The Amphibians and Reptiles of New York State

Identification, Natural History, and Conservation

James P. Gibbs, Alvin R. Breisch, Peter K. Ducey,
Glenn Johnson, John L. Behler, and Richard C. Bothner

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". . . in the ancient days of creation, the world was all water and the only living creatures dwelt upon the back of a huge tortoise, floating on the deep. These creatures held council to find a way of obtaining mud from the bottom of the ocean—mud from which an "earth" could be made, large enough for them all. The muskrat dove to try his luck, but he became exhausted and failed. The beaver tried, but he, too, failed. Then the crayfish made an attempt, and he was successful. From the mud the earth was built upon the back of the tortoise. The animals and people of the world dwell upon the island formed on the dome of his carapace and, among them, the small turtles still crawl about on the earth."

The Haudenosaunee (Six Nations) creation myth, as recorded by Speck (1943)

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In Memoriam

John Luther Behler
June 1943–January 2006

Distinguished herpetologist, committed conservationist,
colleague, and friend

John Behler in a field near his home in Westchester County with one of his favorite species, the spotted turtle. (Wildlife Conservation Society)

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Many individuals contributed to this book. The distributional data were generated by the New York Department of Environmental Conservation's Amphibian and Reptile Atlas Project, which was recently completed with the help of thousands of volunteers from across New York State who contributed tens of thousands of observations. The Atlas project was funded by many sources, including the New York State Biodiversity Research Institute, Sabin Conservation Fund, Harvey and Bernice Weinstein, Society for the Study of Amphibians and Reptiles, Institute for Ecosystem Studies, State University of New York at Cortland, Mohonk Preserve Hudson River Estuary Action Plan Project, New York Cooperative Fish and Wildlife Research Unit at Cornell University, The Wildlife Society, New York Natural Heritage Program, Upstate Herpetological Association, New York Turtle and Tortoise Society, US Fish and Wildlife Service Federal Aid to Endangered Species (Section 6), Return a Gift to Wildlife Tax Checkoff, and US Fish and Wildlife Service Partnerships for Wildlife. The range maps presented are based on data structures developed by John W. Ozard and the considerable technical expertise of Matthew F. Buff and Pablo I. Ramirez de Arellano who converted the Atlas data into map form.

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infectious enthusiasm for the subject matter helped move the book forward. Four anonymous reviewers along with Richard L. Wyman reviewed the manuscript and offered many, useful suggestions that improved it greatly.

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A Note about Royalties

All royalties from this book are deposited at the State University of New York's College of Environmental Science and Forestry and put toward research and advocacy efforts for amphibian and reptile conservation.

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1

Introduction

New York State hosts a magnificent suite of some 69 native species of amphibians and reptiles. These include such wonders as stinkpots, hellbenders, queen snakes, softshells, tiger salamanders, red efts, mink frogs, and spadefoots. This said, a general guide to the state's salamanders, frogs, turtles, lizards, and snakes has long been lacking. The primary reason has been a scarcity of detailed information about the distributions of New York's herpetofauna (i.e., the amphibian and reptile species living in an area, from the Latin "herpes" or "creeping things").

Fortunately, the New York State Department of Environmental Conservation recently completed its ambitious "Amphibian and Reptile Atlas Project." The so-called "Herp Atlas" ("herp" is a shortened version of herpetofauna) was a 10-year survey designed to document the geographic distribution of New York State's amphibians and reptiles. The survey began in 1990 and continued through 1999. During this period some 59,000 reports were submitted by more than 1,800 volunteers. The "Herp Atlas" also collected more than 28,000, pre-1990 records from various sources, including museums, field notes, graduate theses, agency reports, and published literature. The "Herp Atlas" has spawned a series of popular articles on New York's herpetofauna (Bothner and Breisch 2001, Breisch and Behler 2002, Breisch and Gibbs 2002, Breisch and Ducey 2003a and 2003b, Stegeman and Breisch 2005, Breisch and Bothner 2006, Breisch and Jaycox 2006), which updated an earlier series by Reilly (1955, 1957, and 1958) and Wright (1955). The "Herp Atlas" has provided a foundation to create

this first general guide to the amphibians and reptiles of New York State.

This book is intended as a modest contribution in a long series of publications in herpetology that has originated in New York. Many early, prominent herpetologists began their careers in the state, including James DeKay, author of *Zoology of New York* in 1842, which presented the first scientific treatment of the state's herpetofauna. An earlier work by James Macauley (1829) listed 25 species of amphibians and reptiles for the state, but his descriptions were too imprecise to determine which species he recognized. Raymond Ditmars, curator of Herpetology at the Bronx Zoo in the early 1900s, made the study of reptiles and amphibians a popular pastime worldwide, especially with his *Reptiles of the World*. Sherman C. Bishop, while at the University of Rochester, conducted the first systematic studies of salamanders of the United States; his 1941 *Salamanders of New York* and 1943 *Handbook of Salamanders* remain "classics" of the herpetology literature. Cornell University's Albert Hazen Wright and his wife Anna produced the 1947 *Handbook of Frogs and Toads of the United States and Canada* and the 1957 *Handbook of Snakes of the United States and Canada*. As a result of the efforts of these and other herpetologists, New York is the type locality (location of first individual ever described) for at least 18 taxa of amphibians and reptiles (see Chapter 2). A more complete listing of historical publications on New York's herpetofauna can be found in Moriarty and Bauer (2000).

