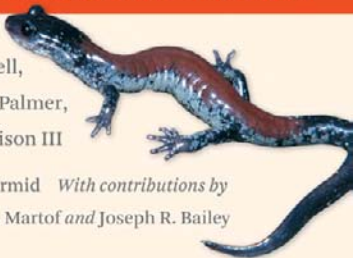


SECOND EDITION, REVISED AND UPDATED

Jeffrey C. Beane, Alvin L. Braswell,
Joseph C. Mitchell, William M. Palmer,
and Julian R. Harrison III

*Photographs by Jack Dermid With contributions by
Bernard S. Martof and Joseph R. Bailey*



Amphibians & REPTILES

of the
CAROLINAS and VIRGINIA



Amphibians
and Reptiles of
the Carolinas
and Virginia

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REPTILES

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The University of North Carolina Press
CHAPEL HILL

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Our dear friend and colleague Julian R. Harrison III passed away during the later editing stages of the second edition of *Amphibians and Reptiles of the Carolinas and Virginia*. The enduring contributions he made as a multidisciplinary naturalist, scientist, and educator, and the lives that he touched, are many. He achieved what most people hope to accomplish during their lives—to be loved by family and friends, to be relevant and appreciated for actions taken, and to be remembered for many positive accomplishments.

This book is dedicated to the memory of Joseph R. Bailey, Julian R. Harrison III, and Bernard S. Martof.

Their steadfast desire to pass along the natural history knowledge they had accumulated to students, colleagues, and the public was inspiring and fostered many others to pursue careers in the natural sciences. The importance of these men to science, to conservation of our natural resources, and to the betterment of humankind is tremendous. The discipline of herpetology and the natural sciences in general have been blessed by their presence and enduring legacy.





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Amphibians
and Reptiles of
the Carolinas
and Virginia

SECOND EDITION,
REVISED AND UPDATED

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Introduction

Amphibians and reptiles play critical roles in natural systems, and many are highly beneficial to humans. Although these animals have long appealed to amateur naturalists as well as professional zoologists, their remarkable diversity of shapes, sizes, colors, patterns, ecologies, and life histories remain poorly known to most of the public. They constitute what has been called “hidden biodiversity” because many species are secretive and are seen rarely or only when one is actively looking for them. In the past few decades, information about amphibians and reptiles has grown tremendously. The explosive spread of urban and suburban living and outdoor recreation has evoked a resurgence of interest in the identification, natural history, behavior, and distribution of plants and animals, especially amphibians and reptiles. This book was written to acquaint persons with these abundant and varied groups of animals that live in Virginia and the Carolinas and to encourage the growth of knowledge about and understanding of these organisms and their importance. We hope it will be a useful reference not only to herpetologists and other biologists and naturalists but to all persons concerned about the environment and the quality of life in our region.

Virginia and North and South Carolina constitute a compact natural area bordered by the Appalachian Mountains to the west and northwest, the Atlantic Ocean to the northeast and southeast, and the Savannah River to the southwest. The region harbors a rich herpetofauna of some 189 species. This richness is due to several biogeographic patterns. A number of southern species have ranges extending northward through the Coastal Plain and terminating in this region. Several others have essentially northern distributions that reach their southernmost limit in the region. Numerous species (about a third of the total) have broad distributions in eastern North America, encompassing much of the mid-Atlantic region and occurring in all three states. A few species extend into the western part of the region via the Tennessee River drainage. And last, but certainly not least, some 40 salamander species have distributions centering on the Blue Ridge and Appalachian mountains. These overlapping distribution patterns

yield totals of some 111 amphibian and 78 reptile species known to occur in the tristate region. About 22 species occur areawide, or nearly so, and at least that many others inhabit two-thirds or more of the area. Furthermore, the area contains 11 endemic species and several others nearly restricted to it, thus providing numerous unique elements.

A species includes a population or a group of populations whose members share many traits and are usually distinguishable from individuals of other species. Members of a species interbreed or are capable of interbreeding among themselves but are reproductively isolated from individuals of other species by a number of mechanisms (such as behavior). Some species are subdivided into geographic races, or subspecies. Such populations are morphologically or physiologically different and inhabit only a part of the total geographic range of the species. Only a few of the more conspicuous subspecies are mentioned in this book.

