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Cover-board Surveys for Reptiles and Amphibians on New Jersey Wildlife Management Areas, 2003

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Introduction

Since 1995, data on the abundance and distribution of reptiles and amphibians in New Jersey have been collected through the Endangered and Nongame Species Program's (ENSP) Herp Atlas Project. Over 400 volunteers have participated in this project and their efforts have resulted in the collection of an overwhelming amount of data. In the last three years alone, volunteers have reported sightings of over 165,000 reptiles and amphibians in the state. These data have contributed to ENSP's understanding of distribution patterns for many New Jersey reptiles and amphibians and have led to numerous Natural Heritage Database entries.

The original survey protocols for the Herp Atlas project were designed to be very flexible and have allowed volunteers with varying degrees of scientific experience to participate in the project. Within these protocols volunteers were able to choose the amount of time they spent surveying and could also set their own survey windows. For example, some volunteers may have surveyed for only 1 hour in given a year, while others dedicated over 100 hours surveying a year. Some volunteers may have surveyed only in spring and others only during the fall, yet others may have surveyed throughout the entire year. While its flexible protocols may partially explain the success of the Herp Atlas project (in terms of number of participants and numbers of records), these protocols have also limited the functionality of the data. Up to this point, the use of Herp Atlas data has largely been limited to identifying species locations and determining distributions, but could not be used for trend analysis or comparisons of relative abundance among different sites or regions of the state.

In 2003, ENSP broadened the scope of surveys conducted for the Herp Atlas Project by establishing a series of cover-board surveys for reptiles and amphibians on state lands. By developing structured protocols aimed at surveying for terrestrial and semi-aquatic reptiles and amphibians, ENSP designed a cover-board methodology that allowed for trend analysis and relative abundance comparisons of data collected at different sites. ENSP's cover-board project generally follows a protocol established by USGS, where cover-board transects are placed in non-randomly selected transects and are checked at specific intervals during the field season. The major goals of this project were to: 1) collect data that will contribute to an inventory of reptiles and amphibians found on the New Jersey Division of Fish and Wildlife's Wildlife Management Areas (WMAs); 2) establish long-term monitoring transects and collect baseline data during the initial three years of the study; and 3) collect species data that can be incorporated into the Heritage Database and Landscape Project.

Methods

Volunteers:

To find participants for this project, ENSP sent letters to highly active Herp Atlas volunteers in early 2003. These letters briefly described the goals of the project and provided details on the new protocol and time commitment associated with the project. A total of 88 letters were mailed out and 34 volunteers responded and expressed interest in participating in the project. Of these 34 respondents, 19 volunteers were actually able and willing to participate in the project. Some volunteers could not take part in the project because they either did not have a WMA close to their home or because the closest WMA was already being surveyed by another volunteer.

Wildlife Management Areas:

As part of the federally funded State Wildlife Grants program, staff members of the Endangered and Nongame Species Program (ENSP) selected 11 "high priority" WMAs in 2003. These WMAs would be the focus of an all taxa inventory in 2003 and management plans for these WMAs would eventually be developed based on the inventory results. To fit in with the State Wildlife Grants project taking place on the 11 priority WMAs, ENSP encouraged volunteers interested in participating in the cover-board project to establish their transects on one the "high priority" WMAs. An additional six WMAs were also chosen by volunteers for this project. Transects were therefore established on 17 different WMAs in 2003, with multiple volunteers surveying Greenwood and Collier's Mills WMAs.

Transects:

Each volunteer agreed to survey 30 cover boards as part of their involvement in this project. Volunteers and ENSP staff worked together to place boards out in the field and arranged them in one, two, or three transects. In the field the volunteers and ENSP staff evaluated the existing habitats and decided whether to set the boards out in one transect (with 30 boards), two transects (each with 15 boards), or three transects (each with 10 boards). Where possible, effort was taken to place the boards in a variety of habitats.

Cover boards where constructed of 19-mm pine plywood and were cut to measure 1.22 x 0.8 m. Boards were spaced at 50-m intervals along each transect in the field. A transect of 10 boards therefore extended a total of 450 m, a 15-board transect was 700 m in length, and a 30-board transect extended 1,450 m. During setup boards were numbered and entered into a Magellan GPS unit to record the exact latitude and longitude of each board.

