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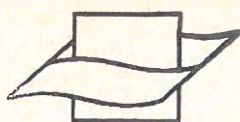
TURTLES

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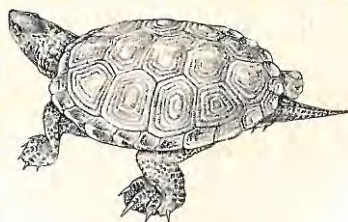
Vlaams Instituut voor de Zee
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MARYLAND TURTLES

FRANK J. SCHWARTZ, Curator

CHESAPEAKE BIOLOGICAL LABORATORY

SOLOMONS, MARYLAND



University of Maryland

Natural Resources Institute

Educational Series No. 79

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FOREWORD

The 1961 publication of **MARYLAND TURTLES** resulted in an increased awareness of these interesting members of Maryland's vertebrate fauna. New information stemming from this effort has been incorporated into this revision. The researches of Dr. J. Crenshaw, Jr. on the genus *Pseudemys*, especially *Pseudemys floridana*, Florida Cooter, has resolved much of the confusion regarding this species' true distribution and systematics in the state. Its occurrence must now be relegated to an "introduced" or "escape" category. Additional information is also on hand to confirm the Bog Turtle's tenacious survival in swampy-bog habitats adjacent to the Susquehanna River. Recent information has helped delineate the occurrence of the Atlantic Ridley turtle in the upper Chesapeake Bay. A new section has been added which discusses fossil turtles. It is hoped this edition will maintain interest in and further expand our knowledge of the turtles of the area.

A work of this nature is not possible without the helping hand of many people. To those from all walks of life, who furnished even the slightest bit of information that helps us to better understand the Maryland turtle fauna, my extreme thanks. Special thanks must be extended to Dr. J. Crenshaw, Jr., University of Maryland, for his valuable comments on the Florida cooters; Dr. James Peters and Dr. Doris Cochran of the U. S. National Museum, Division of Reptiles, for loan of and access to specimens in their care; Mr. J. Hardy of this institution, for many informative and stimulating discussions on Maryland's marine turtle fauna; Mrs. A. J. Mansueti for drawing the turtle illustrations; Dr. M. Tatro, Dr. V. Flyger, and Mr. E. Dunnington of this institution, for their constructive suggestions and review of the manuscript; and Mrs. Erma Mister for the courage to transcribe the poor handwriting of this author into a sensible, typed manuscript. To all, my sincerest thanks for without them this publication would not have been possible.

I hope the reader will call any error or omission he may find to my attention.

June 20, 1967

F. J. SCHWARTZ

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Maryland Turtles

INTRODUCTION

Turtles are familiar to most of us as a liquid — soup. To travelers who streak past in fast cars or boats, turtles appear as small flashes on the pavement or lake. To some of us, especially children, turtles are those small shell-protected animals which are sold as souvenirs in dime stores, often painted with a name such as "Little Orphan Annie." Swapping of these pets is a favorite pastime of children. To others, they are the surprise catches of fishermen or they resemble miniature, armed tanks basking on a sunlit log. To a few, a turtle may be the "beast" in the rain barrel awaiting fattening and eventually becoming turtle soup. To the local postmaster, who doesn't find them listed in his book of subject ratings, turtles are completely bewildering creatures which, for lack of suitable classification, have been shipped with the label, "dangerous insects." Lizards are sometimes mistaken for snakes, and salamanders for lizards, but a turtle can never be mistaken for anything but another turtle.

Turtles are reptiles and like the snakes, lizards, crocodiles and the lizard-like *Sphenodon* on New Zealand, they are vertebrates or back-boned animals. Furthermore, they are cold-blooded vertebrates, animals without heat-control abilities whose body temperatures approximate that of the surrounding air, water, or land. To distinguish them as a group, simply by saying that turtles are reptiles, doesn't resolve the problem, because other vertebrates, such as fish, frogs, and salamanders, are also backboned and cold-blooded. However, if we specify that these animals possess legs and a bony skeleton, fish are easily eliminated. Next, contrast the dry, horny outside covering of a turtle with the slimy or scaly one of a fish or the scaleless moist skin of amphibians, frogs, and salamanders. Among reptiles — snakes, lizards,

crocodiles and *Sphenodon* — turtles alone lack teeth and have shells fused with some parts of the backbone and ribs.

Since turtles are a distinct assemblage of animals and not "insects" as the postmaster noted, what do we know about these animals? What is known of their fossil history, size, distribution, reproduction, ecology, enemies, and relationship to man?

TURTLES — ANCIENT WORLD RESIDENTS

Turtles have existed nearly unchanged, except for size, for some 175 million years while other weird animals, plants, or objects, such as the dinosaurs, *Archeopteryx*, mastodon, rock formations, and types of man have appeared and disappeared from existence. A fossil turtle from South Dakota, the cretaceous marine *Archelon* of 100 million years ago, was a mere 12 feet long and probably weighed a ton. The gigantic *Golossochelys atlas*, perhaps the largest turtle that existed a million years ago, was a 6-foot shelled animal that stood some 4-5 feet high and roamed the hills of northern India. The largest North American species, and probably the largest land tortoise known, was *Testudo louisekressmanni* from the Pleiocene formation of Florida. The shell covering, or carapace, of this species was very high, arched, and over 7 feet long.

The earliest fossil turtle remains in the world occur in the middle Triassic beds of Germany. None are known in North America in geologic evidence below the upper Jurassic formations. A number of fossil turtles have been found in Maryland in beds that range from the Cretaceous to the Pleistocene. Most of these early records are based on fragmentary material, some of which has been lost.

The first reference to fossil turtle remains from the State occurs in Cope's 1867 publication as *Trionyx (Amyda) cellulosa* which subsequent authors have questioned and suspected to be Crocodilian rather than turtle in origin. Apparently, *Chelydra serpentina* and *Gistudo eurypygia*, reported in 1869, from Pleistocene deposits of Oxford Neck, Talbot County, constitute the first valid records of turtle fossil remains from Maryland. Subsequently, a number of fossil forms have been found in the State, especially in the cliffs common to Calvert and St. Mary's counties. The discovery of *Taphrosphys*, which has been considered a member of the Pleurodira or side necked turtles, is the most unique for it represents a group which today inhabits only tropical or subtropical regions of South America, Africa, Madagascar, and Australia. This discovery also suggests that Maryland's climate, ages ago, was much warmer than that of even present-day Beaufort, South Carolina.

To date, fossil turtles have been recovered from the lower Cretaceous, Eocene, Miocene, and Pleistocene deposits. The various species and the geologic formations they occupied are noted in Table 1. Records of *Amyda* and

Lytoloma require additional study and evidence before they can be accepted as valid turtle fossil material. Thus, ancient turtles have evolved, dispersed over the earth, and have disappeared into fossil history. Many modern forms, such as the green turtle and the bog turtle, are nearing extinction; but turtles seem to be plodding along at 0.6 miles per hour unchanged, unconcerned, on into eternity.

Today, the only living giant land turtles, the Galapagos Island tortoises, weigh a few hundred pounds and have shells 3-4 feet long. The present-day leatherback marine turtle is the largest living turtle, 7 feet long, and up to a ton in weight.

A FABLED CREATURE

It is surprising that with such a long geologic history there are relatively few references to turtles in man's writings, ancient paintings or carving. No mention of the turtle exists in the Bible (the reference to the "song of the turtle" refers to turtledoves and their spring courtship song). Aesop's fables mention the turtle twice. One story concerns the turtle and

Table 1. MARYLAND FOSSIL TURTLE RECORDS

SPECIES	FORMATION	AREA FOUND
<i>Psephophorus calvertensis</i>	Miocene	Chesapeake Beach, Calvert Co.
<i>Glyptops caelatus</i>	Lower Cretaceous	Muirkirk, Prince George's Co.
<i>Taphrosphys miocenia</i>	Miocene	Camp Roosevelt, Calvert Co.
* <i>Lytoloma</i> ? sp.	Miocene	Clifton Beach, Charles Co.
<i>Chelonia</i> ? <i>parvitecta</i>	Miocene	Plum Point, Calvert Co.
<i>Chelonia marylandica</i>	Miocene	Chesapeake Beach, Calvert Co.
<i>Chelydra serpentina</i>	Pleistocene	Oxford Neck, Talbot Co.
<i>Terrapene eurypygia</i>	Pleistocene	Oxford Neck, Talbot Co.
<i>Testudo ducateli</i>	Miocene	Chesapeake Beach and Plum Point, Calvert Co.
* <i>Amyda</i> ? <i>cellulosa</i>	Miocene	Plum Point, Calvert Co. and Charles Co.

* - Questionable turtle remains and species.

the eagle while the other deals with the famous race of the hare and the turtle, which the latter wins easily. Turtles are also noted in the "Adventures of Alice in Wonderland."

Ancient civilizations of Asia and South America carved turtle images on buildings, tablets, and even worshipped them. The Book of Rites of China names the tortoise as one of the benevolent, spiritual animals and through the centuries it has been honored as an emblem of longevity and the symbol of righteousness. The supreme ruler of China was determined by reading cracks that appeared when turtle shell bones were scorched. Shakespeare, in *Romeo and Juliet*, used a turtle shell, which hung in an apothecary shop, to create atmosphere. In other literature, turtles are associated with virtuous women. Likewise, Phidias' statue of *Venus* stands with one foot on the shell of a tortoise.

Some ancient Greeks thought the earth was a plate supported by 4 elephants standing on a big turtle. Turtles also played an important role in Indian mythology. Benvenuto Cellini, during the 16th Century, created the Rospigliosi gold cup which depicts an enameled dragon covered with precious stones, supporting a scallop cup, riding a box turtle. In Maryland, the turtle once was a subject of political import and debate with eventual legislation preventing owners from feeding turtle meat to their slaves more than twice a week. The turtle is perhaps best personified in American literature in "Tales of Uncle Remus" or as "Churchy" in the comic strip "Pogo." American Indians still make rattles of turtle shells to wear or use in ceremonial dances. Last, but not least, the turtle has a prominent place in scientific literature.

TERMINOLOGY AND BIOLOGY

The words turtle, tortoise, and terrapin often are used interchangeably without regard to name, size, shape, or description. A tortoise is strictly a land form with stump-shaped limbs. Terrapins, as they are referred to in

Maryland, are fresh or brackish-water turtle species which have a market value. The rest should be called turtles.

Turtles inhabit almost every type of aquatic and terrestrial habitat except the Arctic and Antarctic. More than 335 species of the living turtles currently known to science are divided between 2 major groups known as *Cryptodira* and *Pleurodira*. Most present-day turtles are semi-aquatic or marsh dwellers. There appear to be three major adaptive trends away from this habit: terrestrial, truly aquatic, or bottom dwelling. All three trends have involved a reduction of the shell size and thickness.

A turtle's shell consists of 2 distinct parts (Figure 1); the upper domed covering of the back is the *carapace* while the flattened lower half covering the abdomen is the *plastron*. The carapace is formed of dermal (skin) bones possibly fused to each other and to the underlying vertebrae and ribs and covered with large epidermal scales, the laminae. The plastron bones apparently evolved from parts of the shoulder girdle and from gastralia (dermal bones lying in the ventral body wall between the true ribs and the pelvis) and are also covered with laminae. These two shells are joined at each side by a narrow bridge. The plastron in some species (see species descriptions) is hinged, permitting complete ventral closure and protection. The ribs during development become fused to the carapace and remain straight, never curving down to meet the lower side of the body as in other vertebrates. The trunk or body vertebrae are fused and lost as part of the carapace. In contrast, the bones of the neck and tail remain motile. To alleviate the air breathing problem presented by the rigid shell, turtles have substituted, for the missing rib cage and its pumping action, movements of the limb girdles. To fill the lungs, the bones of the shoulder girdle rotate inward and forward while the pelvis are moved backward and downward. Aquatic turtles have thin-walled sacs in the tail that serve as "cloacal gills."

