

SUMMER 2007

SANCTUARY

THE JOURNAL OF THE MASSACHUSETTS AUDUBON SOCIETY



Time and the Turtle
Understanding New England Turtles

BOARD OF DIRECTORS

CHAIR

Jonathan Panek

VICE CHAIRS

Alfred D. Chandler III
James N. Levitt

PRESIDENT

Laura A. Johnson

CORPORATE SECRETARY

Kristin M. Barr

ASSISTANT CORPORATE SECRETARY

Elaine Kile

TREASURER

Simon (Chip) Walker

ASSISTANT TREASURERS

Gary R. Clayton
Nora Frank
Bancroft R. Poor

DIRECTORS

Diane Arseneau
Walter (Jerry) Bird
Alfred D. Chandler III
Jennifer Charles
Jared Chase
Richard Chute
William Coady
Franz Colloredo-Mansfeld
Nina Doggett
Scott V. Edwards
Thomas D. French
Thaddeus Gillespie
Terilyn A. Henderson
Nora F. Huvelle
Christopher Klem
Erik Knutzen
James N. Levitt
George Cabot Lodge Jr.
Ronald P. O'Hanley
Jonathan Panek
Jeffrey F. Peters
John Riehl
Judy A. Samelson
Edgar Schein
James Sperling
David Straus
Brooke Stevens
Simon (Chip) Walker

COUNCIL CO-CHAIRS

Nora F. Huvelle
James N. Levitt

COUNCIL

Kathleen S. Anderson*
Priscilla Bailey
James Baird
Robert Ball
Frank Bradley
Fred Brink
Anne Brooke*
Brian A. Brooks*
Elise R. Browne
George Butterworth*
Charles C. Cabot III
Jeffrey M. Collins
George T. Comeau
Hamilton Coolidge*
John D. Cunningham III
Lewis S. Dabney*
Thomas A. DeMarco III
Richard A. Dimino
Eugene B. Doggett*
Mrs. Alexander Ellis*
Alexander Ellis III
Barbara E. Fargo*
Charles H. Ferré
Carlos M. Ferré
Marjorie M. Findlay
Richard T. T. Forman

John C. Fuller*
Ayla Gavins
Cyrus F. Gibson
John Green*
Lynn Harvey
Deborah V. Howard*
James Hoyte
Malcolm W. Johnston
Gillian S. Kellogg
Samuel B. Knight
John Kricher
Daniel W. Latimore
Virginia M. Lawrence
Edwin F. Leach II
Anne Lewis
Donald Lewis
Thomas S. Litwin
Merloyd L. Ludington*
D. Lloyd Macdonald, Esq.
William P. Madar
Kate McCarey
A. Rives McGinley
Bernard J. McHugh
Tim McKenna
Edward J. McNierney
Shirley M. Muirhead-Jenkins*
Beatrice J. Nessen
Virgina L. Nicholas
Timothy Noyes
J. David Officer*
George Pendergast
Patricia T. Poitras
Stephen D. Poss
Helen Pounds
George Putnam III*
Edward H. Raymond*
Mary Lou Roberts
Walter Rosenfeld*
Doug Sacra
Mary Schein
David Sibley
Phyllis Solomon
Lee Spelke*
Dean H. Steeger
Chris Sumner
Antony Swartz-Lloyd
Deborah Swenson
Jeffrey Swope
Alexander L. Thorndike
John L. Thorndike*
Patricia Thornton*
Mrs. Richard D. Thornton*
Elizabeth Valentine*
Elizabeth Vizza
William T. Wachenfeld
Mrs. Jephtha H. Wade*
Thomas T. Warren*
Stanley Washington
Nancy Weiss*
Marcus White
Alan Wilson*
Bryan Windmiller
Frederic Winthrop II
Julia Yoshida
Lawrence W. Zuelke*

* = Honorary Director

HONORARY DIRECTORS

Robert C. Baron
Eric Cutler
Richard Emmet
Dr. Robert L. French
Henry Lee
Edward B. Long
Mrs. George M. Lovejoy Jr.
Deborah W. Moses
John F. O'Connor
Lewis H. Parks
Herbert W. Pratt
David Starr
David Walsh

At the Sand's Edge

I have always admired turtles, and I've had memorable encounters with them, but none so remarkable as during some family trips to Costa Rica when I was in high school. For several years at that time, we visited a remote beach area on the Pacific coast, where we were able to observe leatherback sea turtles laying eggs and young turtles hatching.

There was not the keen awareness then, more than thirty years ago, of just how endangered sea turtles were becoming. But I will never forget waiting on the beach at night as one of these extraordinary creatures lumbered out of the water and slowly made her way up the beach to the sand's edge. There she laboriously began to shovel out her nest hole with her hind flippers. What an effort for her and how exhausting it was to watch—I wanted to help, but of course that was impossible. Finally satisfied, she positioned herself, deposited about a hundred leathery eggs in the hole, and slowly filled it once again with sand. Then she made her way back to the sea, leaving her young to incubate and hatch on their own.

The only time I saw the baby turtles hatch was at midday when I was lucky enough to be on the beach. Suddenly, there were tiny hatchlings everywhere, scrambling to get to the safety of the waves before birds or ghost crabs got them. Next they had to fight the waves, and I could only imagine what else, as they disappeared into the ocean. I began to pick them up on the beach, carrying as many as I could out beyond the waves, letting them go with a wish and a prayer that they would be among the few to survive to adulthood. I learned later that if they made it, the females would return years later to the same beach to repeat the same process.

I did not know then what I now know about turtles. Turtles have been on the earth for more than 200 million years—longer than mammals, birds, crocodiles, and snakes. There are 270 species of tortoises, turtles, and terrapins worldwide, ranging from tiny—our very own bog turtles (3 to 3½ inches) of the fens of western Massachusetts—to monstrous—the leatherback turtles (among the largest living reptiles) I watched in Costa Rica.

Sadly, many turtle species are greatly at risk around the globe, including in Massachusetts where six of our freshwater turtle species are listed as endangered, threatened, or of special concern. There's an all-too-familiar litany of human impact on turtles:

- outright taking of turtles to use eggs and adults as a food source, for their shells or other parts, or for the pet trade;
- destruction of habitat or compromising turtle nesting areas;
- decimation of marine turtles by drowning as bycatch; and
- potential impacts of climate change as rising sea levels inundate nesting areas.

Unhappily, the area where I watched the Costa Rican turtles is now a huge resort. I don't know whether there are—or even could be—turtles nesting on that beach any longer. We must work together now to reduce threats so that turtles can remain for thousands of years to come.



© JERRY HOWARD

Laura Johnson, *President*

SANCTUARY

Summer 2007

Volume 46 Number 4

STAFF

Editor:

John Hanson Mitchell

Associate Editor:

Ann Prince

Managing Editor:

Rose M. Murphy

Field Editors:

Thomas Conuel

Gayle Goddard-Taylor

Poetry Editor:

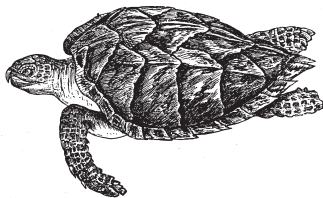
Genie Zeiger

Designer:

Lynne Foy

*Cover: Spotted Turtles and
Wild Plum*

by David M. Carroll



*Printed on recycled paper
with soy-based ink.*



© HENRY B. KANE

Baby snapping turtles

FEATURES

Landscape without Turtle

by John H. Mitchell

Spotty Records

by Thomas Conuel

Ancient Impressions

by Joe Choiniere

Snapper

by Robert Finch

Saving the Sea Turtles

by Gayle Goddard-Taylor

Return of the Native

by David M. Carroll

The Wisdom of Turtles

by Michael J. Caduto

DEPARTMENTS

Families Afield

by Ann Prince

Poetry

The Political Landscape

by Jennifer Ryan

Curious Naturalist

by Gordon Morrison

14

17

20

22

23

29

Sanctuary is a quarterly journal dealing with natural history and the environment and is open to diverse points of view. Opinions expressed herein are those of the authors and not necessarily those of the Massachusetts Audubon Society. To respond to stories in this issue, email us at sancmag@massaudubon.org.

Sanctuary (ISSN 0272-8966), South Great Rd., Lincoln, MA 01773. Published quarterly. Memberships are \$50 (family); \$40 (individual); \$20 (student) of which \$7.50 is applied toward a subscription to *Sanctuary*. Postmaster: send address changes to *Sanctuary*, Massachusetts Audubon Society, Lincoln, MA 01773, 781-259-9500. Periodicals postage paid at Lincoln, MA, and at additional offices. Reprints of this issue are available. Write or call the publications office at Massachusetts Audubon, Lincoln, MA 01773, 781-259-2167. Printed in the U.S.A.



Mass Audubon works to protect the nature of Massachusetts for people and wildlife. Together with more than 100,000 members, we care for 32,000 acres of conservation land, provide educational programs for 200,000 children and adults annually, and advocate for sound environmental policies at the local, state, and federal levels. Mass Audubon's mission and actions have expanded since our beginning in 1896 when our founders set out to stop the slaughter of birds for use on women's fashions. Today we are the largest conservation organization in New England. Our statewide network of 43 wildlife sanctuaries welcomes visitors of all ages and serves as the base for our conservation, education, and advocacy work. To support these important efforts, call 800-AUDUBON (283-8266) or visit www.massaudubon.org.

Landscape without Turtle

The last box turtle I saw was making its way across Russell Street in Littleton, no more than a hundred yards west of Route 495, and not far from a wet field and strip of brushwood and a small pond. The turtle was in the middle of the road, headed west, and eyeing my oncoming car with suspicion, as if wondering: What's this coming at me?, or What's next?, or, more likely, Is this the end?

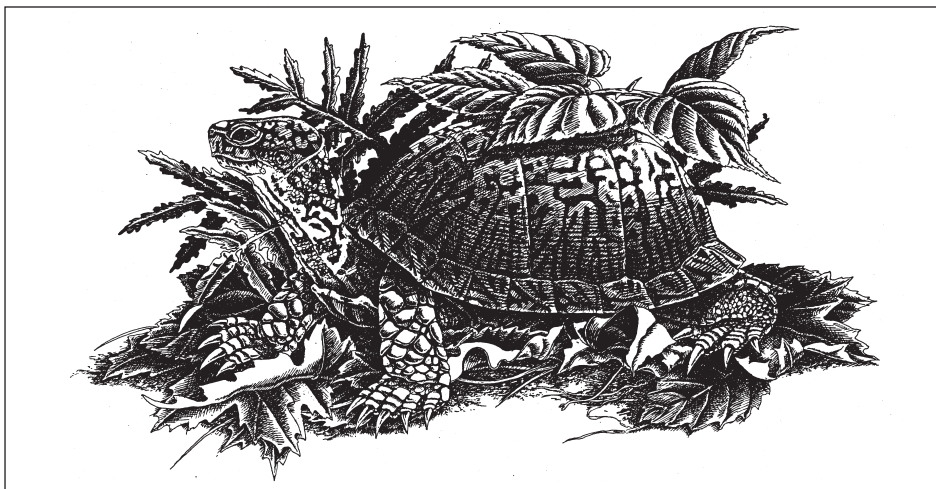
Naturally, I pulled over.

Stopping to rescue turtles is a habit I have had for years now. I've swung onto the rough narrow verges of innumerable back roads and highways to wave off cars from painted turtles, box turtles, baby turtles of all common species, as well as those huge tanks of female snappers that appear on suburban roads near ponds in the month of June. It's probably an unsafe habit—standing there by the side of a road while the indifferent commuters wheel by at illegal rates of speed. But what choice is there? In some ways I look at turtle rescue as an existential statement. By saving one, you will be salvation for them all.

This particular turtle was in a quandary. To the east lay Interstate Route 495. To the north there was a busy numbered highway, thick with traffic. West had a barrier of mini-mansions with driveways and manicured lawns, backed by a wooded hill. South was a fenced bridge over the highway. The turtle was, with no pun intended, boxed in, a condition much of our contemporary wildlife finds itself in.

Box turtles used to be common in the dry uplands around these parts. They favor light open woods and wet meadows, and can often be found, near, although not necessarily in, streams and ponds. They'll eat almost anything, even carrion, but appear to love strawberries and blackberries, flowers, roots and other vegetation, and also slugs, worms, frogs, salamanders, and almost any other edible living or dead thing they can manage to swallow. They appear to be homebodies, never traveling very far in the circumscribed lives of their territories, which may be no larger than two or three hundred yards.

They hibernate in winter, are abroad in summer, and mate in spring and summer, when the females lay several clutches of eggs in a sandy bank or loose soil. The young hatch out in about three months, depending on the ambient temperature. Their most famous trick is that they can shut themselves up entirely inside their hinged shell if they think they're in danger. They'll wait in this position until they perceive, by whatever means turtles perceive, that their enemies have moved on.



Eastern box turtle

© DAVID M. CARROLL

Because of this survival technique, they actually do not have very many enemies, save for one, a major one—the bulldozer.

Development pressure, highway construction, shopping malls and housing, and to some extent the pet trade, as well as the mere presence of roads, have driven the box turtle to the edge of extirpation in Massachusetts, and it is under siege throughout its range, which includes most of eastern North America.

Standing by the road, I held the turtle, now safely closed up in her shell. I wondered what to do with her. (I could tell she was a female by her long slender hind claws and yellowish eyes.) Westward, where she had been headed, lay the manicured yards of the houses, with the wooded hill beyond—a bit of a hike across the notorious private properties of suburban America. To the north and east were highways; and so, in the end, I carried the turtle south, where an old unused road made obsolete by the construction of Route 495 descended into a wooded hollow, and where, in its wisdom, the local land trust had managed to preserve a tract of land complete with a stream and an old stone bridge and an enticing tangle of vegetation. I calculated that this area was close enough to be within the turtle's range.

