Pseudacris c. crucifer

ELRO: AMNH 132878-79 (132879=tadpoles)

other sites in Hyde Park: AMNH 132880-82

Rana catesbeiana

ELRO: AMNH 132890-92

VAMA: AMNH 132893

Rana clamitans melanota

ELRO: AMNH 132895-98, 132909

HOFR: AMNH 132899-900

VAMA: AMNH 132901-02

other sites in Hyde Park: AMNH 132903-05

Rana palustris

ELRO: AMNH 132910-13

HOFR: AMNH 132914

other sites in Hyde Park: AMNH 132915-16

Rana sylvatica

ELRO: AMNH 132924-31 (132928=4 tadpoles, 132930=7 tadpoles, 132931=9 tadpoles)

HOFR: AMNH 132932

VAMA: AMNH 132933

other sites in Hyde Park: AMNH 132934-35

Chelydra s. serpentina

ELRO: AMNH 134392-93

VAMA: AMNH 134934

other sites in Hyde Park: AMNH 134395-96

Chrysemys p. picta* x *p. marginata

ELRO: AMNH 134400-12 (134403-05=shell only, 134407-10=shell only)

VAMA: AMNH 134413-14

other sites in Hyde Park: AMNH 134415-37

Clemmys guttata

ELRO: AMNH 134440

other sites in Hyde Park: AMNH 134441-45

Clemmys insculpta

ELRO: AMNH 134448, BCFS 202 (shell only)
other sites in Hyde Park: AMNH 134449-51

Emydoidea blandingii

ELRO: BCFS 205 (shell only)

Graptemys geographica

HOFR: AMNH 134454-55, BCFS 5

Sternotherus odoratus

ELRO: AMNH 134466-68 (134466=shell only)

VAMA: AMNH 134469-70

other sites in Hyde Park: AMNH 134471-77

Terrapene c. carolina

ELRO: AMNH 134457-58

HOFR: AMNH 134460

VAMA: AMNH 134459

other sites in Hyde Park: AMNH 134461, 136219 (shell only)

Agkistrodon contortrix mokasen

other sites in Hyde Park: AMNH 4007, 4009, 4012, 4129-31 (all of these specimens are skulls only)

Coluber c. constrictor

ELRO: AMNH 134478-79

HOFR: AMNH 134482

VAMA: AMNH 134480

other sites in Hyde Park: AMNH 134481

Diadophis punctatus edwardsii

HOFR: AMNH 134483 other sites in Hyde Park: AMNH 134484-85

Elaphe o. obsoleta

other sites in Hyde Park: AMNH 120078, 134487

Lampropeltis t. triangulum

ELRO: AMNH 134489

VAMA: AMNH 134490

other sites in Hyde Park: AMNH 3741, 134491

Nerodia s. sipedon

ELRO: AMNH 134494-95

HOFR: AMNH 134496

other sites in Hyde Park: AMNH 134497

Opheodrys vernalis

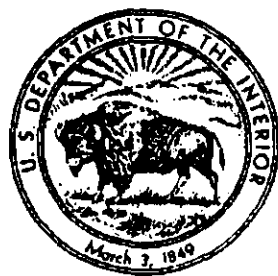
other sites in Hyde Park: AMNH 134498

Thamnophis s. sirtalis

ELRO: AMNH 134505-06

HOFR: AMNH 134507-08

other sites in Hyde Park: AMNH 134509-11



As the nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural and cultural resources. This includes fostering wise use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people. The department also promotes the goals of the Take Pride in America campaign by encouraging stewardship and citizen responsibility of the public lands and promoting citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.