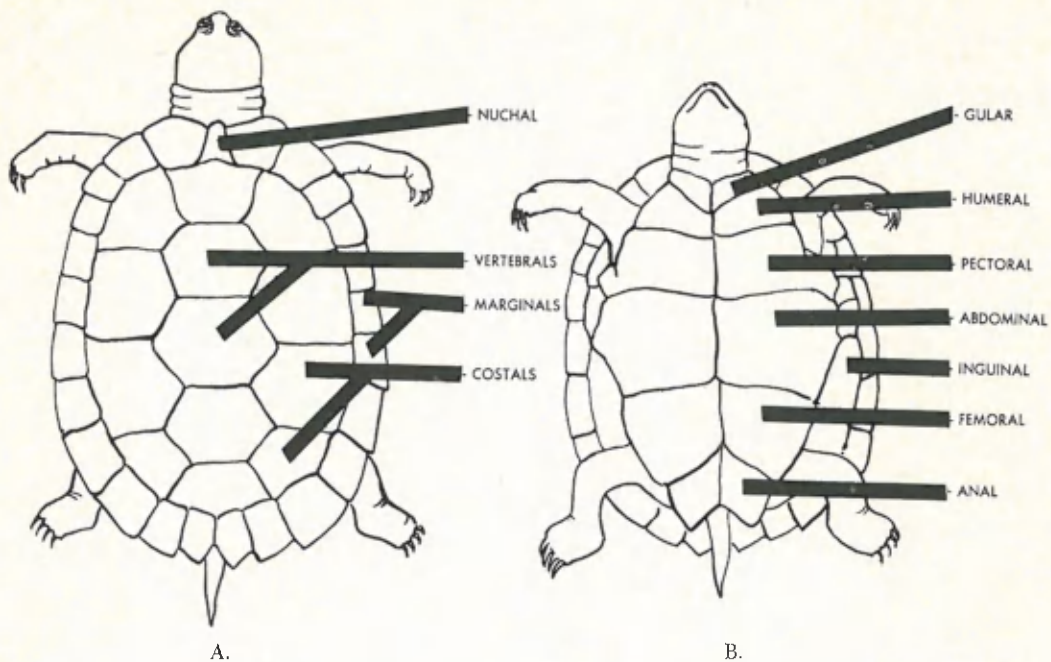


Figure 1. Shields of the carapace (A) and plastron (B) of a typical turtle.

Turtles do not have teeth. Instead, each jaw is usually covered with a long sheath, the beak, which has a sharp cutting edge. A few turtles, like the soft shelled and the leather-back turtle, have leathery shells rather than hard shells which are divided into scutes. Most turtles can retract their necks into the shell in a dorso-ventral plane. However, one group of "side necked turtles" exists today in tropical Africa, South America, and Australia which cannot retract their heads into their shells but must fold them sidewise along the carapace.

Turtles can close their eyes with the aid of eyelids. They have a complete ear but can't hear. Nevertheless, they possess keen sight, wide color spectrum discrimination and the ability to learn a maze or to distinguish between vertical and horizontal lines. These characteristics, and their general adaptability, in the light of ever changing habitats and conditions, will assure that turtles will continue to remain an interesting part of Maryland's reptile fauna.

Turtles no doubt outlive not only every other reptile but even man. Galapagos tortoises are known to live 152 years. The common box turtle sometimes lives a century. It is not uncommon for other species to live 50 years.

Male and female turtles may be distinguished in a number of ways. Males usually have longer tails, elongate forelimb claws, and a concave plastron. Among soft shelled turtles, females are usually larger and bulkier.

Courtship is a necessary preliminary to mating. This may span the range from a simple mounting of the female to more elaborate maneuvers. The painted turtle swims gently toward a female with his forelimbs outstretched to stroke the female's face by moving his long slender nails up and down. The giant tortoise prefers to approach the female uttering resounding roars, then violently pounds on her body for some period, interspersing this with caressing nipping of the legs and body. Mating usually occurs once a year, during the spring. These matings often serve to

fertilize eggs for 2-3 years, as in the case of the diamondback terrapin. Eggs are usually laid in a cup-shaped depression in moist earth or sand. Egg-laying may occur anytime both during the daylight hours or at night, as do the huge marine turtles. The number of eggs per clutch may range from 2-3 in small land turtles to several hundred in marine turtles.

TURTLE — RELATION TO MAN

Turtles are both beneficial and detrimental to man. They act as scavengers in ponds or lakes while feeding on dead fish and other animals or plants. Harmful features include destruction of fish, ducks, and garden vegetables. Turtles have many enemies during their lifetime including fish, sharks, skunks, raccoons, lizards, bears, hogs, crows, frigate birds, and man. The young are most vulnerable, just after hatching or during egg incubation, to many predators which deplete their numbers. Turtles are also susceptible to external and internal parasites which interfere with their movements. Leeches attach themselves to the soft parts of the shell of aquatic turtles and carnivorous insects often lay their eggs on the exposed soft parts of land turtles.

Maryland normally possesses 11 species and 2 subspecies, along with 4 of the possible 5 marine species, of turtles which inhabit land, fresh, brackish or oceanic water habitats as part of its reptile fauna. Six species have been introduced by man into the state to yield a total of 21 species of turtles recorded in Maryland. Many of these species are well known while others are so shy and secretive that almost nothing is known of their biology. Several turtles, especially the marine species, are only occasional visitors to Maryland's waters. A few turtles, like the green turtle, are being so heavily exploited elsewhere that the once proud and vast armadas that roamed the seas have dwindled to only a few thousand.

ECONOMIC VALUE

For many years turtles have served as food for man both as flesh and eggs, which are cooked, preserved, and candied. Sailing vessels carried turtles as ballast and as a source of fresh meat for the crew during prolonged voyages. In those days, too, terrapins played an important role in the economy of Maryland. An industry flourished between 1873-1897 when as much as 89,150 pounds, worth \$21,976, were caught. A portion was reared in pens or ponds and sold annually. In 1938, 6- or 7-inch females were worth 1 and 2 or 3 dollars, respectively. Gone are the 1917 days when terrapin sold for \$128.00 a dozen. Even as late as 1948, the best price amounted to only \$52.00 a dozen.

Today, a terrapin industry still flourishes in Wicomico County (Nanticoke River), Dorchester County (Little Choptank River), and St. Mary's County (Potomac River). The snapping turtle contributes to the turtle industry's recovery in Maryland in the following counties and rivers: Anne Arundel County (Magothy River, Whitehall Creek, Severn River, West River, Rhode River and Patuxent River); Kent County (Chester River, Fairlee Creek); Caroline County (Choptank River); Somerset County (Pocomoke River); Wicomico County (Nanticoke River); Calvert County (Patuxent River); and Charles County (Wicomico River). These rivers supplied, in 1964, 6,380 and 36,500 lbs. of terrapin and snapper meat, landings well below the peak catches of 436,500 pounds of terrapin in 1944 and 169,000 pounds of snapper meat in 1957 (Figure 2). Today, terrapins are increasing in number again since man's appetite for them appears to have waned. Perhaps with the shift in man's demand for this "delicacy" to that of frozen foods and TV dinners, turtle populations will resume their past prominence. Marine loggerhead turtles are often caught and sold in Virginia markets. However, they are so rare in the upper Chesapeake Bay that there is no fishery for this species in Maryland.

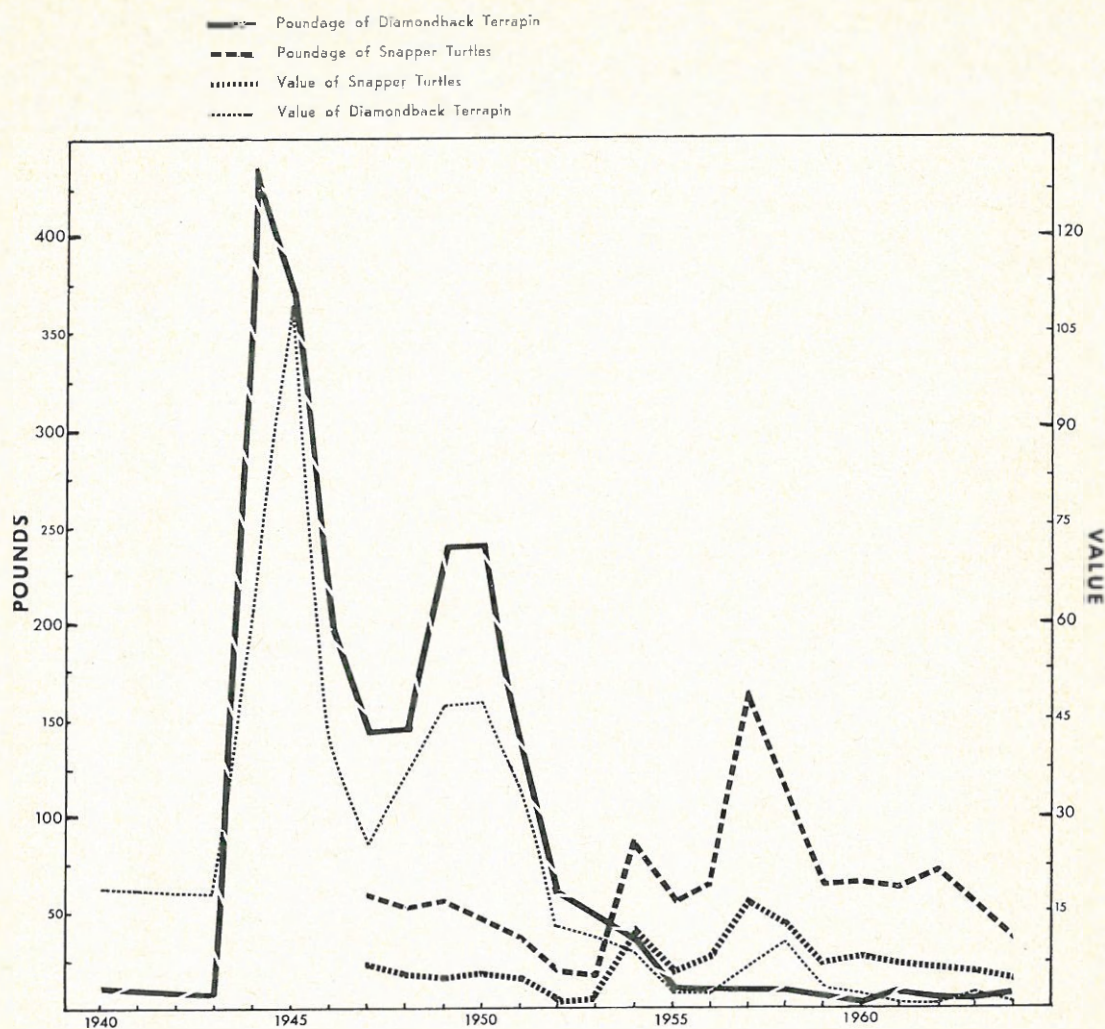


Figure 2. Poundage (in thousands) and value (in dollars) of Diamondback Terrapin and Snapper Turtle commercial catches, 1940-1964