Only a few people in the passing cars eyed me suspiciously as I transported my turtle along the road. I carried her down into the hollow, placed her carefully among some wild strawberries, and wished her Godspeed. She remained closed up in her sanctum for a few minutes and then slowly emerged and, without surveying her new territory, lumbered off into the brush as if she knew exactly where she was headed in life.

JHM

John Hanson Mitchell is editor of Sanctuary.

Spotty Records

Researchers are debating the status of the state's spotted turtle populations.

by Thomas Conuel



© BILL BYRNE

Spotted turtle

At a two-day turtle symposium in February at the University of Massachusetts (UMass), Amherst, the problems besetting the Commonwealth's ten native freshwater and terrestrial turtles drew speaker after speaker to the podium. The consensus was unified—turtles are struggling in Massachusetts. Charts, graphs, and images depicting fragmentation and loss of habitat, road mortality, and problems associated with collection for the pet trade flashed onto the screen as the various presenters implored: turtles need our help. In fact, six of the state's ten freshwater turtles and tortoises are now listed under the Massachusetts Endangered Species Act (MESA).

In recent years, the growing use of radiotelemetry to track turtles has led to better analysis of their movements within the state and the beginning of a solid long-term database that will help determine just what species are in trouble and where. But nobody at the turtle symposium, or anyone with the state's Natural Heritage & Endangered Species Program (NHESP), is predicting easy going or a speedy recovery for the tur-

tles of Massachusetts. This general agreement among the researchers made the state de-listing one turtle species a cause for concern.

In the spring of 2006, amid a cacophony of dissent, Natural Heritage recommended removal of the spotted turtle from the state list where it had been included as a species of special concern since 1986. Some were outraged and felt that the spotted turtle, like all its turtle brethren in the state, needs more, not less, protection.

"It's a somewhat sensitive subject," Scott Jackson, program director for UMass Extension's Natural Resources & Environmental Conservation program, reflected recently. "It has ended up pitting people who normally work together and share common goals against each other. Some have tried to attach all sorts of nefarious motives to this de-listing, but it's not that."

Jackson pointed out that an animal that has so many dots on the state map indicating spotted turtle populations probably shouldn't be on the endangered species list. "The real question is, Should there be that many dots on the map for the spotted turtle?" Jackson said.



© BILL BYRNE

Spotted turtle

Natural Heritage places dots on a map of Massachusetts to indicate areas where its records indicate what the agency refers to as an “elemental occurrence” of a protected species. There are about 600 dots on the state map for the spotted turtle—but some dots represent only a few turtles at a given site.

“It’s a dynamic list,” said Henry Woolsey, program director for NHESP, referring to the state endangered species list. “We’ve added to the list recently, and we’ve removed from the list.” The state now has 442 different species of plants and animals listed as endangered, threatened, or of special concern—178 vertebrates and invertebrates, and 264 native plants.

“That’s a lot more than in most states,” Woolsey pointed out. “But it has to be an honest list or it loses its validity. We took the spotted turtle off the list when it didn’t meet the criteria. The credibility of conservation regulations depends on that list.”

De-listing the spotted turtle was not a new idea—the NHSEP had considered de-listing the species in four other years in the past, most recently in 2002.

Researcher Joan Milam has researched the movements and populations of spotted turtles in Massachusetts, her work prompted in part by the efforts to de-list the turtle. “I don’t know of a single herpetologist who would tell you we have enough solid evidence to say the spotted turtle is abundant and thriving,” she said. “The big question is, Why de-list the spotted turtle before the state’s conservation strategy is in place?”

Is the spotted turtle in decline? “It’s hard to say right

now,” commented Lori Erb, turtle conservation biologist with the NHESP. The only way to get that information is to develop a long-term monitoring program for the turtle, which is what Erb is now busy putting together. Volunteers will survey sites across the state and over the next five to six years and report the data to the NHESP. Erb is hoping to gather data from over 60 sites—that’s a lot of volunteers—and survey new as well as previously documented sites.

Development in Massachusetts, particularly in the Southeastern part of the state, has destroyed or fragmented great chunks of turtle habitat. Along with development come more roads and more traffic, and more dead turtles on the roads. And as suburbia spreads it provides haven to several mammal species that are deadly predators to turtles. Skunks, raccoons, foxes, and coyotes eat turtle eggs as well as baby turtles and even adults. And suburban cats and dogs as well as their owners can also create problems for turtles.

The northern red-bellied cooter and the bog turtle, both denizens of the southern sections of the state, are endangered species; the northern diamond-back terrapin and Blanding’s turtle, coastal and eastern residents, are threatened species; and the eastern box turtle and wood turtle, which are found throughout the state, are species of special concern. Even the venerable snapping turtle, which is unlisted by the Natural Heritage & Endangered Species Program, is thought to be losing numbers.

Turtles, though long-lived, are slow to reach sexual maturity. The spotted turtle, as a typical example, reaches maturity

at 7 to 10 years of age, mates from March to May, nests in late May and June, and lays three to five eggs. That is not a prolific breeding cycle. Spotted turtles live for about 25 years, though some may reach 50 years. If a young turtle is lost from a population, the breeding consequences can be dire and felt for decades. A dent in turtle population, however, may not be noticed immediately. With other species, migratory birds for example, decreasing numbers are usually quickly noted. With turtles, we may see a good number, but we may be seeing the older population, not the younger ones.

The spotted, or “polka-dot,” turtle—identified by yellow spots on the head, neck, legs, and upper shell, or carapace—is a small turtle measuring just three and one-half to five inches in length. It requires a variety of habitats, thus increasing its vulnerability. Spotted turtles overwinter in wetlands and spend their summers in marshy meadows, bogs, swamps, and ponds. In the spring they begin moving around, searching for nesting sites in meadows, fields, or the edges of roads. After laying her eggs, the female then covers the eggs, as most turtles do, but also smoothes the soil by dragging her body over the ground. The one-inch hatchlings dig their way out of the nest 11 weeks later and crawl off to a wet, grassy area in search of food and shelter.

When classifying species on the endangered species list, the state uses three general groupings, commonly agreed upon categories that are also used in federal listings: rarity of the species, threats, and trends.

“With the spotted turtle,” Henry Woolsey said, “all the data showed it as more, not less, prevalent than before.” In 1986, when the spotted turtle was first listed as a species of special concern, there were 24 documented occurrences, or sites where the turtle lived, and it was thought to occur in small numbers with restricted distribution and specialized habitat. Today there are over 1,000 elemental occurrences of spotted turtles in 256 of the 351 cities and towns across the Commonwealth. But herpetologist Al Richmond wonders how many of those 1,000 spotted turtles that correspond with 600 dots on the state endangered species map are in populations of five or fewer turtles. Nobody really knows.

Just a few individuals in an area is bad news for the species. With the spotted turtle this could mean that in many locations there are too few to breed and the population will soon plummet. The state has set aside habitat for turtles, Richmond said, but there aren’t many spotted turtles in those places. “In this state,” Richmond commented, “there is huge pressure to chisel away the Endangered Species Act. It’s an ongoing effort to overturn the regulations.”

Spotted turtles face the same medley of dangers and problems as all of the turtles in Massachusetts, but the big question relates to trends. Under the guidance of NHESP’s Lori Erb, the state is preparing to gather spotted turtle census data to answer the question that makes the de-listing so controversial. If turtle habitat is under duress from development and fragmentation, does that not also mean the spotted turtle may be in decline?

The spotted turtle’s range extends from southern Maine and extreme southern Ontario west to Illinois and south to northern Florida in the east. Isolated colonies can be found in southern Quebec, southern Ontario, central Illinois, central Georgia, and north central Florida. The species is listed as endangered in Vermont, Illinois, and Indiana; threatened in Maine, Michigan, and South Carolina; and a species of special concern in New York. In Massachusetts, though the spotted turtle is no longer on the state protected list, it is against the law to possess one without a permit, an attempt to restrict the spotted turtle’s collection by the pet trade.

Massachusetts is also setting aside some eighty spotted turtle habitat polygons of at least 350 acres in size—protected areas where the species should theoretically thrive. The long-term goal of the NHESP conservation strategy is to maintain fifty populations containing at least 200 individuals each on these roadless habitat blocks.

In the 1990s and early part of this decade, the spotted turtle became an instrument to challenge development proposals. Some developers even claimed that the turtles contributed to the rising cost of new housing statewide. Since the species was fairly widespread and easy to find, opponents to development projects used its presence on the endangered species list to challenge these projects.

The Boston Globe quoted one developer in the spring of 2006 when the de-listing proposal was being debated before the NHESP: “This is a sensitive topic for the development community because we’re being penalized by an abundant species,” said Victor Sheen, development manager at the Mullins Company in Braintree. “We view this species in particular as actually contributing directly to the high price of housing in the Commonwealth.”

There aren’t many herpetologists who agree with that assessment, but most want the validity of the endangered species regulations maintained.

“I find it frustrating when people misuse the conservation laws,” said Scott Jackson. “The Endangered Species Act is not meant to stop development. It’s meant to save species.”

Henry Woolsey agrees: “The Endangered Species Act was never intended to be a land use control act,” he said.

But Scott Jackson feels the spotted turtle should have remained on the list. “There is real and valid disagreement here with how the spotted turtle data is being interpreted,” he said. “A lot of the dots on the map for the spotted turtle are for what we call ‘ghost populations’—small vanishing clusters that persist decades after habitat loss, fragmentation, and increased mortality from roadkills made the population at that site effectively unviable.”

“In the 1800s the spotted turtle may have been the most common turtle in Massachusetts. In the last three or four generations it has started to decline, noticeably so. What we may be seeing with the spotted turtle is extinction in slow-motion. We need standards for endangered species that look into the future, not just the past.”

Thomas Conuel is a field editor for Sanctuary magazine.

Ancient Impressions

Turtles appeared on earth 200 million years ago and have outlasted dinosaurs by 65 million years.

by Joe Choiniere

Years ago on a foggy morning in early May, as I navigated the street on my way to school, I saw a group of neighbors gathered around a large object on the pavement. I stopped to watch, too, as the form lunged in every direction: a huge female eastern snapping turtle on her misguided way from some local pond to a sandy place for egg laying.

This fairly routine natural event had proven novel, a first for some of my Springfield neighbors. I remember the event clearly since it was my first conscious feeling of the ancient aspect and primeval nature of the snapping turtle; the thing looked and felt like a dinosaur! The turtle seemed anachronistic. There was something about the onlookers' attitude—their awe and fear, as if it were in fact a dinosaur ripping around on the street rather than a predictable shelled reptile. This helped me see this turtle, and perhaps all turtles since, as prehistoric.

Turtles *are* prehistoric. The earliest known turtle fossils are over 200 million years old, dating to the late Triassic period, the earliest of three periods that make up the Mesozoic era, which began 248 million years ago and ended abruptly in the Cretaceous period 65 million years ago. The Mesozoic is also called the Age of the Dinosaurs, although turtles predate our most popular dinosaur icons such as tyrannosaurus, triceratops, and stegosaurus. Turtles survived a cataclysm that ended the Mesozoic era and finished off the dinosaurs 65 million years ago. The turtles somehow slipped through the bottleneck of this mass extinction, which eliminated an estimated 60 percent of the species on earth.

To avert a more local and current catastrophe, amidst snippets of conversation running the gamut from “kill it” to “get back,” I enlisted the onlookers' assistance. A small diversion from the neighbors kept the turtle's head busy, during which time I was able to grab the massive shell from behind with both hands, drag and push the beast, and dump it into my conveniently turtle-shaped 1963 VW. The action prompted an adrenaline rush I wouldn't soon forget; I realized that this was the first snapper I had ever handled by the shell.

It is the shell of snappers and other turtles that bespeaks their ancient character to me. I could never imagine such a complicated protective structure as a recent invention. Turtle shells are composed of fused ribs and vertebrae that have evolved to enclose the arm and leg ligatures *within*. This key feature is found

in no other vertebrate, and allows turtles to withdraw legs, head, and tail into the shell for protection. Although the ancestral origins of turtles are uncertain, surely the unique and distinctive shell would have required millions of years to evolve.

In 1947, A.S. Romer, writing in *Vertebrate Paleontology*, mused, “Because they are still living, turtles are commonplace objects to us; were they entirely extinct, their [fossil] shells...would be a cause for wonder.” Without modern turtles for comparison, how would paleontologists ever recreate a turtle from a fossil?

It wouldn't require a paleontologist to recognize the oldest fossil turtles. Proganochelys, the most primitive turtle, appears in the fossil record suddenly and fully recognizable, with the signature feature, the bony shell, completely evolved. Artists' reconstructions of this earliest turtle depict a highly textural prehistoric shell bristling with jagged sawtooth projections. Although proganochelys' shell was very modern in appearance, its skull still had a moveable intracranial joint that is missing in modern turtles. Other turtles are known from the same Triassic period—protochelys is one—but they were even more completely like turtles of today.

I scooted the snapper down a dirt side road to the bog at the edge of the neighborhood, where, as I released her, I noted her shell length as a few inches longer than



Archelon

© RICHARD SARDINHA

my own boots, which later worked out to about fourteen inches. She wasn't huge as snapping turtles go but large enough to bring trepidation to the other natives of the neighborhood.

