Mitigating the Impacts to Federally Threatened Gopher Tortoises

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During a session of the Alabama Senate in 1884, C.H. Laney made what was dubbed the "gopher [tortoise] speech" as a push for actions that would lead to better transportation into south Alabama. A portion of his speech was inspired by a childhood rhyme, *"Jack Spratt could eat no fat, his wife could eat no lean, but everybody in the world can eat gopher [tortoise] when the railroads penetrate ... Give us transportation, and we will send our gophers to Vanderbilt and Gould, and every nabob of the land shall feast like gods."* (Laney, 1902)

The value of gopher tortoises throughout the longleaf pine belt was historically recognized at the dinner table, as a gumbo served warm over rice. Unlike traditional prey mammals such as the white-tailed deer, however, gopher tortoises are slow to reproduce and thrive best in a specific habitat. With this in mind, it's easy to understand that trading gopher tortoise for the dinner table would never have been a sustainable option.

With the decrease of longleaf pine habitat, gopher tortoise populations have declined in some areas enough to trigger federal listing for protection. However, Westervelt Ecological Service in Auburn, Alabama, under the guidance of the U.S. Fish and Wildlife Service (USFWS), has recently established a conservation bank for gopher tortoises in southeast Mississippi, connecting financial value with the long-term sustainability of this native reptile, 125 years following Laney's speech.

A Barometer for Well-Maintained Fire Landscapes

A peculiar relic of the Pleistocene era, the gopher tortoise has used its shovel-like front legs to dig burrows in the sandy soils of the Southeastern United States coastal plain for tens of thousands of years. Averaging 5-10 feet in depth, the burrows serve not only as a refuge to gopher tortoises, but also to hundreds of other documented animals like snakes, lizards, insects, and some mammals and birds. The dirt kicked out by the gopher tortoise during burrow construction and maintenance also serves as an area for these cold-blooded creatures to bask in the sunlight and lay eggs. It also provides a microsite for plant germination. Scientists have determined that for the reasons stated, the existence of many plants, animals, and insects is dependent on the existence of the tortoises. Though they can survive in areas without trees, the presence of gopher tortoises has become a barometer in assessing the health of longleaf pine forests.

Photo by John McGuire

A prominent forester and wildlife biologist in south Alabama once shared that the strategy to managing for food and habitat for gopher tortoises is to remember that they don't jump. In other words, managing the food sources for tortoises must focus on what is available in the first several inches off the ground. Sparse canopy cover that allows sunlight to reach the forest floor, and frequent fires that remove forest litter are key to man-

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aging grasses, forbs, and fruit-bearing vegetation (such as blackberries), all of which are utilized by tortoises. Shed, cured pine needles contribute to the flammability of the forest and assist in the ability to burn. Although other pines can serve as surrogates in this fire landscape, longleaf pine evolved long before modern fire control efficacy, and typically fares the best, making it the most sustainable.

Across vast areas of the Southeast, the once wide-spread, open, park-like piney woods have been replaced by dense pine plantations that consist primarily of pine, yaupon midstory, and pine straw ground layer. Though some animals thrive in the conditions that this habitat provides, these areas offer little habitat to tortoises. With much of their preferred habitat lost or degraded, many remnant gopher tortoises found today are pushed into more marginal habitat such as roadsides, ditch banks, utility and pipeline rights-of-way, pastures, etc., with increasing obstructions to breeding. In 1987, following significant declines in the populations, gopher tortoises were federally listed as threatened across the western portion of its range in Mississippi, Southeastern Louisiana, and those areas west of the Tombigbee and Mobile Rivers in Alabama.

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What is a Conservation Bank?

Until now, development of property where gopher tortoises are federally listed has been constrained by the Endangered Species Act, which limits actions that would otherwise push tortoises closer to extinction. Recognizing a preference for avoiding or minimizing threats to gopher tortoises, the USFWS acknowledged that some impacts could be mitigated and transferred to a conservation bank.