IDENTIFICATION AND CONFUSION

Errors in identification have often added two unnaturally occurring species to Maryland's turtle fauna: Blanding's turtle, *Emys blandingi*, near Pimlico, and the midland painted turtle, *Chrysemys picta marginata*, at the Chain Bridge, District of Columbia, have been mistaken for the eastern painted turtle *Chrysemys picta picta*. Troost's turtle, *Pseudemys scripta troosti* and the red-eared turtle, *Pseudemys scripta elegans*, midwestern forms,

have escaped as pets and have now been established near Baltimore, Maryland. Likewise, a single record of the spiny soft shelled turtle, *Trionyx ferrox spinifera*, exists at the head of Rhode River. In 1961, a large 8 9/16 inch specimen of the Mississippi map turtle, *Graptemys kohni*, was caught in a haul seine in the Patuxent River, Maryland. All of the above are western or southern species that undoubtedly have been brought into the state as pets. The spiny soft-shell turtle was introduced to the Potomac River in 1883 from the

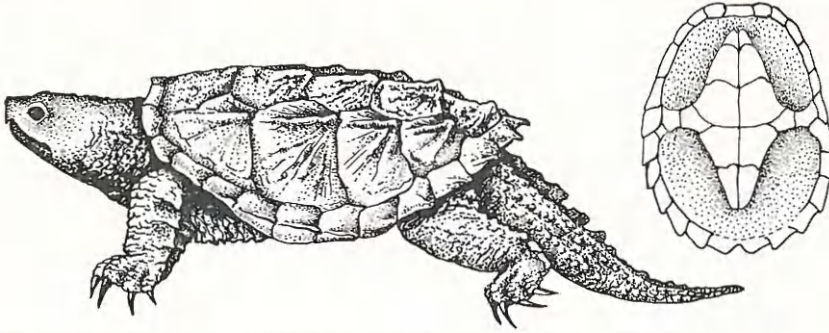
Ohio River near Moundsville, West Virginia. None have been captured or seen since and it is safe to conclude that introduction was a failure.

The identification of turtles depends primarily on the configuration of the head and shell, the arrangements of the plastral and carapical shields and the color pattern of the head and legs. The identifier must know the names of the shields (Figures 1A and B). The size of the turtle is expressed as the maximum

length of the carapace measured in a straight line.

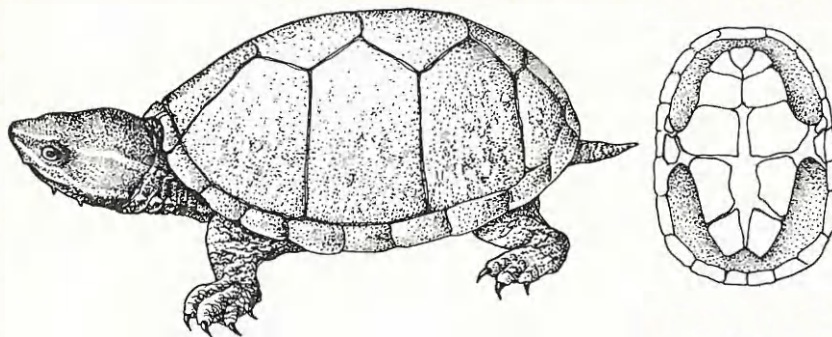
To use the key on pages 28-30, simply start at the first pair of choices and after you decide which best fits your specimen, follow that to the end of the line to either learn the turtle's name or to what choices you should next proceed. Continue selecting one from each pair of characters and eventually you should arrive at the identity of the turtle you are examining.

SNAPPING TURTLE—*Chelydra serpentina*



GENERAL DESCRIPTION:	Three-keeled shell, long tuberculate tail, small cross-shaped plastron and dorsolaterally placed eyes, dark grey-black colored.
SIZE:	Up to 18 1/2 inches long, average carapace one foot, plastron 8 inches. Reach weight of 86 pounds, usually 35 pounds or less.
LONGEVITY:	20 years, probably 1/4 century.
FOSSILS:	From Pleistocene (10,000 years ago) of Maryland, Oxford Neck, Talbot County.
SEXUAL DIMORPHISM:	Female may attain larger size without notable differences in form.
HABITAT:	Nearly any aquatic situation. Partial to lakes and ponds with muddy bottoms and submerged trees in association with vegetation.
BREEDING SEASON:	April to November, often in 2 or more clutches.
EGGS:	Spherical, tough, slightly over one inch. Up to 80, known to lay 52 eggs at 2 per minute in dry earth or sand within reach of water. Hatch in 81 days or may delay until following spring.
BREEDING BEHAVIOR:	Dorsal mounting with claws and legs tightly grasping female carapace, occasionally nipping each other's forelegs.
HABITS:	Very aggressive when cornered out of water, seldom so in water.
HIBERNATION:	Buries in mud or in bank muskrat holes to spend winter. Emerge in March.
MIGRATION:	Seems capable of long, extended journeys.
FOOD AND FEEDING:	Almost entirely carnivorous on crayfish, snails, fish, young waterfowl. Excellent scavenger.
KNOWN ENEMIES:	Man chief enemy. Young eaten by crows, hawks, various mammals and large fish. Eggs dug up by skunks, raccoons. External and internal leeches.
CAPTIVITY:	Hardy in captivity eating all sorts of foods.
ECONOMIC VALUE:	(See text). Source of food and scavenger. Eggs eaten fried.

STINKPOT—*Sternotherus odoratus*



GENERAL DESCRIPTION:

Carapace somewhat arched, may be spotted or streaked, with or without keel. Juvenile carapace with 3 keels which are lost as adults. Two yellow stripes along side of head. Barbels on chin and throat.

SIZE:

Carapace about $5\frac{3}{8}$ inches, plastron 3 inches, weight 8 ounces.

LONGEVITY:

At least 20 years.

FOSSILS:

Nothing Known.

SEXUAL DIMORPHISM:

Male tail longer and ends in blunt nail; female acutely pointed terminal nail, also tuberculated down middle of upper side. Both sexes with broad areas of skin between plastron scutes. Female with wider head than male when about 4 years old. Male with 2 patches horny scales on inner side of each hind leg. Males sexually mature at 3-4 years; female at 9-11 years.

HABITAT:

Shows little habitat preference, being found in lakes, streams and ditches alike.

BREEDING SEASON:

Mates actively during spring. Sperm life and retention long.

EGGS:

2-7 elliptical white, thick, brittle, shell $1\frac{1}{16} \times \frac{5}{8}$ inches, laid June to September between early morning and twilight. Site may be above ground near water in or on bare ground. Gregarious, often scattered or with many nests together. Hatch 60-75 days.

BREEDING BEHAVIOR:

Male chases female and mounts.

HABITS:

Aquatic, bottom-loving species. Weak swimmer and clumsy on land. Occasionally wanders onto land, avoids brackish water. Hisses, holds mouth open when captured, will bite.

HIBERNATION:

Often hibernates gregariously in mud bottoms.

MIGRATION:

Often some distance from water, especially during spring.

FOOD AND FEEDING:

Chiefly carnivorous, sometimes eats water plants. Possesses scavenger tendencies. Hunts food on bottom.

KNOWN ENEMIES:

Muskrats, crows. Eggs eaten by skunks, raccoons, herons and probably other animals. Parasitized by leeches.

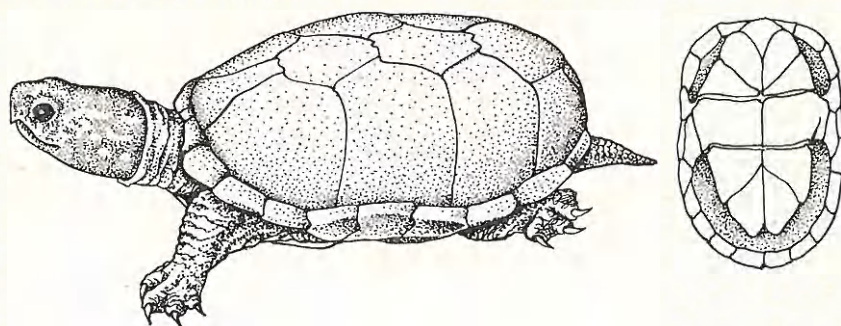
CAPTIVITY:

Highly odoriferous, secretive, aggressive nature. Hardy if kept. Easily fed.

ECONOMIC VALUE:

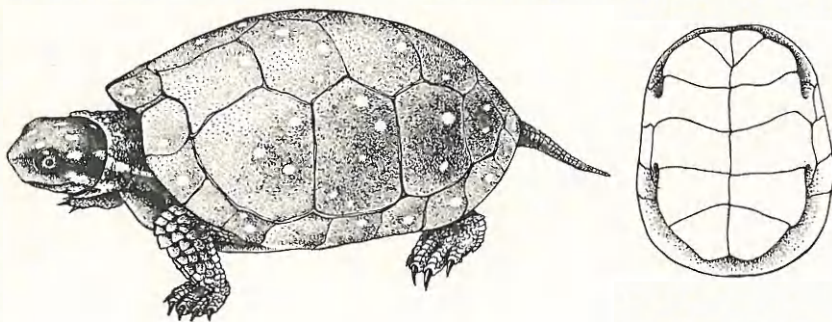
Flesh useless. Annoying to fishermen. No real value.

EASTERN MUD TURTLE—*Kinosternum subrubrum subrubrum*



GENERAL DESCRIPTION:	Carapace smooth, domed, keelless, without light stripes. Plastron with two hinges. Stiff bridge. Side of head plain or mottled with yellow, but not striped.
SIZE:	Carapace little over 4 inches, plastron 3 inches.
LONGEVITY:	Up to 38 years.
FOSSILS:	Known in Pliocene formations.
SEXUAL DIMORPHISM:	Male tail longer and ends in blunt nail; female slender, pointed. Male with 2 patches of horny scales on inner side of hind legs. Rear plastron notched in male.
HABITAT:	Most frequently seen in quiet water with abundant vegetation and mud bottom. Often in brackish marshes.
BREEDING SEASON:	May-June.
EGGS:	2-5 elliptical white, hard, thick and brittle, $1\frac{1}{4} \times \frac{5}{8}$ inches, laid in earthen nest 5 inches deep. Hatch in September or October or winter in nest.
BREEDING BEHAVIOR:	Little known except mates under water.
HABITS:	Less aquatic than musk turtle. Bottom inhabitant. Good swimmer. Less odoriferous and more passive than musk turtle.
HIBERNATION:	Little known except some have been found in holes a few feet from water.
FOOD AND FEEDING:	Fish, insects, worms, but really not well studied.
KNOWN ENEMIES:	Snakes, mammals, crows.
CAPTIVITY:	Secretive, prefers to feed in water but can be kept in aquaria.
ECONOMIC VALUE:	None.

SPOTTED TURTLE—*Clemmys guttata*



GENERAL DESCRIPTION:

Carapace smooth, black with numerous small round yellow or orange spots; plastron with large black blotches. With age, spots develop on legs and tail.

SIZE:

Seldom more than 5 inches, carapace usually 4 1/2 inches, plastron 3 3/8 inches. Weight - few ounces.

LONGEVITY:

Up to 42 years in captivity.

FOSSILS:

From Eocene formations.

SEXUAL DIMORPHISM:

Male eye dark brown, yellow stripe along lower jaw lacking. Throat speckled with orange or yellow; female eye bright orange, both jaws pale yellow, lower jaw yellow stripe conspicuous. Throat spotted with yellow.

HABITAT:

Desires quiet or sluggish water with mud bottoms and low vegetation. Sometimes in mountain streams, canals or lakes. Often in brackish water.

BREEDING SEASON:

April to May

EGGS:

2-4 elliptical white eggs. 1 1/8 x 5/8 inches laid in flask-shaped hole near water. Hatch in 82 days.