Snappers are the largest of our New England mainland turtles. Although the alligator snapping turtle—a close relative of the eastern snapper and the only other worldwide member of the “snapper” family—is much larger, this southeastern species currently ranges no farther north than Illinois. Alligator snappers reach weights of over 200 pounds and are the largest freshwater turtles in the world. Much smaller, eastern snapping turtles still far exceed our other local turtle species in length and weight. Large specimens are commonly seen basking at the water's surface and are also periodically encountered on their egg-laying wanderings. Their sizes are often compared colloquially to various, large, roundish objects such as trash-can lids, hubcaps, and turkey platters.

In a 1996 issue of *Massachusetts Wildlife*, Editor Peter Mirick reported a world-record snapper captured in Orange, Massachusetts, that weighed in at 76.5 pounds and had an almost twenty-inch shell. This turtle survived in a zoo for three years, and the mounted specimen is still used for education by MassWildlife staff. Its age was estimated at over 50 years.

Turtles exhibit indeterminate growth—the longer they live, the larger they grow. Large snappers are estimated at 50 to 100 years old. The biggest extinct turtle, a sea turtle called archelon, had a twelve-foot-long shell. Archelon swam with the even larger marine reptiles, mosasaurs, 70 million years ago, in shallow seas that covered what is now North Dakota. I remember archelon as the first turtle I noticed in a childhood book, *The How and Why Book of Dinosaurs*, with its paintings of ancient life on the land and in the sea. I often imagined these beasts surviving, like Nessy, in the deep tannic waters of the bog near my home, an imaginary adventure that kept my interest until the real thing, in the form of snappers, became surrogates for the carnivorous marine plesiosaurs.

Our neighborhood bog pond sported an outlying narrow trench called a “moat,” one section of which consisted of dry and open sand with sparse grasses. I felt the turtle might stay put there with its sandy steep sides. She revealed her gender and mission almost instantly by beginning to dig with her hind legs, pushing away sand as she backed down gradually, now utterly oblivious to my presence. Some herpetologists speculate that the journeys snappers make to their eventual nest spots remove scent from their shells to avoid nest predators. The habit of digging a few false nests may be an adaptive behavior, or possibly an eventual recognition on the turtle's part that the sand is too dense or hard. My snapper had easy digging but tried twice before being satisfied with the third nest.

Watching the turtle dig reopened my prehistoric reveries and provided a rationale for why the moment had affected me so. Its huge head and beak, gigantic scaled legs, the greenish algal slime covering its shell, and jagged toothlike ridges along the tail all promoted an unmistakable ancient character. In

comparison with other turtle species I was familiar with, this snapper stood out. It didn't even seem able to retract into its shell, and I wondered whether snappers were indeed more ancient than our other local species of turtle. Did they survive longer through geologic time than other natives, and if so what features and adaptations were favorable for their long-term existence? Did their relatively small plastron (a turtle's lower shell is its plastron; the upper shell is called the carapace) represent an ancient feature? If so, how did this evolve into the more complete shell of the eastern box, eastern painted, and spotted turtles? Were snappers at all related to these other local species?

Modern turtles preserve at least two divergent lines of evolution. Although the neck of our earliest fossil turtle *Proganochelys* likely couldn't be pulled into its shell, a key divide in turtle evolution and turtle classification is the way a turtle's head retracts. Either the neck folds into curves horizontally (parallel to the ground), as with the so-called side-neck turtles, suborder Pleurodira; or vertically (perpendicular to the ground), as with the front-neck turtles, suborder Cryptodira. While both types of turtle are around today, all New England turtles and most other turtles in the world are classified as Cryptodira. The snapper's neck, however,



© RICHARD SARDINHA

Snapping turtle

retracts very little and cannot be withdrawn completely into its shell. More commonly the neck projects outward rapidly when the turtle is menaced on land, leading to its common name.

Despite the snapper's overwhelmingly armored carapace, its lower shell, the plastron, is a bikini by comparison, a small cross of shell that covers little more than 30 percent of its underparts. Why such a soft underbelly and a tank-proof upper shell? Perhaps they move around enough on land or on pond bottoms to benefit from the freer motion of their legs enabled by less shell. Snappers are primarily aquatic, present in almost any body of water at almost any time of year. Snappers may emerge from puddles, small pools in small streams, bogs, lakes, ponds, drainage ditches. Discovering snappers along roadways far from a large body of water can pose a puzzle as to their origin.

As the turtle dug deeper and deeper on her third try, I began to suspect she was going to finally lay her eggs. I set up in position behind her, close enough for observation, far enough away to avoid disturbance. Over twenty-five eggs dropped into the hole, evidenced by my occasional glimpse of the ping-pong ball-sized, pinkish white objects accompanied by a wave of cylindrical expansion of visible soft tissues from shell edge to tail underside. I was able to count the pulsations, whether I saw an egg fall each time or not. Snapping turtles deposit from fifteen to one hundred eggs, depending upon the female's age and size, so my turtle was about average. Other New England turtles lay far fewer; in fact, snapping turtles lay more eggs than any other local species. Sea turtles lay large egg clutches as well, and this characteristic is thought to have been the same for the earliest turtles.

Scientists look at the morphology as well the genetic makeup of organisms to test hypotheses of evolutionary relationships. This process is known as cladistic analysis. The cladograms derived from testing these hypotheses provide well-tested theories about an organism's evolutionary history. Morphological characteristics of turtles used for comparison in cladistic analysis include neck features, limb specializations, and shell modifications. Classifications of extant and fossil turtles position the turtle species that lay large numbers of eggs as more ancient. In the language of cladistics, the trait of laying fewer eggs is "derived"; that is, a less ancient characteristic. Snapping turtles are considered the most ancient of our extant turtles in New England when compared via cladistics.

The bog's backdrop of ancient Atlantic white cedars with their jagged and irregular tops and swollen limbs blended favorably with the turtle's shape; again the scene appeared primordial. The turtle lurched ahead, and after she left the nest I was able to examine the test holes and the successful nest, all well buried and flattened. I was wondering what happened next to the eggs. I didn't really know at that time whether female turtles



© RICHARD SARDINHA

Proganochelys

needed to remain and incubate, and I was a little worried that I had frightened her away. I have learned since that the sun provides incubation over the summer; the eggs typically hatch in September when warm rains percolate to the nest. The young emerge from the ground and then go off to find water, a difficult task for hatchlings whose mothers have nested on road edges. Live hatchlings making for the pond edge and clusters of flattened hatchlings in September are not uncommon sights along back roads.

Later that summer, when I found that my turtle's nest had been raided by a striped skunk, I worried that I had been responsible for making this nest easier to find. But I later learned that this fate is common rather than the exception. Part of the low reproductive success for snappers is due to the fact that there are many nest predators as well as many animals that feed on the young. Only a few of the hatchlings will survive to maintain the species.

After studying the nest I set out to track the mother. I suspected that, since she had been moved, the turtle might be confused. But to my surprise the turtle's movement after nesting was as directed as could be; she turned 180 degrees, clambered up the six-foot slope of the moat, and set out onto the sand plain path directly to the edge of a small boggy pond about 200 feet away. With so many possible directions available, her actions had a sense of purpose and homing ability. I wasn't surprised to learn that turtles have proven to have an incredible navigational ability.

This little encounter, more than thirty years ago, has left a lasting and ancient impression: the snapper was not a dumb lumbering reptile that had managed to survive simply because it had a shell. It was in fact an enduring survivor of millions of years and any number of earth-altering catastrophes.

Joe Choiniere is property manager at Wachusett Meadow and Broad Meadow Brook wildlife sanctuaries.

Snapper

by Robert Finch

On the way home from town last week, I saw a large, dark object in the middle of the road. I stopped the car and got out to look at it. It was a snapping turtle, the first of the season, and a whopper. Nearly two feet long, it had a dark-brown, crusty shell, a large scaly head with a hooked, hawk-like beak, claws for feet, and a long, dragging, serrated tail. Its appearance was impressively ferocious, except for its eyes. The eyes—those deep, shiny, dewy-fresh eyes of reptiles, so startling in their ancient, scaly bodies—looked perplexed, not frightened exactly, but lost in an impersonal way, as if trying to get their bearings.

A freshwater swamp lay on either side of the road that the turtle straddled. In its 25 million-year-old trek from one swamp to another, it had suddenly found itself on a modern highway, an asphalt strip that bisected its world with no points of reference. It stood bewildered, its roots momentarily cut. It was queer to think that such a small and exploited land as ours can still harbor such apparitions as this strange and savage bit of reptilian life.

I went over and picked it up carefully by the back edge of the shell. I thought briefly of taking it to the local Mass Audubon sanctuary, in Wellfleet, and even more briefly of turtle soup. But as the turtle turned its snake-like head and stared back at me with that impersonal, insulated gaze, I realized what I really wanted was to stay there and talk to it, to hold what converse we could manage across our vertebrate class lines—to talk turtle, for once. If nothing else, I felt that I might gradually absorb from it a patient readiness for thought, saying nothing, but suddenly striking out in purposeful action. But as I held it there, like a divining rod above the heated highway, I realized how clogged our lines of communication were with myth, prejudice, and irrational fears.

The snapping turtle, an American native, bears one of the most complex relationships to humans of any reptile. Iroquois Indians used the dried shells as rattles and drums in ceremonial dances. In New England it used to be common for families to keep a snapper in a hog swill barrel until it was fat enough to transfer to the soup pot. Yet its appearance and formidable striking capabilities have given the snapper an unfortunate and ill-deserved reputation. Turtle literature almost invariably

describes it as “savage,” “voracious,” “mean,” “sullen”—a bad character. For generations, children were taught that these “vicious” snappers drag cute, helpless ducklings down to a watery death, and chomp off the toes and fingers of unwary swimmers. In many areas such ingrained ignorance led to attempts to exterminate this reptile.

Fortunately, modern herpetologists have come to the defense of this much-maligned beast. This so-called “ravenous” carnivore actually consumes much more vegetable matter and carrion than animal life, and its “ferocious” behavior exists largely on land—that is, when provoked while out of its normal habitat. In the water, the snapper tends to avoid humans. You are much more likely to be attacked by a swan than a snapping turtle.

But the snapper’s eyes seemed to say to me that whatever moral I wanted from it, I would have to draw myself. So I set the turtle down on the other side of the highway and watched it zigzag off, dragging its stegosaurian tail through the grass down into the shallow swamp, where it settled slowly from sight like a wide stone.

Robert Finch is the author of six collections of essays and broadcasts a weekly commentary, “A Cape Cod Notebook,” on WCAI (90.1-FM), Woods Hole. His new book, The Iambics of Newfoundland: Notes from an Unknown Shore, will be published in July by Counterpoint Press. He lives in Wellfleet.



Adult snapping turtle

© BILL BYRNE

Saving the Sea Turtles

The efforts of a huge cadre of volunteers and some of the highest level technologies combine to save cold-stunned sea turtles that come up to Northern waters each summer.

by Gayle Goddard-Taylor



Surviving stranded turtles awaiting transport to the New England Aquarium

© MASS AUDUBON STAFF

Deep within the converted warehouse of the National Marine Life Center (NMLC) in Buzzards Bay, nine sea turtles ceaselessly patrol the walls of their very un-sea-like home. They are divided between two, round, 3,300-gallon pools and seem oblivious to each other as they swim, seemingly unable to grasp the concept of “wall.” Each wears a bicolored “bracelet” around the elbow of a front flipper, a marker that helps Veterinarian Michele Sims keep track of each individual.

Today, Dr. Sims is testing the quality of the tank water, which is trucked in a couple of times a month from the Cape Cod Canal. The temperature must be

maintained at 75 degrees, bacteria from the turtles’ feces and urine must be kept to a minimum, and the pH (measure of acidity and alkalinity) needs to remain within acceptable levels. Still, two of the turtles have been off their feed, and tests reveal that they have a systemic infection, enterococcus, and they are now on antibiotics.

“When turtles are cold stunned, their immune systems are compromised,” explains Sims, “so it’s not uncommon for them to get systemic infections.”

Cold stunning is a phenomenon that occurs each winter along the beaches of Cape Cod Bay, from Truro to Dennis, and it claims the lives of nearly two-thirds of

the turtles that are washed ashore with the high tides. Roughly a month or two before they arrived at the NMLC, these nine Kemp's ridleys—among the world's most endangered sea turtles—lay torpid and close to death along the Cape's beaches. But for the carefully choreographed efforts of volunteers from the Northeast Sea Turtle Stranding Network, the turtles would have died where the tide left them.

To understand how creatures so attuned to the sea can become its victims requires an understanding of the life cycles of sea turtles. Hatchlings emerge from their nests, buried in the sands of beaches of the Gulf of Mexico, and head directly for the water and out to sea. Here, they spend the first four to six years of their lives in floating patches of seaweed where they can feed, safe from the reach of predators.

"For the first few years, they are confirmed drifters," says Bob Prescott, Wellfleet Bay Wildlife Sanctuary Director and coordinator for the stranding network. "But when they get to be a foot or larger, they start to stand out and become targets for sharks and bigger fish."

At this point, the young turtles shift from a pelagic lifestyle, living on the surface, to a benthic one, prowling the sea bottom where they crunch crabs and whelks in their toothless beaks. To do so, they swim toward shallower water—from 50 to 100 feet in depth—which brings them up onto the Continental Shelf and even into embayments. Those that have drifted out into the Gulf Stream ride the current as far as Massachusetts, and then swim west into Cape Cod Bay.

As long as the weather remains warm the turtles linger in the shallow waters, but when temperatures cool, they instinctively head south. But for those that have spent the fall within the curling arm of the Cape, geography conspires against completion of their journey since heading south traps them inside. As the water temperatures drop to between 60 and 65 degrees Fahrenheit the turtles begin to slow, and at 50 degrees their systems start shutting down and they become lethargic. Unable to feed or swim, the turtles simply drift at the mercy of wind and tide, ending up on beaches in Truro, Wellfleet, Eastham, Brewster, and Dennis. "If they are rescued in October or November, their chances of recovery are good," says Prescott. But those that are found at the end of December have already succumbed to the cold.

