

## Bog Turtles Make New Friends: Landowners and Livestock

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As eastern pastureland vanishes, so does bog turtle habitat. Some farms are sold for development, others revert to forest and some pastures are converted to cropland. Any of these changes are bad news for bog turtles, which lose ideal homes when sunny meadows with waterlogged soils disappear.

The good news is that prime opportunities for bog turtle conservation remain on surviving farms. In fact, the bog turtle's new friends may be goats, sheep and cows--and the farmers that raise them--all of whom can help restore the tiny turtle's habitat with a regimen of moderate grazing. And with over 90% of remaining bog turtle habitat on private lands, landowner management and incentives to encourage it are crucial for this species.

### America's Tiniest Turtle in Danger

With its top shell measuring just 3 to 4 1/2 inches in length, the bog turtle (*Glyptemys (=Clemmys) muhlenbergii*) is the tiniest turtle in the U.S. It is also one of the rarest. Habitat loss was cited as the primary cause of decline in 1997, when the U.S. Fish & Wildlife Service (FWS) listed bog turtles in scattered locations in New Jersey, New York, Maryland, Pennsylvania, Connecticut, Delaware and Massachusetts as threatened. About 250 miles separates this listed population from a disjunct southeastern population that the FWS concurrently listed as "threatened by similarity of appearance." Although bog turtles in Virginia, Tennessee and the Carolinas south into Georgia are also declining, they are considered less imperiled. Since the two populations cannot easily be distinguished, the dual listing aims to discourage another serious threat to the species: the lucrative, worldwide black market for collectors. In Tokyo's pet shops, bog turtles have fetched as much as \$2,500.

Although a bog turtle nestled into a muddy hoofprint in a wet pasture might appear as imperiled as one for sale in a pet shop, the turtle is likely to thrive in the pasture. Goats, sheep and cows prune encroaching vegetation before it can render habitat unusable by the bog turtle, which is an early successional species. Possibly today's livestock fill an ecological niche left vacant when yesterday's grazers--bison, elk and mastodon--vanished. And the livestock that devours woody vegetation may be replacing the wildfires that swept the East before fire suppression or the beaver activity that declined after the fur trade attracted hunters.

### Wetlands Play Key Role in Bringing Bog Turtle Back

One of the first observers to note the bog turtle-livestock association was Dennis Herman, curator of living collections at the North Carolina State Museum of Natural Sciences. For over two decades he surveyed spring-fed wetlands for bog turtles, finding dozens of new populations and hundreds of the elusive turtles. Herman found that areas with cattle had fewer alders and maples than areas without cattle, and that habitats with fewer trees tended to have turtles. Cattle also spared Herman and other regional bog turtle experts the laborious work of controlling vegetation to maintain turtle habitat.

Herman's work led directly to the formation of Project Bog Turtle, an initiative of the North Carolina Herpetological Society. Project Bog Turtle secures voluntary "conservation lease agreements" with landowners in which they agree to allow access to sites by Herman and others for research and management and not to do knowingly anything likely to harm turtles.

### Finding Volunteer Landowners and Grazers

Working at the opposite end of the bog turtle's range, Jason Tesauro, then biologist and bog turtle expert at the New Jersey Division of Fish and Wildlife, began experiments in 1999 to determine the potential of grazing animals to restore bog turtle habitat. He hoped to find a benign alternative to herbicides, which harm non-target species, and the labor-intensive hand removal of invasive plants. After recruiting willing landowners, Tesauro established four experimental sites where he turned goats, sheep or cows loose on such notoriously invasive plants as purple loosestrife, reed canary grass, *Phragmites* and Japanese stilt grass. The grazers reduced unwanted vegetation on all sites, sometimes dramatically. Sheep specialized in reducing grass density and height, cows cleared brush and non-invasive woody plants and the horned goats, which Tesauro calls "living brush hogs," demolished encroaching brush and even large trees. Although other tools, such as targeted (rather than broadcast) herbicide use, remain in the bog turtle conservation toolkit, Tesauro's research clearly demonstrates grazing's potential for restoration. Expanded habitat restoration work followed in New Jersey, using state resources and U.S. Department of Agriculture Wildlife Habitat Incentives Program (WHIP) funding.

