

# Managing for massasaugas

The eastern massasauga rattlesnake, a federally threatened species, plays an important role in biodiversity. Massasaugas serve as both predator and prey, which make them a critical component of the environment.

Because the massasauga's primary diet consists of mice, voles and other small mammals, they help control rodent populations — which, in turn, helps reduce the tick population. The snakes also provide food for hawks, owls and other predators. “Ecosystems are a complex web of interactions that we are constantly trying to figure out,” explains Jarod Reibel, conservation stewardship land manager at the Edward Lowe Foundation. “Even though you may not see animals like massasaugas often, they still play an important role in the greater system, and losing any plant or animal species can alter the function of that system.”

## Encouraging biodiversity

Although the Edward Lowe Foundation's primary focus is entrepreneurship, it is also committed to land stewardship. Big Rock Valley (BRV), the foundation's 2,000-acre property in southwest Michigan, features a broad variety of landscapes and ecosystems, with massasaugas adding to species diversity.

To encourage its massasauga population, the foundation's environmental team engages in a number of practices, such as establishing grasslands near known habitats.

From fall through spring, massasaugas typically live in wetland



Top photo: An eastern massasauga rattlesnake found at Big Rock Valley. Inset: Jarod Reibel, conservation stewardship land manager, catches a massasauga to collect data as part of a long-term mark-recapture study.

areas. In summer months, however, some of the snakes often migrate to drier upland areas that can range from forest openings to old fields and prairies. Disturbances in these grasslands while snakes are foraging (e.g., mowing, haymaking or cultivation) can cause high mortality. To prevent that from happening, the foundation's environmental team limits management in areas near known massasauga habitats to dates when the snakes are in hibernation.

The foundation also has converted many established cool-season grasslands to prairies. In contrast to cool-season grasslands, prairies offer greater diversity of height, texture and structure. Prairies generally support a much greater number of individual

plant species (often 50 to 100) per acre than cool-season grasslands. The result: Fields vary between tall, dense grasses and open areas with more light. This gives the massasaugas greater access to rodents — and makes it easier for them to regulate body temperature — while simultaneously protecting the snakes from birds or other predators.

## Slowing down succession

To prevent trees and brush from taking over wetland areas and converting the habitat to woodlands, the foundation thins wetlands by hand and through prescribed burning. “With a population of federally threatened snakes, we don't want to risk killing any while burning,” Reibel says. “We generally conduct prescribed burns in early spring and

## Best practices at BRV

The foundation encourages its massasauga population in a variety of ways:

- Establishing grasslands near habitats the snakes are known to frequent.
- Introducing more native prairie plants.
- Managing key habitats to slow down natural succession.
- Educating staff and neighbors about the importance of conserving eastern massasaugas.

utilize a soil temperature logger placed in the wetland to help us predict when snakes will emerge from hibernating,” Reibel says.

Education is also important to correcting misperceptions of massasaugas, and the foundation has hosted workshops on the massasaugas in conjunction with the Michigan Department of Natural Resources for its staff and the community. Although the eastern massasauga is venomous, it’s a docile, nonaggressive species that rarely threatens humans.

### Researchers at BRV

The foundation also promotes its massasauga population by hosting researchers on its property.

For example, while a graduate student at Central Michigan University, Matt Cross conducted a two-year study on how eastern massasaugas react to prescribed burns. Cross also found a hibernaculum in a woodland area with a full tree canopy — unusual because massasaugas like the sun.

After consulting with several massasauga experts, the foundation’s environmental team began modifications to encourage the snakes in this area, such as creating

a corridor to a nearby wetland and thinning out trees and brush around the hibernaculum so the ground could heat up more quickly.

In 2009 the foundation forged a partnership with the Eastern Massasauga Rattlesnake Species Survival Plan® (EMRSSP), a consortium of about 20 zoos. Since then, the group has been conducting an ongoing field study at BRV to collect genetic and demographic data — data that is being used for population modeling and to inform conservation plans.

“The partnership is important because few long-term datasets exist for this threatened species,” points out Lisa Faust, senior director of population ecology at the Lincoln Park Zoo in Chicago, who serves as EMRSSP’s field conservation adviser. “To understand how a population is changing, you need a solid baseline of what that population used to be like.”

The researchers estimate that BRV has about 150 adult massasaugas in the survey area — and the population seems to be healthy and have good reproductive rates. This is especially good news in light of a recent fungal disease. “There is some evidence of the disease being present at BRV, but we don’t see it impacting the population in a meaningful way like in other sites,” Faust says.

In addition to its longevity, the BRV field study is also important because it takes place in the middle of the snake’s geographic range, Faust adds. “Most massasauga studies have focused on areas in the extreme south or north. Because climate change is changing environmental conditions, having a study in the dead center of the massasauga’s range is very helpful.”

And in contrast to studies that look at declining snake populations, data from BRV’s healthy massasaugas provides context and a better understanding of what normal survival

rates look like, Faust adds.

Eric Hileman, the EMRSSP’s quantitative ecologist and an assistant professor at West Virginia University, has conducted several massasauga studies of his own at BRV, and the resulting data has been used to enhance the EMRSSP’s annual findings. In one project, which leveraged data from BRV and 46 other sites, Hileman demonstrated how life history traits vary across the snakes’ range, such as offspring being heavier in regions with higher annual precipitation.

In another project, Hileman developed a more precise tool for determining when snakes emerge from hibernation. In the past, April 15 was used as an arbitrary calendar date for emergence. Yet by leveraging soil probes and game cameras near hibernaculas at BRV, Hileman demonstrated that when soil temperatures at 30 centimeters and 60 centimeters invert and the shallower soil becomes the warmer temperature for a few days, snakes begin to emerge. This is important knowledge for land managers so they can better time prescribed burns.

### Ongoing monitoring

Not many properties have habitat management and research activities going on at the same time, says Yu Man Lee, a conservation scientist with the Michigan Natural Features Inventory, which has partnered with the foundation on educational events and research.

Active monitoring is especially important when it comes to animal species, Lee points out, noting it’s important to make sure management practices are effective and determine which techniques are better.

“When managing vegetation, you can tell what’s happening,” she says, “but it’s difficult to know what’s happening to an animal species without actively monitoring them — especially massasaugas, which are hard to see.”