"It takes a westerly wind to bring them in and that's when we mobilize," he says. "When we find them, there's almost no way of telling if they're dead or alive. We move

them above the high tide line and cover them with debris to insulate them. The water they've been in may be 45 to 50 degrees, but if the air temperature is as low as 28 degrees and they're exposed they'll die."

The turtles that are rescued are brought to Wellfleet Bay Wildlife Sanctuary within an hour, where they are weighed and measured and their medical problems are noted. If their eyes are dried out or filled with sand, they are bathed with a saline solution. They are kept out of water—"dry-docked"—in temperatures of no more than 50 degrees, and shuttled to the New England Aquarium in Boston by volunteers who have been put on standby the previous evening.

© DON LEWIS



As the water temperatures drop to between 60 and 65 degrees Fahrenheit the turtles begin to slow, and at 50 degrees their systems start shutting down and they become lethargic. Unable to feed or swim, the turtles simply drift at the mercy of wind and tide, ending up on beaches in Truro, Wellfleet, Eastham, Brewster, and Dennis.

"The worst thing we could do is warm them up too quickly," says Prescott. "Once their systems have shut down, you have to get them back online in the right sequence and slowly. Otherwise, they risk kidney or liver failure."

At the New England Aquarium, Veterinarian Charles Innis and a triage team take the turtle's temperature and a blood sample, and perform a physical exam. Most sea turtles that strand are dehydrated; because they ordinarily get water through the foods they eat rather than from seawater, they dehydrate if they are unable to feed or if they've inadvertently swallowed seawater.

The blood work determines their course of treatment. Usually, the turtles undergo fluid therapy, either intravenously or with injections, and the slow process of warming them up is begun.

"We only warm them by 5 degrees a day," says Innis. "So, if you've got a turtle with a temperature of 40 degrees and you want it to reach 75 degrees, it can take a week to get it there."

For rewarming, the turtle—still dry-docked—is sent to a temperature-controlled intensive-care unit where, for the first few days, it is likely to exhibit little, if any, movement. The stronger ones are allowed a five-minute swim in freshwater, which helps

rehydrate them and can also rouse them if they are sluggish. As their temperatures rise and they are exposed to water for increasingly longer periods, their immune systems begin to strengthen.

For some turtles, cold stunning produces other problems. Up to 40 percent of the turtles brought to the aquarium each winter have pneumonia, which is revealed through X-rays and sometimes further confirmed through a tracheal culture, CAT scan, or bronchoscopy. Some are afflicted with a fungal pneumonia

that is difficult to treat because of the paucity of data on how well sea turtles tolerate the drugs that target fungal diseases.

Some turtles have suffered broken bones from being tossed around in the surf, and those injuries are tackled by veterinary orthopedic surgeons, often with good results. Wounds on the flippers are common and, if they're deep enough to expose bone, can lead to infection.

Turtles that make it past their third day at the aquarium have a 90 percent chance of being released back into the wild. But it usually takes about a month for a turtle to recover sufficiently to make the journey to either the National Marine Life Center or the Woods Hole Science Aquarium for the final leg of its rehabilitation. Some will remain behind for up to six months—and occasionally a turtle will spend another winter in rehab because of late-developing problems.

"The turtles we get are past the critical phase," says Kathy Zagzebski, executive director of the NMLC. "They still have ongoing issues, but, because a reptilian metabolism is so slow, it takes a long time for them to heal."

The NMLC has come a long way since treating its first sea turtle—a loggerhead—in the winter of 2004-2005. The center's staff of two part-time veterinarians, a veterinary technician, and Zagzebski, a biologist with a background in marine mammals, are all fully trained in the skills needed to minister to their patients.

The nine Kemp's ridley turtles here have a way to go before they can be released back into the ocean this summer. Some arrived from the aquarium with pneumonia, two more have bacterial infections, another has a fatty tumor on its neck for which it receives a thiamine/vitamin E supplement, and one has flipper wounds.

Those that are deemed fully recovered will be released on



© MASS AUDUBON STAFF

The turtles that are rescued are brought to Wellfleet Bay Wildlife Sanctuary within an hour, where they are weighed and measured and their medical problems are noted. They are kept out of water—"dry-docked"—in temperatures of no more than 50 degrees, and shuttled to the New England Aquarium in Boston by volunteers who have been put on standby the previous evening.

the south or east side of Cape Cod when water temperatures are sufficiently warm—usually between mid-July and mid-August. But each turtle must pass certain criteria: good blood values, recovered fractures and infections, and a healthy weight. About 4 to 8 pounds when first found, these turtles will have doubled their weight by summer. Capable of living up to fifty years, a mature Kemp's ridley weighs around 90 pounds.

"They've also got to show good turtle behaviors," says Zagzebski. "They need to be utilizing the whole water column, swimming and diving, and generally just acting the way a sea turtle should act."

Plucking cold-stunned turtles from the sands of Cape Cod is nothing new for Mass Audubon's Prescott. A self-admitted turtle fanatic, he began informally patrolling for stragglers in the early 1970s and by 1979 was officially keeping data,

and the New England Aquarium began working with the cold-stranded turtles in the 1980s.

"Since 1979, we've recovered over 1,500 cold-stunned turtles dead and alive," says Prescott.

Of all the species of sea turtles, three are typically recovered along the Cape's beaches—Kemp's ridleys, loggerheads, and greens—but it is the Kemp's ridley that strands in the greatest numbers. This past winter, approximately eighty of the ninety plus turtles found were Kemp's ridley turtles—and of those, only about a third were found alive. Ironically, the larger number of Kemp's ridley strandings seems to indicate that the species is recovering.

"We think they're recovering because of the successful protection of their one known nesting site in Mexico," Prescott says. "In the late 1970s maybe 50,000 hatchlings made it into the ocean, but by 2002, 200,000 hatch-



© MASS AUDUBON STAFF

Wellfleet Bay Sanctuary Director Bob Prescott collects data on a newly arrived cold-stunned sea turtle.

lings were leaving that beach. The increase in strandings is just a reflection of what's out there."

Success is hard to quantify when the topic is cold stranding. Since the New England Aquarium began working with them, 600 stunned turtles have been rehabilitated there. Of those brought in alive, the turtles have a survival rate that can range from the 90 percent surviving in the winter of 2005-2006 to 60 percent this past winter. When the turtles first arrive at the aquarium, they may have hearts that are beating only once or twice a minute,

but staffers don't give up on their patients until it is shown they are brain-dead. According to Charles Innis, sometimes a turtle's heart will continue to beat even after it's removed from the body during necropsy.

"If the heart was beating one day and the turtle was dead the next, was it dead when it arrived?" asks Innis. "That's what makes it hard to determine a success rate."

For the volunteers who don several layers of clothing and head out on blustery winter days and nights, their work is to find each turtle, cover it, and transport it. After that, it is out of their hands. Eastham resident Bill Allan remembers the first turtle he and his wife, Ann, found after joining the network. The sun was setting on that November afternoon and the tide had just begun its retreat. The Allans and their dog, Hunter, were patrolling Skaket Beach.

"I could see its flippers were moving," Allan recalls of the stunned Kemp's ridley. "I brought it up past the tide line and covered it with seaweed to protect it as much as possible from the cold air and called for someone to pick it up."

When the turtle was fully recovered and water temperatures were suitable, Allan was allowed to release it the following summer. There's a good chance that one of the seven turtles he and Ann rescued this past winter will be among those that crawl back into the sea this summer. For the Allans, who have found about

forty turtles since volunteering, the release is a life-affirming moment.

"When you find it, it's half-dead and looks sunken," he says. "But by summer, it's a completely different turtle from the one you picked up. It's really satisfying to think that you, as an individual, did something to save this turtle."

Gayle Goddard-Taylor is a field editor for Sanctuary magazine.

Return of the Native

by David M. Carroll

In the spring of my fifty-seventh year, having stayed away for twenty years, I went back to Cedar Pastures. I could not return with the heart of the youthful turtle-seeking painter-poet, only with the mind of the distanced observer clad in a coat of scientific detachment, a naturalist in quest of basic facts. Were spotted turtles still here at all? If so, could I get any idea of their possible future by looking at the space they had left, the status of their habitat? I did not go looking for love or inspiration, just bits of information. The fact that this was not my turtle place anymore helped me be more detached.

Vestiges of the landscape I once knew remained, enough to take some people's breath away. If I was careful where I looked and how I framed my vision, I could see something of what I had once found here. I was moved more than I thought I would be—more than I wanted to be—by the early April morning I encountered. But the poetry of the place was lost in its long-ago translation, a real and dream landscape lost in the conversion to “open space.” Perhaps some among the multitudes who came here could let their imaginations, like their dogs, run wild, but they had no idea what had been here. Not knowing, or forgetting, what once was present in a place, we give ourselves too much credit for too little, make far too much of the bits and pieces of landscape that have been “protected.”

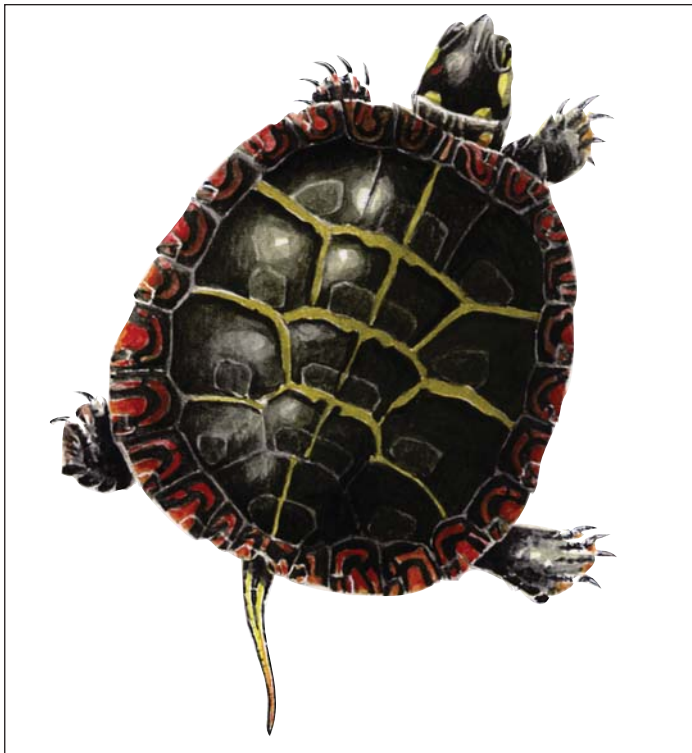


Blanding's turtle

I walked in along the broad, cindery bike path, veered off to pass through a well-remembered opening in a stone wall still held in the grip of massive vines of poison ivy, and made my way into dense brush. A cottontail rabbit lippety-lipped into tangles I had to work my way around. Only rabbits, snakes, and small birds could penetrate the gnarled thickets of ancient blueberries. Impossible for deer and me, and challenging to fox even in the old days, these tangles were now all the more impenetrable, having become shot through with rope-like bindings of bittersweet and tortuous welters of multiflora rose. Many areas of the park had been cleared out, but tangles persisted here and there, and in them the last of the most adaptable wildlings held out.

Occasional calls came from the spring peepers in the marsh-and-shrub borders of a permanent pool at the park's entrance; some things had managed to keep their places. I twisted and crawled my way to the deepest and the largest, and hence most permanent, seasonal pool in the chain. Tall willows still ringed the southern margin, ten narrow trunks with very scaly bark ascending sinuously about thirty feet in the air. At the northern fringe of the pool, several great pussy willows held their richly catkinned crowns nearly as high as the other willow tops. These symbols of spring struck me as emblematic of nature's insistent, abiding confidence.

By what dynamics do living things manage to hold their place and achieve a measure of balance in a prodigiously



Painted turtle

© DAVID M. CARROLL

© DAVID M. CARROLL



Courtship of spotted turtles

human-altered landscape? I was perplexed by this toehold of stasis in an arena of profound change. A mere corner in an overrun coastal plain, this pool and its plants, its thicketed borders, its rabbits and small, secretive birds kept on, while day after day the human world raced by.

What of the spotted turtles? I kept a hidden watch for half an hour or so and saw only a couple of caddis fly larvae, several water striders, and a modest assortment of isopods and amphipods moving in the water. I waded the pool's perimeter, then searched its shorelines for turtles who might have left chill waters to take the warming morning sun, but found none. Time becomes confounding with such returnings. The renewing cycles of the seasons in a niche that has been left alone, with a semblance of its natural patterns, curiously arrest the passages of time, at least in terms of the human measuring of years. I felt that I was on a search in a spring past as well as in the present moment.