BREEDING BEHAVIOR:

Mates and courts in or out of water. Nest made in afternoon or evening. Little else known.

HABITS:

Extremely wary, likes to bask. None aggressive. Readily buries in mud bottom if startled.

HIBERNATION:

Little known but apparently between November and March.

FOOD AND FEEDING:

Chiefly insectivorous, some plant life and vertebrates such as frogs, salamanders and tadpoles.

KNOWN ENEMIES:

Little known.

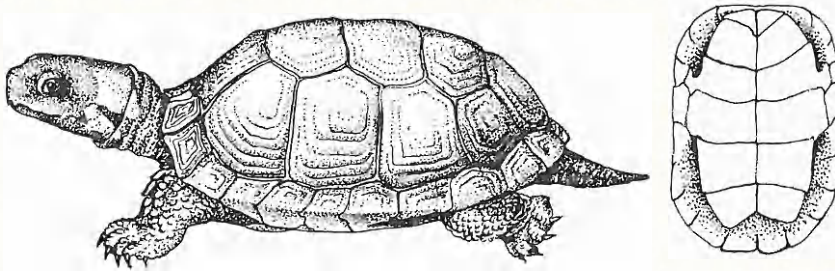
CAPTIVITY:

Excellent pet; no aggressiveness.

ECONOMIC VALUE:

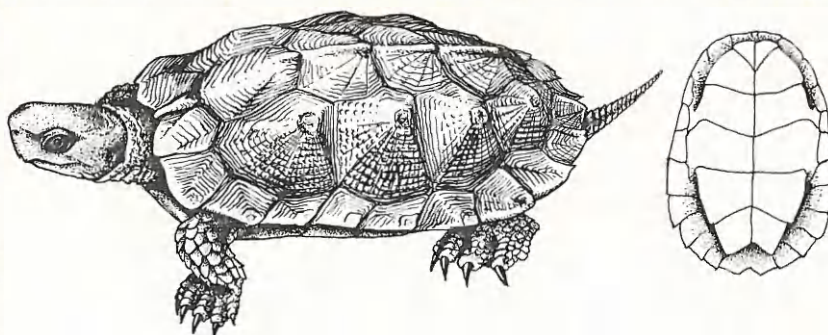
Apparently aesthetic, as too small to be eaten, makes attractive pet.

BOG (MUHLENBERG'S) TURTLE—*Clemmys muhlenbergi*



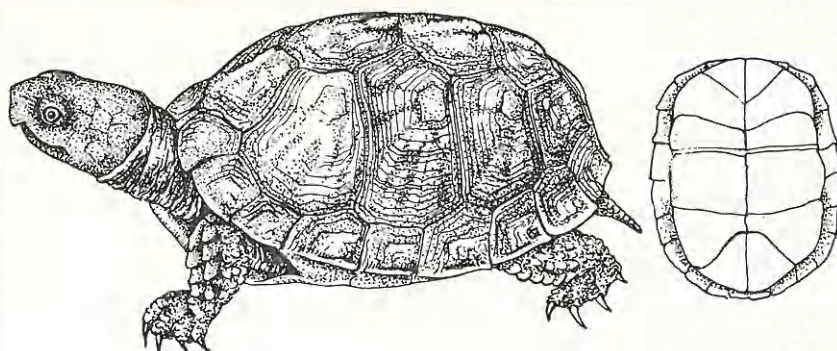
GENERAL DESCRIPTION:	Conspicuous orange blotch often yellowish, may be split on side of head. Shell feebly keeled, dark brown to black. Scales show concentric markings on carapace. Plastron black, irregularly marked with yellow or red.
SIZE:	Up to 4 inches, carapace usually 3 1/2 inches, plastron 2 3/8 inches, weight less than 1/2 pound.
LONGEVITY:	Unknown.
FOSSILS:	Eocene formations.
SEXUAL DIMORPHISM:	Male tail thicker and longer than female. Male plastron concave, female flat. Heavy forelimb claws. Male may have some claws turned outward, females are straight.
HABITAT:	Sphagnum bogs, small streams and wet marshes, or on dry land.
BREEDING SEASON:	Almost nothing known — except eggs are laid in June.
EGGS:	Elliptical, 1 1/4 x 5/8 inches.
BREEDING BEHAVIOR:	Unknown.
HABITS:	Aquatic, equally at home on land. Otherwise, little known. Found up to altitudes of over 4,000 feet often with spotted turtle.
HIBERNATION:	Little known.
FOOD AND FEEDING:	Believed to be omnivorous.
KNOWN ENEMIES:	Unknown. Probably man most destructive in draining suitable marsh habitats.
CAPTIVITY:	Does well and will eat raw meat, earthworms, beetles and berries in captivity. Will feed in or out of water.
ECONOMIC VALUE:	Because of its rarity this species should not be considered as food or for other uses.

WOOD TURTLE—*Clemmys insculpta*



GENERAL DESCRIPTION:	Body soft parts orange-red. Carapace dark scultured and keeled. Plastron yellow. Upper jaw usually notched. Legs reddish or salmon colored.
SIZE:	May measure 9 inches. Carapace usually $6 \frac{3}{4}$, plastron $6 \frac{5}{8}$ inches, weight to near a pound.
LONGEVITY:	Lives at least 5 years. One known for 58 years.
FOSSILS:	Pleistocene of Pennsylvania.
SEXUAL DIMORPHISM:	Male plastron concave; female convex. Male with long claws and prominent scales on fore surfaces of legs. Male tail length in front of anus twice that of female.
HABITAT:	Both aquatic and trrestrial, usually where some moisture exists.
BREEDING SEASON:	May to October.
EGGS:	7-12 elliptical $1 \frac{1}{2} \times 1 \frac{1}{16}$ inches, white. Buried in sand in afternoon. Hatch September to October.
BREEDING BEHAVIOR:	Courtship begins with elaborate dance and whistling by both sexes and ends with mating under water. Males' legs firmly grasp female carapace.
HABITS:	Active on land and in water, excellent swimmer. Not aggressive, but will bite. Harmless. Intelligent.
HIBERNATION:	Early October to March in deserted muskrat holes along streams or in mud bottom streams.
FOOD AND FEEDING:	Omnivorous, with strong preference for vegetables, fruits, berries and mushrooms.
KNOWN ENEMIES:	Skunk, fish.
CAPTIVITY:	Excellent pet, often shy. Will mate in captivity.
ECONOMIC VALUE:	Sometimes eaten. Once had commercial value, none today. Often sold as a terrapin substitute.

BOX TURTLE—*Terrapene carolina carolina*



GENERAL DESCRIPTION:

Medium-sized land turtle with dark brown, domed and slightly keeled shell usually marked with yellow or orange dots, lines or blotches, often forming letters C, E, or F. Plastron yellow with black blotches and hinged fore and rear to permit complete ventral closure.

SIZE:

Up to 6 inches, generally 5 3/8 inch carapace, plastron 5 1/4 inches, weight 1/2 to 3/4 pound.

LONGEVITY:

Often a century or more. Usually 30-40 years.

FOSSILS:

Pleistocene of Indiana and Pennsylvania.

SEXUAL DIMORPHISM:

Male plastron concave; female flat. Male eye bright red; female dark red, brown or grey. Males usually larger. Male hind claws shorter than female.

HABITAT:

Woodland species where some moisture exists. Will swim if necessary.

BREEDING SEASON:

May to October.

EGGS:

Eight elliptical, thin, flexible, white 1 5/16 x 3/4 inches. Laid June-July or late autumn in earth nest. Can lay eggs without remating from stored sperm. Hatch spring to November.

BREEDING BEHAVIOR:

Male chases female viciously biting shell and legs. Mounts and with rear legs entwined and at nearly 90° angle copulation takes place.

HABITS:

Diurnal and solitary. Slow and deliberate moving. During entire lifetime may wander over an area only a few hundred feet in diameter.

HIBERNATION:

In loose soil or burrows from October to February. Estivate in mud during summer hot dry spells.

FOOD AND FEEDING:

Ranges from insect larva, snails, worms and slugs to fungi, berries, fruit and often poisonous mushrooms.

KNOWN ENEMIES:

Man, large birds, rats, crows; skunks and dogs dig out and destroy eggs. Parasitized by North American chigger and bot fly.

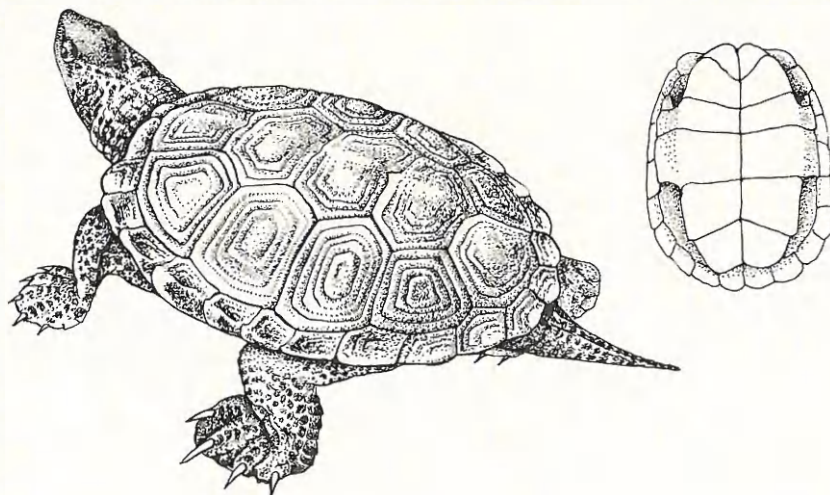
CAPTIVITY:

Excellent pets. Docile.

ECONOMIC VALUE:

No food value, serves as insect control, often harmful to garden crops.

NORTHERN DIAMONDBACK TERRAPIN—*Malaclemmys terrapin terrapin*



GENERAL DESCRIPTION:

Conspicuously raised concentric ridges on each side of a parallel shell. Head and neck without yellow stripes but black spots on grey. Body ground light grey on brown color. Plastron colored from yellow to green-grey. Some black mottling on head and legs. Head and skin coloration highly variable. Widely stocked within State as well as in other Atlantic coastal states. Much confusion centers around possible hybrids with southern stocks of this turtle once introduced from North Carolina.

SIZE:

May reach 9 1/2 inches. Female carapace usually 7-8 inches, male 5 inches. A pound or more in weight.

LONGEVITY:

Perhaps over 40 years.

FOSSILS:

Era uncertain.

SEXUAL DIMORPHISM:

Female larger, head more rounded, deeper shell and shorter tail than male.

HABITAT:

Salt and brackish marshes and rivers.

BREEDING SEASON:

May to August, but one copulation may suffice for 3 or 4 years.

EGGS:

5-29 white 1 2/5 x 4/5 inches laid near water. Maximum 123 eggs in one clutch. Hatch in 90 days.

BREEDING BEHAVIOR:

Generally unknown except female lays 4-6 eggs in nests only a few inches apart.

HABITS:

Aquatic. Likes to bask.

HIBERNATION:

In mud bottoms of streams and ponds.

FOOD AND FEEDING:

Eats crustaceans and molluscs in or out of water.

KNOWN ENEMIES:

Muskrats, crows, skunks, raccoons, man.