Surveys:

ENSP staff designated monthly "survey windows" during which volunteers were asked to visit their transects once. Each survey window was 9 days long, beginning on the first Saturday of the month and ending the following Sunday. Setting specific sampling periods helped to standarize the data collection. The timing and duration (9 days) of each survey window were planned so that volunteers would have 2 full weekends to check their transects. Because 2003 was the first year of this project, transects were not established until mid summer. Therefore, the earliest survey that took place was in August 2003 and transects were checked at the most four times. Some transects were not established until August and were therefore only surveyed twice in 2003. In 2004, monthly surveys will begin in March and continue through October.

During each survey, volunteers checked under the cover boards and recorded the species and number of individuals they observed. Furthermore, while walking the 50 m that separated each cover board (within a given transect) volunteers searched (both visually and by turning over rocks, logs, etc.) for reptiles and amphibians within a distance of 5 m to their left and 5 m to their right. Reptiles and amphibians observed within the 10-m wide belt transect searched between boards were also recorded. Using a fixed-width search (or belt transect survey) between boards was another way to standardize the data collected from this project.

Results & Discussion

The 19 volunteers participating in cover-board project established transects in 17 different WMAs and set out a total of 542 cover boards in 2003 (Table 1). Transects on 12 of the WMAs were checked 4 times in 2003. The remaining five WMAs were either checked three times (two WMAs), twice (one WMA), or not at all (two WMAs). To calculate volunteer time dedicated to this project we estimated that each volunteer spent 4 hours per cover board survey (including travel to and from the site). We therefore calculated that volunteers spent a total of 224 hours on this project in 2003.

Volunteers reported sightings of 349 reptiles and amphibians, comprising 30 different species. Most numerous were redback salamanders, which accounted for 46% of the sightings (Table 2). The large majority (90%) of redback salamander sightings were reported from Whittingham WMA. The 2003 surveys also produced data on three different state threatened species. Northern pine snakes were reported once during the surveys, Pine Barrens treefrog twice, and long-tailed salamanders five times. This data will be submitted to the Natural Heritage Program and will be incorporated into the NJDEP's Landscape Project.

During the first year of this study surveys in the segments between cover boards resulted in more reptile and amphibian sightings than did surveys of the cover boards themselves. Of the 349 individuals observed in 2003, only 54 (15%) were found under the cover boards. The remaining 295 (85%) were found in the segments between cover boards. This finding was not unexpected for the first year of the project, since cover boards are thought to take some time to "weather" in the field before they become fully productive refugia for reptiles and amphibians. It is during this weathering period that the microhabitat under the cover boards becomes established.

Despite the differences in abundance of reptiles and amphibians found between the cover boards and the belt transects (segments), both methods seem to complement one another for sampling reptile and amphibian diversity. Five species found under the cover boards were not reported from the segments in between boards. These species were the Northern ringneck snake, Southern ringneck snake, Eastern garter snake, Northern fence lizard, and Northern red salamander. Likewise, 15 species were found only in the transects between cover boards and were not found under the cover boards themselves. These species are summarized in Table 2. The high complementary between methods justifies the continued inclusion of both methods in the second year of this study.

Appendix 1 has been included to summarize the species found at the different WMAs where cover board transects have been established. While it is tempting to make comparisons between

WMAs, we have decided to hold off on this type of analysis until data has been received for the 2004 field season. We feel that more accurate comparisons can be made once a full year of surveying has been conducted at each site.

Even in its first year, the Herp Atlas cover board project has resulted in valuable data that can help establish inventory and baseline information on the State's WMAs. We look forward to the continued collection of this type of rigorous data in the years to come and hope that it will ultimately lead to the proper management of state lands for the reptiles and amphibians that occupy them.

Table 1. Wildlife Management Areas where cover-board transects have been established as part of the Herp Atlas cover board project.

Wildlife Management Area	**Number of Boards**	**Number of Times Checked in 2003**
Alexauken Creek	30	4
Assunpink	27	4
Buckshutem	30	4
Colliers Mills	60	4
Forked River	30	4
Glassboro	30	0
Greenwood Forest	60	4
Hammonton Creek	16	0
Higbee Beach	20	4
Makepeace Lake	30	4
Manchester	30	4
Peaslee	30	4
Stafford Forge	29	3
Tuckahoe	30	4
Turkey Swamp	30	4
Whittingham	30	2
Winslow	30	3
Total	***542***	***56***

Table 2. Summary of species observations for the 2003 Herp Atlas cover board project. Column labeled “Cover Boards” shows the abundance of species found directly under the cover boards, while the column labeled “Segments” summarizes the species and abundance of reptiles and amphibians found in the belt transects between boards.

