



This Iowa endangered yellow mud turtle (*Kinosternon flavescens*) was found during the annual field day at Muscatine County's Big Sand Mound Nature Preserve in 2012. The annual field day is the only day a portion of the preserve is open to the public and reservations are required. It occurs only once every three years. AT RIGHT are the wild rose, Iowa's state flower; a view of Big Sand Mound from Beatty's pond; and Dr. Tom Rosburg of Drake University, examining a tiny American toad. The sand mound prairies are one of Iowa's most unique ecosystems. Unusual dunes shift in the winds, prickly pear cactus beds flourish, reptiles sunbathe and the area mimics the arid American Southwest more than the nation's breadbasket.

RECOVERY IN THE LAND OF THE LOST

At Big Sand Mound Nature Preserve, a dazzling sand prairie next to the Mississippi River, *ornate box and yellow mud turtles, race runner lizards, blue grosbeaks, hoary puccoon and sand primrose* shows what people can save when they value it.

BY MINDY KRALICEK PHOTOS BY MINDY KRALICEK AND ERIC OSMUNDSON



At 4:30 a.m. the night's rain has diminished to mist and it floats through the open car window. It's time to hit the road to make the "early riser" programs of the field day at Big Sand Mound Nature Preserve in Muscatine. Scheduled to start promptly at 5:30 a.m., the maxim is "Get there on time so you won't be left behind."

Parked in front of the Monsanto Recreation Building, the mist has turned into a downpour. Inside, Connie Veach, Monsanto's environmental coordinator, greets 20 or so early risers with a wry smile and coffee. Nothing to do until the rain lets up.

Twenty minutes later the rain moves westward and the early risers split into two groups: birdwatchers are with Jessica Bolser of the U.S. Fish and Wildlife Service; those interested in a preserve overview are with biologist Dr. Tom Rosburg of Drake University.

Following Rosburg into the preserve, it's a short walk to a graveled levee next to Spring Lake. In the mist, thousands of tiny American toads hop from grassy banks onto the gravel. Newly transformed from toadlets to toads, they are leaving the pond for their new life on land.

“This area was wetland until the river levee was built at the turn of the century and groundwater was extracted for irrigation, industry and urban development. That left this area dry,” explains Rosburg. “In order to bring back the wetland, a hole was made in the levee to fill the wetland during the wet season and the water recedes during the dry part of the cycle. That change has brought the wetland animals, invertebrates and herptiles back.”

Today, the wetland is dry except for a small pond in the deepest area of Spring Lake, where Monsanto dug it out to hold water during drought.

The birdwatchers pass us with Bolser pointing out common yellow throat, indigo bunting, catbird and a field sparrow that just let loose its insect-sounding trill. Diffused lighting from dark clouds pumps up the feather colors.

Dampness creeps up our pant legs; shoes and jeans are soaked toe to thigh.

Beyond Spring Lake is sand prairie in three visible terraces formed by a sequence of rainfall patterns and climate changes over thousands of years.

Our group comes upon a pitfall screen fence used by Mount Mercy University biology students to trap small animals for population studies. Small animals will follow the fence until there is a break where plastic buckets are buried. Some have lids that sway with the weight of the animal that crosses it, and the animal falls in. Other pits are open, but just as likely to contain small animals.

Beetles and spiders are the most numerous creatures in the pits, but one bucket contains a female six-lined racerunner lizard. Lizards eat crickets, grasshoppers, beetles, spiders and caterpillars, which they mash with their strong jaws. Although the lizard is trapped, it has food until the researchers return to record, measure and release what’s been captured.

Rosburg points out many species of plants growing in the sandy dry soil. Although productivity is poor in the sandy soil, diversity is high because of the sunny conditions. Due to the early

2012 spring, the plants are ahead of their normal growing schedule. He points to flowers that don’t usually bud until August or September—but this June they are here.

As we hike upward, Rosburg points out several varieties of milkweed and catchfly. Catchfly produces a sticky substance at the base of its flowers that catch small insects. There is also hoary verbain, bush clover, horse nettle, purple prairie grass, June grass, pennyroyal and cranesbill.

Rosburg spies a western ribbon snake and someone in the group snatches it. Ribbon snakes are active in daytime and more aquatic than garter snakes, which is why it is in Big Sand Mound amid its ponds and marshes.

Along the property line are many non-native, invasive autumn olive shrubs. Their leaves are tough and leathery, dull green on top and silver underneath. “It’s difficult to get rid of,” says Rosburg. “An herbicide will probably be used, as cutting or burning it creates more shrubs. It looks nice and smells good, but it shades out native plants.”