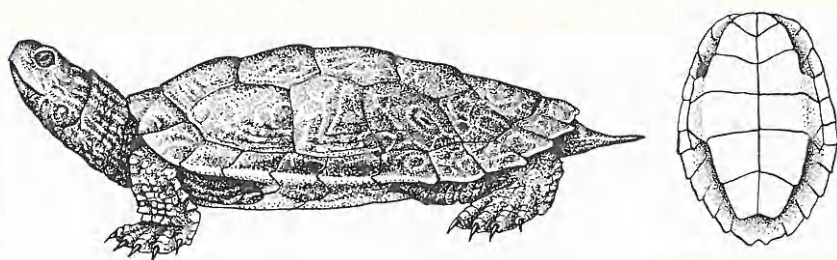
CAPTIVITY:

Hardy. However, young are well adept escape artists.

ECONOMIC VALUE:

(See text) Most highly favored of turtles for food. Supports thriving industries in numerous areas and states.

MAP TURTLE—*Graptemys geographica*



GENERAL DESCRIPTION:

Carapace slightly keeled with flared, serrate posterior edge; olive with network of light lines. Plastron yellowish to white and generally unmarked. Head has elongated spot on side not attached to other markings. Distinct vertical line between spot and eye. Neck with numerous longitudinal yellow stripes.

SIZE:

To 11 inches. Generally 9 inch carapace, plastron 7 inches on larger female. Weight 1/2 pound or so.

LONGEVITY:

Unknown.

FOSSILS:

Oligocene.

SEXUAL DIMORPHISM:

Male tail longer. Female carapace rounded posteriorly.

HABITAT:

Back waters, sloughs of rivers and lakes to ponds. Almost strictly aquatic.

BREEDING SEASON:

May to July.

HABITS:

Gregarious, likes to bask. Prefers large bodies of water—rivers and lakes.

HIBERNATION:

May not hibernate during winter; if they do, utilize mud bottom or muskrat holes. Emerge by April.

FOOD AND FEEDING:

Main food freshwater molluscs, but also eat crayfish, aquatic insects, fish carrion.

KNOWN ENEMIES:

Man, mammals and leeches.

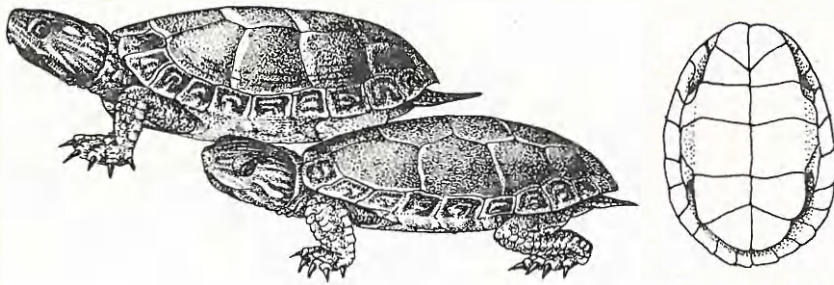
CAPTIVITY:

Shy, may not feed and may try endlessly to escape.

ECONOMIC VALUE:

Important fish predator. Edible but not generally marketed.

EASTERN PAINTED TURTLE—*Chrysemys picta picta*
MIDLAND PAINTED TURTLE—*Chrysemys picta marginata*



GENERAL DESCRIPTION:

Small, flat, smooth-shelled turtle with red markings on shell edge. Notched upper jaw with cusp to each side. Plastron plain yellow or reddish. Head olive, legs with yellow or red stripes. In Midland Painted Turtle, carapace scute sutures are alternately united whereas on Eastern Midland Turtle they run straight across carapace.

SIZE:

Usually 6-7 inches. Carapace 7 inches, plastron 6 3/4 inches unhinged. Weight less than a pound.

LONGEVITY:

About 20 years.

FOSSILS:

Eocene era.

SEXUAL DIMORPHISM:

Female larger and broader than male; tail longer in male. Male develops long fore claws during breeding season.

HABITAT:

Aquatic. Ponds, streams and lakes with vegetation.

BREEDING SEASON:

April to July. Mating in spring and autumn.

EGGS:

5-8 smooth, elliptical, soft-shelled blunt eggs laid May to July in soft soil in woods or open country in late afternoon. Incubation may last year but is generally less.

BREEDING BEHAVIOR:

Swims facing front of female. Gently extends long claws to stroke lores of female lightly. Actual copulation not observed.

HABITS:

Gregarious. Diurnal, shy. Agile swimmers. Like to bask. Rather sedentary. Often wander far from water.

HIBERNATION:

In mud or bottom debris. October to March.

FOOD AND FEEDING:

Omnivorous and generally swallow food under water. May serve as scavengers.

KNOWN ENEMIES:

Man, leeches, skunks, squirrels and raccoons.

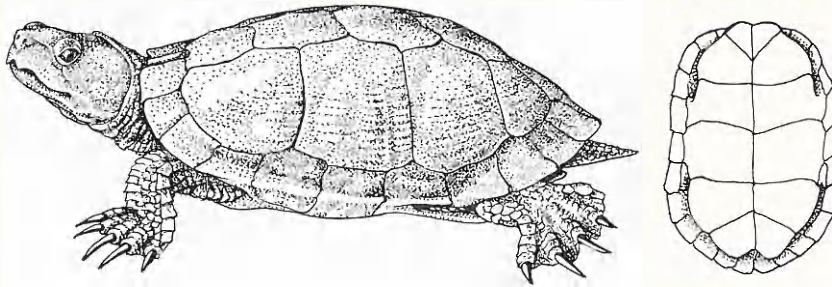
CAPTIVITY:

Excellent pet, breed readily.

ECONOMIC VALUE:

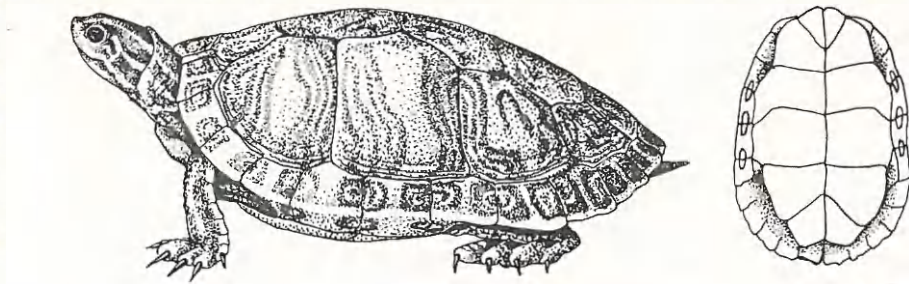
Flesh is palatable but too small for real value. Have been sold for \$1.00 per dozen or as a terrapin substitute.

RED-BELLIED TURTLE—*Pseudemys rubriventris*



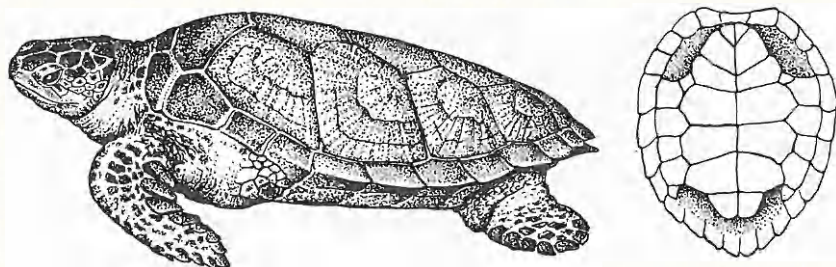
GENERAL DESCRIPTION:	Upper jaw high and strongly notched and flanked by prominent cusp. Stripes on head not interrupted to form bars or spots. Plastron red colored.
SIZE:	May reach 16 inches, but usually 10 inches. Weight several pounds.
LONGEVITY:	Unknown.
FOSSILS:	Pliocene era.
SEXUAL DIMORPHISM:	Male has long forelimb claws. Female larger than male and has convex plastron; male flat. Old males mottled with reddish brown, females have vertical reddish line on each of first 3 costal scutes.
HABITAT:	Streams, rivers, marshes, ponds, lakes and often brackish water.
BREEDING SEASON:	June and July.
EGGS:	May lay 2 clutches of 6-12, 1 x 3/4 inches, elliptical, white eggs. Laid in June or July in cultivated sandy clay or loam near water 4 inches deep.
BREEDING BEHAVIOR:	Unknown.
HABITS:	Excellent swimmer. Often found in deep water. Shy, alert. Hisses when annoyed. Likes to bask.
HIBERNATION:	Perhaps on shallow bars. Apparently doesn't hibernate.
FOOD AND FEEDING:	Omnivorous, needs to swallow under water.
KNOWN ENEMIES:	Crows, man.
CAPTIVITY:	Lives well, becomes very tame. Feeds well on variety of foods.
ECONOMIC VALUE:	Often sold as substitute for Diamondback Terrapin. Once supported good industry in Maryland, but nothing since 1883.

FLORIDA COOTER—*Pseudemys floridana floridana*



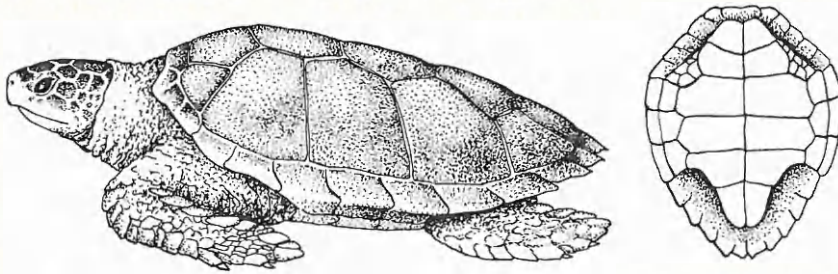
GENERAL DESCRIPTION:	Good-sized, high, brown-shelled turtle with yellow marking on shell, neck and top of head. Upper jaw not notched or weakly serrate. Plastral pattern unmarked yellow. Hollow ovals on underside of marginals.
SIZE:	Female up to 12 inches, males smaller - 9 inches. Up to 6 1/2 pounds in weight.
LONGEVITY:	Unknown.
FOSSILS:	Pliocene.
SEXUAL DIMORPHISM:	Males with elongated claws on forelimbs. Smaller head and size than female.
HABITAT:	Little discrimination, found in rivers, ponds, swamps or marshes.
BREEDING SEASON:	Unknown.
EGGS:	Unknown.
BREEDING BEHAVIOR:	Unknown.
HABITS:	Shy. Likes to bask.
HIBERNATION:	Unknown.
FOOD AND FEEDING:	Algae.
KNOWN ENEMIES:	Bears, raccoons, snakes, man, sewage and pollution.
CAPTIVITY:	Extremely wary.
ECONOMIC VALUE:	None.
DISTRIBUTION:	Known from one record near Baltimore, Maryland. Apparently a discard or escapee. All previous records assigned to this species upon reexamination of the species group were based on <i>Pseudemys rubriventris</i> . Nearest known localities now are from the Rappahannock River 5 miles SE of Fredericksburg and Dismal Swamp, Virginia.

GREEN TURTLE—*Chelonia mydas mydas*



GENERAL DESCRIPTION:	Paddle shaped limbs with one claw. A single pair of shields, prefrontals, between the eyes. Four costal shields, the first of which does not touch the nuchal.
SIZE:	Carapace to 4 feet long and generally 300 pounds. The record weight is 800 pounds. In Maryland usually weight 250 pounds or less.
LONGEVITY:	Captive specimen lived for 15 years.
FOSSILS:	Miocene, Chesapeake Beach, Maryland.
SEXUAL DIMORPHISM:	Female tail short and rarely extends beyond carapace. Male tail to end of extended flippers.
HABITAT:	Lagoons and shoals of continents near sand or mud beaches or areas of vegetation.
BREEDING SEASON:	March to September depending on latitude, later in the year with northerly latitude. Often emerge as many as 7 times to lay eggs. Seldom more than twice per season.
EGGS:	Spherical, soft-shelled, white eggs $1 \frac{5}{8}$ inches in diameter, several hundred (100-175) to nest. Hatch in 47-62 days.
BREEDING BEHAVIOR:	Mate at sea with male dorsally mounted holding female with fore flippers. Mate before and during breeding season usually at night, perhaps into the day. May dig many nests before laying eggs 2 at a time in more than one clutch.
HABITS:	Sleep floating or often on rocky island ledges.
HIBERNATION:	Uncertain.
FOOD AND FEEDING:	Eel grass, algae, crabs, snails. Herbivorous.
KNOWN ENEMIES:	Man worst enemy. Sharks, rats, raptorial birds, gulls, raccoons.
CAPTIVITY:	Docile, easy to keep. Require little attention if kept in natural waters. Feed crabs, fish, clams if placed in aquarium.
ECONOMIC VALUE:	Most valuable of sea turtles for food, eggs or oil. Exploitation has brought species to near extinction.

