



Common Name: BOG TURTLE

Scientific Name: *Glyptemys muhlenbergii* Schoepff

Other Commonly Used Names: none

Previously Used Scientific Names: *Clemmys muhlenbergii*

Family: Emydidae

Rarity Ranks: G3/S1

State Legal Status: Endangered

Federal Legal Status: Threatened (northern population: New York, Maryland, Massachusetts, Delaware, Pennsylvania); Threatened due to similarity of appearance [TSA] (southern population: Georgia, Tennessee, South Carolina, North Carolina, Virginia)

Description: The bog turtle is the smallest turtle species in North America reaching only 11.5 cm (4½ inches) in maximum carapace length. The low-keeled, black, brown, or mahogany-colored carapace is usually rough in appearance due to the distinctive growth annuli of the scutes. These annuli often become obscured in older individuals due to wear and accumulation of iron deposits from their mucky habitat. The unhinged plastron is typically black with yellow or cream-colored blotches along the midline. A conspicuous orange, yellow, or red blotch is present on each side of the head behind the eye. Skin color is brown to pink and may have some reddish mottling. The plastron in females is flat and is strongly concave in males. The tail of adult females is short with the vent barely extending beyond the rear edge of the plastron. In males, the

tail is long and muscular with the vent well beyond the rear edge of the carapace. Otherwise similar to adults, juveniles have a yellow plastron with a large black blotch in the center.

Similar Species: Within the range of the bog turtle in Georgia, only the common musk turtle (*Sternotherus odoratus*) remotely resembles the appearance of the bog turtle. However, this turtle lacks the bog turtle's neck blotch and its plastron is weakly hinged.

Habitat: Georgia bogs inhabited by this elusive turtle are generally found along slowly flowing spring creeks and seepages within low mountain valleys. Habitats capable of supporting a viable bog turtle population may be as small as an acre. Though the habitat type of this turtle varies from spring seepages, bogs, and wet meadows, the presence of soft, deep, mucky organic soil and open wet areas with shallow water are prerequisites to inhabitation by bog turtles. These bogs are ideally quite open and characterized by a rich growth of sedges, rushes, bulrushes, and, especially, sphagnum moss. Woody vegetation present often includes red maple, tag alder, willow, and swamp rose.

Diet: Bog turtles feed opportunistically on a wide variety of prey including insects, earthworms, snails, slugs, crayfish, millipedes, frogs, tadpoles, salamanders, watersnakes, and the young of mice, but also eat an array of aquatic vegetation, seeds, and berries, and occasionally scavenge on carrion.

Life History: Bog turtles are primarily active during spring, early summer, and early fall. Turtles may become relatively inactive if the summer months are extremely hot and dry. Trapping and radio-telemetry studies have dispelled the belief that bog turtles usually aestivate in summer, but instead are simply more difficult to locate during this time of the year when vegetation is especially dense. Winter hibernacula sites consist of mammal burrows, tussocks of sedges, mucky soil, and other suitable retreats. Turtles may hibernate singly or in association with others. During the activity periods, bog turtles are diurnal and spend a good deal of time basking on land, on top of grass clumps, or in the shallows of small rivulets. During the warmest parts of the year, turtles actively burrow below the surface. These turtles forage and feed on land and in the water. Male turtles roam widely in search of females shortly after they become active in late March. Courtship and breeding occur from late April to early June, and eggs are subsequently laid from May to July. Eggs are either buried in soft soil or rotted wood, placed in thick beds of sphagnum moss, or deposited in the top of sedge tussocks. These nest sites are usually located in areas receiving plentiful sunlight. Adult females produce only one clutch of one to six elliptical eggs per year, but may not nest every year. In Georgia, incubation time varies from 52 to 60 days with hatchlings typically emerging in late August or September and immediately burrowing into the surrounding substrate. Bog turtles in the wild reach sexual maturity at the age of 7-9 years. Predators of eggs, juveniles, and adults include raccoons, skunks, opossums, foxes, wading birds, and common snapping turtles.

Survey Recommendations: Although bog turtles remain active from late March to early October, visual surveys for bog turtles within suitable mountain bog habitats are most effective during the period of greatest annual turtle activity (spring emergence and breeding) from mid-April to mid-June. In early spring, bog turtles can be found basking as soon as there is sufficient sunlight, while later in the spring and summer, turtles are most active before intense mid-day sun

makes it too warm for them on the surface. Other survey methods include the use of probing sticks and specialized traps, but these should only be used by experienced individuals.

Range: Bog turtles have a discontinuous range that stretches from western Massachusetts southward to extreme northeastern Georgia. A large gap in West Virginia and northern Virginia separates the so-called northern and southern populations. Disjunct populations are known from upper New York, northwestern Pennsylvania, and northeastern Tennessee. The existence of this species in Georgia was unknown until 1979, when an individual was captured in a trap set for ruffed grouse. Bog turtles reach their southernmost limit in northern Georgia and were probably never very abundant there. All Georgia localities are confined to the Blue Ridge physiographic province within wetlands above 150 m (1800 feet) in elevation.