Border fence posts have several bluebird houses attached. Rosburg opens the lid of the first and it is occupied by baby swallows. All the birdhouses checked contain baby swallows. Their parents dart and circle above our heads as the sun burns away the last of the mist.

Rosburg moves ahead with speed, leaving stragglers behind. Bob Bryant, a naturalist at Nahant Marsh Education Center in Davenport, brings up the rear and stops at a decaying branch on the ground with a greenish-white plant with bright red tops growing from it. “This isn’t a plant,” says Bryant. “It’s British soldier lichen, named for the red-coated soldiers who fought against the American Revolution.”

Beautiful, wide-crowned shrubs bloom. They are identified as the common hoptree or wafer ash. “Some think the shrub’s odor stinks, while others like the smell. The fruit is a round wafer-like winged seed,” informs Rosburg.

We take a turn through a



BOX TURTLE PHOTO BY ERIC OSMUNDSON; REMAINING PHOTOS BY MINDY KRALICEK

LEFT: An ornate box turtle (*Terrapene Omata*), is found among woodland debris at Big Sand Mound. Mount Mercy University biology students check a pitfall fence line in search of small animals inhabiting the preserve. Rosburg, arms raised, leads a group of early-risers on a tour of the preserve. BELOW: A western ribbon snake (*Thamnophis proximus*), similar to a garter snake but more aquatic, poses patiently for a photo.





stand of trees and discover an ornate box turtle. A few more are found in the woodland debris. A later group will find 14 in that same stand.

As we join the birders walking back to the Monsanto Recreation Building, they tell us they spotted a blue grosbeak—a definite high point for a birder—as well as an eastern kingbird, a pileated woodpecker and many goldfinches.

Professors and Boy Scouts

Gathered at the check-in point are a hundred or so adults and college students waiting to begin the regular Big Sand Mound Field Day activities. Boy Scout Troop 560 from Cedar Rapids is there to assist the groups with navigation. This troop also helped remove downed trees and brush so yellow mud turtles and hatchlings can travel from hibernation areas to the preserve's ponds to drink and eat. Troop 560, along with Troop 160 of Muscatine, helped erect 3,225 feet of net fencing with Mount Mercy University research students.

Choices include either a three-hour tour of Big Sand Mound or attendance at two short session tours or talks. After pondering whether to join a session about photographing nature, the wetlands of the preserve, prairie plants, birds of prey or handling amphibians and reptiles, I join the turtle and other fauna group led by Neil Bernstein, Mount Mercy University biology professor.

Bernstein and his students have monitored yellow mud turtle populations here for more than nine years, a study started by retired Drake University professor

Jim Christiansen in 1988. This is the largest population known to exist in Iowa. Three of his students and his daughter will help check the pitfall traps.

Again, the first stop is Spring Lake with its thousands of tiny hopping toads. He says changes in hydrology during the last 4,000 to 8,000 years isolated this sand prairie from sand prairies southwest of Iowa. Female yellow mud turtles are first to come to the ponds to feed and drink in April. Then males arrive. Females leave first to lay eggs, with males following later. Eggs hatch in the fall, but hatchlings remain buried until spring warms the sand. There are no mud turtles to view at Spring Lake. The early warm weather has affected the turtles' normal schedule as well.

We head to the pitfall traps where the female racerunner is waiting to be weighed and measured. Bernstein says to hold the racerunner under its head. Grabbing it by the tail will cause it to drop its tail.

After peering into buckets of trapped beetles, Bernstein quotes British biologist J.B.S. Haldane (1892-1964). "The Creator, if he exists, has 'an inordinate fondness for beetles.'" This alludes to the fact that there are more types of beetles than any other form of insect, and more insects than any other kind of animal.

A deer mouse is found in one trap. His students often find prairie pocket mice, too. The last bucket holds an eastern garter snake. Both are measured and released.

Bernstein's students have found four adult yellow mud turtles and two hatchlings in the pit traps at Beatty's Pond,



OPPOSITE PAGE: Mount Mercy University biology student Taylor Helms and Dr. Bernstein study a 10-year-old yellow mud turtle found at the preserve. The turtle is named for its bright yellow plastron (bottom shell). The deepest part of Spring Lake is where turtles and toads come to feed, drink and mate. A Fowler's toad is discovered in woodland debris and sand. **THIS PAGE:** The public gathers at the Monsanto Recreation Center for the field day. Dr. Mark L. Anderson, archaeologist, discusses prehistoric cultures that lived in the area. A visitor examines a hoe like those used in the Late Prehistoric period. At left is a female six-lined (count the yellow and dark stripes) racerunner (*Cnemidophorus sexlineatus*) caught in a pitfall bucket.

a larger pond at the preserve. No yellow mud turtles have been caught in the last two weeks and students may start checking bullfrog stomach contents to see if they are eating hatchling mud turtles.