ATLANTIC LOGGERHEAD TURTLE—*Caretta caretta caretta*



GENERAL DESCRIPTION:	Flippers with 2 claws. Two pairs of shields, prefrontals, between eyes; 5 rows of costals, the first of which always touches nuchal.
SIZE:	Generally carapace 28-84 inches. Weight of 300 pounds. Record is 9 feet, 850 pounds. Those in Maryland usually of 150-300 pounds in weight.
LONGEVITY:	In captivity known to live 33 years.
FOSSILS:	Pleistocene of Florida.
SEXUAL DIMORPHISM:	Male tail reaches beyond end of flipper; female to edge of carapace.
HABITAT:	Marine, occasionally entering streams and lagoons where vegetation may exist.
BREEDING SEASON:	May to August, depending on latitude.
EGGS:	Soft, white, spherical egg approximately 1 5/8 inches in diameter, laid usually in 3 separate clutches up to 150 in number. Hatch in 2 months.
BREEDING BEHAVIOR:	Female migrates to high tide after dark to lay eggs. Mating probably at sea.
HABITS:	Fairly aggressive. Sleep while floating.
HIBERNATION:	None. Known to withstand temperature as cold as 13° F.
FOOD AND FEEDING:	Crabs, shellfish, conchs, fish and jellyfish. Carnivorous.
KNOWN ENEMIES:	Pigs and raccoons destroy nests. Man most destructive.
CAPTIVITY:	Quite readily adaptable; however, occasionally are overly aggressive.
ECONOMIC VALUE:	Eggs are a delicacy, flesh inferior to that of the Green Turtle. Oil is often used to soften leather.

KEY TO THE TURTLES FOUND IN OR INTRODUCED (*) INTO MARYLAND

1	Limbs modified into flippers	20
1	Limbs not modified into flippers, but with claws	2
2	Shell covered with horny scutes	3
2	Shell not covered with horny plates, leathery— Eastern Spiny Soft Shell Turtle, <i>Trionyx ferox spinifera</i> *	
3	Tail longer than hind legs, rough with high tubercles or scales on its upper surface— Snapping Turtle, <i>Chelydra serpentina</i>	
3	Tail shorter than hind legs, without dorsal tubercles	4
4	Plastron with less than 12 plates, carapace does not flare outward	5
4	Plastron with 12 or more plates, carapace does flare outward	6
5	Head with two yellow lines on each side, pectoral plate rectangular, one hinge— Stinkpot, <i>Sternotherus odoratus</i>	
5	Head without two yellow lines on each side, pectoral plate triangular, 2 hinges— Eastern Mud Turtle, <i>Kinosternum subrubrum subrubrum</i>	
6	Plastron with one transverse hinge, 5th toe of rear foot absent— Box Turtle, <i>Terrapene carolina carolina</i>	
6	Plastron with 2 or without hinges, 5th toe present but clawless	7
7	Carapace with small yellow spots— Spotted Turtle, <i>Clemmys guttata</i>	
7	Carapace without small yellow spots	8
8	Head and neck with longitudinal yellow stripes	9
8	Head and neck without longitudinal yellow stripes	17
9	Upper jaw not notched in front	10
9	Upper jaw notched in front	12
10	Length of lower jaw symphysis 1/4 longer than distance between orbits (Figure 3), small (narrower than orbit) more or less triangular; yellow spot behind eye; a distinct vertical light line between spot and eye; mid dorsal spines not prominent— Map Turtle, <i>Graptemys geographica</i>	

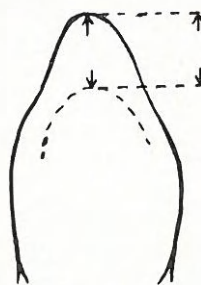


Figure 3. Measurement of Symphysis length on lower jaw.

10 Length of lower jaw symphysis equal to or less than least interorbital distance; mid-dorsal spines prominent and knoblike 11

11 A large (at least as wide as diameter of orbit) crescentic or transverse yellow spot or line behind eye. No or only faint lines between this spot and eye; neck stripes reach the eye—
False Map Turtle, *Graptemys pseudogeographica**

11 A crescentic yellow line behind ($1/2$ as wide as) eye that extends downward and forward under the eye; neck stripes never reach eye; spines of vertebral shields broadened and knob-like—
Mississippi Map Turtle, *Graptemys kohli**

12 First marginal extending beyond suture between 1st costal and 1st vertebral (Figure 4) 13

12 First marginal not extending beyond suture between 1st costal and 1st vertebral 16

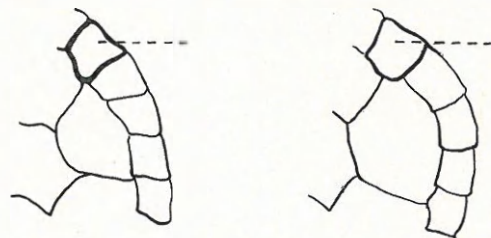


Figure 4. Anterior marginal shields not extending as in *Chrysemys* (A) and extending beyond suture between 1st costal and vertebral as in *Pseudemys* (B).

13 Lower jaw when viewed head-on is rounded (Figure 5) 14

13 Lower jaw when viewed head-on is flattened 15

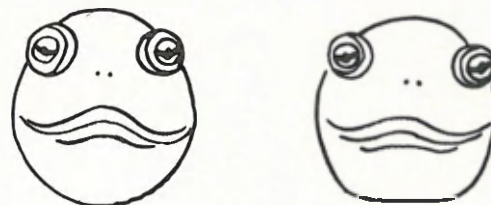


Figure 5. Head-on view of lower jaw illustrating rounded (A) and flattened (B) lower jaw conditions.

14 Vertical black bars present on upper jaw, yellow stripe behind eye—
Cumberland Turtle, *Pseudemys scripta troosti**

14 Vertical black bars absent on upper jaw, broad red stripe behind eye—
Red-eared Turtle, *Pseudemys scripta elegans**

15 Upper jaw toothed and serrated, plastron reddish with or without dark blotches—
Red-bellied Turtle, *Pseudemys rubriventris*

15 Upper jaw weakly toothed and serrated or not so, plastron yellow—
Florida Cooter, *Pseudemys floridana floridana**

16 Scute sutures of carapace run straight across—
Eastern Painted Turtle, *Chrysemys picta picta*

16 Scute sutures of carapace do not run straight across but alternate—
Midland Painted Turtle, *Chrysemys picta marginata*

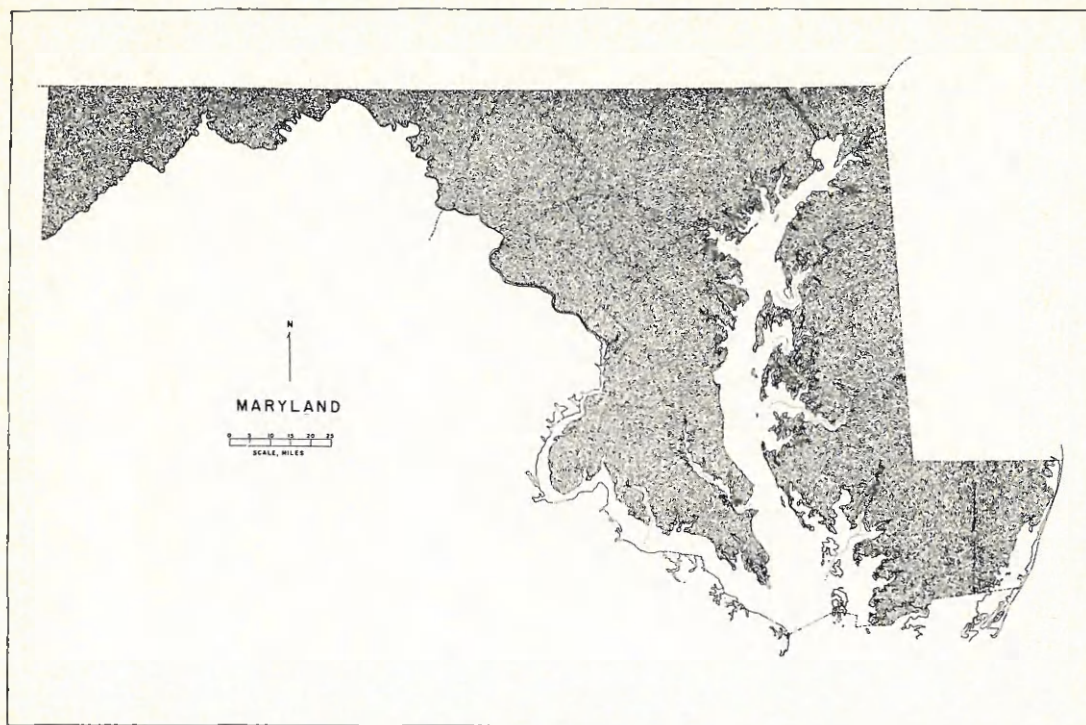
17 Head with large orange-yellow spot on each side—
Bog Turtle, *Clemmys muhlenbergi*

- CONANT, R. 1958a. Field guide to reptiles and amphibians of the United States. Houghton Mifflin Co., Boston. xv+366.
- . 1958b. Annotated check list of the amphibians and reptiles of Del-Mar-Va Peninsula.
- COOPER, J. E. 1947. Records of the Loggerhead Turtle in Maryland. Nat. Hist. Soc. Md. Jr. Soc. News. 3(14):2.
- . 1949. Additional records for *Clemmys muhlenbergi* from Maryland. Herpetologica 5:75-76.
- . 1959. The turtle *Pseudemys scripta* feral in Maryland. Herpetologica 15:44.
- . 1960. Distributional Survey V: Maryland and the District of Columbia. Bull. Phila. Herpetological Soc. May-June 18-24 pp.
- . 1961. Further notes on non-indigenous turtles in Maryland. Herpetologica 17:209-210.
- DAWSON, W. A. and R. D. WEYMOUTH. 1965. Active uptake of sodium by softshell turtles. Science 149(36-79):67-69.
- FLETCHER, A. M. 1965. Care of pet turtles. Aquarium J. 36(4):161-166.
- FOWLER, H. W. 1915. Some amphibians and reptiles of Cecil County, Maryland. Copeia (22):37-40.
- . 1925. Records of amphibians and reptiles for Delaware, Maryland and Virginia II. Maryland. Copeia (145):61-64.
- GOIN, C. J. and OLIVE B. GOIN. 1962. Introduction to herpetology. W. H. Freeman Co., San Francisco. ix+341.
- GOULD, E. 1959. Studies on the orientation of turtles. Copeia (2):174-176.
- HARDY, J. D., JR. 1962. Comments on the Atlantic Ridley Turtle, *Lepidochelys olivacea kempi*, in the Chesapeake Bay. Chesapeake Sci. 3(3):217-220.
- HAY, O. P. 1901. The fossil turtles of North America. Publ. Carnegie Inst. Wash. 75:1-568, 113 pls.
- HAY, W. P. 1902. The list of Batrachians and reptiles of the District of Columbia and vicinity. Proc. Biol. Soc. Wash. 15:121-145.
- HIGGINS, E. 1939. Progress in biological inquiries, 1936. Rept. U. S. Comm. Fish. 1937. Appendix (3):1-61.
- HILDEBRAND, S. F. and C. HATAL. 1932. Growth of the Diamondback Terrapins, size attained, sex ratio and longevity. Zoologica 9:551-563.
- and H. F. PRYTHERCH. 1947. Diamond-back Terrapin culture. U. S. Fish & Wildl. Serv. Fish. Lft. (216):1-6.
- KEIM, T. D. 1914. Amphibians and reptiles of Jennings, Maryland. Copeia (2):2.