My next step in retracing my old circuit was the deeper, boulder-bordered seasonal pool in which I saw my first turtle at Cedar Pastures. Recalling coiled garter snakes and recumbent spotted turtles warming to spring here, I scanned the brindled floor of fallen leaves. Some things stay so clear in the mind. I looked at the exact spot in a little hollow of the low slope of the pool's alder

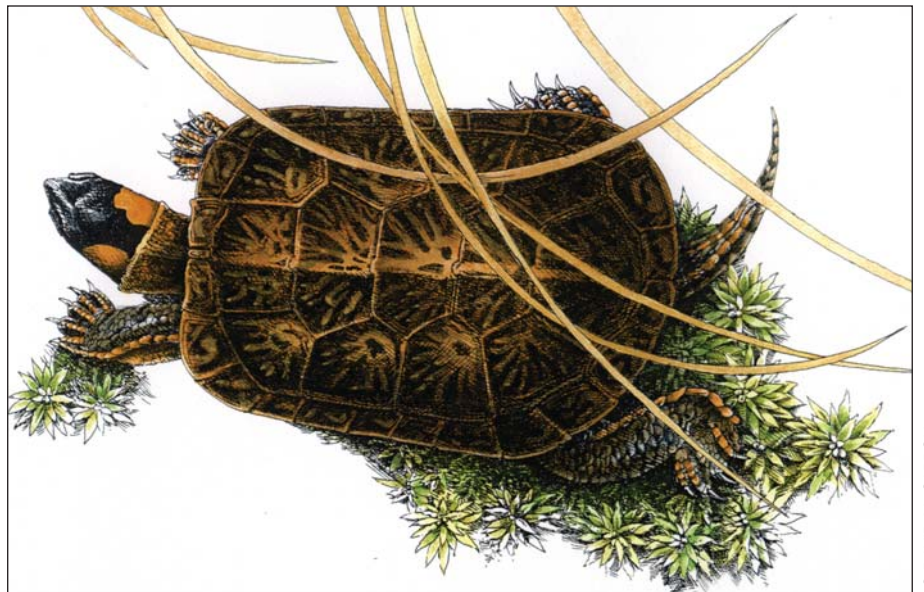
border and saw a spotted turtle of four decades past. In the mesmerizing morning light, time did another dance. The seasonal moment I attended in the steady streaming of the year was manifest. But what year was it? How old was I?

A couple of shouts and the sound of running feet brought me sharply back to the present. In brilliant red shirts with large white numbers, a high school cross-country team ran by. In camouflage, unmoving in alders just off their well-beaten track, I went unnoticed.

I moved through the alders to a pool no more than six feet in diameter. Every bowl of water here was well remembered, and I had seen spotted turtles in each of them. Again I watched and waited. And once again the anticipated became at the same time impossible and inevitable. A female spotted turtle rose up from the deep black leaf pack beneath a spray of fallen branches in clear April water. She

had only fourteen spots in all on her carapace scutes, two of which had none. But she displayed full spotted-turtle radiance just the same. Her shell was well chewed about the head and shoulders, but she was intact. If there was a male left anywhere within her encircled habitat, she would become charged with the continuance of her species here.

As I marveled at a turtle, yet one more time in my life, people walked their dogs, ran, and bicycled by, so close. Two men about my age exchanged information on



Bog turtle

Massachusetts Freshwater Turtles

Species	Massachusetts Status	Habitat
Blanding's Turtle	Threatened	Shrub-Swamp/ Vernal Pools
Bog Turtle	Endangered	Fens
Eastern Box Turtle	Species of Special Concern	Woods
Stinkpot (Musk Turtle)		Rivers/Streams
Northern Diamond-back Terrapin	Threatened	Salt Marsh
Northern Red-bellied Cooter	Endangered	Ponds
Eastern Painted Turtle		Ponds
Red-eared Slider (Introduced)		Ponds/Streams
Eastern Snapping Turtle		Most Wetlands
Spotted Turtle		Vernal Pools/ Shrub Swamp
Wood Turtle	Species of Special Concern	Rivers/Streams

investment options as they jogged past. I felt as if I were in a television commercial but did not pick up any secrets that would help me advance in my particular trade.

I penetrated the shrub tangles but was excluded from much of the bog thicket by its quagmire footing; with one false step I would sink impossibly deep. This final abiding exclusion was significant for whatever persistence spotted turtles could achieve in the park. Fortunately, no one thought the tangles here picturesque enough to rate a boardwalk. A tiny wisp of disturbed mud in a channel of water threading among the shrubs caught my eye. I found a foothold, reached into deep muck, groped around, and almost at once pulled out a young spotted turtle. The growth rings on her plastron showed that she was nine years old. Then, searching an extremely tangle-bordered little brook flow, I was again rewarded. Looking landward, anticipating a turtle who had moved out into streamside cover to bask in the sun, I found an adult male doing precisely that.

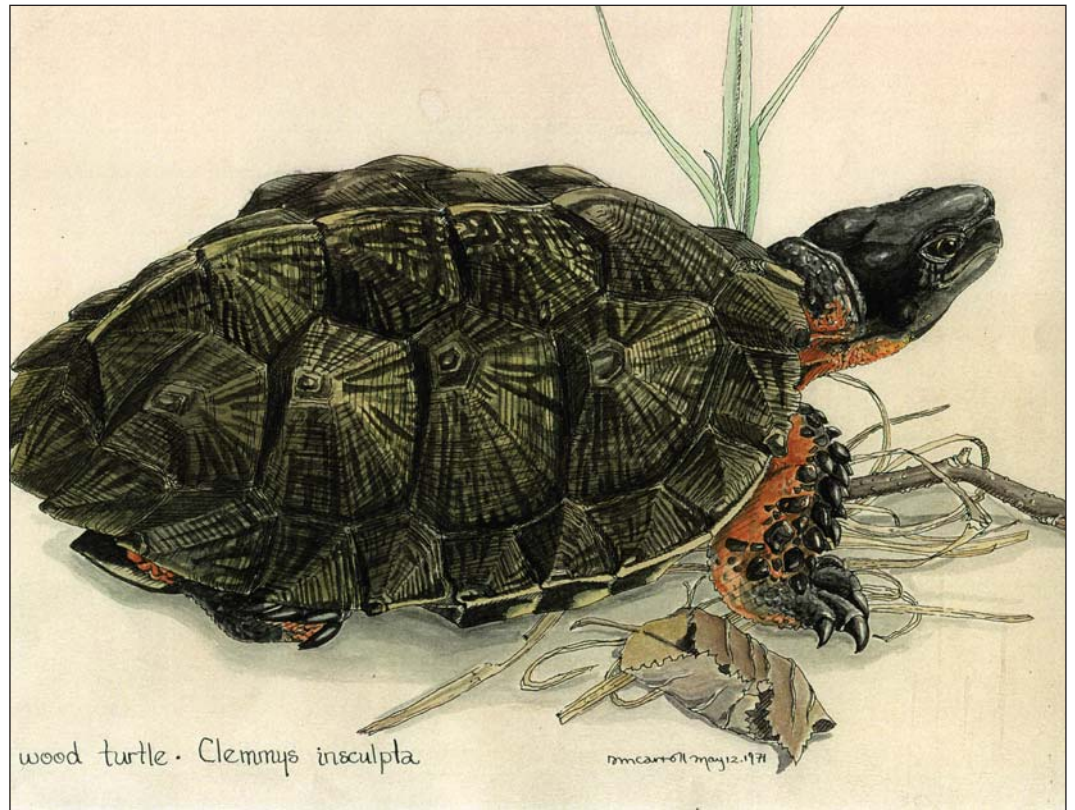
An adult male and female and a subadult: heartening finds in a disheartening overview. Spotted turtles had a toehold, at least. Many people would conclude from this

finding that we can have unending growth and places of mass recreation, with scattered islands of multiuse parks and open spaces (sometimes called "conservation lands," even "sanctuaries," or "preserves")—all this and nature too.

I do not believe it. I know what finding the spotted turtles meant and what it didn't mean. Ecology, or at least conservation, enters the debate, but rarely does it truly carry the day. Ethics, the belief that nature has a right to its own space, existence, and destiny; and aesthetics, the idea that human activity is degrading the patterns and forms of the natural world, making the world uglier by the day, are not allowed to enter into the debate. Nor is the spiritual, the recognition of the right of the

natural realm to possess its own nature, and the need for that nature in the completion of the human spirit.

Excerpted from Self-Portrait with Turtles by David M. Carroll, Houghton Mifflin Company, 2004. In 2006, Carroll was awarded a MacArthur Fellowship for his "eye of an artist...mind of a scientist...voice of a great storyteller, and...soul of a conservationist."

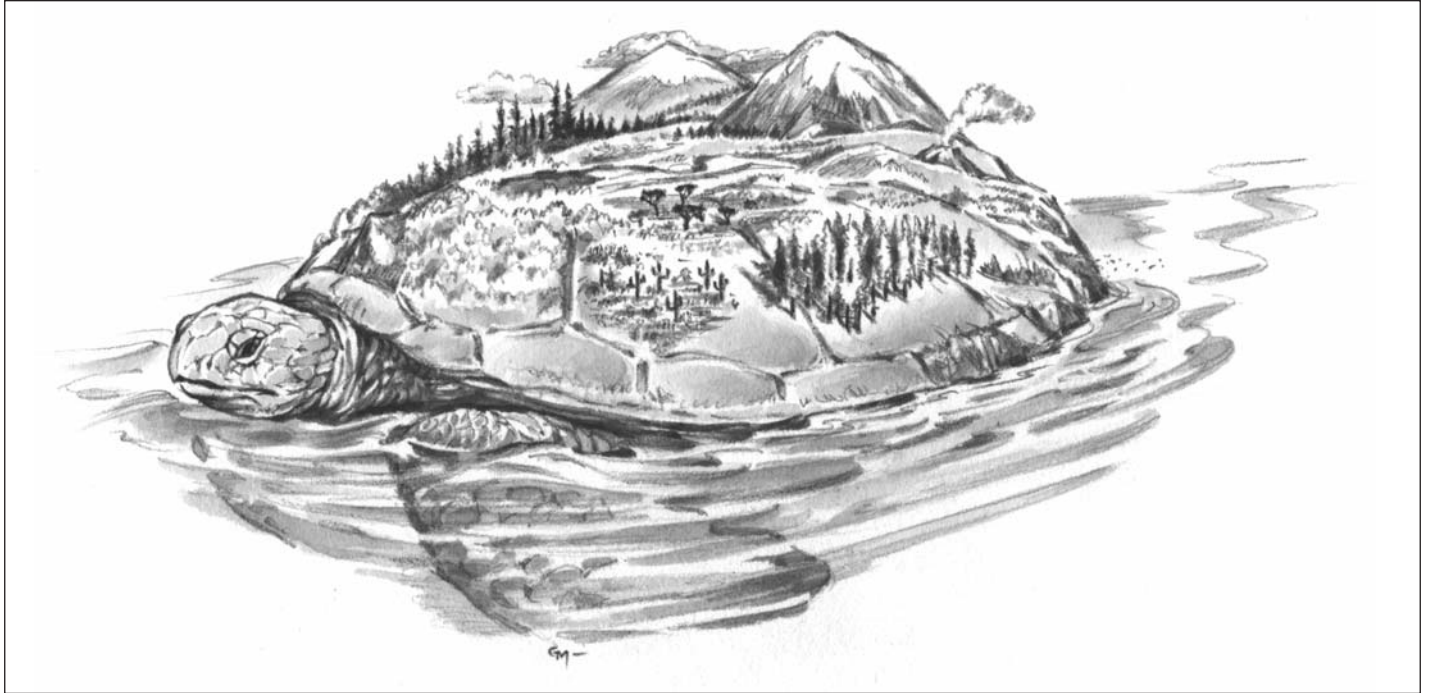


Wood turtle

The Wisdom of Turtles

Turtle legends appear in folktales and creation myths throughout the world.

by Michael J. Caduto



© GORDON MORRISON

Many years ago, soon after I moved to the North country, I was told by friends of Abenaki and Mohawk descent that all turtles have thirteen scales on their backs, and that each scale represents one of the moons we see throughout the year. My training as a scientist prompted me to search for proof among the shells of turtles from around the world. To my amazement, everything from giant leatherback sea turtles—up to 1,500 pounds—to our familiar painted turtles—a pound at most—have thirteen scales on their backs.

Native American cultures of the middle and southern latitudes correlate each moon on a turtle's back with a natural event or with something people do outdoors at that time of year. September's moon is the Cornmaker (Abenaki), Wild Rice Moon (Anishinabe), Moon of the Black Buffalo Calf (Lakota), and the Nut or Black Butterfly Moon (Cherokee). Since there are twelve lunar cycles plus an extra eleven or so days in each solar year, a thirteenth moon comes around in about every three years as reckoned by the sun. This is the Big Moon to the Abenaki. The Maliseet of northern Maine and the Maritime provinces know the moon as Paguas: "He who borrows or begs light from the sun." Scientific knowledge and indigenous wisdom seemed to converge on a turtle's carapace.

Ask someone from among the six nations of the

Haudenosaunee Iroquois, and they will tell you that Earth rests on the back of a giant turtle. Long ago, they say, in the heart of Sky Land, in a world above the clouds, grew a magnificent tree. Its branches were covered with blossoms of every color and many kinds of nuts and fruit. One day Sky Woman fell asleep leaning against the trunk of the great tree. She dreamt that someone pulled the tree up by its roots. When Sky Woman had this vision two more times, she told it to the elders. As was their tradition, the elders decided any dream that appeared three times must be honored.

So the tree was uprooted, and this left a hole so deep that the Sky People could see water far beneath them. Sky Woman leaned so far over that her hand slipped off the branch of Sky Tree she was holding and she fell through the hole in Sky Land. There was nothing but ocean down below. Seeing that Sky Woman would drown, some swans flew up and caught her on their backs while the other animals tried to bring some earth up from the bottom of the sea for her to stand on. Beaver, loon, and diving duck tried, and failed. Only the strong-willed little muskrat succeeded. She placed the earth on the back of a giant sea turtle, where it grew to become all the land we now see. The swans flew down, and Sky Woman stepped off their backs, saying, "Thank you for saving my life." In her hands, Sky Woman still held seeds of many kinds from the branch of



Turtles and dinosaurs shared the planet for 135 million years

Sky Tree, which she sowed, bringing all good plants to Earth. To this day the Haudenosaunee refer to Earth as Turtle Island.

