

Amphibians and Reptiles of the Lower West River

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ABSTRACT

We surveyed West River Memorial Park in New Haven, Connecticut to determine which amphibian and reptile species are present within the park's available habitats and to assess the potential effects of salt marsh restoration on the herpetofauna. A variety of aquatic and terrestrial census methods were used. We recorded seven species of amphibians and reptiles, all of which are either described as habitat generalists or able to persist in highly disturbed urban areas. We conclude that plans for restoration of wildlife populations and future wildlife monitoring efforts in West River Memorial Park should be based on other taxa.

Connecticut is inhabited by 45 species of reptiles and amphibians (Klemens 1993). Most of these species are widely distributed across the state, but have limited distributions among the diversity of available habitats. As examples, many amphibians require the presence of non-permanent freshwater habitats, and many reptiles require dry, well-drained uplands (Klemens 1993). We surveyed West River Memorial Park to determine which amphibian and reptile species are present within the park's available habitats and to assess the potential effects of salt marsh restoration on the herpetofauna. We used an array of aquatic and terrestrial survey techniques in order to evaluate presence and absence of species.

METHODS

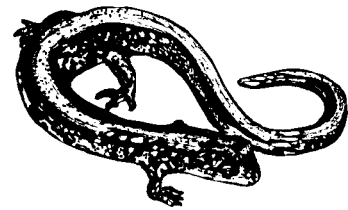
Between April and August of 1996, we surveyed West River Memorial Park to document the presence of amphibian and reptile species. The park is located on the lower reaches of the West River in New Haven, Connecticut, at the border with West Haven (see Fig. 3, p. 31). Our survey area was bounded on the north by Derby Avenue and on the south by Route 1 (Congress Avenue). Park land to the east of the reflecting pool was not surveyed. The three small ponds feeding into Horseshoe Lagoon, although not part of the park proper, were surveyed. Two ponds enter the lagoon on the eastern horn, and one enters on the western horn. The ponds are located west of Marginal Drive and north of the lagoon.

QUADRAT SAMPLING

Quadrat sampling was used to survey woodland salamanders and fossorial snakes (eastern worm snake and ringneck snake) in large patches of homogeneous habitat. Four 3 m by 6 m quadrats were randomly selected along a 50 m transect perpendicular to the slope. Two transects were searched, one in the hardwood forest on the southern edge of Horseshoe Lagoon, and one in the wooded riverbanks between Route 1 and the southern park gate. Within each quadrat, all ground cover, particularly large woody debris and rocks, was overturned, and all leaf litter was thoroughly searched. Searches were conducted within 24 hours of a thunderstorm or other soaking rainfall event.

CASUAL LEAF LITTER SEARCHES

On several occasions, thorough examinations of the ground cover were made in the woods bordering Horseshoe Lagoon on the north, the woodlands on either side of Marginal Drive and north of Horseshoe Lagoon, the isthmus just above the northwest corner of the island, and around the ditches located west of Marginal Drive and north of the isthmus connection. Examinations were conducted by picking through leaf litter until reaching the soil surface. Large woody debris and rocks were overturned to check for woodland salamanders and snakes. Quadrat sampling was not used in these areas.



Redback salamander

DIP NET SAMPLING

We walked the margins of the West River and Horseshoe Lagoon and visually surveyed for suitable amphibian habitats such as beds of submergent and emergent vegetation in the littoral zone as well as amphibian eggs, larvae, and adults. Submerged leaf litter and vegetation were sampled with a dip net. The two feeder ponds on the eastern horn of Horseshoe Lagoon, the feeder pond at the western horn of the lagoon, and the small backwater in the northeast corner of the Route 1-Marginal Drive intersection were similarly investigated.

PITFALL TRAPS

An array of pitfall traps was installed at the bottom of the slope between Marginal Drive and the backwater at the Route 1-Marginal Drive intersection. Traps were constructed from two, No. 10 aluminum cans attached at one end with duct tape, the bottom of the top can having been cut out. Each trap was installed so that the upper lip was approximately 3 cm below the ground, and traps were installed at 3 m intervals. Guide curtains made of heavy brown paper were

erected between the traps, but not over the trap openings. The curtains were approximately 0.75 m high, and the bottoms were buried in a shallow trench in the ground.

Traps were arranged in a "T"-shaped configuration. Four traps were installed in a line perpendicular to the slope, and two traps were installed parallel to the slope.

