



**Status:** State special concern

**Global and State rank:** G4/S2S3

**Family:** Emydidae (pond and box turtle family)

**Range:** Wood turtles are found from Nova Scotia and New Brunswick south through New England, New York, and Pennsylvania to northern Virginia, and west through southern Quebec, Ontario, northern Michigan and Wisconsin to eastern Minnesota and northeastern Iowa (Ernst et al. 1994).

**State distribution:** In Michigan, wood turtles occur primarily in the northern Lower Peninsula and the Upper Peninsula. Occasional reports of wood turtles from the southern part of the state, such as in Allegan and Ingham counties, likely represent released individuals instead of established breeding populations (Harding and Holman 1990). Although the Michigan range map indicates a fairly widespread distribution at the county level, it is important to note that wood turtles occur in specific habitats, and may only occur in a small portion of each county where suitable habitat is available. It also is important to note that this species has not been systematically surveyed throughout the state.

**Recognition:** The wood turtle is a medium-sized turtle, with adult carapace (upper part of shell) ranging in length from 6.3 to 9.8 inches (Harding 1997). The **broad, low carapace** usually has a **central keel** (i.e., a raised ridge running down the center of the shell), and **raised, often pyramidal ridges** of well-defined concentric growth rings on each scute or scale. The carapace is brown or grayish

brown, often with radiating yellow and black lines on the ridges. The **plastron** (underside of shell) **lacks a hinge**, and is **yellow with dark, oblong blotches** along the outer edge. The plastron also has a V-shaped notch at the base of the tail. The highly “sculptured” carapace and unhinged, patterned plastron distinguish this species from other turtles in the state. The head and upper surfaces of the neck, legs, and tail are black; the rest of the body is yellow or yellowish orange. Hatchlings are gray, tan, or brown in color, with circular carapaces and long, thin tails. Carapace lengths of hatchlings range from 1.1 to 1.5 inches.

**Best survey time:** Although wood turtles can be seen anytime between late April and October, the best times to survey for this species are spring and early fall because turtles are active and concentrated near streams (Ewert et al. 1998). Spring is better than fall because herbaceous ground cover is sparser, allowing for better visibility, and turtles are frequently basking near water. The leafing out of most deciduous trees in the spring indicates a good time to initiate wood turtle surveys. Wood turtles are most easily seen basking during warm, sunny conditions.

**Habitat:** Three components typify wood turtle habitat: (1) hard-bottomed streams and rivers, (2) herbaceous vegetation for foraging, and (3) sandy nesting substrate (Ewert et al. 1998). Wood turtles are found primarily in or near moving water and associated riparian or floodplain habitats. They prefer clear, medium-sized rivers and streams (range 7 to 100 feet wide) with sand or sand and gravel substrates and moderate flow (Buech and Nelson 1991, Harding 1991). They tend to avoid drainages with clay or muck bottoms and very slow or fast flow. Wood



turtles have been found along slow-moving, silty sections of some large rivers; however, these sections usually occur between hard-bottomed riffle areas (Ewert et al. 1998). Wood turtles require partially shaded, wet-mesic herbaceous vegetation, such as raspberries, strawberries, grasses, willows, alders, algae, and moss, along or near the river for foraging. Forested floodplains (deciduous and coniferous) with numerous sunlit openings and a dense mixture of low herbs and shrubs seem to provide ideal habitat for this species. They also have been found in nonforested habitats such as willow and alder thickets, sphagnum bogs, swamps, wet meadows, and fields within or near the floodplain (Buech and Nelson 1991, Harding 1997). Wood turtles also require sandy or sandy-gravelly areas along or in the river for nesting. Examples of nesting habitat include sand bars, sand points, and cutbanks. In areas where natural nesting habitat is not available, wood turtles have been observed nesting on gravel and borrow pits, road cuts and shoulders, railroad and highway bridge crossings, clearcuts, utility rights of way, and residential yards and gardens.

**Biology:** In Michigan, wood turtles are active from late April or May to early October (Harding 1991). They typically occupy aquatic habitats from fall through late spring and move into adjacent or nearby terrestrial habitats during the summer. Wood turtle movements of up to a third of a mile inland and several miles along the river have been documented (Ewert et al. 1998). However, wood turtles in Michigan appear to be fairly aquatic; Harding (1991) found all individuals within 500 feet, and most within 50 feet, of water throughout the year during a 20-year study in Michigan.

Mating occurs in shallow water anytime during the active season but primarily in the spring and less commonly in the fall (i.e., June and September, respectively) (Harding 1991). Most nesting occurs in June in the late evening, often after sunset. Females produce one clutch per year. Clutch size in Michigan may range from 5 to 18 eggs, with an average of 10.5 eggs per clutch (Harding 1991). Hatchlings emerge in late August or early September.

In addition to sandy substrate, wood turtles generally prefer nesting areas that have a slope of less than 40 degrees, have little or no ground vegetation (<20% ground cover), are sunlit most of the day, and receive little human disturbance. Nests are usually placed one to three yards above the water line so that they are not subject to flooding. Nests also are usually placed within a few dozen yards and always within a few hundred yards from the river (Ewert et al. 1998). Females may travel long distances to find suitable nesting sites, which they may share with other wood turtles as well as other turtle species. Females may use the same nest area year after year (Harding 1991).