Common Name	**Cover Boards**	**Segments**	**Combined**
Redback Salamander	32	130	162
Fowler's Toad	3	25	28
Southern Leopard Frog	0	25	25
Northern Slimy Salamander	2	15	17
Northern Water Snake	0	14	14
Northern Fence Lizard	0	13	13
Wood Frog	1	11	12
Pickerel Frog	0	11	11
Spotted Salamander	3	8	11
Green Frog	0	9	9
Eastern Box Turtle	1	6	7
Red-spotted Newt	0	7	7
Long-tailed Salamander (T)	3	2	5
Northern Black Racer	1	3	4
Common Snapping Turtle	0	3	3
Black Rat Snake	1	1	2
Four-toed Salamander	0	2	2
Marbled Salamander	1	1	2
Northern Fence Lizard	2	0	2
Pine Barrens Treefrog (T)	0	2	2
Redbelly Turtle	0	2	2
Bullfrog	0	1	1
Eastern Garter Snake	1	0	1
Eastern Mud Turtle	0	1	1
Eastern Painted Turtle	0	1	1
Jefferson Salamander	0	1	1
Northern Red Salamander	1	0	1
Northern Ringneck Snake	1	0	1
Northern Pine Snake (T)	0	1	1
Southern Ringneck Snake	1	0	1
Total	***54***	***295***	***349***

Appendix 1. Summary of findings from the 2003 Herp Atlas cover-board surveys.

Wildlife Management Area	Common Name	Abundance
ALEXAUKEN CREEK	Data Not Entered	0
ASSUNPINK	Eastern Garter Snake	1
	Green Frog	8
	Redback Salamander	1
BUCKSHUTEM	Eastern Box Turtle	2
	Northern Ringneck Snake	1
COLLIERS MILLS	Common Snapping Turtle	1
	Fowler's Toad	3
	Northern Black Racer	1
	Northern Fence Lizard	1
	Northern Water Snake	1
	Redback Salamander	1
	Southern Leopard Frog	4
	Southern Ringneck Snake	1
FORKED RIVER MOUNTAIN	Fowler's Toad	4
	Northern Fence Lizard	3
	Redback Salamander	1
GLASSBORO	No Data Received	0
GREENWOOD FOREST	Bullfrog	1
	Eastern Painted Turtle	1
	Fowler's Toad	4
	Pine Barrens Treefrog	1
	Redbelly Turtle	1
	Southern Leopard Frog	6
	Redback Salamander	5
HAMMONTON CREEK	No Data Received	0
HIGBEE BEACH	Black Rat Snake	1
	Fowler's Toad	2
	Northern Spring Peeper	10
	Eastern Box Turtle	1

MAKEPEACE LAKE	Eastern Mud Turtle	1
	Northern Fence Lizard	5
	Pine Barrens Treefrog	1
	Redbelly Turtle	1
MANCHESTER	Black Rat Snake	1
	Redback Salamander	1
PEASLEE	Eastern Box Turtle	1
	Fowler's Toad	6
	Northern Black Racer	1
	Northern Fence Lizard	1
	Southern Leopard Frog	15
	Wood Frog	2
STAFFORD FORGE	Common Snapping Turtle	1
	Eastern Box Turtle	3
	Fowler's Toad	7
	Green Frog	1
	Northern Fence Lizard	3
	Northern Pine Snake	1
	Pickerel Frog	10
TUCKAHOE	No Species Observed	0
TURKEY SWAMP	Redback Salamander	8
WHITTINGHAM	Four-toed Salamander	2
	Jefferson Salamander	1
	Long-tailed Salamander	5
	Marbled Salamander	2
	Northern Black Racer	2
	Northern Slimy Salamander	17
	Northern Spring Peeper	3
	Pickerel Frog	1
	Redback Salamander	145
	Red-spotted Newt	7
	Spotted Salamander	11
	Wood Frog	10
WINSLOW	Common Snapping Turtle	1
	Fowler's Toad	1
	Fowler's Toad	1
	Northern Fence Lizard	2