The species here included are those generally recognized by most herpetologists; however, for questionable or controversial species, our choices of the alternatives (often not unanimous) are used. Divergence of opinion arises mainly because some species are in different stages of evolution, and because knowledge of many populations is so fragmentary. Many species are capable of becoming divided into geographically isolated populations, each of which may accumulate genetic differences and become morphologically or physiologically distinct over time. If such a population remains geographically isolated, its taxonomic status (whether it is an unusually distinct subspecies or a full-fledged species) is often a subjective judgment. However, if the populations in question overlap on the landscape, then their taxonomic status may be easily ascertained. If, in the zone of overlap, the parental phenotypes occur frequently and hybrids only occasionally, taxonomists conclude that barriers to interbreeding exist and that the populations are separate species. On the other hand, if most individuals in the central part of the zone of overlap have some of the diagnostic features of both parental forms, the populations are best classed as the same species. The problem of recognizing species is further exacerbated because some populations have become reproductively isolated (do not interbreed) but are phenotypically similar or identical (sibling or cryptic species).

Numerous changes in the scientific names of amphibians and rep-

tiles have occurred since the first edition of this book was published in 1980. This is largely due to the advances in molecular technology that provide insights into the genealogy of these animals. Changes in taxonomic names reflect advances in understanding genetic relationships among species or groups of species. Thus, taxonomy, the naming of species, is not a static science. Use of molecular technology has also caused scientists to rethink what constitutes a species. In short, how genetically different must a population be in order to be properly recognized as a full species? In some cases, especially in salamanders, species are recognized entirely by their genetic differences rather than by external characteristics we can see. Because of their limited mobility, salamanders are often more easily influenced by some of the factors (e.g., geographic barriers) that lead to speciation than are more mobile animals. See Table 1 for a listing of species added and name changes since publication of the first edition of this book in 1980.

Taxonomy is often controversial, and not all published taxonomic changes are immediately universally accepted in the scientific community. Examples include *Lithobates* for *Rana* (true frogs), *Anaxyrus* for *Bufo* (toads), *Plestiodon* for *Eumeces* (skinks), and *Pantherophis* for *Elaphe* (rat snakes). Because this book is designed for a general audience, we decided to remain conservative and use the older, more established names. However, we have added in parentheses in the appropriate accounts the newer names for future reference based on the 2008 checklist of North American amphibians and reptiles published by the Society for the Study of Amphibians and Reptiles. Names will continue to change as more and more groups are studied with modern techniques. In several of the accounts, we note that we anticipate that a particular species may undergo revision in the near future.

In spite of numerous attempts to standardize the common names of amphibians and reptiles, much controversy remains. An obstacle to standardization, of course, is the deep entrenchment of different names for a species in various regions of the country. In general, our common names follow those recommended in 2008 by the Society for the Study of Amphibians and Reptiles, but we have departed in a few cases where we believe our selections more appropriately describe the animal, or where we feel that retention of certain traditional, long-standing names would be more familiar and less confusing to most readers.

All species featured in this book are native to the area, with the

**TABLE 1 Species Added and Scientific Name Changes
since the 1980 Edition**

Salamanders

Desmognathus fuscus split into:

<i>Desmognathus conanti</i>	Spotted Dusky Salamander
<i>Desmognathus fuscus</i>	Northern Dusky Salamander
<i>Desmognathus planiceps</i>	Virginia Dusky Salamander
<i>Desmognathus folkertsi</i>	Dwarf Black-bellied Salamander
<i>Desmognathus marmoratus</i>	Shovel-nosed Salamander (formerly <i>Leurognathus marmoratus</i>)

Desmognathus ochrophaeus split into:

<i>Desmognathus carolinensis</i>	Carolina Mountain Dusky Salamander
<i>Desmognathus ochrophaeus</i>	Allegheny Mountain Dusky Salamander
<i>Desmognathus ocoee</i>	Ocoee Salamander
<i>Desmognathus orestes</i>	Blue Ridge Dusky Salamander
<i>Desmognathus santeetlah</i>	Santeetlah Dusky Salamander