The work of some of these herpetologists is germane to this day. For example, John Treadwell Nichols of the American Museum of Natural History marked numerous eastern box turtles on his Long Island estate in the early 1900s (figure 1.1). Some of Nichols' turtles are still alive and well and teaching us much about the longevity of turtles in the wild (see Chapter 6: Eastern box turtle: Other Intriguing Facts).

New York's significance in herpetology is not simply historical; several scholarly institutions retain an important focus on herpetology. Herpetologists at Cornell University in Ithaca focus primarily on questions in behavior, ecology, and evolution, and those at the American Museum of Natural History in New York City focus on classifying the world's herpetofauna (Myers 2000). This long tradition of herpetological research is increasingly being directed at questions concerning conservation of New York's herpetofauna (see Chapter 11,Conservation

Figure 1.1. One of J.T. Nichols' marked eastern box turtles photographed after being marked 35 years previously. Turtles initially marked by Nichols have been recently found alive at more than 100 years of age (see figure 6.17b). Suffolk Co., New York. (Neg./Trans. no. 101050, American Museum of Natural History Library.)

Case Studies). Two major organizations that are internationally active in reptile and amphibian conservation are based in New York. The Wildlife Conservation Society at the Bronx Zoo breeds a number of species in captivity that would otherwise face extinction in the wild. It also provides spectacular exhibits to the public of amphibians and reptiles from around the world (figure 1.2). Last but certainly not

Figure 1.2. A reticulated python named Samantha at the Bronx Zoo in New York City. She was obtained in 1973 from hide hunters who had caught her at a cave entrance near a remote village 50 miles from Samarinda, Borneo. Pigs were her favorite food—she ate one a month while in captivity in the Bronx and grew to more than 26 ft. (7.9 m) and 275 lb. (125 kg) before she died on November 22, 2002. Coauthor John L. Behler is on the far left. (Do DeMello © Wildlife Conservation Society.)

least, the New York Turtle and Tortoise Society has long played a critical role in advocating for turtle conservation around the world.

Despite the impressive herpetological activity in New York State, conspicuous has been the lack of a guide available with which to venture out into the field and identify the state's amphibians and reptiles. Residents of both New York State and adjacent regions have long desired an accessible, informative, and up-to-date treatment of the state's herpetofauna. We developed this book primarily to address this need. We were also looking for an outlet to express our long-standing fascination with these creatures and our collective concern for their well-being. More specifically, New York's extraordinary herpetofauna is being steadily displaced by the state's human inhabitants. Several species in New York are on the brink of extirpation, and population extirpations are widespread. Moreover, New York State's amphibians and reptiles, despite their beauty and venerability, are regarded by many with loathing, disdain, or, at best, indifference. This is unfortunate, given that these creatures play an important role in ecosystems as both predators and prey, some are valuable indicators of environmental quality for all organisms (including humans), and others still are model organisms for medical research.

This book is based on our many collective decades of teaching about and conducting research on New York State's herpetofauna, as well as working to conserve it. During our careers, each of us has developed a tremendous interest and fondness for these creatures, which we hope to share. The book has three primary themes: identification,

natural history, and conservation. In detailed species accounts are key characteristics and geographical ranges to permit the confident identification of every reptile or amphibian native to New York State (as well as a few introduced species). In addition, the species accounts also contain short discussions of the natural history and habitat associations of each species (as well as, surprisingly often, mention of what biologists do not yet know about them). Supplementary sections offer an overview of the biology and habitats of the animals.

Most of the descriptions of the animals themselves as well as the habitats that they occupy are based on our personal experience. We have also drawn occasionally from other sources as needed. For species descriptions of salamanders we examined Bishop (1941), Pfingsten and Downs (1989), and Petranka (1998); for frogs and toads, Dickerson (1969) and Wright and Wright (1949); for turtles, Ernst et al. (1994) and Carr (1952); for snakes, Wright and Wright (1957), Ernst and Barbour (1989), and Ernst and Ernst (2003); and for lizards, Smith (1995). Habitat descriptions are based largely on our own observations and augmented by reports in technical literature that are cited in each species' account.

Mapping where species do and do not occur is problematic for any group of organisms. The distribution maps presented herein are our best approximation of the current distributions of amphibians and reptiles in New York based on the extensive records compiled by the New York State "Herp Atlas" project between 1990 and 2005. Shaded areas on a given species' map are areas with clusters of "Herp Atlas" records. Isolated dots are seemingly legitimate records too remote from any others to map them as part of an obvious aggregation of records (a small number of significant but isolated records from before 1990 are included to augment the 1990–2005 Atlas records). The remaining blank areas have no known records. This said, the blank areas may or may not truly reflect the absence of a particular species. Despite the enormous number of records compiled by the "Herp Atlas," New York State covers a huge swath of territory. Much of it is quite rural (most of central, western, and northern New York) or even downright remote (e.g., Adirondack Mountain region). In other words, a great deal of searching for "herps" in the state has occurred, and much remains to done. Therefore, the blank spots on the distribution maps should be considered a strong hypothesis about a particular species' absence. In addition, these blank spots should be considered worthy targets for further searching. Collection of additional

distributional information using the Atlas format is continuing and you are encouraged to contribute records (see "Herp Atlas" Report Card).

