

Death on the Dunes

Biologists Fight to Save North America's Sleepiest Turtle

STORY AND PHOTOS BY LOWELL WASHBURN

It's tough being a tiny turtle. Given constant predator threats, drought and changing habitat, the odds of a mud turtle surviving seven years to breeding age are slim. Buried beneath the sands and inactive nine months a year, the turtle and its dime-size hatchlings in southeast Iowa's Mississippi river sand prairies face a population crash so severe maybe a year remains to save the species.

At the Big Sand Mound Nature Preserve, snug against Mississippi River backwaters along the Louisa and Muscatine county line, a diverse 510-acre refuge owned and protected by MidAmerican Energy and Monsanto forms the last bulwark for the endangered mud turtle.



Dime-sized yellow mud turtle hatchling.



Adult mud turtle

Unfortunately, 99 percent of Iowa's sand prairies were long ago destroyed to grow corn, beans and Muscatine melons, which thrive on its hot sands. At least for the little remaining habitat, the two corporations and others work to protect and restore the preserve and the turtles, too, Iowa's second smallest species. The black-skinned hatchlings are less than an inch long, with yellow dotting the edges of their oblong shells. The companies have won praise from the national Wildlife Habitat Council for their work.

Geologists call the sand mound prairies 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. The preserve is home to more threatened and endangered life than anyplace in Iowa. It's where termite-eating lizards like the six-lined racerunner then nourish endangered western hognose snakes. Cricket frogs and chorus frogs call. Voles scurry.

Fowler's toads, their calls likened to cries of a newborn child, spend much of the year buried in its sands, emerging evenings to feed. Southern bog lemmings scamper in its grasslands, wet meadows and wetlands. Endangered plains pocket mice populate the dunes. Iowa's rarest mammal, the least shrew, is found only in undisturbed sand prairie.

Here, scientists and staff from Mount Mercy College, MidAmerican Energy, Monsanto, and a retired Drake University biologist now at the University of Texas labor to study mud turtle decline and aggressively work to protect them. Since the 1970s, biologists have journeyed into the dune- and cactus-dotted preserve to trap and mark turtles, search for nests, and monitor numbers of hatchlings that, dehydrated, weak and tiny, desperately search for drink and food. By mid-April they reach the waters of Beatty's Pond, Monsanto Pool and Large South Pond to feed on dead fish, crayfish, insects and snails



OPPOSITE: An adult mud turtle. LEFT: Green algae on the shell of this adult mud turtle tells biologists the turtle is returning from the pond. Turtles leaving the dunes lack the green covering. This specimen is at least 11 years old. The rim around the shell of marked turtles are notched with a hacksaw which doesn't harm the turtle, but leaves unique, permanent marks for researchers to track. BELOW: Panoramic shot of the Big Sand Mound Preserve shows open sand "blowouts" critical to habitat. Shifting sands keep them open, but as trees encroach they hold the sands in place. Burns and mechanical removal of large trees help to restore the ecology, reduce predators and aid the turtles and other rare species.



before returning to the dunes mid-July to nest. It's the shortest mealtime of any North American turtle.

Most common across the deserts of Texas, eastern New Mexico and Mexico, Iowa's mud turtles are extremely isolated. They, along with other desert plants and animals invaded Iowa during a period of hot and dry climate beginning about 8,000 years ago.

Once a mud turtle haven, slow changes to the sand prairie landscape are causing populations to crash. Since settlement, sand prairies were eliminated. Humans suppressed fire—nature's prairie lifeguard—in remaining areas, slowly allowing trees to infiltrate the dunes and shading buried eggs that require high heat to develop. Trees create habitat for raccoons, which lie in wait from above, scanning for bite-sized turtles and eggs. Buried mud turtle eggs hatch in fall, but hatchlings wait until spring to emerge, finding skyscraper-like tangles of downed limbs, trunks and branches—huge obstacles