Nest predation can be high, often exceeding 80% (Harding 1997). Hatchlings and juveniles also are highly vulnerable to predation. Raccoons are the primary predators; other predators include skunks, mink, otters, foxes, coyotes, and

ravens.

During the active season, wood turtles spend a considerable amount of time basking and feeding. Basking sites include logs, grassy, sandy, or muddy streambanks, and forest openings with low ground cover. Wood turtles can feed both under water and on land, and are opportunistic omnivores. Food items include leaves, berries, algae, fungi, insects, snails, earthworms, and even dead animals (Harding 1997).

Wood turtles in Michigan generally enter hibernation around mid-October. Wood turtles overwinter in streams where water flows all winter (Soule 1992). Most wood turtles hibernate underwater under overhanging roots or logs, in pools or along the stream bottom under the ice, or in beaver lodges or muskrat burrows (Ernst et al. 1994).

**Conservation/management:** Wood turtles are characterized by slow growth, late sexual maturity (12 to 20 years old), low reproductive success, and long adult life (Harding 1997). Given these life history traits, high annual survivorship of adults and juveniles is required to maintain a stable population. Mortality or removal of adults and juveniles at a rate faster than they can be replaced can lead to population declines and potential local extinctions over time.

Populations in Michigan and other parts of its range have declined significantly over the past 20 to 30 years (Harding and Holman 1990). The most serious threat to this species is poaching for commercial pet trade and incidental collecting by the general public (Harding 1991, Soule 1992). Human activities such as construction of streamside cabins and roads, timber harvesting, grazing, agriculture, recreation, channel impoundments, stream channelization, and bank stabilization have resulted in some habitat loss and degradation (Buech and Nelson 1991, Harding 1997). Habitat loss at this time, however, appears to represent a less serious threat to wood turtles in Michigan than indirect effects of development such as increased mortality from road traffic and predation from raccoons and skunks which use roads as travel corridors (Soule 1992, Harding pers. comm.). Wood turtles also have been shot to death by vandals (Harding 1991). Water pollution currently is not a major threat to wood turtles in Michigan, but can represent a significant potential threat since this species appears to be extremely sensitive to all types of water pollution (Harding 1991).

Despite these threats, wood turtles can persist with moderate levels of habitat alterations and human disturbance as long as sufficient habitat and natural mortality levels are maintained. In some cases, wood turtles can even benefit from human activities. Maintaining good water quality, controlling sedimentation, restricting pesticide use near waterways, implementing minimum development set-back distances, and leaving buffer zones along streams during timber harvest, grazing, and agricultural operations can preserve good wood turtle



habitat (Harding 1991). Maintaining stream dynamics that create sand bars, islands, and open sandy banks is crucial for providing suitable nesting habitat (Soule 1992). Creating small openings in floodplain forests can provide foraging, basking, and/or nesting habitat. Harvesting during the winter would minimize impact on this species (Harding pers. comm.).

Predator control may be beneficial at some nesting sites (Soule 1992). Road construction near streams and rivers should be avoided or minimized. Management practices such as sand traps in trout streams and streambank stabilization can eliminate or reduce good wood turtle habitat, and should be avoided (Harding 1991, Soule 1992). Stream channelization and dams also should be avoided. Finally, limiting intense human activity along rivers (e.g., canoe put-ins, campgrounds), particularly at nest sites, is critical for habitat protection.

In addition to habitat protection, the most important requirement for conservation of wood turtles is simply to leave them alone (Harding 1991). In Michigan, under the Director's Order No. DFI-166.98, Regulations on the Take of Reptiles and Amphibians, it is unlawful to take a wood turtle from the wild except as authorized under a permit from the Director (legislated by Act 165 of the Public Acts of 1929, as amended, Sec.302.1c (1) and 302.1c (2) of the Michigan Compiled Laws). The public should be informed and educated that this species is protected under the Director's order and should not be collected or harmed. In addition, in 1992, this species was added to Appendix II of the CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) treaty. This listing prevents unauthorized exports of wood turtles and closely regulates commercial trade of this species. Any suspected illegal collection or trade of wood turtles should be reported to local authorities, conservation officers, or wildlife biologists. Disturbance at nesting or basking sites should be limited during the nesting season (early May to mid-August) (Harding 1997).

**Research needs:** An assessment of the species' current status and distribution in the state is needed. Nesting and wintering sites as well as large populations in the state need to be identified and monitored (Harding pers. comm.). Long-term population studies including viability analyses are needed to better understand wood turtle population dynamics and to identify those parameters that determine viability and best indicate population health (Soule 1992). This information would be useful for developing effective monitoring protocols and assessing this species' status in the state. Impacts of management and land use practices such as streambank stabilization, residential development, and recreation should be further investigated. Effective methods to educate the public also need to be researched and implemented (Harding pers. comm.).

**Related abstracts:** Blanding's turtle, box turtle

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