The theme of conservation appears throughout the book. A set of habitat conservation guidelines for land managers, landowners, and concerned citizens is presented, as are case studies of specific conservation efforts in New York State. Elsewhere a section on how to study and enjoy amphibians and reptiles along with a sampling of the "unnatural history" of these creatures, including New Yorkers' curious perspectives on "herps" as recorded in the state's folklore, is presented. Collectively, the book is intended to provide a comprehensive look at the diversity, distribution, and natural history of New York's magnificent herpetofauna as well as approaches, opportunities, and reasons for conserving it.

Take this book out into the field, perhaps with a child, parent, friend, or even a politician. Use it to learn more about New York's amphibians and reptiles and involve yourself in their conservation. As a result, perhaps your grandchildren will also have the opportunity to gaze upon New York's stinkpots, hellbenders, spadefoots, tiger salamanders, and more, with wonder and delight.

2

Herpetofauna of New York

Here we present the species of amphibians and reptiles known to occur in New York State. We also provide an overview of the biology of these fascinating organisms by examining their similarities and contrasting their differences. Later in the book, at the beginning of each collection of species accounts, we provide overviews of each of the major groups of amphibians and reptiles of New York State, that is, the salamanders (see Chapter 4), frogs and toads (see Chapter 5), turtles (see Chapter 6), and lizards and snakes (see Chapter 7).

Amphibians and Reptiles of New York State

Just how many species of amphibians and reptiles are native to New York State? The answer is generally accepted as 69: 18 salamanders and 14 frogs and toads (table 2.1) and 17 turtles, 3 lizards, and 17 snakes (table 2.2). Quite notably, the state is the type locality for some 18 taxa, including 5 salamanders, 5 frogs, 4 snakes, and 4 turtles (table 2.3). In addition, there are three particularly widespread, introduced species. Accounts for all these species are provided later in the book, with one exception: the hawksbill seaturtle, whose occurrence in New York State is based on just a single record from Long Island Sound in 1938.

After perusing tables 2.1 and 2.2, those of you who may have learned your salamanders by reading Bishop (1941) may wonder: what happened to the purple salamander? (It's now the spring salamander). Or you may note that Bishop's *Triturus* was changed to *Diemictylus* and is now *Notophthalmus*. Or if you have been a student of older

Table 2.1.
Amphibians of New York State and Their Status[a]

Scientific Name	Common Name	New York Natural Heritage Program State Rank[b]	NatureServe Global Rank[c]	New York State Listing[d]	Federal Listing
Caudata	Salamanders				
Cryptobranchidae	Giant Salamanders				
Cryptobranchus alleganiensis	Hellbender	S2	G3G4	Special Concern	
Proteidae	Waterdogs				
Necturus maculosus	Mudpuppy [Common Mudpuppy]	S4	G5		
Ambystomatidae	Mole Salamanders				
Ambystoma jeffersonianum	Jefferson Salamander	S4	G4	Special Concern	
Ambystoma laterale	Blue-spotted Salamander	S4	G5	Special Concern	
Ambystoma maculatum	Spotted Salamander	S5	G5		
Ambystoma opacum	Marbled Salamander	S3	G5	Special Concern	

Ambystoma tigrinum	Tiger Salamander [Eastern Tiger Salamander]	S1S2	G5	Endangered
Salamandridae	True Salamanders			
Notophthalmus viridescens	Eastern Newt	S5	G5	
Plethodontidae	Lungless Salamanders			
Desmognathus fuscus	Northern Dusky Salamander	S5	G5	
Desmognathus ochrophaeus	Allegheny Mountain Dusky Salamander [Allegheny Dusky Salamander]	S5	G5	
Eurycea bislineata	Northern Two-lined Salamander	S5	G5	
Eurycea longicauda	Long-tailed Salamander [Longtail Salamander]	S2S3	G5	Special Concern
Gyrinophilus porphyriticus	Spring Salamander [Northern Spring Salamander]	S5	G5	
Hemidactylium scutatum	Four-toed Salamander	S5	G5	
Plethodon cinereus	Eastern Red-backed Salamander [Northern Redback Salamander]	S5	G5	

Table 2.1. (continued)

Scientific Name	Common Name	New York Natural Heritage Program State Rank[b]	NatureServe Global Rank[c]	New York State Listing[d]	Federal Listing
Plethodon glutinosus	Northern Slimy Salamander	S5	G5		
Plethodon wehrlei	Wehrle's Salamander	S3	G4		
Pseudotriton ruber	Red Salamander	S3S4	G5		
Anurans	Frogs				
Pelobatidae	Spadefoot Toads				
Scaphiopus holbrookii	Eastern Spadefoot	S2S3	G5	Special Concern	
Bufonidae	True Toads				
Bufo americanus	American Toad	S5	G5		
Bufo fowleri	Fowler's Toad	S4	G5		
Hylidae	Treefrogs				
Acris crepitans	Northern Cricket Frog	S1	G5	Endangered	
Hyla versicolor	Gray Treefrog	S5	G5		

Pseudacris triseriata	Western Chorus Frog	S4	G5	
Pseudacris crucifer	Spring Peeper	S5	G5	
RANIDAE	TRUE FROGS			
Rana catesbeiana	Bullfrog	S5	G5	
Rana clamitans	Green Frog	S5	G5	
Rana palustris	Pickerel Frog	S5	G5	
Rana pipiens	Northern Leopard Frog	S5	G5	
Rana septentrionalis	Mink Frog	S5	G5	
Rana sylvatica	Wood Frog	S5	G5	
Rana sphenocephala	Southern Leopard Frog	S1S2	G5	Special Concern

[a]Names follow Crother et al. (2000/2001, 2003) and Collins and Taggart (2005, in brackets, where different).