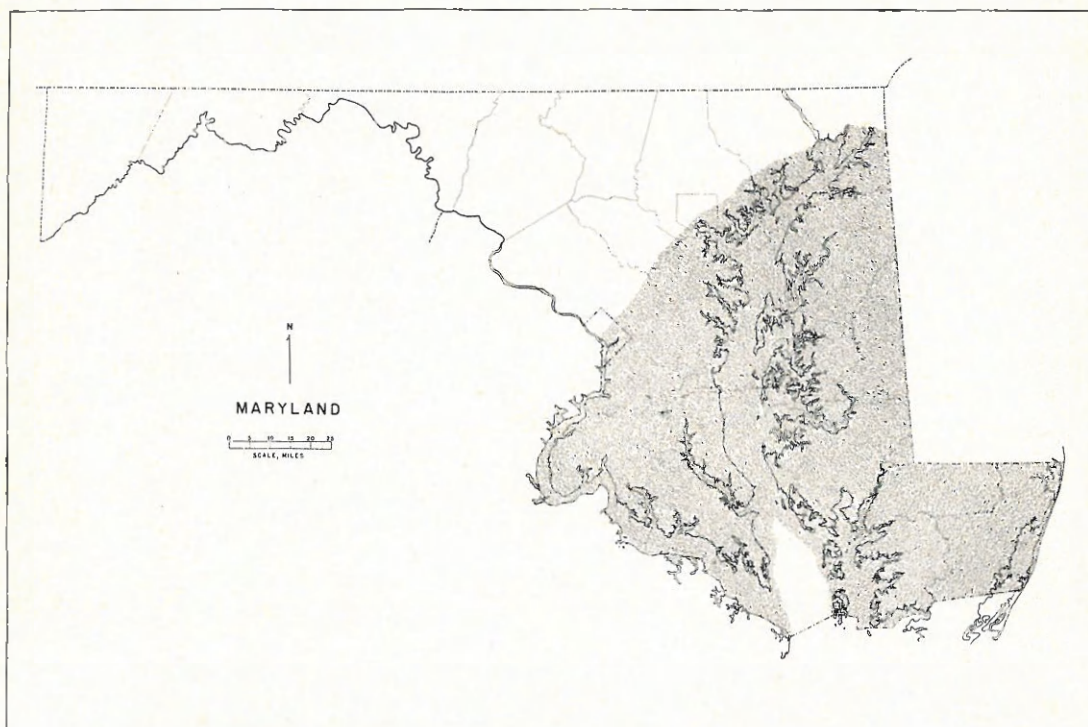
- LATROBE, F. C. 1939. The Diamondback Terrapin. 20th Century Press, Baltimore. 29 pp., ill.
- MAHMOUD, I. Y. 1967. Courtship behavior and sexual maternity in four species of Kinosternid turtles. *Copeia* (2):314-319.
- MANSUETI, R. 1939. Reptiles noted during 1938 in and around the Patapsco State Park. *Nat. Hist. Soc. Md., Jr. Bull.* 3(1):5-11. 3 pls., 14 hand colored figs.
- . 1941. A descriptive catalogue of the amphibians and reptiles from in and around Baltimore City, Maryland, within a radius of twenty miles. *Proc. Nat. Hist. Soc. Md.* 8:1-42, ill.
- . 1942. Notes on the herpetology of Calvert County, Maryland. *Md. Nat. Hist. Soc. Bull.* 12:33-43, ill.
- and D. W. WALLACE. 1960. Notes on the Soft-shell Turtle (*Trionyx*) in Maryland waters. *Chesapeake Sci.* 1(1):71-72.
- MCCAULEY, R. H. 1945. The reptiles of Maryland and the District of Columbia. Private printing, Hagerstown, Md., 194 pp., ill.
- and C. S. EAST. 1940. Amphibians and reptiles from Garrett County, Maryland. *Copeia* (2):120-123.
- MOSIMANN, J. E. 1958. The revolutionary significance of rare matings in animal populations. *Evolution* XII (2):246-261.
- NORMAN, J. E. 1949. Maryland Turtles. *Md. Naturalist* 19(1):13-16.
- PALMER, W. 1909. Description of a new species of Leatherback Turtle from the Miocene of Maryland. *Proc. U. S. Nat. Mus.* 36:369-373, 1 pl.
- PARSONS, J. J. 1962. The Green Turtle and man. Univ. Fla. Press. Gainesville x+126.
- POPE, C. H. 1946. Turtles of the United States and Canada. Alfred Knopf Co., N. Y. 343 pp. 199 photos.
- REED, C. F. 1957. Contributions to the herpetology of Virginia. 2. The reptiles and amphibians of Northern Neck. *J. Wash. Acad. Sci.* 47(1):21-23.
- REID, G. K., JR. 1955. Reproduction and development in the northern Diamond-back Terrapin *Malaclemmys terrapin terrapin*. *Copeia*. (4):310-311.
- ROBERTSON, H. C. 1947. Notes on the Green Turtle in marine waters of Maryland. *Md. J. Nat. Hist.* 17(2):29-32.
- ROMER, A. S. 1941. Man and the vertebrates. Univ. Chicago Press. 405 pp.
- SCHMIDT, K. P. and R. F. INGER. 1957. Living reptiles of the world. Hanish Hamilton, London 287 pp.
- SCHWARTZ, F. J. and B. L. DUTCHER. 1961. A record of the Mississippi Map Turtle, *Graptemys kohni*, in Maryland. *Chesapeake Sci.* 2(1-2):100-101.

- SEXTON, O. J. 1965. The annual cycle of growth and shedding in the Midland Painted Turtle, *Chrysemys picta marginata*. *Copeia* (3):314-318.
- TINKLE, D. W. 1961. Geographic variation in reproduction, size, sex rate and maturity of *Sternotherus odoratus* (Testudinata: Chelydridae). *Ecology* 42: 68-76.
- . 1962. Variation in shell morphology of North American turtles. 1. The carapical seam arrangements. *Tulane Stud. Zool.* 9(5):331-349.
- TINKLEPAUGH, O. 1932. Maze learning of a turtle. *J. Comp. Psychology* 13: 201-206.
- TRUITT, R. V. 1939. Annual Rept. Chesapeake Biol. Lab. Contr. (34):1-23.
- WANGERSKY, E. D. and C. E. LAND. 1960. Interaction between the plasma of the Loggerhead Turtle and toxin of the Portugese Man-of-War. *Nature* 185(4709): 330-331.
- WILLIAMS, F. R. and J. B. HANZLEY. 1953. New county records for the Wood Turtle (*Clemmys inscripta*) in Maryland. *Md. Naturalist* (1-2):22-23.
- YOUNG, J. Z. 1950. *The life of the vertebrate*. Oxford Clarendon Press, pp. 349-407.

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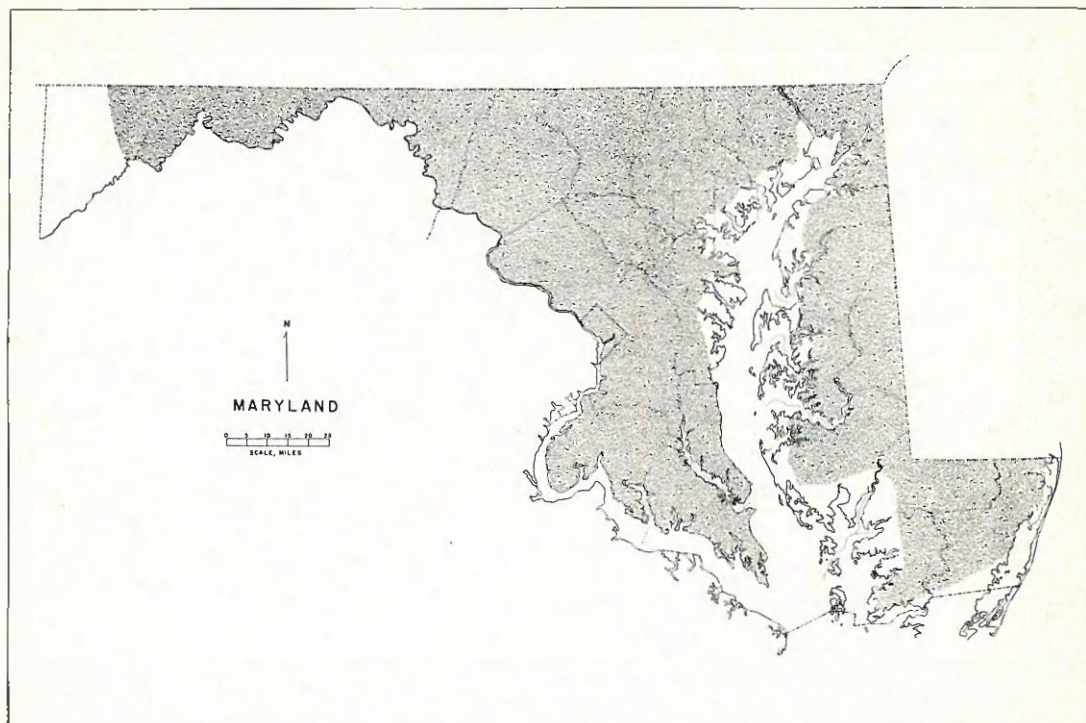


Snapping Turtle, Stinkpot, and Box Turtle (Statewide)