CALLING SURVEYS

Four surveys of frog and toad breeding calls were conducted. Two surveys were made in April, one in May, and one in June. The surveys were conducted at dusk and lasted 60 to 90 minutes. Surveys were conducted within 48 hours of a thunderstorm or other soaking rainfall event. The surveys were conducted by walking Marginal Drive between the park gates.

OBSERVATIONAL SAMPLING

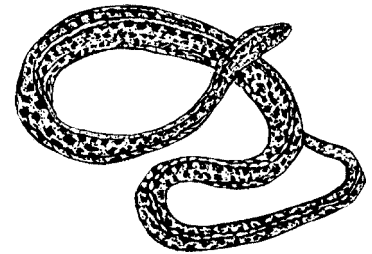
Binoculars were used to scan riverbanks and water surfaces for frogs, turtles, and snakes. We searched Horseshoe Lagoon, its feeder ponds, the main river channel, and the reflecting pool on approximately 10 occasions. Observations were made either during the mornings, one to two hours after sunrise, or during the calling surveys (see above). Marginal Drive and the gravel parking lot were checked for basking snakes at the same times.

RESULTS

Despite the use of several sampling methods, we recorded just seven species of amphibian and reptiles in West River Memorial Park (Table 1). None of the recorded species are listed as endangered, threatened, or of special concern (Connecticut Department of Environmental Protection 1995).

No individuals were revealed during quadrat sampling. Despite an abundance of prey (earthworms, sowbugs, etc.) and ground-level moisture (as measured by the authors' touch), no woodland salamanders or fossorial snakes were found. No individuals were found on the isthmus or in the woods north of Horseshoe Lagoon during the causal leaf litter searches.

An area adjacent to the ditches near the north end of Marginal Drive revealed a small population of redback salamanders. Both red and lead forms were found in equal numbers. The salamanders were concentrated in one 75 m² area. Other areas along the ditch with similar tree and ground covers (e.g., leaf litter and amount of large woody debris) failed to yield additional individuals. A single, eastern garter snake was captured in this area in late April.



Eastern garter snake

Table 1. Current records of amphibians and reptiles in the towns of New Haven and West Haven, Connecticut (Klemens 1993, J.P. Gibbs, Columbia University, personal communication). Species found during this survey of West River Memorial Park are denoted by an "X".

SALAMANDERS AND NEWTS

Four-toed salamander (<i>Hemidactylium scutatum</i>)	
Marbled salamander (<i>Ambystoma opacum</i>)	
Northern dusky salamander (<i>Desmognathus f. fuscus</i>)	
Northern two-lined salamander (<i>Eurycea bislineata</i>)	
Redback salamander (<i>Plethodon cinereus</i>)	X
Red-spotted newt (<i>Notophthalmus v. viridescens</i>)	
Spotted salamander (<i>Ambystoma maculatum</i>)	

FROGS AND TOADS

Bullfrog (<i>Rana catesbeiana</i>)	
Eastern American toad (<i>Bufo a. americanus</i>)	X
Fowler's toad (<i>Bufo woodhousii fowleri</i>)	
Gray treefrog (<i>Hyla versicolor</i>)	
Green frog (<i>Rana clamitans melanota</i>)	X
Northern spring peeper (<i>Pseudacris c. crucifer</i>)	
Pickerel frog (<i>Rana palustris</i>)	
Wood frog (<i>Rana sylvatica</i>)	

TURTLES

Common snapping turtle (<i>Chelydra s. serpentina</i>)	X
Eastern box turtle (<i>Terrapene c. carolina</i>)	
Painted turtle (<i>Chrysemys picta</i>)	X

SNAKES

Eastern garter snake (<i>Thamnophis s. sirtalis</i>)	X
Eastern milk snake (<i>Lampropeltis t. triangulum</i>)	
Northern black racer (<i>Coluber c. constrictor</i>)	
Northern brown snake (<i>Storeria dekayi dekayi</i>)	
Northern copperhead (<i>Agkistrodon contortrix mokasen</i>)	
Northern ringneck snake (<i>Diadophis punctatus edwardsii</i>)	
Northern water snake (<i>Nerodia s. sipedon</i>)	X
Smooth green snake (<i>Opheodrys vernalis</i>)	

Dipnetting and searching along the banks revealed green frog tadpoles in the pond on the western horn of Horseshoe Lagoon and in the northernmost pond on the eastern horn. Green frog tadpoles were regularly found in both ponds from late May to mid-July. One adult was observed in the western pond in June. Several adults were found around the margin of both eastern feeder ponds and the eastern horn of the lagoon throughout the study period.