In exchange for restoring and maintaining ecosystem structure and function, and by preserving the ecologically valuable land, a third party (a "banker") is awarded "approved credits" by the USFWS. The approval of these credits is based on a rigorous set of guidelines established by the USFWS and includes desired habitat conditions, legal assurances of the property title, short-term assurances of restoration success (such as establishment of a Letter of Credit), a permanent Conservation Easement, and establishment of an endowment which will provide money to manage the property into perpetuity. For land developers allowed to mitigate their impacts through USFWS approval (usually through a Biological Opinion), credits can be purchased from the banker. In return for the purchase of these credits, the developer can exercise a severance of liability and move forward with their project.

Several biological arguments can be made for the role of conservation banks in the recovery of gopher tortoises. Many gopher tortoises today are isolated groups or individuals with diminishing chances for reproduction. Conservation banking requires the establishment of larger reserves that allow for many of these isolated tortoises to be relocated amongst other tortoises, increasing potential for breeding success. Restoring tortoise habitat over large acres also increases the potential benefit to other species such as the eastern indigo snake, Bachman's sparrow, black pine snake, etc., and contributes to an increase in fire-maintained longleaf pine forests. Finally, conservation banks have legal and financial safety nets in place to make certain that mitigated animals will be permanently protected. By contrast, tortoises remaining on private land throughout their range do not have these protections. Though not a panacea for recovery of the species, conservation banks established under the new guidelines provide near "bullet-proof" conservation of important lands contributing to recovery.

From a financial perspective, requiring mitigation for gopher tortoises allows for a novel income stream to be realized. In September 2009, Westervelt Ecological Services became the first company to establish an entrepreneurial conservation bank for gopher tortoises. In order to establish the Chickasawhay Conservation Bank, roughly 1200 acres were carved out of a larger landscape owned by The Westervelt Company in Greene County, Mississippi. While the company will generate revenue over time through timber sales and hunting leases, the objective of this parcel is not to maximize timber production at the expense of ecosystem values. In fact, the contrary is true, the goal is maximize habitat for gopher tortoises; which, just so happens to earn revenue.

Site Selection, Restoration, and Management

Primary field evaluations focused on a specific list of soils deemed appropriate for gopher tortoises by the USFWS. The area chosen had to have the potential of supporting roughly 80 gopher tortoises on approximately 220 acres of suitable land. As soil types do not follow perfectly symmetrical lines, putting a fire break along the sinuous boundary between suitable and unsuitable soils for gopher tortoises seemed largely impractical. Instead, additional land was included into the bank as a buffer despite little, if any, credit given for it.

The next step was to determine the population size of the current tortoise population on the bank, after which the gopher tortoise carrying capacity (based on soil type) was determined to reveal the potential population capacity. When the land occupied by the resident population was removed from the equation, the number of available credits available for sale was recognized. In this case, credits are roughly the amount of acres – two on average – required to sustain a relocated, adult gopher tortoise.

Credit release occurs when the habitat reaches a range of conditions deemed by the USFWS as ideal for tortoises. As such, the timing of restoration was of utmost importance, as the timing of credits released is hinged to the business plan. Modifications were made to typical silvicultural techniques on these sandy uplands. Although having a pine overstory was important, restoration is driven almost exclusively by the need to restore groundcover vegetation. Given the starting point of closed canopy loblolly plantations, typical restoration techniques called for intensive chemical site preparation, planting containerized longleaf pine, and follow-up with herbaceous weed con-

Photo by John McGuire

Alabama Forestry Commission Partners with Wildlife & Freshwater Fisheries to Restore Longleaf Pine Habitat

The Alabama Forestry Commission, in partnership with the Alabama Department of Conservation and Natural Resources Division of Wildlife and Freshwater Fisheries (WFF), is restoring longleaf pine through the American Reinvestment and Recovery Act. The award amount of $360,350 will be used to restore longleaf pine on Barbour County Wildlife Management Area and private lands.