Prehistoric Cultures at Big Sand Mound

On top of a ridge, a perspiring but rapt group listens to project archaeologist Mark Anderson's account of prehistoric cultures that lived here.

"This preserve was farmed until the 1960s and was sold in 1962 to Monsanto and MidAmerican Energy. Fortunately, U.S. industries are now interested in preserving large tracts of land and this property is benefitting from that trend," begins Anderson.

"Not much is specifically known about the cultures at Big Sand Mound," says Anderson, who also serves on the preserve's advisory board.

He says sands accumulated here between 20,000 and 17,000 years ago, forming the mounds. A cool, wet climate eventually gave way to warmer and dryer conditions over the next 8,000-plus years. Bands of hunter/gatherers roamed the upper Midwest. They probably relied on hunting deer, elk and other large game with darts and spears, and small game captured in pit traps, with plant foods used in the warm season. Ultimately, Native Americans transitioned from highly mobile hunter/gatherers with large ranges to more seasonal camps dependent on local resources.

Big Sand Mound has three distinct erosion-formed

terraces. Anderson says the highest—Gunder Terrace—was likely stable by about 6,000 years ago. Archaic and later Woodland period cultures could have occupied this landscape. Environmental change was occurring rapidly, with the expansion of prairie and later, deciduous forests. People flourished and populations slowly grew. The hunter/gatherer way of life continued as ground stone tools came into wide use. By the end of the period, burial sites began to occur, along with experimenting with growing plants. This terrace could contain buried sites.

Anderson leads the group down to the second terrace—Robert's Terrace—likely stable around 2,000 years ago. One of the prominent cultures of the time was the Hopewell. Networks of trading brought obsidian from the Yellowstone area, copper from Lake Superior and shells from the Gulf. Domesticated plants were tended and mound building was an integral part of their culture. Political and social hierarchy was clearly developed.

"As you look at the evolution of Native Americans, you find the population grew as horticulture increased, and as cooking with pots developed. This allowed greater caloric intake. People slowly stopped moving seasonally and developed larger villages," says Anderson. "Trading with other Native Americans appears to have occurred more regularly. Use of bows and arrows arrives in the upper Midwest during this period."

The lowest—Camp Creek Terrace—formed about 200 years ago.

"By about 1,200 years ago, people in the Big Sand

Mound vicinity had improved food production, pottery technology, storage methods and greater social and political complexity,” says Anderson. “The Oneota culture occupied this area and likely later became known as the historic Ioway peoples, our state’s namesake. The Sac and Fox (Meskwaki) tribes go back several hundred years ago. They moved out of the western Wisconsin area to eventually live here.”

The Find

As we walk to the Monsanto Recreation Building, a couple of tent classrooms have been set up and I catch the end of the talk on creatures great and small. There is a tiger salamander, large American toad and several snakes to hold. One of Bernstein’s students holds a black turtle, about 7 inches long, that she found several yards away. A crowd gathers.

She gently turns the turtle over. The plastron is bright yellow. “It’s a yellow mud turtle,” heralds Bernstein. He examines the long, front claws and checks the distance from tail to vent (cloaca). A male’s vent is located further away from the body than a female’s. Bernstein counts rings on a scute, or shell section, and points to one with a notch.

“He’s about 10 years old and we caught him two years ago, too,” he tells us. “This is a great find. It’s time we let him get back to his life,” Bernstein says.

He carries the turtle away and releases him gently in cream-colored grass in the direction of the wetland. Excitement turns to sadness as I watch the turtle quickly stroke his way into the shadows of trees and out of sight. I want to follow the turtle, pick him up and run with him—take him where he’ll be protected from predators, vehicles and everything that could hurt him.

Bernstein watches me and I see a flash of emotion in his face. “He’ll be alright,” Bernstein says, and I fall in step with him, back to where his students wait.

Trap Line at Beatty’s Pond

Bernstein and the students gather in two vehicles to grab a quick lunch. Then, it’s off to the MidAmerican Energy side of the property and a remote access point on a bumpy road to the area

around Beatty’s Pond.

We stop the cars at a woodland and climb out. Clouds have moved in and the woods are dark, but the browns, beiges and greens are vibrant. The quiet is welcoming and eerie at the same time. A field sparrow wings past us as we walk to a clearing where the pitfall fence begins.