[b]New York Natural Heritage State Ranks (as of February 2006) are: S1–typically 5 or fewer occurrences or some factor of its biology making it especially vulnerable in New York State; S2–typically 6–20 occurrences or factors demonstrably making it very vulnerable; S3–typically 21–100 occurrences; S4–apparently secure; S5–demonstrably secure in New York State.

[c]NatureServe Global Ranks are: G1–critically imperiled globally because of extreme rarity (5 or fewer occurrences) or especially vulnerable to extinction because of some factor of its biology; G2–imperiled globally because of rarity (6–20 occurrences) or very vulnerable to extinction throughout its range because of other factors; G3–either rare and local throughout its range (21–100 occurrences), or found locally (even abundantly at some of its locations) in a restricted range (e.g., a physiographic region), or vulnerable to extinction throughout its range because of other factors; G4–apparently secure globally, although it may be quite rare in parts of its range, especially at the periphery; G5–demonstrably secure globally, although it may be quite rare.

[d]In 2006 all native amphibians and reptiles in New York State were classified as "game" providing NYS DEC The authority to regulate their harvest, which in practice is currently restricted to frogs of the genus *Rana*, snapping Turtle, and diamond-backed Terrapin (see Chapter 9).

Table 2.2.
Reptiles of New York State and Their Status[a]

Scientific Name	Common Name	New York Natural Heritage State Rank	NatureServe Global Rank	New York State Listing	Federal Listing
Testudines	Turtles				
Chelydridae	Snapping Turtles				
Chelydra serpentina	Snapping Turtle [Common Snapping Turtle]	S5	G5		
Kinosternidae	Mud and Musk Turtles				
Kinosternon subrubrum	Eastern Mud Turtle	S1	G5	Endangered	
Sternotherus odoratum	Stinkpot [Common Musk Turtle]	S5	G5		
Emydidae	Pond Turtles				
Chrysemys picta	Painted Turtle	S5	G5		
Clemmys guttata	Spotted Turtle	S3	G5	Special Concern	

Glyptemys insculpta	Wood Turtle	S3	G4	Special Concern	
Glyptemys muhlenbergii	Bog Turtle	S2	G3	Endangered	Threatened
Emydoidea blandingii	Blanding's Turtle	S2S3	G4	Threatened	
Graptemys geographica	Northern Map Turtle [Common Map Turtle]	S3	G5		
Malaclemys terrapin	Diamond-backed Terrapin [Diamondback Terrapin]	S3	G4		
Pseudemys rubriventris	Northern Red-Bellied Cooter [Eastern Redbelly Turtle]	Introduced	G5	Unprotected	
Terrapene carolina	Eastern Box Turtle	S3	G5	Special Concern	
Trachemys scripta	Pond Slider [Slider]	Introduced	G5	Unprotected	
Cheloniidae	Seaturtles				
Caretta caretta	Loggerhead	S1	G3	Threatened	Threatened
Chelonia mydas	Green Seaturtle [Green Turtle]	S1	G3	Threatened	Threatened

Table 2.2. (continued)

Scientific Name	Common Name	New York Natural Heritage State Rank	NatureServe Global Rank	New York State Listing	Federal Listing
Eretmochelys imbricata	Hawksbill Seaturtle [Hawksbill]	SN	G3	Endangered	Endangered
Lepidochelys kempii	Kemp's Ridley Seaturtle [Atlantic Ridley]	S1	G1	Endangered	Endangered
Dermochelyidae	Leatherback Seaturtles				
Dermochelys coriacea	Leatherback Seaturtle [Leatherback]	S1N	G2	Endangered	Endangered
Trionychidae	Softshell Turtles				
Apalone spinifera	Spiny Softshell	S2S3	G5	Special Concern	
Squamata	Lizards/Snakes				
Sauria	Lizards				
Phrynosomatidae	Sceloporine Lizards				
Sceloporus undulatus	Eastern Fence Lizard	S1	G5	Threatened	

Lacertidae	Wall Lizards			
Podarcis sicula	Italian Wall Lizard	Introduced	G5	
Scincidae	Skinks			
Eumeces anthracinus	Coal Skink	S2S3	G5	
Eumeces fasciatus	Common Five-lined Skink [Five-lined Skink]	S3	G5	
Squamata	Snakes			
Colubridae	Colubrids			
Carphophis amoenus	Eastern Wormsnake [Eastern Worm Snake]	S2	G5	Special Concern
Coluber constrictor	Eastern Racer	S4	G5	
Diadophis punctatus	Ring-necked Snake [Ringneck Snake]	S5	G5	
Elaphe alleghaniensis	Eastern Ratsnake [Eastern Rat Snake]	S4	G5	

Table 2.2. (continued)

Scientific Name	Common Name	New York Natural Heritage State Rank	NatureServe Global Rank	New York State Listing	Federal Listing
Heterodon platirhinos	Eastern Hog-nosed Snake [Eastern Hognose Snake]	S3	G5	Special Concern	
Lampropeltis triangulum	Milksnake [Milk Snake]	S5	G5		
Liochlorophis vernalis	Smooth Greensnake [Smooth Green Snake]	S4	G5		
Nerodia sipedon	Northern Watersnake [Northern Water Snake]	S5	G5		
Regina septemvittata	Queen Snake	S1	G5	Endangered	
Storeria dekayi	Dekay's Brownsnake [Brown Snake]	S5	G5		
Storeria occipitomaculata	Red-bellied Snake [Redbelly Snake]	S5	G5		