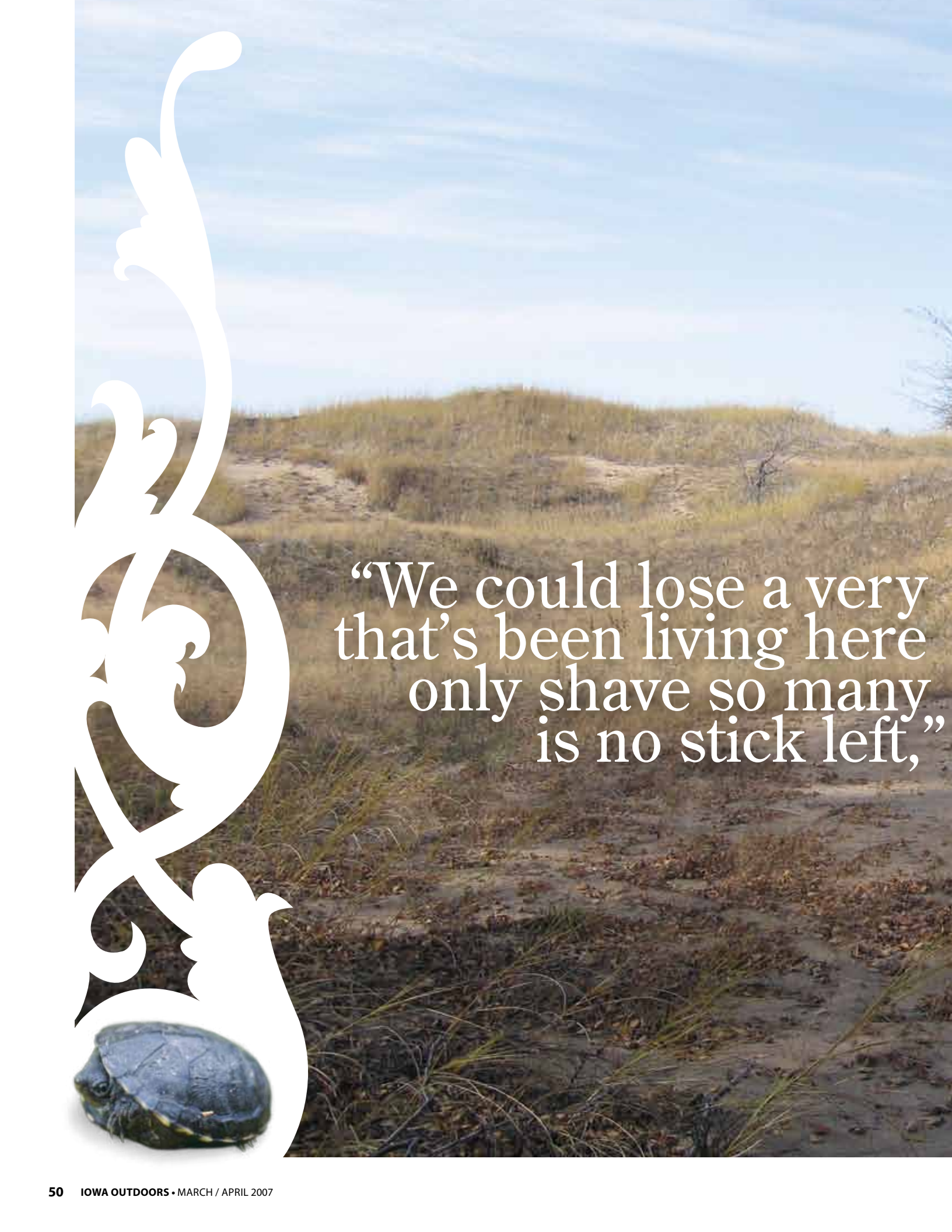
for tired turtles. "Raccoons patrolling the area get high percentages of the turtles," says Dr. James Christiansen, the former Drake biologist, who after two decades of research knows more about the turtles than anyone. The dunes just aren't the same place they were a century ago.

"If the trend is not reversed...there will be no yellow mud turtles left to capture by the spring of 2008 or 2009," laments biologist Dr. Neil Bernstein of Mt. Mercy College in Cedar Rapids.