Restoration of longleaf pine on private lands is being administered through the WFF Landowner Incentive Program (LIP). Projects were selected to assist private landowners with the cost of containerized longleaf pine seedlings. Under this grant, restoration activities will cover seven counties and over 370,000 longleaf pine seedlings planted on approximately 800 acres. "With over 90 percent of the land in Alabama being under private ownership, landowners are critical to the success in the restoration of the longleaf pine ecosystem," said Traci D. George, WFF Landowner Incentive Program Coordinator. "This partnership with the AFC allows an opportunity to strengthen program services to forest landowners and restore longleaf pine."

The Barbour County Management Area is comprised of 19,624 acres in parts of Barbour and Bullock counties. The total project restoration area includes approximately 2,500 acres that will be restored to a longleaf pine forest. The first phase of this project consists of an approximately 500-acre block that can be observed from the boundary formed by North Road and John Road. Restoration practices funded by this grant include site preparation spraying, prescribed burning, herbaceous weed control, as well as purchase and planting of longleaf seedlings.

The longleaf pine ecosystem once covered almost 90 million acres in North America. Due to a number of factors, such as land clearing and fire suppression, the longleaf pine habitat has been reduced to about 3 million acres. Restoration projects such as this AFC-WFF effort are a proactive and beneficial step in ensuring a healthy ecosystem and wildlife populations. A number of species of concern, such as the gopher tortoise, eastern indigo snake, black pine snake, and red-cockaded woodpecker all thrive in fire-maintained longleaf pine habitat. Other associated species that benefit from this ecosystem include the bobwhite quail, whitetail deer, eastern turkey, and the Bachman's sparrow.

trol the next spring. Although many native plants will return following this regime, there were no assurances this would coincide with the required timeframe.

In areas where we did not have obvious groundcover, the overstory was completely removed. However, in locations where there was groundcover evident, the loblolly pine overstory was thinned back from roughly 100 ft^2/acre to 30 ft^2/acre. In either situation, both groundcover and shrub response was vigorous following tree harvest. Left alone, the sites would have grown up into a tangle of midstory vegetation unsuitable for gopher tortoises. As opposed to broadcast herbicide treatments, site preparation consisted almost entirely of using targeted herbicides to control midstory shrubs with 48 oz. *Garlon XRT®*, 16 oz. *Chopper Gen 2®* and 96 oz. *Sunset MSO®*. Yaupon was one plant aggressively targeted by backpack crews, and the results were astounding. In areas that would have taken multiple growing season burns to achieve similar results, the desired forest structure was achieved with merely one application of targeted chemicals. This produced the grasses and forbs desired by gopher tortoises, and did not serve as a barrier for initiation of a prescribed fire regime.

Photo by Mark Bailey

Non-native, invasive organisms have the potential to threaten the long-term vitality of this conservation bank if they are not aggressively managed. Cogongrass was, and will continue to be, a struggle to control on this site (as well as the Southeast). To combat, a large amount of effort and resources are dedicated to control this noxious weed, primarily the application of 20 oz. Arsenal® mixed with 48 oz. Accord MRT® and 20 gallons of water in early fall prior to dormancy.

The use of prescribed fire is requisite on this site. In all likelihood a three-year burning rotation will be adopted which may vary in both season and frequency due to the vegetative response. Annual monitoring is used to help assess restoration success and is a feedback mechanism into the management of Chickasawhay Conservation Bank.

Conclusion

Conservation banking is not a final solution to the recovery of the gopher tortoise, nor is it a viable economic alternative for all landowners. However, where appropriate, impacts to occupied gopher tortoise habitat can be mitigated offsite on a protected property with suitable ecological characteristics. The development of the Chickasawhay Conservation Bank by Westervelt Ecological Services attempts to tap into this novel market under the guidance of the USFWS. Through the ecosystem market of gopher tortoise conservation, revenue will be generated through a holistic approach to managing forests that bridges the gap between business and biology.

Citation

Laney, C. H. (1902) The gopher and reminiscences of the Alabama legislature. Pensacola, Fla., Burrow Printery 30 p.