We follow it, winding around fallen branches, trees and brush, watching our steps to avoid the many small Fowler’s toads. An eastern garter snake is surprised and caught as we make our way uphill. A male racerunner, a gorgeous blue, is caught in a pit. Larger Fowler’s and American toads are caught, and then a beautiful ribbon snake. Lightning flashes in the distance. More tiny toads. All are counted, measured and released.

Beatty’s Pond spreads out before us, loaded with water lilies. Trees flank water’s edge. Lightning strikes closer and Bernstein motions. “I don’t want you caught out here in lightning. Go back to the cars and I’ll finish the trap line and meet you back there.”

The students tell him no way; they want to finish the job. Then there is a downpour. We take shelter under tall bushes, pulling hoods over heads, unprepared for this turn in weather.

Bernstein notices a large dead map turtle in the grass. The carapace and plastron are in great shape, but it stinks. Cause of death is beyond guess.

Lightning continues and rain pours. I signal to others that I am going back and turn tail to the pounding rain.

The trap line is about a mile and a half long, and it’s another quarter mile through woods to the car, so it means backtracking almost that far with nothing familiar in sight except the trap line. I stay next to it, trying to jog when I can. The path turns slippery and I slow for footing. There’s something about being in a new place and not sure where you are going that conjures up Rod Serling’s voice—a sound wave into the Twilight Zone. Then I see the safe haven of the Jeep Cherokee, paint shining in the rain, wheels sunk in mud, on the edge between woodland and prairie.

In 10 minutes the rest join me, drenched and tired, eyes shining with adventure. We say our thank-yous and good-byes and head for the highway home. 🐢



OPPOSITE PAGE: A blue racer (*Coluber constrictor foxi*) was caught slithering through the grass. An eastern garter snake (*Thamnophis sirtalis*) caught in a researcher's pit-fall trap gets a visitor's lookover before it is released. **THIS PAGE:** The endangered yellow mud turtles appear to be in decline at Big Sand Mound Nature Preserve.



Yellow Mud Turtles: A Perilous Journey at Big Sand Mound

During a period of hot, dry climate about 8,000 years ago, yellow mud turtles (*Kinosternon flavescens*) made their way to the sand prairies of Iowa, Illinois and Missouri. Their small legs pulled them through oxbows, marshes and backwaters in the spring for hydration. After feeding and mating, they returned to the sand prairies for nesting in mid-July. Their hatchlings broke through their shells in the fall, but remained buried in the sand, waiting for spring. When warmth returned, the walnut-sized hatchlings began their journey to find water and feed on dead fish, crayfish, insects and snails. Their journey took them several hundred meters to a large pond they'd never seen. Raccoons, skunks, hawks, eagles, foxes, even crows, are their predators on land. In water, fish and larger turtles feed on them, but some survive to make the trip back to the Big Sand Mound—they've done so ever since.

As part of a larger area known as Muscatine Island, the sand prairie was

drastically altered since settlement in the mid-1800s. People increased the size of Muscatine Island, lowered the water table, and dried up oxbows and wetlands. Trees encroached the sand dunes. Wildlife in the unique environment found itself homeless.

Upon purchasing the 510-acre site, Monsanto and MidAmerican Energy decided to conserve and enhance the ecological communities, manage endangered species, protect archaeological features and accommodate scientific research. By their efforts, at least 352 native plants and 30 rare plants and animals, including copperbelly water snakes, smallmouth salamanders and plains pocket gophers are thriving. To protect yellow mud turtle populations, a DNR-approved trapper removed raccoons and volunteers cut encroaching woody plants. Water flow in the main oxbow from the Mississippi River was reconnected by culvert. Wetlands were deepened. Prescribed burns removed trees to restore prairie.

In 2008, the area was honored by the

Wildlife Habitat Council for voluntary private sector involvement for biodiversity conservation.

Still, yellow mud turtle populations decline, as monitoring by Professor Neil Bernstein and students show. "Preservation without focused management may not be enough to maintain the species, even within a protected habitat," says Bernstein.

Then there is the problem with fragmentation. Surveys in 2007 outside of Big Sand Mound found no yellow mud turtles large enough to attract the Big Sand Mound population for mating, it is doubtful the isolated population will survive.

"A majority of the mud turtles found in 2009 were unmarked. It's likely the adults are not living to breeding age (seven years), which explains the lack of hatchlings," says Bernstein. "However in 2012, 10 adults at Spring Lake were marked. That's a positive sign, but total numbers found have continued to decline."