Several hundred (visual estimate) American toad tadpoles were found in the backwater at the corner of Route 1 and Marginal Drive. One large adult toad and several dozen neomorphs were captured adjacent to the backwater in the pitfall traps. These toadlets were abundant in the woodlands around the backwater throughout July and August.

Remarkably, no frogs were heard during the calling surveys despite the presence of robust choruses and breeding activity of a number of species during the same period at the nearby Yale Preserve. Scanning the surface and margins of the water revealed a snapping turtle and a northern water snake in the pond on the western horn of Horseshoe Lagoon in late June. Painted turtles were observed in this location, in Horseshoe Lagoon, and in the southernmost pond on the eastern horn throughout the study period. No turtles, snakes, or frogs were ever observed in the river channel or reflecting pool.

DISCUSSION

Over half of Connecticut's 45 amphibian and reptile species have been recorded within New Haven and West Haven (Table 1; Klemens 1993). Given this diversity, the number of species ($n=7$) recorded at West River Memorial Park is low. Quite probably, additional sampling effort would uncover more species (e.g., northern ringneck snake, bullfrog). However, many species are likely to be absent because the park does not provide suitable habitat. There is little in the way of necessary breeding habitats for amphibians, such as ephemeral ponds, small streams, and seeps. Most of the standing water is permanent, intermittently saline (Cuomo and Zinn, this volume), inhabited by predatory fish (Moore et al., this volume), and has a largely unvegetated littoral zone. This combination of attributes makes the park extremely inhospitable to most aquatic-dependent amphibians (Kats et al. 1988, Klemens 1993, Holomuzki 1995).

Among primarily terrestrial species, there is an entire complement of regionally common amphibians and reptiles (e.g. Fowler's toad, eastern box turtle) that favor dryer uplands or rocky habitats. The park does not provide such habitats. The small size and isolation of the park within an urban landscape probably contributes to the low number of species (Minton 1968). In Campbell's review (1974), he emphasizes the poor dispersal ability of reptile and amphibian species through urbanized landscapes. Gibbs (1995) notes that many locally abundant Connecticut amphibians are unable to traverse urban landscapes in order to exploit suitable habitats within the urban matrix.



Painted turtle

CONCLUSIONS

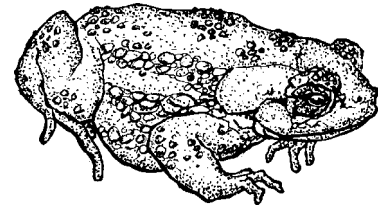
The herpetofaunal diversity of West River Memorial Park is extremely low and comprised entirely of common species that can persist in urban environments (Klemens 1993). Our results are consistent with the findings of Campbell (1974) and the several urban herpetofaunal surveys that he describes. Restoration of the salt marsh is unlikely to improve habitat for most of these species. Just two, the snapping turtle and the American toad, are routinely found in and around salt marshes (Klemens 1993). Others such as painted turtles, northern water snakes, and green frogs may be lost when salinity in the river and associated backwaters increases (Klemens 1993; Cuomo and Zinn, this volume). The remaining species (redback salamander and garter snake) are likely to persist in the wooded portions of the park (Minton 1968, Campbell 1974).

Salt marsh restoration is unlikely to promote the unaided immigration and establishment of new species. There is at least one species, the diamondback terrapin, that is a specialist within Connecticut's coastal habitats. However, the diamondback terrapin has been recorded only once¹ in New Haven and West Haven, despite intense local collecting evidenced by many historical records of rare (and now locally extinct) species (Klemens 1993).

Because of the lack of suitable freshwater and terrestrial habitats, the park has been, and will continue to be, unsuitable for most amphibians and reptiles. Fortunately, within the surrounding region there are other protected areas containing excellent habitat for amphibians and reptiles (e.g., West Rock Ridge State Park and the Yale Preserve). Wildlife monitoring efforts and plans for restoration of wildlife populations in West River Memorial Park should be based on other taxa.

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Eastern American toad

¹ On May 31, 1996 Ray Pupedis and Celia Lewis of the Peabody Museum of Natural History caught, photographed, and released a diamondback terrapin in the Quinnipiac River in New Haven. Diamondback terrapins were once common in Connecticut salt marsh creeks, but are now less abundant.

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