Eurycea bislineata split into:

<i>Eurycea bislineata</i>	Northern Two-lined Salamander
<i>Eurycea cirrigera</i>	Southern Two-lined Salamander
<i>Eurycea wilderae</i>	Blue Ridge Two-lined Salamander

Eurycea quadridigitata split into:

<i>Eurycea chamberlaini</i>	Chamberlain's Dwarf Salamander
<i>Eurycea quadridigitata</i>	Dwarf Salamander
<i>Eurycea</i> n. sp.	"Sandhills <i>Eurycea</i> "
<i>Plethodon aureolus</i>	Tellico Salamander

Plethodon glutinosus split into:

<i>Plethodon chatahoochee</i>	Chatahoochee Slimy Salamander
<i>Plethodon chlorobryonis</i>	Atlantic Coast Slimy Salamander
<i>Plethodon cylindraceus</i>	White-spotted Slimy Salamander
<i>Plethodon glutinosus</i>	Northern Slimy Salamander
<i>Plethodon variolatus</i>	South Carolina Slimy Salamander
<i>Plethodon teyahalee</i>	Southern Appalachian Salamander

Plethodon jordani split into:

<i>Plethodon amplus</i>	Blue Ridge Gray-cheeked Salamander
<i>Plethodon cheoah</i>	Cheoah Bald Salamander
<i>Plethodon jordani</i>	Jordan's Salamander
<i>Plethodon meridianus</i>	South Mountain Gray-cheeked Salamander
<i>Plethodon metcalfi</i>	Southern Gray-cheeked Salamander
<i>Plethodon montanus</i>	Northern Gray-cheeked Salamander
<i>Plethodon shermani</i>	Red-legged Salamander

Plethodon kentucki
Plethodon sherando
Plethodon ventralis

Plethodon virginia

Cumberland Plateau Salamander
Big Levels Salamander
Southern Zigzag Salamander (formerly
P. dorsalis)
Shenandoah Mountain Salamander

Frogs

Bufo fowleri

Pseudacris crucifer
Pseudacris feriarum

Pseudacris kalmi
Pseudacris ocularis

Rana capito

Fowler's Toad (formerly *B. woodhousii*
fowleri)
Spring Peeper (formerly *Hyla crucifer*)
Upland Chorus Frog (formerly *P. triseriata*
feriarum)
New Jersey Chorus Frog
Little Grass Frog (formerly *Limnaeodius*
ocularis)
Carolina Gopher Frog (formerly
R. areolata)

Turtles

Apalone ferox
Apalone spinifera

Kinosternon baurii
Pseudemys concinna

Pseudemys rubriventris

Trachemys scripta

Florida Softshell (formerly *Trionyx ferox*)
Spiny Softshell (formerly *Trionyx*
spiniferus)
Striped Mud Turtle
River Cooter (formerly *Chrysemys concinna*
and *C. floridana*)
Red-bellied Cooter (formerly *Chrysemys*
rubriventris)
Yellow-bellied Slider (formerly *Chrysemys*
scripta)

Lizards

Hemidactylus turcicus
Ophisaurus mimicus

Mediterranean Gecko
Mimic Glass Lizard

Snakes

Heterodon platyrhinos

Lampropeltis getula
Nerodia floridana

Eastern Hognose Snake (formerly
H. platyrhinos)
Eastern Kingsnake (formerly *L. getulus*)
Florida Green Water Snake (formerly
N. cyclopion)