There seems to be an ancient wisdom in the eyes of turtles that is born of their antiquity. For 200 million years turtles have inhabited the land and water. During two-thirds of that time they shared their world with dinosaurs, then somehow survived the mass extinction of 65 million years ago that put an end to the dinosaurs' reign. Turtles swam the seas 55 million years ago when the ancestor of today's loons sliced the water with powerful webbed feet. Mastodons, dire wolves, and giant beavers as big as bears rose and fell, but turtles lumbered on through time. So when human beings appeared in recent geologic history, it's little wonder that these ancient creatures crept into the folklore of cultures from around the world.

Stories from Asia associate turtles with the creation of Earth. In China a divine turtle spent 20,000 years making the moon and the stars and Earth, and in popular culture evolved into a symbol of longevity—not surprising since some tortoises can live for 150 to 200 years. Turtles bring good fortune and are a symbol of peace in Japan. One Japanese story, "Turtle Returns the Gift," recounts what befell a family and their entourage sailing for Kyushu. It was a long journey of many days. On the third day, the wind began to howl and whip the seas into froth. Waves, which

loomed like mountains above the small sailboats, broke over the decks. Sails tore under the strain of the fierce wind. Before everyone could get safely below the youngest son was washed overboard.

"Stop the ships and release the lifeboats!" the father cried to those on deck. All night long the sea raged as the father and his crew rowed the swells in search of the child. But the boy had drowned. The father and mother retired to their cabin and cried themselves to sleep.

As the father entered the land of dreams, a giant sea turtle appeared to him. "Have you lost faith?" asked the turtle. "Do you not remember how you saved me from the fisherman who caught me in his net? Two years ago, in the Capital, you saw me captive and took pity upon me. You bought me from the fisherman, who was going to kill me for turtle soup. You saved my life. Now is my chance to show gratitude." With those words, the turtle pulled his head beneath the water and was gone.

The captain shook the father from his slumber: "Come up on deck immediately," he said. "Something is swimming toward us and we do not know what it is." As it drew

Turtles All the Way Down

William James, the renowned philosopher, delivered a lecture on the solar system and was afterward approached by an elderly lady who claimed his theories were all wrong.

"We don't live on a ball rotating the sun," she informed him, "We live on a crust of earth on the back of a giant turtle."

James didn't wish to demolish her absurd argument with the massive scientific evidence at his command. It was preposterous that anyone in the twentieth century could believe there was a gigantic tortoise beneath our feet.

He decided to dissuade his opponent gently. "If your theory is correct, madam, what does this turtle stand on?"

"You're a very clever man, Mr. James, and that's a good question, but I can answer that. The first turtle stands on the back of a second, far larger turtle."

But what does the second turtle stand on?" The philosopher asked patiently.

The old lady crowed triumphantly. "Its no use, Mr. James—it's turtles all the way down!"

This famous anecdote appeared in Time of the Turtle by Jack Rudloe, Alfred A. Knopf, Inc., 1979.



© GORDON MORRISON

Turtle returns the gift

near, the figure of a child dressed in a white frock appeared, riding on the back of a great sea turtle.

“Look,” cried the mother, “Our son is coming back to us!”

At that joyous moment, the father remembered two years ago when he had rescued the turtle. Gazing into the turtle’s gentle eyes—the same eyes into which he was now staring—his heart had been filled with compassion. He had traded his own priceless cloak to the fisherman in exchange for the turtle. Then he had released the turtle back to his home in the sea.

He watched as the turtle’s head once again disappeared beneath the waves, and the father now realized that, on this day, the great sea turtle had repaid his kindness by saving the life of his beloved son.

* * * *

Sea turtles are associated with the fertility of the ocean in the waters around New Guinea, where it was once forbidden to disturb mating turtles for fear of diminishing the fecundity of other marine life. In Hawaii, there was a legend of a green sea turtle that could change herself into a girl and protect children playing on the beach.

Turtles play a central role in Native American cultures. In stories of creation and moral tales—like those

of Toleba, the Abenaki trickster—turtles inhabit the fabled worlds of land, air, and water. Sacred turtles were used in Zuni fertility rites in the American Southwest. The Anishinabe of the Great Lakes region tell of how Turtle enlists the other animals in a great battle to stop people from hunting. In a classic trickster tale that plays on the infamous torpidity of terrapins, a Seneca story recalls how Turtle takes to the air and outwits Beaver in a race across their pond.

As an evolutionary strategy, going slowly and steadily has served turtles well through the ages, but is often no match for the pace and appetites of humankind. Fortunately, we can still read the stories in a turtle’s scales, and find there a world complete. It is a place upon which we can bring to bear the full force of our scientific knowledge, and wield it with a sagacious hand. If we succeed, turtles will still be here for millions of years to come.

Michael J. Caduto is an author, ecologist, educator, and storyteller. His website is www.p-e-a-c-e.net. The story “Turtle Returns the Gift” is adapted with permission from Earth Tales from Around the World ©1997 by Michael J. Caduto, All Rights Reserved. Fulcrum Publishing.

Families Afield
Sherman's Bid for Freedom

by Ann Prince



© WILLIAM FOURNIER

Eastern painted turtles sunning in sequence on a log

When I was little, having pet hatchling turtles was as commonplace as owning goldfish. Dime-store, quarter-sized, baby turtles with their grass-green carapaces were absolutely darling and captivating, so whenever we were in the 5 & 10 to pick up Buster Brown socks and turtlenecks, we begged my mother for one. Sometimes we prevailed, but we soon learned that it's not easy to take good care of a young turtle; after a few deaths and heartbreaks my mother convinced us that furry, truly domesticated, family members were better for the animals *and* for the owners. Thereafter we stuck with retrievers and gerbils.

Several years ago my daughter was entrusted with the care of a turtle named Sherman for a friend who was spending the summer at an overnight camp. This turtle was the same size and color as those my family had adopted nearly forty years ago. I'd never known what species the turtles were back then, but Sherman was unmistakably identical. We checked a field guide and learned that he was a red-eared slider: green oval shell, green legs with thin yellow stripes, green head with a red stripe behind the eye; ranging from Indiana to New

Mexico down through Texas to the Gulf of Mexico.

Sherman came with a perfect replica of the shallow plastic dishes we'd kept our turtles in so long ago, including a trough for a bit of water and a tiny plateau with a miniature fake palm tree. Our instructions were to feed him every other day and to make sure to change the water daily to keep it clear. We put him in a sunny spot since we knew turtles like basking, and we used bottled water since I figured it would be better for him than tap water. In the evening the children and I loved to watch him eat and enjoyed ascertaining where he liked to hang out most—often on the plastic palm plateau; sometimes in the half-inch of water below.

All went well for a couple of weeks but then what appeared to be a catastrophe occurred. He'd been in his dish high up on a shelf, but when we arrived home from church he was gone!

I was beside myself because it wasn't our turtle. I figured a four-foot fall for a tiny turtle must have been fatal, and he was nowhere to be found. Furthermore, I couldn't help but wonder what our West Highland terrier would do if she found Sherman on the ground. We searched all over the

house, underneath every piece of furniture. I hoped he wasn't under the piano, which I couldn't budge. After much frantic searching we gave up.

Then, an hour or so later, lo and behold, there he was, a live green half-dollar on the wood floor, at the opposite extremity of the house from his inadequate "habitat" that he'd crawled out of. Fortunately, he was completely unharmed.

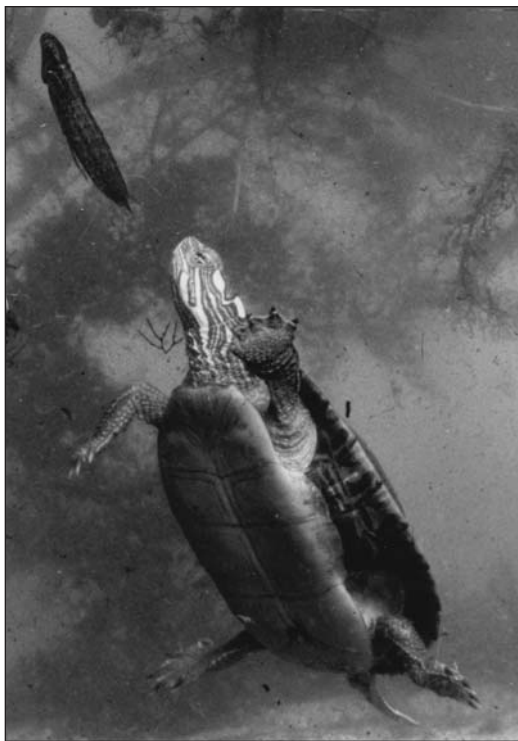
There would be no more escapes—though I sympathized with his desire for freedom. I temporarily put him in a jar he couldn't possibly climb out of, and on that Sunday afternoon the children and I went to the pet store. The employee there, who was quite knowledgeable, gave us lots of advice. First, she said that selling a turtle that small was no longer legal. Second, she said that Sherman, an omnivore, needed to eat more—and every day. Third, she said that he was semiaquatic and therefore needed to occupy an aquarium that included both a section where he could swim and a place above water where he could rest and dry out. Last but not least, she said that with proper care a red-eared slider can live up to 35 years. So we bought Sherman an aquarium, set it up for him as we were instructed by the pet store clerk, and gave him more food more often.

Fortunately, when Sherman's owner retrieved him in August, he was thriving. But I couldn't forget his attempt at liberation.

Not a week had passed after Sherman returned to his household when my son Noel and I went to our favorite nearby pond to swim. It was early evening and still light. When we walked back to the car, there was Sherman, strolling along the dirt road, or so it appeared. "What's Sherman doing here?" we both asked at the same time.

Actually, our surprise sighting was a wild hatchling painted turtle the exact same size as Sherman. We would have returned him to the pond immediately but thought there might be too much human disturbance in the park swimming area. Nevertheless, we had to get it away from the road where we were glad that it had not already been accidentally squashed by a car. So Noel held it while I drove home.

Painted turtles have red crescents along the edge of the shell and a yellow breastplate. The carapaces are olive colored. Like the red-eared slider, the painted turtle is a common semiaquatic species, and its range is from southern Canada to northern Mexico. I called around to decide where exactly to return it to the pond, then the next evening Noel and I drove to the quieter



Eastern painted turtle chasing a dragonfly nymph

© HENRY B. KANE

side and asked a cottager along the outskirts where he had seen painted turtles. He told us that the turtles bask, often in rows or one atop another, on logs and wide submerged branches in isolated areas along the edge of the pond in a section where there was little disturbance.

Our best bet was to find a painted turtle-sunning site in the vicinity, so Noel carried the hatchling to the shoreline next to a floating log we located and let it go. We were amazed at how well the tiny baby swam. It dove to the bottom instantly, freed to live the life it was intended to live. We hope it's still inhabiting the pond, feeding on insects, tadpoles, small fish, and aquatic plants.

I already knew that in Massachusetts it is illegal to possess any turtle on the endangered species list such as the eastern box turtle, the diamond-back terrapin, and all of the sea turtles. But I didn't know that it is in fact permissible to collect two of any nonlisted species as pets, including painted turtles. But Mass Audubon discourages anyone from doing so. Owners may tire of the responsibilities of caring for a pet turtle and release it back into the wild where it may not survive after being in captivity. Turtles that are not properly cared for suffer from various illnesses and eventually die, and some turtles carry salmonella, which can be passed to humans when the purest water quality is not maintained.

Exotic turtles not native to the state should never be released into the wild because they could take over habitat of other species. For example, in some locations in New England, red-eared sliders such as Sherman are taking over painted turtle habitat.

The philosophy I've developed on pet ownership is that you need to be knowledgeable and committed enough to caring for and loving the animal in your home so that it lives to an old age rather than suffering an untimely demise when it's still a baby or juvenile. Plus, it should be an animal that is genuinely happiest as a pet—which is to say a warm-and-fuzzy domesticated creature that bonds with people and isn't in any way threatened by human possession. Terriers and guinea pigs are now our family favorites. But others might choose cats, or even the old standby goldfish.

Ann Prince is associate editor of Sanctuary. She worked as a park naturalist for the first five years of her career.

The Progress of Turtles

by Betsey Houghton

One lifted foot, the other three defining a plane—
the simplest three point supposition: milking stool,
airplane wheels, football lineman—and the shell,
either lifted above or scraping over the earth,
moves better than any house on hydraulic jacks
with foreman and crew and slow *wide-load*
flashing lights. For the tortoise, there's no seeing
behind the edges of its shell, no feint or pivot,
reverse or pick or stall—just forward progress.

And what of regret? Are there no spring berries
left uneaten, no log too soon vacated, no
longing
for an old hardshell well met in the clearing?
Old is the tortoise forever, and nothing matters
but warmth, the bracing odor of leafy greens,
the sun's height, and its own incremental motion.



Betsey Houghton is a writer living in Plymouth. Her work has appeared previously in Sanctuary.

Our Threatened Natural Heritage & Endangered Species Program

by Jennifer Ryan



© HAL H. HARRISON

Blackpoll warbler (with babies), a species of special concern in Massachusetts

In 1974, a year after the federal Endangered Species Act passed, The Nature Conservancy, Mass Audubon and other nonprofit conservation organizations, and state natural resource agencies recognized the need for a structure within each state's government that would manage information on rare plants and animals, and seek their protection—and complement more traditional fish and wildlife programs.