Thamnophis brachystoma	Short-headed Gartersnake [Shorthead Garter Snake]	S3	G4		
Thamnophis sauritus	Eastern Ribbonsnake [Eastern Ribbon Snake]	S4	G5		
Thamnophis sirtalis	Common Gartersnake [Common Garter Snake]	S5	G5		
Viperidae	Pitvipers				
Agkistrodon contortrix	Copperhead	S3	G5		
Crotalus horridus	Timber Rattlesnake	S3	G4	Threatened	
Sistrurus catenatus	Massasauga	S1	G3G4	Endangered	Candidate

[a]Names follow Crother et al. (2000/2001, 2003) and Collins and Taggart (2005, in brackets, where different). Status designations are as given in Table 2.1.

Table 2.3.
Places in New York Where Specimens Used to Fix a Name to a New Type of Amphibians and Reptiles Were Found

Common Name	Species	Type Locality	Notes	Source
Salamanders				
Marbled Salamander	*Ambystoma opacum*	New York	Originally reported by Gravenhorst 1807, collector unknown	Anderson (1967)
Northern Dusky Salamander	*Desmognathus fuscus*	Northern parts of New York State	Originally reported by Rafinesque 1820	McCoy (1982)
Eastern Newt	*Notophthalmus viridescens*	Lake George, Lake Champlain, and the springs and brooks of the neighborhood	Originally reported by Rafinesque 1820, collector unknown	Mecham (1967)
Eastern Red-backed Salamander	*Plethodon cinereus*	Hudson Highlands of New York	Originally reported by Rafinesque 1818	Smith (1963)
Frogs and Toads				
Northern Cricket Frog	*Acris crepitans*	Vicinity of Queens, New York	Originally reported in DeKay 1842	Smith et al. (1995)
Gray Treefrog	*Hyla versicolor*	Restricted to the vicinity of New York City	As reported in Schmidt 1953	Schmidt (1953), McCoy (1982)

Green Frog	*Rana clamitans*	Lake Champlain and Lake George	Subspecies *melanota*, originally reported by Rafinesque 1820	Stewart (1983)
Northern leopard frog	*Rana pipiens*	Fall Creek, Etna, Tompkins County	As reported in Pace 1974	Pace (1974), McCoy (1982)
Mink Frog	*Rana septentrionalis*	Sackett's Harbor, Jefferson County	Originally reported by Baird 1854	Hedeen (1977)
Wood Frog	*Rana sylvatica*.	Vicinity of New York City	Originally reported by LeConte 1825	Martof (1970)
Turtles				
Snapping Turtle	*Chelydra serpentina*	Vicinity of New York City	Originally reported by Linnaeus	Gibbons et al. (1988)
Painted Turtle	*Chrysemys picta*	Vicinity of New York City	Originally reported by Schneider 1783	Ernst (1971)

Table 2.3. (continued)

Common Name	Species	Type Locality	Notes	Source
Wood Turtle	*Glyptemys insculpta*	Vicinity of New York City	As reported in Schmidt 1953	Schmidt (1953), McCoy (1982)
Diamond-backed Terrapin	*Malaclemys terrapin*	Coastal waters of Long Island	Originally reported by Schoepff 1793	Ernst (1982)
Snakes				
Timber Rattlesnake	*Crotalus horridus*	Vicinity of New York City	Originally reported by Linnaeus 1758	Collins and Knight (1980)
Milksnake	*Lampropeltis triangulum*	Vicinity of New York City	Originally reported by Lacepede 1788	Williams (1994)
Northern Watersnake	*Nerodia sipedon*	Vicinity of New York City	As reported in Schmidt 1953	Schmidt (1953), McCoy (1982)
Common Gartersnake	*Thamnophis sauritus*	Michigan Hollow, near Ithaca, Tompkins County	Subspecies *septentrionalis* Collected by J.A. Bartley in 1959	Rossman (1970)

field guides, you will find Muhlenberg's turtle is now the bog turtle and the entire genus *Natrix* is missing, replaced by two "new" genera: *Nerodia* and *Regina*. A renewed interest in amphibians and reptiles over the past two decades, coupled with novel insights derived from genetic analyses, has resulted in changes to accepted common and scientific names of many species, a process that will doubtlessly continue.

Three remaining groups of amphibians and reptiles that live on Earth but are not native to New York State may be found under unusual circumstances in the state. The caecilians (sometimes known as "rubber eels") are a group of limbless, worm-like amphibians found across the tropical parts of the world but confined to zoos and pet shops in New York. Another group that is not native to the state is the crocodilians, familiar to most as occasional denizens of New York City's sewer system (see box: "Are there really alligators in New York City Sewers?"). A final group not known to New York under any circumstance is sphenodon (or tuatara), an obscure and endangered, lizard-like reptile that only occurs in New Zealand.

Are There Really Alligators in New York City Sewers?