exception of the Texas Horned Lizard, which has thrived in multiple established populations for several decades, and the Mediterranean Gecko, which has persisted in small colonies in all three states for several years. Small colonies of a few other nonnative species may have become established in our area as of this writing. The Brahminy Blind Snake, *Rhamphotyphlops braminus*, a tiny, parthenogenic (single-sex) species commonly transported with greenhouse plants, has been reported in parts of Richmond and Newport News, Virginia, and at least one specimen was found in a greenhouse in Wake County, North Carolina. The Chinese Softshell Turtle, *Pelodiscus sinensis*, has been reported from the Potomac River in northern Virginia. Mississippi Map Turtles, *Graptemys (pseudogeographica) kohnii*, have been found in several man-made reservoirs in central North Carolina. The Brown Anole, *Anolis (= Norops) sagrei*, has been reported from at least two localities in New Hanover County, North Carolina, and southeastern Virginia. Individual Cuban Treefrogs, *Osteopilus septentrionalis*, have been reported from several locations in the Carolinas, but no evidence of breeding has been noted. Whether these potentially invasive species will spread, maintain their populations in only small areas, or be extinguished remains to be determined. Although several other species have been introduced—in particular, such popular exotic pet species as the Green Iguana (*Iguana iguana*) and the Burmese Python (*Python molurus*) are found with increasing frequency as escaped or intentionally released individuals—none shows signs of establishing breeding populations. On the other hand, a nonnative race of a species native to our area (the Red-eared Slider, a subspecies of the native Yellow-bellied Slider, *Trachemys scripta*) has been widely introduced and is now well established in several localities. There is also evidence of intra-area and extra-area transport of native animals, chiefly the result of the use of amphibians as fish bait and reptiles as pets. More impressive changes in distributions of amphibians and reptiles are associated with agriculture, dam building, mining, coastal alterations, suburban development, and highway construction. No extinctions of our herpetofauna are known to have occurred in historical times, and we wish to keep it that way! On the other hand, numerous decreases in populations have occurred in many parts of the area due to habitat loss or other factors, and turbulent times lie ahead. This statement is as true today as it was when the first edition of this book appeared in 1980.

Recognizing that humans have drastically altered habitats and

eliminated many species, Congress passed the Endangered Species Act of 1973, and subsequent reauthorizations made a variety of changes. Each state also has its own endangered species law with its own list of endangered and threatened species. There are several compelling reasons why we must prevent the extinction of species: (1) We share with other organisms a common evolutionary heritage, and we find kinship, inspiration, and beauty in many of them. (2) Human populations are large, complexly interrelated, and vulnerable to extinction. We have much to gain from studies of other imperiled populations. (3) More practically, as genetic and biochemical resources, other organisms are indispensable in biological and medical research. Clearly, the most effective protection of endangered species is provided by preservation of their natural habitats. Not only do we need more large parks and wilderness areas, but many communities would benefit immeasurably by having their own programs of habitat preservation.

To promote interest in our diminishing herpetofauna, we have listed those species requiring special protection in Table 2, which is based mainly on current state and federal listings. State listing criteria parallel, but seldom precisely mirror, federal criteria. Also, the levels of protection provided by state listing differ from federal levels and are usually less stringent. South Carolina, North Carolina, and Virginia all have legislation in place authorizing development of state listings for Endangered and Threatened species (South Carolina's In Need of Management category is the equivalent of Threatened). North Carolina has an additional Special Concern category below Threatened. Endangered and Threatened are the only official federal categories. Roughly defined, the three levels of vulnerability to extinction are indicated: Endangered species are those in imminent danger of extinction; Threatened species have reduced populations in a large portion of their ranges and are likely to become Endangered if current trends continue; and species of Special Concern have a lesser degree of endangerment and may disappear from our area or are those about which only scant information is available. Even though federal and state laws impose heavy penalties for the possession, sale, or transport of several of these species, all need the maximum protection we can provide. State and federal listings are subject to change when new information becomes available or reevaluations occur, and the necessary legal processes are followed. The most recent listings should be sought out whenever there is a need to interact with a potentially