As a result of these moves, here in Massachusetts the Natural Heritage & Endangered Species Program (NHESP) came to be. It is to the credit of those who worked hard to get the programs launched that every state, every Canadian province, and the Navajo Nation as well, has a natural heritage program. These programs continue to be the recognized source for the most complete data for at-risk species and ecosystems. Their

size, scope, and funding sources vary; many are fully integrated into state government; a few are nonprofits relying entirely on grants and private donations. The Massachusetts NHESP implements endangered species regulations, and we have one of the strongest state Endangered Species Acts in the nation.

What do natural heritage programs do? Their inventory and research efforts provide data and, very importantly, interpretation of data on “at-risk species” that are indicators of what is unique to our region—coastal plain ponds in southeastern Massachusetts as an example. They also indicate what is sensitive and being disproportionately impacted by human activities—such as piping plovers and Kennedy’s emerald dragonflies. With this data they protect at-risk species, restore habitat, and guide land acquisition and conservation planning efforts. Here in Massachusetts, state agencies, land trusts, environmental nonprofit organizations, municipalities, and others regularly tap NHESP expertise, which provides information on everything from rare species and habitat priorities for land conservation projects to wetlands protection regulations administered by conservation commissions.

With our kindred missions, it is natural that Mass Audubon is a strong advocate for the Natural Heritage & Endangered Species Program. Among other things, we use the NHESP information in our sanctuary-based land protection efforts. And, on a broader scale, the data connects into a North and South American international network of biological inventories called NatureServe, guiding rare species monitoring and protection at national and international levels. To consider whether or not a species—take the banded boghaunter dragonfly—is rare and merits limited conservation resources in Massachusetts, a biologist needs to be able to answer the question of how common or rare this dragonfly is elsewhere. Is our state home to a significant portion of this dragonfly’s habitat, as it is in the case of the banded boghaunter? State data is also used in listing decisions under the federal Endangered Species Act and more broadly in land and water conservation planning.

The Natural Heritage & Endangered Species Program has received national acclaim through its prescient conservation planning tools, BioMap and Living Waters. The elegant model developed for BioMap—providing a map of the habitat needed for at-risk species to flourish—was mirrored by several other states as a way to prioritize and plan for rare species protection. This model has also been

incorporated into the Massachusetts Wildlife Action Plan—a plan to keep wildlife from becoming rare or extinct and, importantly, a conduit for federal funding for wildlife protection. The Massachusetts plan is considered a leader by the not-easy-to-please Defenders of Wildlife, among other groups. Mass Audubon Advocacy staff recently visited Washington, DC, and lobbied for federal funds to implement the plan. If all goes well, Massachusetts will be eligible for \$1.3 million in federal monies for wildlife protection, and much of the work of the

Natural Heritage & Endangered Species Program is eligible for this funding.

Historically, the NHESP received significant funding from the state, but this was lost in the 2004 budget crunch. Recognizing the importance of funding for the program, this spring Mass Audubon, The Nature Conservancy, and the Environmental League of Massachusetts launched a major campaign to restore state support. The Natural Heritage & Endangered Species Program is funded by project-specific bond monies, a small but appreciated number of voluntary individual contributions on state income tax forms, fees from environmental review under the Massachusetts Endangered Species Act that only pay for regulatory review staff, and federal monies that cover wildlife but not natural communities or

plants (of the 442 state-listed species, 264 are plants). “Natural communities” is parlance for groups of species that typically occur together such as a pine forest or a highbush blueberry thicket.

This has left our natural heritage in a tenuous position. Rare plant and natural community protection are poorly supported and with uncertain and limited funds for rare species research and restoration. It’s the importance of their work and the vagaries of funding such as this that keep Mass Audubon fully engaged in advocacy for NHESP.

Notable Harvard entomologist E.O. Wilson, who is a strong proponent of the network of natural heritage programs, indicates that these programs are “one of the reasons that I remain hopeful about the future of life on Earth.” We remain hopeful as well.

For more information on the Natural Heritage & Endangered Species Program, contact advocacy@massaudubon.org and see www.nhesp.org.

Jennifer Ryan is Mass Audubon’s assistant director for Legislative Affairs. She is also a conservation biologist.

What do natural heritage programs do? Their inventory and research efforts provide data and, very importantly, interpretation of data on “at-risk species” that are indicators of what is unique to our region.... They also indicate what is sensitive and being disproportionately impacted by human activities....



Mass Audubon Tours
supporting conservation here and abroad

NATURAL HISTORY TRAVEL

Summer 2007-Winter 2008

Upcoming International Birding and Nature Trips

Siberia: September 1-17, 2007, with Bill Gette

Fiji & New Caledonia: September 7-17, 2007, with Wayne Petersen

Ecuador: September 7-17, 2007, with Jerry Bertrand

Belize Family Tour: December 26, 2007-January 1, 2008,
with Bob Speare

Thailand: January 19-February 3, 2008, with Chris Leahy

Malaysia: February 3-18, 2008, with Chris Leahy

Trinidad and Tobago: February 19-28, 2008

Belize and Tikal: February 1-9, 2008, with René Laubach

India—Birds and Tigers: February 11-25, 2008,
with Robert Buchsbaum

Botswana Birding: March 10-20, 2008, with David Larson

Martha's Vineyard Getaway: September 28-30, 2007

For more information, contact Broadmoor, 508-655-2296

Cosponsored with Habitat

Birding the Mid-Atlantic Coast: October 23-28, 2007,

with René Laubach

For more information, contact Berkshire Sanctuaries, 413-637-0320

Nature Cruises

Southwest Pacific: November 22-December 11, 2007

Antarctica, Falklands, S. Georgia: December 15, 2007-
January 7, 2008

Belize Barrier Reef: January 4-11, 2008

Baja Cruise: January 19-26, 2008

Summer & Fall North America Tours

Astronomical Camping: July 7-8, 2007

For more information, contact Ipswich River, 978-887-9264

Puffins and Peatlands: July 19-22, 2007

For more information, contact South Shore, 781-837-9400

Family Wetlands Campout: July 28-29, 2007

For more information, contact Ipswich River, 978-887-9264

Family Campout: July 28-29, 2007

For more information, contact Moose Hill, 781-784-5691

Family Camping Trip: August 25-26, 2007

For more information, contact Broad Meadow Brook, 508-753-6087

Jamaica Bay Wildlife Refuge and the Connecticut Coast:

September 8-10, 2007, with David Larson and Steve Grinley

For more information, contact Joppa Flats, 978-462-9998

Block Island: September 14-16, 2007

For more information, contact South Shore, 781-837-9400

For a list of all trips, visit: www.massaudubon.org/travel



© KAREN O'NEILL

Leopard tortoise in Botswana

For detailed itineraries, contact us at: 800-289-9504 Email: Travel@massaudubon.org

FAMILY PROGRAMS AT MASS AUDUBON SANCTUARIES

BERKSHIRE SANCTUARIES

Lenox, 413-637-0320

Evening at the Beaver Ponds

July 5—7:30-9 p.m.

August 16—7-8:30 p.m.

September 6—6-7:30 p.m.

Twilight World of Bats

July 13—7:30-9 p.m.

July 27 and August 10—7-8:30 p.m.

BLUE HILLS

Milton, 617-333-0690

Playful Ponding

August 4—3-4:30 p.m.

Turtle Atlas

August 19—1-5 p.m.

BROADMOOR

South Natick, 508-655-2296

Ice Cream and...

Frogs: July 12—7:30-9 p.m.

Fireflies: July 26—7:30-9 p.m.

Bats: August 9—7:30-9 p.m.

Katydid: August 23—7:30-9 p.m.

CONNECTICUT RIVER VALLEY

Easthampton, 413-584-3009

Redback Salamanders at

Laughing Brook

July 21—10-11:30 a.m.

DRUMLIN FARM

Lincoln, 781-259-2206

Summer Seekers

June 26-July 31—3:30-5 p.m.

HABITAT

Belmont, 617-489-5050

Insects and Ice Cream

August 1—6-7:30 p.m.

IPSWICH RIVER

Topsfield, 978-887-9264

Wildlife Safaris

July 22 and August 12—10 a.m.-noon

JOPPA FLATS

Newburyport, 978-462-9998

Imagine, Sing, and Learn

The Mighty Merrimack

July 26—10-11:30 a.m. or 2:30-4 p.m.

July 27—10-11:30 a.m. or 1-2:30 p.m.

Tide Pool Treasures

August 9—10-11:30 a.m. or 2:30-4 p.m.

August 10—10-11:30 a.m. or 1-2:30 p.m.

MOOSE HILL

Sharon, 781-784-5691

Family Owl Prowl

August 17—8-9:30 p.m.



© BILL BYRNE

SOUTH SHORE

Marshfield, 781-837-9400

Farm Day

September 29—10 a.m.-4 p.m.

STONY BROOK

Norfolk, 508-528-3140

Bats in Flight

July 18—8-9:30 p.m.

Totally Terrific Turtles!

August 5—1-3 p.m.

WACHUSETT MEADOW

Princeton, 978-464-2712

Helping Turtles

August 5—1-3 p.m.

WELLFLEET BAY

South Wellfleet, 508-349-2615

Cape Cod Bay Marine Life Cruises

Offered several times weekly in July and August

Seashore Rambles

Offered several times weekly in July and August

Call Wellfleet Bay for more information.

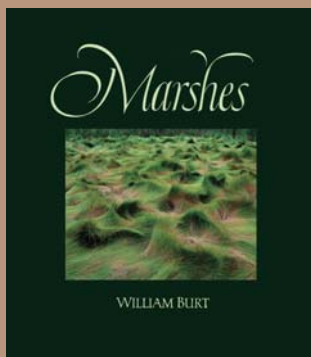
Call the individual sanctuaries for more information, fees, and to register.

For a full listing of Mass Audubon programs and events, visit our online catalog at www.massaudubon.org/programs.

New from naturalist, photographer, and writer

William Burt

Marshes, The Disappearing Edens



Available at the Audubon Shop at Drumlin Farm
Wildlife Sanctuary

Tuesdays-Sundays (and Monday holidays)

10 a.m.-5 p.m.

781-259-2214

Unique books, gifts, guides, and gear inspired by nature

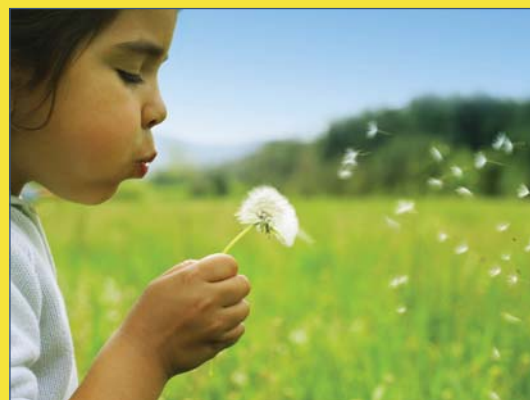
C is for **creatures** big and small I will see

A is for nature **arts** and crafts I will create

M is for **miles** I will hike through field and forest

P is for all the **possibilities** awaiting me

Discover the Magic of Camp!



Mass Audubon offers 16 different day camp programs
at our wildlife sanctuaries for all ages as well as

Wildwood—Mass Audubon's overnight camp.

To find out more visit www.massaudubon.org/camps

CANOEING and KAYAKING PROGRAMS

BERKSHIRE SANCTUARIES

Lenox, 413-637-0320

Canoe Trip on the Housatonic

July 1, 28, August 4, and
September 2—8:30 a.m.-12:30 p.m.

Canoe Trip to Upper and Lower Goose Ponds

July 7—8 a.m.-noon

Canoe Trip to Buckley Dunton Lake

July 21 and August 12—9 a.m.-noon

BROAD MEADOW BROOK

Worcester, 508-753-6087

Sunset Paddle on the Quinsigamond River

July 12—6:30-8:30 p.m.

BROADMOOR

South Natick, 508-655-2296

Evening Canoe on the Charles

July 14—6-9 p.m.

Dragonflies of the Charles

July 22—1-4 p.m.

Canoe and Breakfast on the Charles

August 18—7-11 a.m.

CONNECTICUT RIVER VALLEY

Easthampton, 413-584-3009

Perseid Meteor Shower

August 13—8-10:30 p.m.

IPSWICH RIVER

Topsfield, 978-887-9264

Kayak to Thacher Island

June 24 and July 14—10 a.m.-3 p.m.

Moonrise Over Kettle Island

July 30—5-10 p.m.

Kayak to Choate Island

September 22—10 a.m.-3 p.m.

Family Dusk Paddles

July 11, 25, and August 1—6-8 p.m.

JOPPA FLATS

Newburyport, 978-462-9998

Exploring the Great Marsh

Please call Joppa Flats for more
information.

WELLFLEET BAY

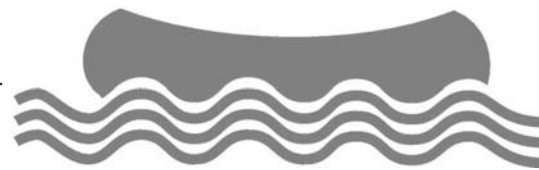
South Wellfleet, 508-349-2615

Canoe & Kayak Programs

Call Wellfleet Bay for more information.

*Call the individual sanctuaries
for more information, fees, and
to register.*

For a full listing of
Mass Audubon programs and
events, visit our online catalog at
www.massaudubon.org/programs.



BIRDING PROGRAMS

BERKSHIRE SANCTUARIES

Lenox, 413-637-0320

Bird Walks at Canoe Meadows

September 7 and 14—8-10 a.m.

BROAD MEADOW BROOK

Worcester, 508-753-6087

Birds of Massachusetts

September 11-November 13—7-9 p.m.

BROADMOOR

South Natick, 508-655-2296

Fair Weather Birding

Scheduled 1-2 times per month.