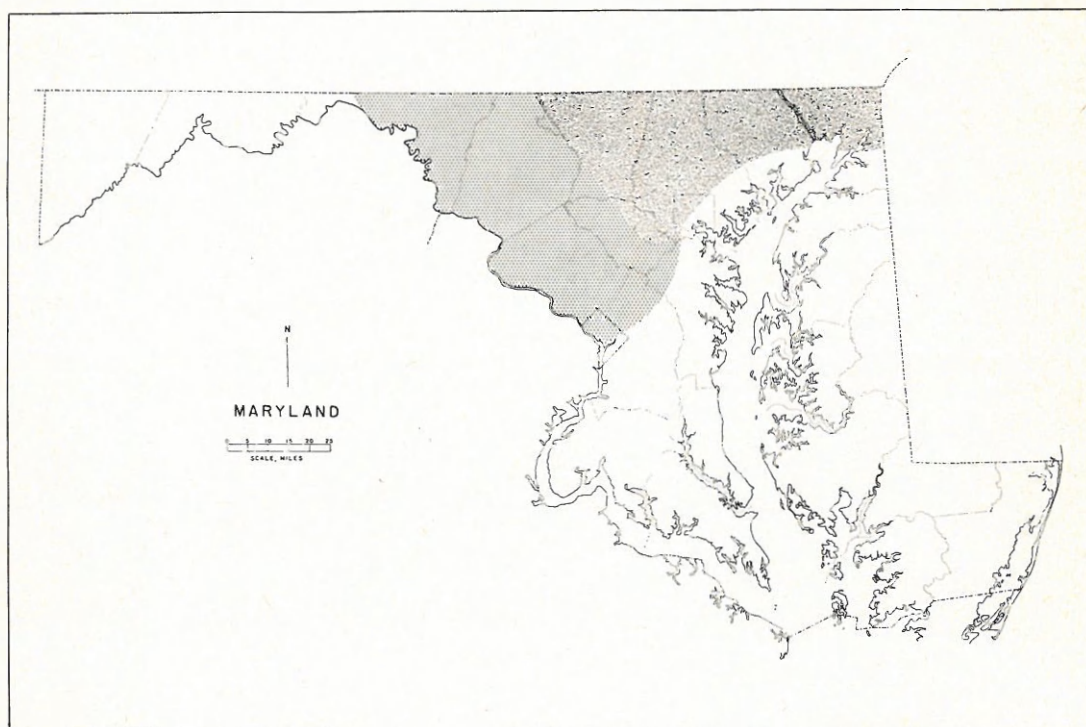


Eastern Mud Turtle and Northern Diamondback Terrapin

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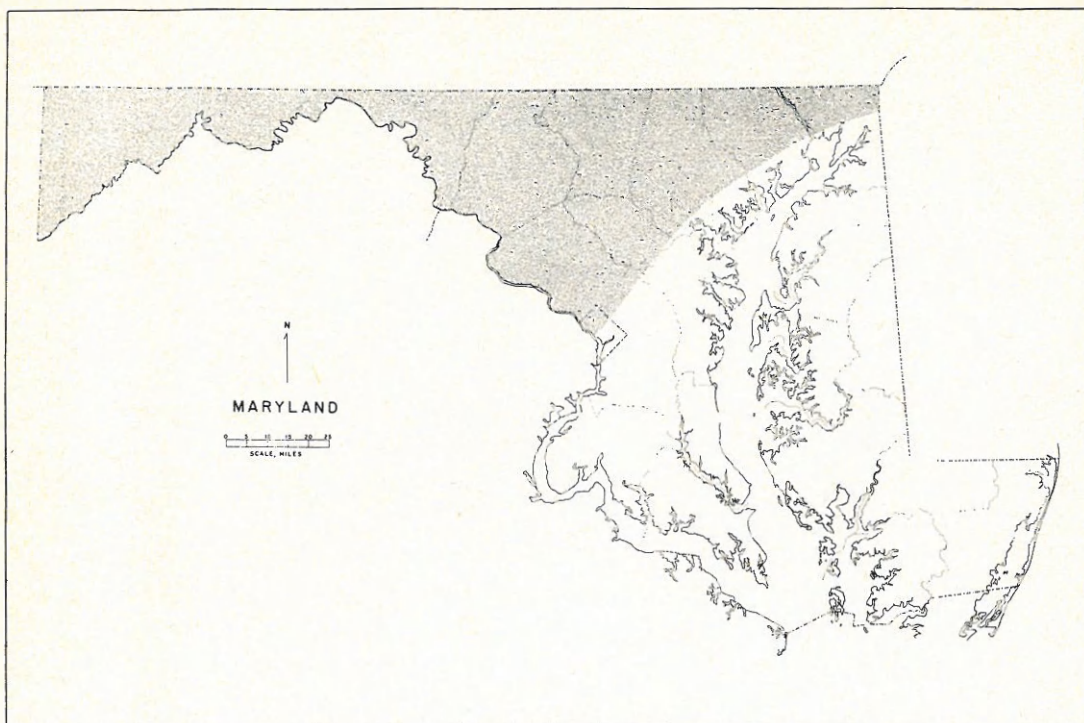


Spotted Turtle

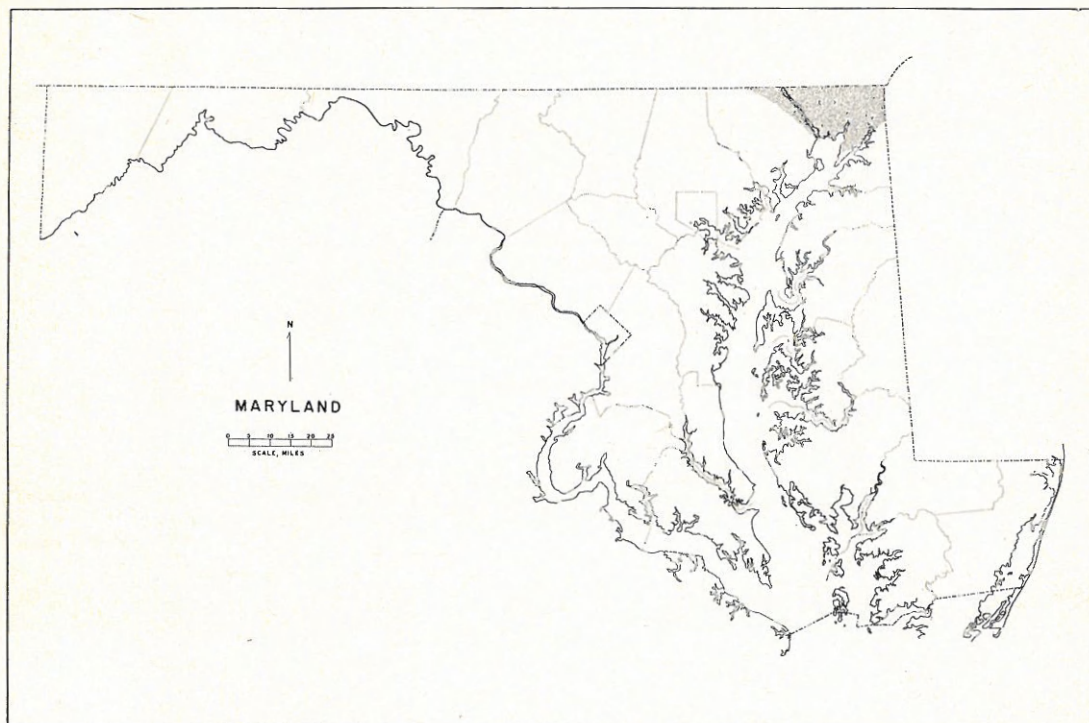


Bog Turtle (Shaded: Known Distribution; Dots: Expected Localities)

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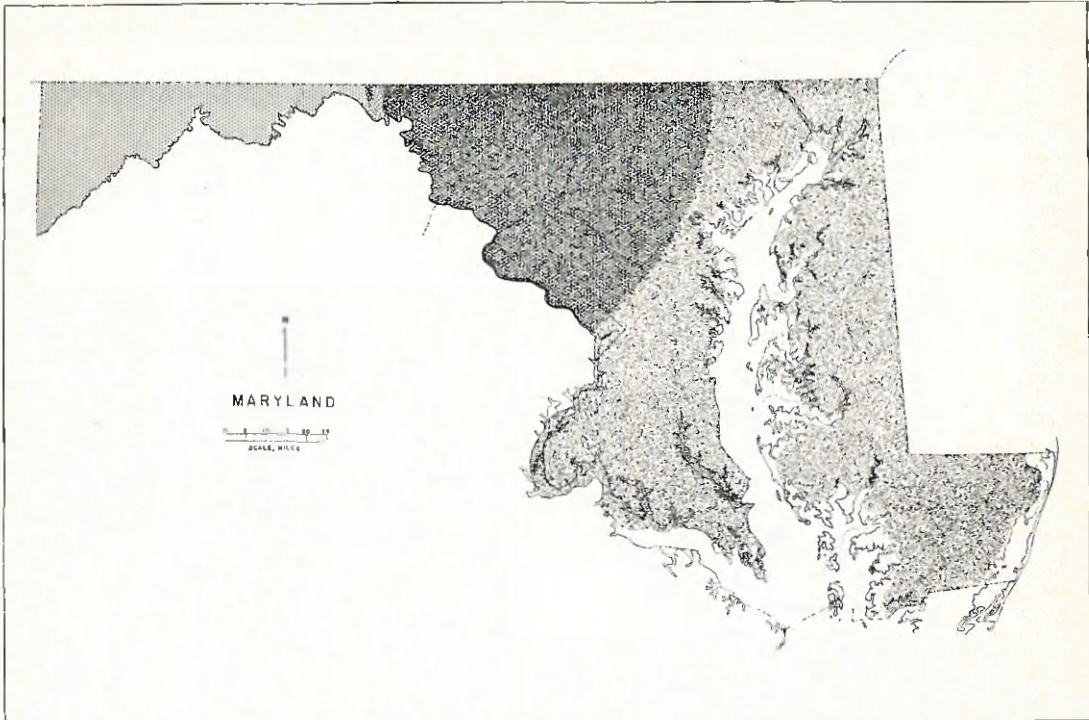


Wood Turtle

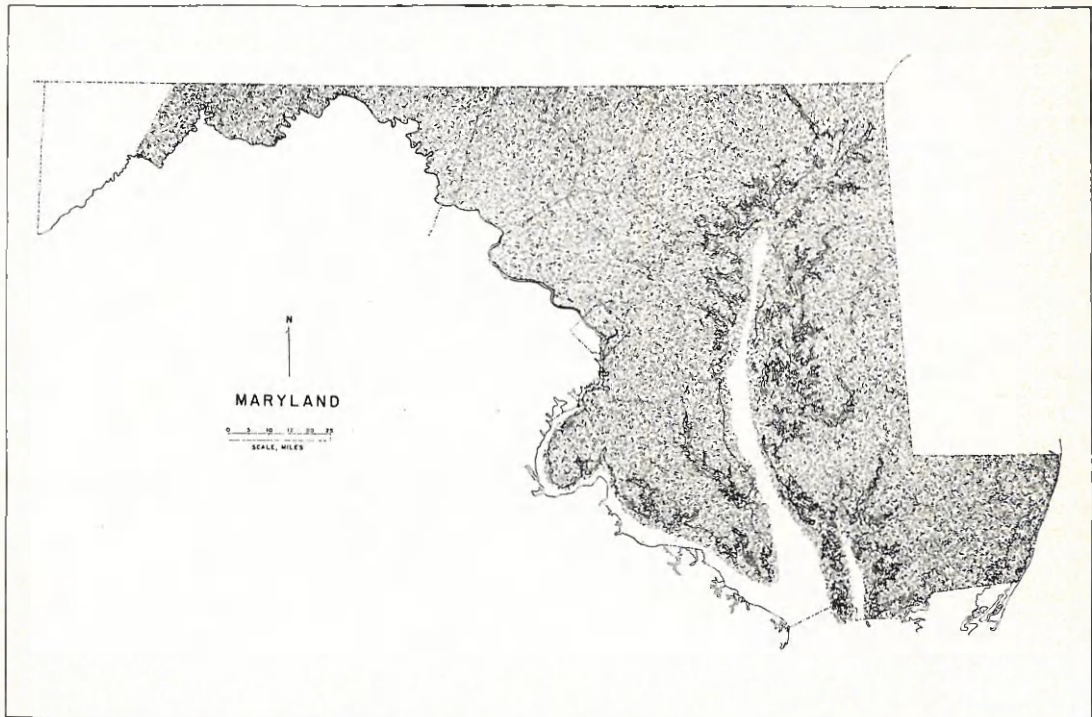


Map Turtle

SPECIES DISTRIBUTION IN MARYLAND



Eastern Painted Turtle (Shaded), Midland Painted Turtle (Dots), (Dark Area: Overlap Zone)



Red-bellied Turtle