Whether they're adults, eggs or hatchlings—raccoons love to eat turtles. Unlike ornate box turtles, adult mud turtles can't pull their hind legs into the shell. Raccoons chew off the legs of palm-sized adults then eat the shell's contents. A hatchling's shell is merely a walnut shell to a raccoon and offers no defense. In the desert Southwest, devoid of raccoons, mud turtles never evolved to fend them off, says Christiansen. And now, here, they suffer.

When the study began in 1988, researchers captured





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"This preserve is recognized as being extremely unique, and I don't think there's another place exactly like it," says Joe Bannon, MidAmerican Energy environmental manager. But there are challenges. Preventing the sand prairies from being over-run and destroyed by invasive, woody plants requires carefully prescribed burns, girdling of tree bark and labor-intensive mechanical removal for large trees. "What we hope to accomplish is to combine several small fragments into one large sand prairie. As we continue to remove woody vegetation we hope to create something more hospitable for the unique animals that live here," he says.

Monsanto and MidAmerican are using trappers to remove raccoons that feast on the turtles. "I'm really anxious to see how the trapping helps," says Connie Veatch, Monsanto's environmental coordinator. If the trapping works, turtles could rebound in a year or two, says Bannon.

unique and interesting species for a very long time. You can pieces off the stick until there says Dr. Bernstein.

A FAMOUS HERPETOLOGIST'S RARE DISCOVERY

While monitoring mud turtle populations at the Big Sand Mound Prairie Preserve, Dr. James Christiansen, a natural history author, reptile researcher, and retired biology professor at Drake University, heard the distinct call of a bullfrog in distress. Knowing such calls often lead to interesting observations, he hiked to the edge of a large pond to find the frog being swallowed head-first by a large water snake.

Evasive, the snake escaped into underwater vegetation. After an unsuccessful, intensive search, the distress calls resumed, but muffled. Christiansen found the calls coming from inside the bulging snake. Upon capture, Christiansen realized his rare find—a federally endangered copper-bellied water snake, unseen on the preserve since 1975. Alone, he snapped a one-handed documentary digital photo—the other hand clutching the snake.

Upon release, the agitated water snake regurgitated its meal. The indestructible bullfrog, now liberated, quickly hopped and disappeared into the pond in spite of being in the snake belly at least half an hour.





COULD TURTLE SECRETS ADD A CENTURY TO HUMAN LONGEVITY?

in nature, each species has its place in a fully functioning ecosystem. But rare and endangered plants and animals have practical uses too.

Researcher James Christiansen studies turtle “super cells” that fight bacteria at near-freezing temperatures to protect turtles during hibernation. NASA funds his research, interested in future attempts to cool astronauts to similar temperatures to slow the aging process in order to reach distant solar systems.

Another study relates to human longevity. Unlike humans, aging turtles not only continue to grow new tissue, they don’t physically deteriorate during aging, instead dying due to cars, raccoons or infectious disease, but not old age. While human cells divide about 50 times before telomeres in DNA begin to create genetic mistakes, turtles may get a burst of telomeres early in life. If the turtle’s secret is found, it could help maintain human telomeres to extend human lifespans and help repair tissue.

Three adult yellow mud turtles captured in pitfall trap.



519 adult mud turtles and 168 hatchlings at Beatty’s Pond. During last year’s monitoring, 37 adults and one hatchling were counted. The region’s population is crashing too. A few survive near Ft. Madison. The largest Illinois population is fewer than 25 turtles. Missouri is down to three. Iowa is the turtles’ best bet in the upper Midwest.

DEATH NESTS

The food-laden backwaters of the Mississippi River are a raccoon Valhalla. Over a third of nested mud turtles never escape their raccoon raiders, likely an underestimate. Underground and undetected by biologists, to a lesser extent, snakes also feed on eggs and hatchlings. “When a really good predator, like the raccoon, learns what a nest smells like it becomes very efficient at locating and destroying additional nests. Once a raccoon begins to actively search the dunes for turtle eggs, it becomes more and more effective,” says Bernstein.

“The majority of the mud turtles we’re capturing these days are unmarked. The original adults that should still be here have vanished and we’re no longer finding hatchlings. We’re also not seeing young mud turtles live to breeding age,” says Bernstein. Adults may live 35 years.