Call Broadmoor for more information.

CONNECTICUT RIVER VALLEY

Easthampton, 413-584-3009

Night Hawks and Ice Cream

August 24—7-8:30 p.m.

HABITAT

Belmont, 617-489-5050

Nighthawk Watch

August 24—6-8 p.m.

IPSWICH RIVER

Topsfield, 978-887-9264

Heron Rookery Excursion

July 28—9 a.m.-noon

South Beach Birders' Delight

August 12—8 a.m.-6 p.m.

JOPPA FLATS

Newburyport, 978-462-9998

Wednesday-Morning Birding

Wednesdays starting August 1—9:30 a.m.-
12:30 p.m.

SOUTH SHORE

Marshfield, 781-837-9400

Early Fall Migration at Wompatuck

September 9—9 a.m.-noon

STONY BROOK

Norfolk, 508-528-3140

South Beach Spectacular 1

July 15—7 a.m.-5 p.m.

South Beach Spectacular 2

September 9—7 a.m.-5 p.m.

WELLFLEET BAY

South Wellfleet, 508-349-2615

Ornithology Field Schools

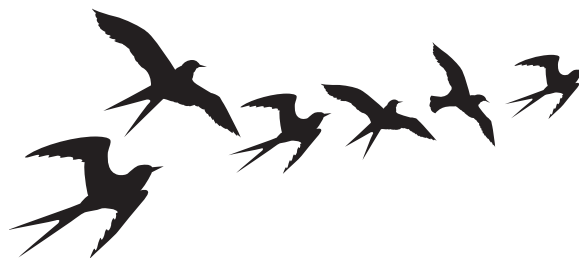
Call Wellfleet Bay for dates and details.

Birding Trips to Monomoy Island, South Beach, and Nauset Marsh

Call Wellfleet Bay for dates and details.

*Call the individual sanctuaries for
more information, fees, and to register.*

For a full listing of Mass Audubon
programs and events, visit our
online catalog at
www.massaudubon.org/programs.



HOMESCHOOL PROGRAMS

BROAD MEADOW BROOK

Worcester, 508-753-6087

Homeschool Open House

September 6—2-4 p.m.

CONNECTICUT RIVER VALLEY

Easthampton, 413-584-3009

Fall Homeschool Program at Arcadia

8-week program on Tuesday afternoons—1-4 p.m.

MOOSE HILL

Sharon, 781-784-5691

Homeschool Field School

Mondays: one-day nature classes

Tuesdays: five-to-six week nature series

Thursdays: one-day art classes

Please call Moose Hill for a brochure.

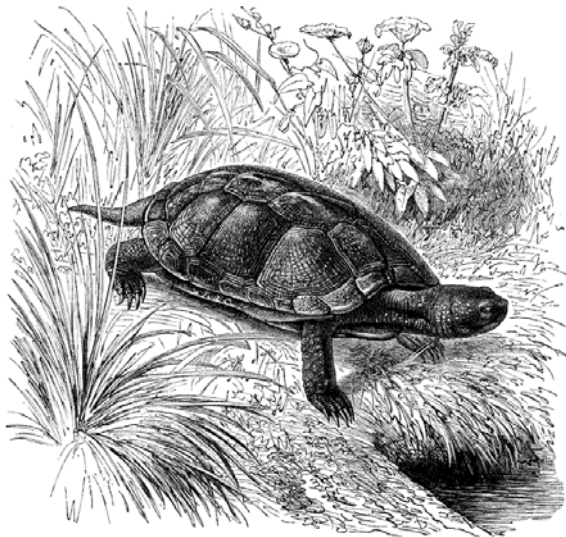
WACHUSETT MEADOW

Princeton, 978-464-2712

Homeschool Programs

Turtles: August 24—1-3 p.m.

Hawk Migration: September 14—1-3 p.m.



Call the individual sanctuaries for more information, fees, and to register.

For a full listing of Mass Audubon programs and events, visit our online catalog at www.massaudubon.org/programs.

Central/West Regional Property Office

Waterfront Cottage for Rent

Late May through Early October
at Pierpont Meadow
Wildlife Sanctuary in Dudley

Call 978-464-2712
for more information
and availability.

Send A Special Message

A gift to Mass Audubon is a wonderful way to pay tribute on a variety of occasions:

Anniversary
New Baby
Birthday
Get Well

Graduation
Retirement
Thank you
Marriage

Your message of love, congratulations, or sympathy will also show, through your support of Mass Audubon, that you care about providing a better quality of life for both people and wildlife.

Your gift will be promptly acknowledged to the proper person with appropriate sentiments. In addition, your donation will be tax deductible and the dollar amount considered confidential.

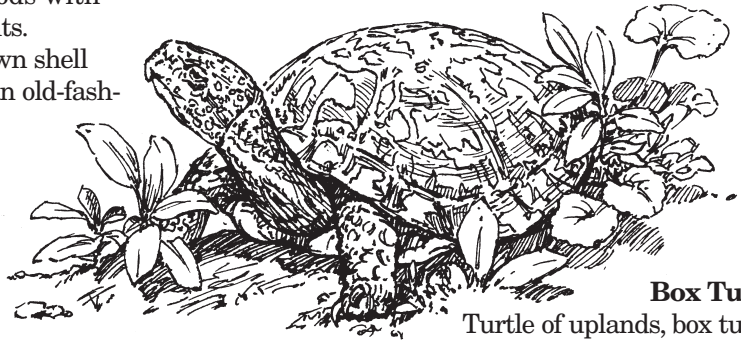
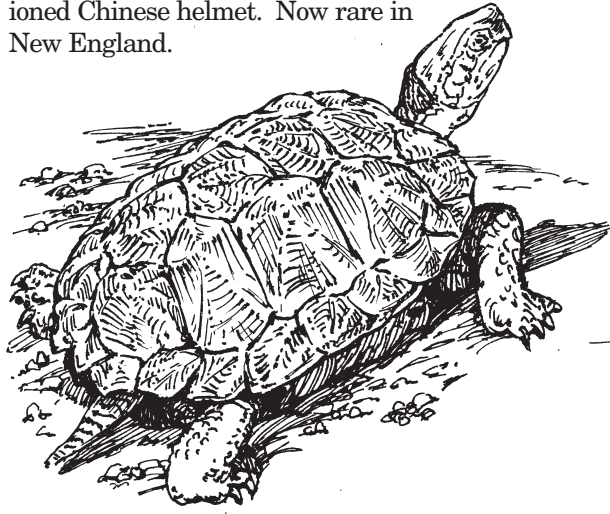
**Please contact Betsy Watson,
Director of Planned Giving, at
bwatson@massaudubon.org
or 617-259-2131, and she will gladly help
you complete your gift.**

Common and Uncommon Turtles

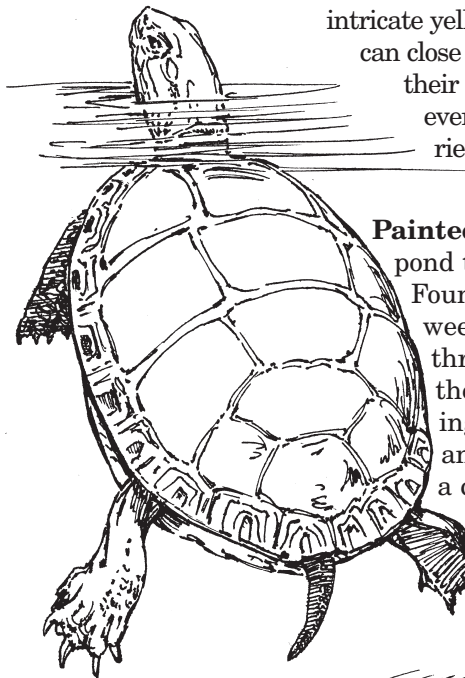
Illustrated by Gordon Morrison

Turtles were once a standard element of rural summers, often brought home for pets in the days when children still roamed the countryside. Except for snappers, they are easy to catch, and easy to tame. Now (partly because of their popularity as pets) some formerly common species are rare or threatened in Massachusetts.

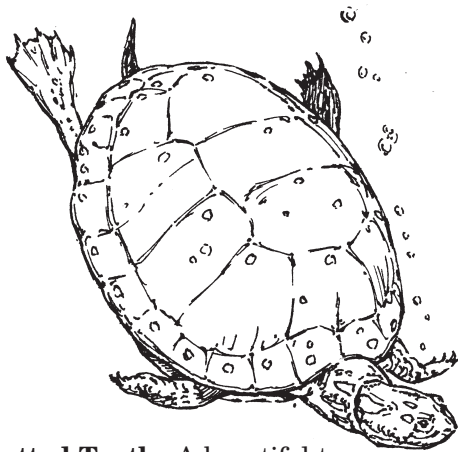
Wood Turtle: A turtle of dry land that favors woods with nearby streams or rivers, even those with swift currents. Recognized by its flattened, ridged, brown to light brown shell and its red or yellow legs. The shell looks a little like an old-fashioned Chinese helmet. Now rare in New England.



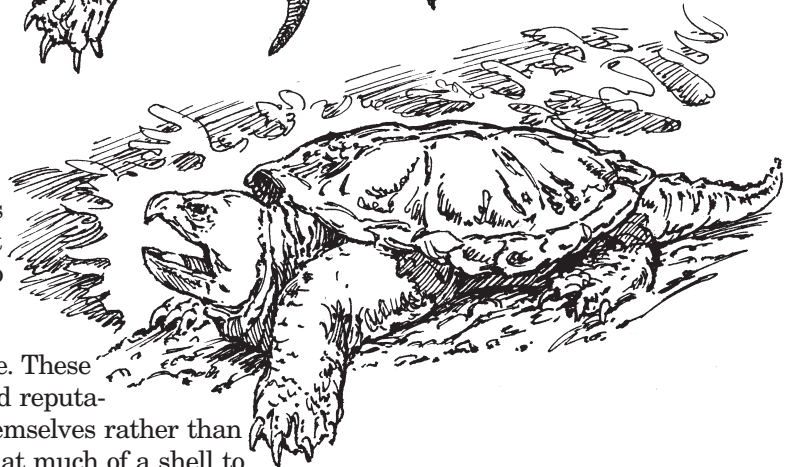
Box Turtle: Turtle of uplands, box turtles have high domed shells with intricate yellow and black patterns, and they can close themselves up completely inside their shells. Omnivorous, they will eat everything from worms to strawberries, and even carrion. Now uncommon. (See page 2.)



Painted Turtle: This is the classic pond turtle in the Northeast. Found in slow waters, lakes, and weedy ponds and marshes throughout the region, these are the turtles you often see basking in a line on exposed logs and rocks. Close up, they have a colorful plastron or bottom shell, with a brightly patterned red and yellow stripe along the edge. Common.



Spotted Turtle: A beautiful turtle of ponds and marshes with a black shell and yellow spots. Formerly common; now this turtle's status is debated. Along with their vulnerability to habitat destruction, which affects all turtles, they appear to be sensitive to pollution. (See page 3.)



Snapping Turtle: The turtles people love to hate. These wrongly dreaded turtles of quiet waters have a bad reputation simply because on land they try to defend themselves rather than retreat into their shells. In fact, they don't have that much of a shell to retreat into. (See page 6.)

Outdoor Almanac ▲ Summer 2007



June 2007

June 21 Summer solstice, longest day of the year. Celebratory bonfires were lit in many European countries on this night.

June 23 Gray treefrogs begin singing about this time. Listen for their birdlike trill on sultry days just before a rain.



June 25 Bullfrog chorus begins; listen for them at night by ponds in rural areas.

June 30 Full moon. The Strawberry Moon.



July 2007

July 2 Day lilies are in bloom by this date; watch for them on roadsides along with other wildflowers. Most of the wildflowers you see by roadways (and many in fields as well) are nonnative species.



July 5 Watch for cardinals, indigo buntings, and snowy egrets.

July 7 Watch for adult toads in the garden. (Watch also for the tiny black baby toads on old dirt roads near water.)



July 8 Blueberries ripen.

July 11 Snowy tree crickets and katydids begin singing around this date.

July 14 New moon.

July 16 On warm summer nights, listen for the mournful wail of the screech-owl.



July 20 Cicadas, or seventeen-year locusts, may be whining in the trees on hot days by this time.

July 23 Meadowsweet and steeplebush bloom in old fields.



July 25 Shorebirds begin migrating. Watch for the flocks along the coast.

July 27 Look for the appearance of Indian pipes and beechdrops in forested areas.



July 29 Full moon. The Buck Moon.



August 2007

August 5 Yellow warblers and northern waterthrushes begin moving south.

August 8 Black fruits appear on the curving stems of Solomon's seal about this time of year.

August 9 New moon.

August 14 Sweet pepperbush blooms near lakes and ponds about this time; sniff the air for its spicy odor.

August 17 Woodland asters, the first asters of the season, begin blooming.

August 20 Cardinal flower is flowering along clean freshwater streams.

August 24 Nighthawk migration is in progress; watch for these slender-winged birds overhead at dusk.

August 26 Fall webworms begin to appear; watch for their nests at the tips of tree branches.

August 28 Full moon. The Sturgeon Moon.

September 2007

September 4 This is the peak of the fall warbler migration; watch for them in backyard shrubbery and treetops.

September 7 Asters bloom in wayside and woodland thickets.

September 11 New moon.

September 15 Broad-winged and sharp-shinned hawks migrate about this time of year. Watch the ridges on clear days with a north-west wind.

September 18 After rains watch the woodland floor for wild mushrooms.

September 23 Autumnal equinox. Days and nights are of equal length. First light frosts may occur about this date.