Alligators are prominent in the folklore of New York City. While swarms of flushed pets do not lurk and breed in the Gotham's sewers, such tales are not baseless. Reports of alligators in the city have indeed been recorded since the 1930s. In June of 1932, two small boys collected a dead 3 ft (1 m) alligator along the banks of the Bronx River. In January 1935, teenagers captured and killed a 125 lb (57 kg) alligator found in a manhole at East 123rd Street. In May of 1937, a barge captain lassoed a large alligator in the East River. In August 1982, a 26-inch-long (0.66 m) alligator was sighted in a Westchester reservoir and in July, 1997, a four-foot-long (1.2 m) alligator was encountered in Kissena Lake, Queens. More recently, in June, 2001, an alligator was spotted in the Harlem Meer in the northeastern section of Central Park but was likely a mistaken sighting of a large snapping turtle, which are bona fide residents of New York City's sewer system (large individuals have been reported fairly regularly at the intake grates of the city's sewage treatment plants). Alligators are not restricted to New York City; a live alligator was captured near a public swimming beach on Thompson's Lake, Albany County in 1983 and a youngster was pulled out of a ditch in Pulaski (near Lake Ontario) by one of us (G. Johnson) in 1993. The good news is that New York's climate all but ensures that alligators released in the summer will die in the following winter (source: archives of *The New York Times*).

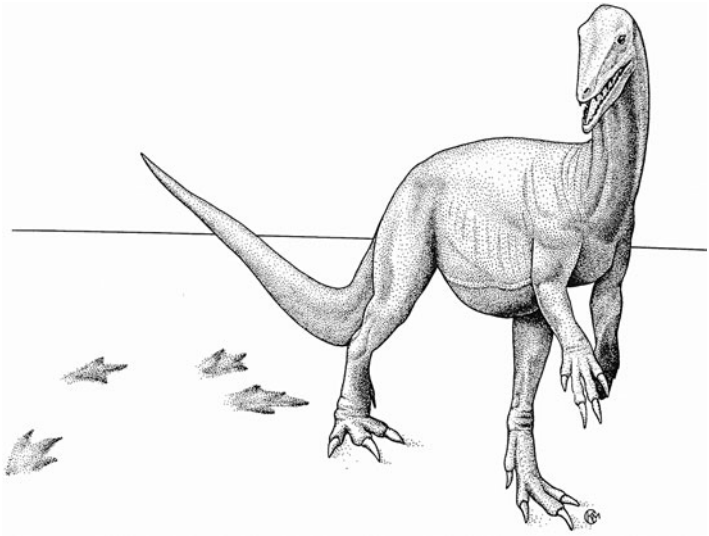

Figure 2.1. *Coelophysis* was an ostrich-like predator (4.7 ft. [1.5 m]) that hunted the mudflats, lake shores, and rivers of New York some 200 million years ago, eating amphibians and smaller plant- and animal-eating reptiles that were stuck in the mud or too slow to escape the dinosaur's "numerous sharp knife-like teeth designed for slashing and severing flesh" (Fisher 1981). (New York State Museum.)

A prominent, although now extinct group of reptiles—dinosaurs—almost certainly wandered New York State in the past. Two sets of fossil footprints probably made by the three-toed *Coelophysis* are known, one from Rockland County and the other from Long Island (figure 2.1). As yet, no fossils of the bodies of dinosaurs have been found in New York. Most rocks of Mesozoic age (when the dinosaurs lived, about 65 to 240 million years ago) that might have contained such fossils have been repeatedly "bulldozed" by glaciers and obliterated throughout the region.

Similarities between Amphibians and Reptiles

One similarity between amphibians and reptiles is that both obtain body heat necessary to function from sources outside their bodies. Often, the animals are termed "cold-blooded," a characterization that is technically incorrect because amphibians and reptiles can (and often do) raise their body temperatures to "warm-blooded" levels by basking in sunlight. The correct term is "ectothermic," which suggests

that amphibians and reptiles must position themselves strategically in the environment to warm themselves sufficiently to become active or otherwise must remain inactive for long periods, as most do during the long New York winters.

Being ectothermic gives reptiles and amphibians some distinct advantages. For one, it permits many to have small bodies. If a bird or mammal is too small, heat loss becomes prohibitive because their bodies have too much surface area relative to volume to retain much body heat. But for "herps," which do not need to keep body temperatures high and stable to survive, this is not an issue. Although some "herps" such as snapping turtles are large-bodied, most are in fact quite small (< 10 g) and much smaller than most vertebrate animals. Being small-bodied permits "herps" to exploit a myriad of ecological niches unavailable to larger-bodied, endothermic vertebrates, such as tiny tunnels in the soil and leaf litter, cracks in rocks, the insides of decaying logs, and bark fissures.

Being ectothermic also lets amphibians and reptiles put all the energy that is not frittered away staying warm directly into growth and reproduction; hence, they can become exceedingly numerous (e.g., Burton and Likens 1975b, Petranka and Murray 2001, Davic and Welsh 2004). The eastern red-backed salamander may well be, for example, the most abundant terrestrial vertebrate animal in New York State. A typical density is about 1,660 individual salamanders per acre (4,100/ha) of mature forest (P. K. Ducey and A. R. Breisch, unpublished data). Given that 62% of New York State is forested, there may be some 35,894,311,000 (36 billion) eastern red-backed salamanders in the leaf litter. Much of this layer is too young to support healthy salamander populations, yet only about 20% of salamanders are likely to be at the soil surface and "countable" at any given time (Bailey et al. 2004). Who knows how it all adds up, but suffice it to say that there are likely tens of billions of these salamanders lurking in the soils of the forests of the state. Moreover, although many amphibians and reptiles are small, their collective weight adds up. This means that amphibians make important contributions to animal "biomass" and predator–prey connections in many ecosystems. For example, woodland salamanders are important conduits of nutrients being cycled within the forest, particularly calcium (Burton and Likens 1975a). Because they consume so many invertebrates that fragment leaf litter they slow significantly decomposition and the release of carbon dioxide to the atmosphere (Wyman 1998).

