



Saline Springs Tiger Beetle (*Habroscelimorpha circumpicta johnsonii*)

The Role of Missouri's Natural Areas and Other Conservation Lands in Preserving Tiger Beetle Diversity

By Ted C. MacRae

When Missourians think about wildlife diversity, usually the state's 800+ species of fish, amphibians, reptiles, birds, and mammals come to mind. In reality, the diversity title belongs to the perhaps 25,000 species of insects that share habitats with vertebrates, ranging from the microscopic (springtails) to the annoying (mosquitoes) to the revered (monarch butterfly). Among the most charismatic insects in Missouri are the tiger beetles, predaceous insects that favor open ground in a variety of lowland and upland habitats. Like their big cat namesakes, tiger beetles have huge eyes that can detect the

slightest movement, long thin legs for running down prey, and large, toothy jaws for grabbing and promptly dispatching their hapless victims. While representing only a tiny fraction of the total insect fauna in Missouri, the 24 species of tiger beetle that live in the state still represent a level of diversity worthy of study and protection.

Tiger beetles frequently live in disturbed habitats with sparse vegetation, such as sandbars and erosion cuts, as well as along muddy banks, on glades and in forest litter. European settlement resulted in drastic alterations in the abundance and distribution of these habitats, and tiger beetle populations have been affected as a result. Dredging and straightening of streams and rivers, fire



Six-spotted Tiger Beetle (*Cicindela sexguttata*)



Bronze Tiger Beetle (*Cicindela repanda*)



Swift Tiger Beetle (*Cylindera celeripes*)



Punctured Tiger Beetle (*Cicindela punctulata*)

suppression, and grazing have all impacted species that live in the habitats these activities have affected. Some anthropogenic changes have actually benefited certain species—e.g., road, borrow sand pit and pond construction that create habitat for species favoring exposed clay and sand or water’s edge. Common species in Missouri include *Cicindela sexguttata* (Six-spotted Tiger Beetle) on woodland trails, *Cicindela repanda* (Bronze Tiger Beetle) along the state’s water courses, and *Cicindela punctulata* (Punctured Tiger Beetle) in a variety of open, upland habitats. Most species, however, have more specific requirements, and while the status of many species is secure, a few are rare or highly localized and, thus, warrant protection.

Among the rarest is *Cylindera celeripes* (Swift Tiger Beetle). These tiny, flightless beetles are restricted to the eastern/central Great Plains, where they mimic small ants or spiders as they dart amongst openings between clumps of grass in search of prey. The species lives almost exclusively in upland prairies and grasslands with clay/loess soils and sparse vegetation, and populations have declined dramatically over the past century due to conversion and other alterations of preferred habitat. The beetle was not even known in Missouri until 2009 when Christopher Brown and I discovered it in loess hilltop prairie remnants at Brickyard Hill, Star School Hill Prairie, and McCormack Loess Mounds Natural Areas—the largest and highest quality examples of this critically imperiled natural community remaining in Missouri. We have searched unsuccessfully for the beetle in other loess hilltop prairie remnants in the area, none of which have the size and quality that the above mentioned sites possess. This suggests that the beetle is sensitive to habitat alteration/reduction and emphasizes the need to design and implement land management practices at sites known to support populations to reduce the chance of localized extinction. Such measures include the use of disturbance factors that favor grasslands over forests, including removal of encroaching woody vegetation, judicious use of

prescribed burning, and/or selective grazing. It is essential that these measures be implemented in a manner that minimizes impacts to beetle populations—e.g., prescribed burning should be done on a rotational basis and when adults and larvae are not active (late fall through early spring), perhaps also establishing permanently unburned refugia where alternative disturbance factors are used to maintain open ground and limit encroachment. In addition, potentially suitable areas adjacent to known sites should be renovated to expand potential habitat and minimize isolation distances.

An even rarer species is *Dromochorus pruinina* (Loamy-ground Tiger Beetle), a grassland specialist normally found in Kansas, Oklahoma, and Texas. Known historically from a small series of museum specimens collected in Johnson Co., an extant population was located in 2005 in Knob Noster State Park. Intensive surveys of suitable habitat throughout west-central Missouri concluded that the beetle is restricted to exposed red clay embankments along a 2.5-mile stretch of just a single road in the park. Apparently suitable eroded clay roadsides exist elsewhere in the park

and surrounding areas; however, they are disjunct and separated by woodlands that the flightless beetles cannot traverse or have been recently altered by road construction. The nearest known population lies 75 miles further west (in Olathe, Kansas), preventing genetic exchange with the main population and increasing the likelihood of loss of genetic diversity in Missouri's small, isolated population. Because of this, it is critical that efforts be made to increase the size of the population through creation of additional habitat to ensure viability of the population. Much of the park and surrounding environs are heavily forested and, thus, do not provide suitable habitat for the beetle. Prescribed burning has been implemented within portions of the park in recent years to restore the grasslands and open woodlands thought to be prevalent prior to European settlement. However, the beetle has not been found in these restored grasslands, most likely due to the high vegetational density and closed structure they exhibit rather than the patchwork of barren slopes that the beetle prefers. Thus, land management practices should be modified to create and maintain more

Loamy-ground Tiger Beetle (*Dromochorus pruinina*)



Photo by Ted C. MacRae

open clay exposures within restored grasslands adjacent to the roadside embankments where the beetle occurs and also convert additional adjacent forests/woodlands to more open grasslands.

Our most beautiful tiger beetle may have already been lost. *Habroscelimorpha circumpecta johnsonii* (Saline Springs Tiger Beetle) lives on barren soil near saline seeps in the central and south-central Great Plains. In Missouri, a highly disjunct population of the beetle occurred historically in central Missouri's saline seep habitats—a critically imperiled natural community that has been degraded significantly during the past century by altered hydrology, cattle trampling, invasive exotics, and other disturbances. While the beetles were abundant in past years, particularly at Boone's Lick State Historic Site, populations have declined dramatically more recently as the sites suffered vegetational encroachment. Prompted by this apparent decline, we conducted a survey of known and potential saline seep habitats in central Missouri during 2001–2003, finding only a single beetle at Boone's Lick and a small population (less than two dozen individuals) at Blue Lick Conservation Area. Three apparently suitable saline seeps exist at the latter site, but adults and larvae were only observed at one of them, and prolonged flooding of this

particular seep during the third year of the study and subsequent years induced complete vegetational encroachment of the site. No beetles have been observed at Boone's Lick or Blue Lick in the years following the survey, and the likelihood of finding additional seeps capable of supporting the beetle seems very low. We conclude that Missouri's distinctive population of this beetle has declined below detectable limits and may have already been extirpated. The loss of this beetle from Missouri's fauna would represent a significant blow to our state's natural heritage, and it is imperative that any remaining saline seeps in central Missouri be protected and renovated if the beetle is to have any chance of surviving in the state. We have urged the Missouri Department of Conservation, the Missouri Department of Natural Resources, and other conservation organizations within the state to identify and allocate the resources needed to develop and implement a recovery plan for the species in Missouri. 🌿

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2016 Missouri Natural Resources Conference



February 3–5, 2016 • Osage Beach, Missouri • www.MNRC.org