Threats: The high demand for bog turtles in the black market pet trade has resulted in the removal of many individuals from sites in other states and may be a threat in Georgia as well. Range-wide, bog turtles have experienced their greatest decline in numbers due to loss of habitat. Alteration of habitat disturbance regimes and agricultural drainage of bog habitat often leads to the extirpation of the bog turtle through the elimination of suitable basking, foraging, and nesting sites. Plants and animals associated with mountain bog habitats have become increasingly rare simply because their habitat is becoming increasingly rare. Because Southern Appalachian mountain bogs are early successional habitats that naturally succeed to forested communities, animals such as the bog turtle that depend on them are adapted to seek out new sites once previous ones become densely forested or hydrologically unsuitable. Historically, however, greater equilibrium existed between bog succession and bog creation through natural disturbance. Today, the rate of bog loss far exceeds the rate of bog creation, as most mountain bog wetlands have been drained and converted to other uses over the years, as these flat areas (where private property is concentrated in the Georgia mountains) are also ideal locations for towns, roads, reservoirs, and farms. Stream impoundment, stream channelization, and human intolerance for natural beaver disturbance have significantly reduced bog habitat on the landscape as well. Because natural disturbance factors – grazing by bison and elk, impoundment by beavers, and natural fire – needed to maintain mountain bog habitats in an early stage of succession have been eliminated or significantly reduced, those charged with the conservation of bogs and their flora and fauna must maintain the last remaining bog habitats on the landscape by artificially mimicking the effects of natural disturbances.

Georgia Conservation Status: The bog turtle is currently known from only eleven localities within the wilds of Georgia (Fannin, Rabun, Towns, and Union counties), though more undoubtedly occur within the rugged terrain of the north Georgia mountains (a reported site in Stephens County is of questionable validity). Within half of these sites the bog turtle is known only from the observation of a single individual, and in three of these sites the associated population is apparently extirpated due to habitat succession and site drainage. The Chattahoochee National Forest harbors two known natural populations, but the future viability of one of these populations is uncertain due to low turtle numbers and limited available suitable habitat. Two populations on private lands are currently thought to contain viable populations and are the source of hatchling turtles for the ongoing headstarting and population establishment project within restored mountain bog habitat on federal land.

Conservation and Management Recommendations: Restoration of mountain bog hydrology has seldom been attempted, and never in conjunction with bog turtle site repatriation. Ironically, the presence of cattle within the margins of mountain bog habitat in many cases has been shown to maintain at least marginally suitable bog turtle habitat presumably by mimicking grazing disturbance of now extirpated elk. Where wetland hydrology is intact, restoration of mountain bog habitats ideally could be achieved through the restoration of natural disturbance regimes. In reality, however, within the current fragmented landscape of the Southern Appalachians, there no longer exists the network of hydrologically intact mountain bog habitats of differing successional stages necessary to naturally perpetuate bog flora and fauna over time and over the landscape. Furthermore, the progression of the effects of natural disturbance, such as impoundment by beaver, take many decades to produce suitable, yet ephemeral early successional bog habitat, during which time such habitats are unsuitable for the majority of rare bog species of conservation concern. Because the characteristics of early successional bog habitat can be achieved relatively quickly through mechanical woody vegetation removal, this method of artificial disturbance is the one most often employed within restoration efforts despite the method's limited long-term effectiveness. Since mechanical woody vegetation removal at best only mimics wind throw, its effectiveness is merely temporary when used alone, as compared to a more natural and gradual process of bog creation (e.g., beaver impoundment). Consequently, in order to assure continued existence of rare bog flora and fauna across the Southern Appalachian landscape, conservationists must continually maintain an early successional state within a number of restored mountain bog habitats through mechanical woody vegetation removal, judicious use of herbicides, and prescribed fire.

Management of known bog turtle sites in Georgia is difficult since most occur on private land. The possibility of establishing conservation easements to maintain the early successional bog communities on private land sites should be investigated and utilized whenever feasible. Efforts to locate additional bog turtle sites and mountain bog habitat within the vast federally owned lands and surrounding private landholdings in the northeast Georgia mountains is considered a high priority. Conservation and proper management of bog turtle sites also benefits other bog-inhabiting rarities such as the federally-threatened swamp pink (*Helonias bullata*) and the state-endangered mountain purple pitcherplant (*Sarracenia purpurea* spp. *venosa* var. *montana*).

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Date Compiled or Updated:

T. Floyd and J. Jensen, Dec. 2007: original account

K. Owers, Sept. 2009: updated status and ranks, added pictures

T. Floyd and J. Jensen, April 2011: updated Georgia conservation status and elevation range.

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Juvenile