Differences between Amphibians and Reptiles

Beyond the commonality of being ectothermic, the differences, rather than similarities, between amphibians and reptiles are more striking. Indeed, modern reptiles are more closely related to birds and mammals than they are to modern amphibians (Laurin and Reisz 1995). Most reptiles, for example, produce a few eggs with shells (like birds), usually well provisioned with yolk, and lay these eggs in dry soils. Some even give birth to live offspring. Reptiles also have dry, scaly skin and respire primarily through their lungs.

Amphibians, in contrast, must remain in moist environments and most return to water to breed. Their eggs are fragile structures—mere embryos in jelly envelopes typically cast into the water in vast numbers. Amphibian skins are generally so permeable that much gas and water exchange occurs directly through the skin (whereas the tough skin of reptiles results in most reptilian respiration occurring across the membranes of the lung). The dependence of amphibians on both land and water underpins the term amphibious used to describe them (*amphi* = both and *bios* = modes of life).

3

New York's Environment as Habitat for Amphibians and Reptiles

New York State covers 49,108 sq. mi. (127,189 km^2) and extends from sea level along Long Island Sound to 5,344 ft. (1,600 m) in the Adirondack Mountains (figure 3.1). This area spans almost 5° of north–south latitude and 8° of east–west longitude. The state occurs in a humid temperate region, with average temperatures of 16–34°F (–9 to 1°C) in January and 66–77°F (19–25°C) in July. Precipitation is evenly distributed through the year, and much of the state receives about 40 in. (102 cm) annually. This variation in climate, topography, and vegetation generates the striking diversity of amphibians and reptiles of the state.

New York's complement of amphibians and reptiles represents a convergence of species with affinities to more southern, midwestern and northern regions. For example, the state is the northern limit of the hellbender, marbled salamander, tiger salamander, red salamander, long-tailed salamander, Wehrle's salamander, eastern spadefoot, northern cricket frog, southern leopard frog, eastern mud turtle, bog turtle, eastern fence lizard, and copperhead. It is also the eastern extreme for the tiger salamander, massasauga, queen snake, and western chorus frog. One species reaches its southern range limit in New York: the mink frog. These peripheral species are complemented by a large number of species that are widely distributed across the entire state. These include the spotted salamander, eastern red-backed salamander, northern two-lined salamander, eastern newt, bullfrog, spring peeper, green frog, wood frog, pickerel frog, snapping turtle, painted turtle, and common gartersnake. Other widespread species

Figure 3.1. Ecological zones and topography of New York State. Elevation is relative to the highest point, Mt. Marcy in the northeastern Adirondack Mountains at 5,344 ft. (1,629 m), and the lowest, sea level along the margin of the Atlantic Coastal Plain. Data sources: New York State Gap Analysis Project (for ecological zones) and US Geological Survey EROS Data Center, April, 2003, North America Shaded Relief: National Atlas of the United States, Reston, Virginia (for topography).

include the northern water snake and eastern milk snake (missing from parts of northern New York) and the American toad (absent only from Long Island).

This chapter describes the major ecological zones found in New York: Atlantic Coastal Plain, Appalachian Plateau, Great Lakes Plain, Hudson and Mohawk Valleys, Catskill Mountains, St. Lawrence Plains/Champlain Valley, and Adirondack Mountains (see figure 3.1) as well as the herpetological specialties of each. "Eco-zones" are referred to in the species accounts and are based on those recognized by the New York State Department of Environmental Conservation (Dickinson 1979, Will et al. 1982). Similarly, other identifiers are mentioned often in the species accounts so we also provide maps for these: rivers and lakes (figure 3.2), counties and cities (figure 3.3), and major habitat associations (figure 3.4).

Figure 3.2. Major lakes and rivers of New York State. Data source: Streams and Waterbodies of the United States, National Atlas of the United States, March, 2005.

Figure 3.3. Counties and major cities of New York State. Data sources: Census 2000 US Gazetteer Files, 2002, US Census Bureau (for cities); County Boundaries of the United States, National Atlas of the United States, June, 2005 (for counties).

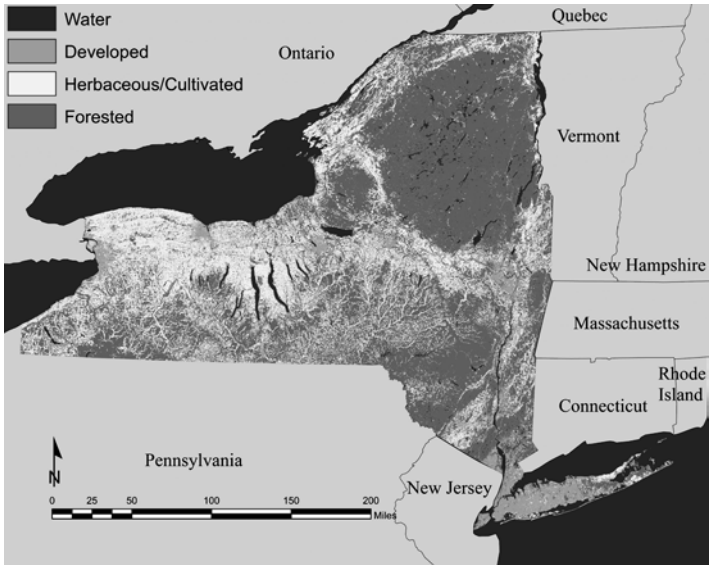

Figure 3.4. Land cover of New York State. "Water" includes both fresh and marine water bodies, "herbaceous/cultivated" includes primarily pasture and cropland, "developed" represents primarily suburban and urban areas, and "forested" is dominated by trees. Data source: National Land Cover Dataset 1992, US Geological Survey, January 1, 1997, Sioux Falls, South Dakota.