In January 2004, Tesauro began work as a consultant at the Environmental Defense Center for Conservation Incentives (CCI), helping launch an initiative to restore bog turtle habitat in New York, Pennsylvania and Maryland. This effort involves close collaboration among state and federal agency staff and conservation groups to help direct incentive funding and technical assistance to landowners willing to restore habitat through moderate grazing, mechanical cutting or controlled burns.

### CCI Partnerships Working to Restore Turtle

CCI's partners in Pennsylvania include two land trusts, Brandywine Conservancy and Natural Land Trust; The Nature Conservancy; Pennsylvania Fish and Boat



The tiny bog turtle needs plenty of sunshine and soggy soils. (Credit: Andrea M. Teti)

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Commission; and two federal agencies, FWS and U.S. Natural Resources Conservation Service (NRCS). In New York, CCI's partners are two state agencies, the Department of Environmental Conservation and the Natural Heritage Program; three non-governmental organizations, The Nature Conservancy, Hudsonia Ltd. and Friends of the Great Swamp; and again the two federal agencies, NRCS and FWS.

Up to six restoration projects are scheduled to start in New York this summer, with funding from the New York NRCS's Wetlands Reserve Program, FWS's Partners for Fish and Wildlife Program and CCI. These projects will feature ten-year restoration agreements between landowners and NRCS, which landowners can later convert to permanent conservation easements and receive additional NRCS compensation.

In Maryland, the Department of Natural Resources is in the process of amending its Conservation Reserve Enhancement Program agreement to include targeted enrollments of bog turtle habitat under a new practice standard for conservation of rare and declining habitats. If approved, enrollment could include up to 2,000 acres, a significant portion of Maryland's rare bog turtle habitat. The state is also teaming with CCI to expand restoration work.

Other bog turtle funding opportunities include Farm Bill programs such as WHIP and the Environmental Quality Incentives Program, as well as FWS's Private Stewardship Grants and Landowner Incentives Programs. To direct Farm Bill monies into bog turtle conservation, CCI is working with NRCS state offices to develop practice standards that outline habitat management techniques to guide landowners in restoring habitat. Regulatory incentives such as Safe Harbor agreements may also further bog turtle conservation.

## Bog Turtle Habits and Habitats

Despite their name, bog turtles are most likely to occupy sunny meadows with soft, wet soils and low-growing vegetation. They thrive in a mosaic of microhabitats that suits various turtle activities. For nesting, they seek the sunlight of an open canopy and hummocks, where *Carex stricta* or other sedge species and sphagnum moss offer slightly raised, drier habitat. These higher areas are critical because bog turtles nest within their core habitat, rather than travelling upland like most other turtle species. On these hummocks, years of plant growth decompose, generating the warmth needed to incubate turtle eggs.

Restored habitat must also include soggy soils. Here the turtles spend most of their time, half-buried in muck. The same near-steady water temperatures that cool turtles on hot days keep them warm on colder days. Diving into the soft soils offers a quick escape if a turtle is disturbed. And when it's time to hibernate in late September, a bog turtle moves to the base of a shrub or other sheltered area, where seeping groundwater ensures a constant temperature until it emerges into the warmth of May.

Other rare and declining wetland meadow species are also likely to benefit from bog turtle habitat restoration. Box turtles, spotted turtles, wood turtles, Baltimore checkerspot butterflies, bog buckmoths, sedge wrens and several rare sedges and orchids are a few of the species sharing similar habitat requirements. Yet other beneficiaries are landowners themselves, who enjoy the visual appeal of the sunny meadow that replaces a dense, overgrown thicket. One is New Jersey horse farmer Tina Bachmann, who restored bog turtle habitat with the help of a few goats and sheep (see profile below).

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