“Although we’ve observed the destroyed nests of other species, we did not see any evidence of mud turtle eggs during last season’s monitoring session. Some people wonder if mud turtles are still breeding here at all,” he says.

FIGHTING TO SAVE THE SPECIES

But efforts are underway to try to save the turtles by aggressively removing invading trees and brush: red cedar, black cherry, buckthorn and woody plants that threaten dune ecology. Controlled burns now restore the balance. Invasive trees are girdled or cut and chipped on-site. The Boy Scouts are involved too; Troop 560 from Cedar Rapids lends a hand each year. MidAmerican leveraged a DNR landowner incentive grant to conduct habitat improvements with other partners like The Nature Conservancy. And both companies paid to deepen portions of ponds to sustain water through the summer.

“Unless checked, woody succession could take out rare plant and animal life,” says Bernstein. “Unfortunately, succession favors predators, like the raccoon. If successful, removal of woody vegetation could help preserve the unique features (flora and fauna) of the dunes while, at the same time, make the area much less



On a rainy, cold spring day, biologists James Christiansen and Neil Bernstein (with backpack) are aided by Mt. Mercy student researcher Jennifer Schubert as they shore-up and inspect over 3,200 feet of drift fence used to collect turtles. Turtles that fall into 31 bucket pitfall traps along the line are counted, inspected and marked before release. The entire fence is buried under four inches of sand and staked to make it "turtle tight." **BELOW:** The red eyes and legs of this ornate box turtle are typical of males.

GET INVOLVED

Help ornate box turtle research by contributing to the Fish and Wildlife Fund on line 59 of Iowa's tax form.



ORNATE BOX TURTLES FLOURISH AMID MUD TURTLE DEATH

The ornate box turtle is one the most beautiful and interesting wildlife found in Iowa. Unlike most turtles, ornate box turtles are non-aquatic, their entire life cycle tied directly to the sand prairies where they feed, breed, live and die. Maturing at 6 to 9 years of age, females lay clutches of four to six eggs. This small clutch size is offset by the reptile's amazing longevity: a century, perhaps longer.

The state's largest ornate box turtle population resides at the Big Sand Mound Nature Preserve, where researchers study the species along with its critically endangered cousin, the yellow mud turtle.

Most ornate box turtles captured and examined last spring were "recaps" or specimens previously captured and marked. Scientists found stable or slightly increased numbers of hatched box turtles and young box turtles survive to breeding age.

While mud turtles disappear from the sand prairies, ornate box turtles are at their highest monitored levels. With better armored shells where they can entirely and safely retreat, box turtles are more resistant to mammals than mud turtles. Box turtles also tend to lay eggs at greater distances from water, where raccoons are unlikely to find them.

Two problems facing mud turtles, raccoon predation and a lack of water at critical times, aren't as crucial for ornate box turtles. "First of all, box turtles don't need wetlands. And although raccoons may destroy the nests of both species, they cannot destroy adult box turtles. When a raccoon attacks an adult mud turtle, the turtle usually gets eaten," says Bernstein.



attractive to predators." If the habitat work fails to show immediate results, the mud turtle is in deep trouble.

In addition to restoring the prairie balance, biologists are pinning hopes on emergency predator control: raccoon trapping. Local trappers worked last winter, contracted to live-trap and euthanize the masked bandits. Again this spring when mud turtles get active, trapping resumes. To help the turtles, the DNR allows out-of-season trapping on-site during the hatch. During this time, MidAmerican and Monsanto pay the trapper, since pelts cannot be sold out-of-season.

The mud turtles may face other threats too. "Since mud turtles are inactive for so much of the year, spring is about the only time they eat or hydrate," says Bernstein. "It's a time when they have a very critical need for wetlands. One of the things we don't yet know is how to factor in the loss of wetlands or pumping of water by cities or industry. It's possible that this could be an important component to the species' survival."

For now, trapping could be the turtle's last chance. "It's startling, but true. We could lose a very unique and interesting species that's been living here for a very long time. You can only shave so many pieces off the stick until there is no stick left," says Bernstein. 🐢