TABLE 2 Imperiled Species

Species	Common Name	State Listings			Federal Listings ¹		
		SC ²	NC ³	VA ⁴	SC	NC	VA
Salamanders							
<i>Pseudobranchius striatus</i>	Northern Dwarf Siren	T					
<i>Cryptobranchius alleganiensis</i>	Hellbender		SC				
<i>Necturus lewisi</i>	Neuse River Waterdog		SC				
<i>Necturus maculosus</i>	Common Mudpuppy		SC				
<i>Ambystoma cingulatum</i>	Flatwoods Salamander	E				T	
<i>Ambystoma mabeei</i>	Mabee's Salamander			T			
<i>Ambystoma talpoideum</i>	Mole Salamander		SC				
<i>Ambystoma tigrinum</i>	Eastern Tiger Salamander		T	E			
<i>Aneides aeneus</i>	Green Salamander		E				
<i>Eurycea junaluska</i>	Junaluska Salamander		T				
<i>Eurycea longicauda</i>	Long-tailed Salamander		SC				
<i>Eurycea quadridigitata</i>	Dwarf Salamander		SC				
<i>Hemidactylum scutatatum</i>	Four-toed Salamander		SC				
<i>Plethodon longicrus</i>	Crevice Salamander ⁵		SC				
<i>Plethodon shenandoah</i>	Shenandoah Salamander			E			E
<i>Plethodon ventralis</i>	Southern Zigzag Salamander		SC				
<i>Plethodon websteri</i>	Webster's Salamander	E					
<i>Plethodon wehrlei</i>	Wehrle's Salamander		T				
<i>Plethodon welleri</i>	Weller's Salamander		SC				
Frogs							
<i>Hyla andersonii</i>	Pine Barrens Treefrog	T					
<i>Hyla gratiosa</i>	Barking Treefrog			T			
<i>Pseudacris brachyphona</i>	Mountain Chorus Frog		SC				
<i>Rana capito</i>	Carolina Gopher Frog	E	T				
<i>Rana heckscheri</i>	River Frog		SC				
Crocodilians							
<i>Alligator mississippiensis</i>	American Alligator	T	T				all T(S/A)
Turtles							
<i>Sternotherus minor</i>	Stripe-necked Musk Turtle		SC				
<i>Clemmys guttata</i>	Spotted Turtle	T					
<i>Clemmys insculpta</i>	Wood Turtle			T			
<i>Clemmys muhlenbergii</i>	Bog Turtle	T	T	E			all T(S/A)

Species	Common Name	State Listings			Federal Listings ¹		
		SC ²	NC ³	VA ⁴	SC	NC	VA
<i>Deirochelys reticularia</i>	Chicken Turtle			E			
<i>Malaclemys terrapin</i>	Diamondback Terrapin			SC			
<i>Gopherus polyphemus</i>	Gopher Tortoise	E					
<i>Caretta caretta</i>	Loggerhead Sea Turtle	T	T	T	T	T	T
<i>Chelonia mydas</i>	Green Sea Turtle	T	T	T	T	T	T
<i>Eretmochelys imbricata</i>	Hawksbill Sea Turtle	E	E	E	E	E	E
<i>Lepidochelys kempii</i>	Kemp's Ridley Sea Turtle	E	E	E	E	E	E
<i>Dermochelys coriacea</i>	Leatherback Sea Turtle	E	E	E	E	E	E
<i>Apalone spinifera spinifera</i>	Eastern Spiny Softshell			SC			
Lizards							
<i>Eumeces anthracinus</i>	Coal Skink		T				
<i>Ophisaurus mimicus</i>	Mimic Glass Lizard			SC			
<i>Ophisaurus ventralis</i>	Eastern Glass Lizard					T	
Snakes							
<i>Heterodon simus</i>	Southern Hognose Snake	T		SC			
<i>Nerodia sipedon williamengelsi</i>	Carolina Water Snake			SC			
<i>Ophedryx vernalis</i>	Smooth Green Snake			SC			
<i>Pituophis melanoleucus</i>	Pine Snake			SC			
<i>Micrurus fulvius</i>	Eastern Coral Snake			E			
<i>Crotalus adamanteus</i>	Eastern Diamondback Rattlesnake			E			
<i>Crotalus horridus</i>	Timber Rattlesnake			SC		E ⁶	
<i>Sistrurus miliarius</i>	Pigmy Rattlesnake			SC			

¹Federal official listings are Endangered (E) and Threatened (T) and can carry the designation S/A (similarity of appearance) for a species or population that is listed because it looks very similar to a listed species or population.

²South Carolina's official state listing designations are Endangered (E) and In Need of Management (T) (the equivalent of Threatened).

³North Carolina's official state listing designations are Endangered (E), Threatened (T), and Special Concern (SC).

⁴Virginia's official state listing designations are Endangered (E) and Threatened (T).

⁵Considered by some to be a variant of *Plethodon yonahlossee*, Yonahlossee Salamander.

⁶Coastal Plain population only.