Ecological Zones of New York State and Their Herpetofauna

Atlantic Coastal Plain

This zone is represented primarily by Long Island and Staten Island (see figure 3.1; figure 3.5). The zone has very low relief, typically less than 200 ft. (60 m). Climate is strongly moderated by the ocean, and soils are mostly derived from glacial drift. Soils are therefore generally "poor" and sandy, with natural vegetation dominated by scrub oak and pines. Much of the vegetation in the zone, with the exception of eastern Long Island, has been "urbanized" (see figure 3.4). Nevertheless, because of its distinct climate and ecosystems, the region remains a stronghold for several species, including the eastern mud turtle, eastern box turtle, and tiger salamander. Moreover, large populations of diamond-backed terrapins occur in salt marshes and estuaries. This is the only part of the state where sea turtles appear, typically stranded on the beaches. Notably, Long Island Sound is also a

Figure 3.5. The Atlantic Coastal Plain. Queens Co., New York. (Russell Burke.)

vital nursery area for young Kemp's ridley seaturtles (see Chapter 6 box: Sea turtles in New York State).

Appalachian Plateau

This zone (see figure 3.1; figure 3.6) represents a vast swath of the State, covering the hilly regions of much of central and western New York to the Pennsylvania border. The zone extends from west of the Catskill Mountains through the southern end of the Finger Lakes region to the Allegheny Hills. Elevations are typically between 1,000 and 2,000 ft. (300–600 m). The region's hilly nature in combination with its deeply carved valleys results in a topography that supports fewer wetlands than are found in other parts of the state. Northern hardwood forests are the predominant vegetation, covering about one third of the region, with hemlock (*Tsuga canadensis*) prominent in stream valleys. Most of the remainder of the land is in agriculture, although much of grassland component has been abandoned and is slowly reverting to forest. The Appalachian Plateau is a stronghold for many notable species, including the long-tailed salamander, slimy salamander, Wehrle's salamander, hellbender, short-headed gartersnake, and coal skink.

Figure 3.6. The Appalachian Plateau. Wyoming/Livingston Co., New York. (James P. Gibbs.)

Great Lakes Plain

This zone (see figure 3.1; figure 3.7) extends along the plains of Lake Erie and Lake Ontario and includes land at the eastern end of Lake Ontario. The region remains mostly below 800 ft. (240 m), except for the Tug Hill Plateau at the extreme eastern end of Lake Ontario, which reaches almost 2,000 ft. (600 m). Northern hardwood forests cover only about one fifth of the area, and these are highly fragmented by agriculture, mainly dairy farms and orchards,

Figure 3.7. The Great Lakes Plain. Jefferson Co., New York. (James P. Gibbs.)

except for the Tug Hill region, which remains heavily forested (see figure 3.4). Notably, salamander communities tend to be relatively impoverished in this region, possibly because much of the remaining forest is young and heavily fragmented, making it difficult for salamanders to repopulate. Specialties of the Great Lakes Plain include the spiny softshell, northern map turtle, massasauga, and bog turtle.

Hudson and Mohawk Valleys

This zone (see figure 3.1; figure 3.8) consists of plains and hills surrounding the Hudson River valley (about 50% of the area being forest comprised of oak–northern hardwoods) and extending west into the Mohawk River valley (where some 20% of the landscape is forest, primarily northern hardwoods). The Hudson River valley is a stronghold for bog turtle, Blanding's turtle, timber rattlesnake, copperhead, common five-lined skink, and northern cricket frog. One notable area, the Albany Sand Plains, is dominated by oak and pine. The Albany Sand Plains is "a northern outpost for southern species" (Stewart and Rossi 1981) and hosts eastern spadefoot, Fowler's toad, box turtle, eastern wormsnake, and eastern hog-nosed snake.

Figure 3.8. The Hudson River Valley. Englewood Cliffs, New Jersey. (James P. Gibbs.)

Catskill Mountains

This zone (see figure 3.1; figure 3.9) contains numerous peaks over 3,000 ft. (900 m) elevation that form the headwaters of the Delaware River. The region ends abruptly to the north at the Heldeberg Escarpment, a favorite study area of one of New York's preeminent herpetologists, Sherman C. Bishop (Bishop 1926, 1941). Most of the area is heavily forested with spruce and fir at the upper elevations and mixed hardwoods at the lower elevations. Large areas are protected as part of either the Catskill State Park or the New York City watershed. Amphibian and reptile diversity is low at the higher elevations, but the southern lowlands bordering the Delaware River and its tributaries are host to many species, including timber rattlesnakes, eastern racers, and eastern ratsnakes.

St. Lawrence Plains/Champlain Valley

This zone (see figure 3.1; figure 3.10) is composed of lowlands less than 700 ft. (200 m) fringing the Adirondack region to the north and east. The St. Lawrence Plains are made up of fragmented forests of northern hardwoods, expanses of swamplands, and extensive shrub land on abandoned farmlands with a harsh northern climate. The Champlain Valley has a more moderate climate and more