TURTLE TRACKERS

When highway construction and development threaten to wipe out box turtle populations, The HSUS leads efforts to stay one step ahead of the bulldozers

by NANCY LAWSON

The sight of chewed-up orange mollusks isn't likely to set most people's hearts aflutter. But when those goopy remnants dribble from the mouth of an eastern box turtle, Susan Hagood celebrates.

"He's been eating something—that's good!" she says reverently. The object of her affection stares back at her through brilliant red eyes, bright slimy bits framing his satiated face. Hagood pronounces the contents of the day's breakfast: tasty slug.

The uninitiated may find it puzzling, this adulation of a shy critter shuffling among the leaves of a 1-acre holding pen in the woods of Boyds, Md. He's a cute turtle, as turtles go, with all the expected features: hard shell, soft insides, and a hinged mechanism that allows him to completely withdraw. He doesn't look a day under 1,000 years old. In short, he's no party animal.

But in typical reptilian fashion, his beauty creeps up on you, especially if you're lucky enough to see him through the turtle-loving eyes of this HSUS wildlife issues specialist, who spots another one of her charges moving along the fenced perimeter a few paces away. Closer inspection reveals evidence of an unheralded but interesting existence: a morsel of mushroom hinting at a recently enjoyed meal, a dented shell recalling a long forgotten skirmish. And further reflection reminds observers that his has been a journey both ordinary and extraordinary, stretching from an age when dinosaurs walked the earth to a day when dinosaur DNA can be analyzed in a test tube.

"These guys are little Tyrannosaurus rexes, and it's remarkable to me that

Transmitters attached to the shells of rescued turtles allow The HSUS's Susan Hagood to monitor animal movements and measure the success of the relocation project.

we still have remnants of that era," says Hagood. "But if we don't do something, we won't much longer."

At the moment on this sweltering July day, Hagood is trying to pick up signals from turtles with transmitters glued to their backs, intent on ensuring the dozens she's relocated don't find their way out of the safe harbor of the two large enclosures she has created. They've already eluded death once, narrowly escaping the path of destruction forged by a major highway project when Hagood's dog, Drew, sniffed them out of harm's way. They're spending at least a year on this land owned by Boyds resident Michael Rubin, an advocate for farmland and forest preservation who has long opposed construction of the 18-mile road that is displacing these animals. Other turtles have been relocated to property owned by the Washington Suburban Sanitary Commission, which protects the land surrounding its reservoirs. After acclimating to their new environment, they'll all be allowed to roam into the world at large.

It's called a "soft release," intended to help the turtles remain in the areas where they've been moved. Research by Hagood and others has shown that "hard releases"—which relocate them into new territory without an initial adjustment period—can send at least half the animals packing in search of native lands.

If all goes according to plan, the Boyds turtles will like where they've ended up and stay put. Having evaded formidable predators for millennia, these creatures now meet their demise in an all too pedestrian way: by stepping into the road.

PAVING THE WAY

That fate befalls millions of vertebrates a day in the U.S. From the reptiles of Maryland to the elk of Montana to the bobcats of California, roadkill is the No. 1 kind of wildlife mortality caused directly by humans.

For turtles, it's not the only threat. Adults who've lived for decades perish in an instant under lawn mowers and other agricultural equipment. They become pets of people who snatch them from the wild. Their eggs feed raccoons, coyotes, and other predators who've proliferated alongside human civilization.

Unlike those faster-moving animals, the turtles can't react quickly enough when it's time to get out of the way. When Maryland's Intercounty Connector is completed, it will include fencing and passageways for wildlife attempting to cross. But turtles living directly in the path of its construction won't have another chance to step into the road—the road is about to step over them.

The HSUS has long opposed the project because of the destruction it will cause to local ecosystems. "But we as an organization are nonetheless willing to get involved when the battle has been lost," says Hagood, "and to help the wildlife that will be affected."

On an early September morning in North Branch Stream Valley Park, Hagood and fellow volunteers are finding and moving more of the luckier animals under permits issued by the Maryland Department of Natural Resources; they've saved hundreds since the project began in the fall of 2007. Efforts by The HSUS, the Maryland State Highway Administration, and university researchers are unprecedented for the species; until now, no one has attempted to rescue eastern box turtles from highway construction and assess the effects on population survival.

PREVIOUS SPREAD: JIM MERITT/GETTY IMAGES. THIS PAGE, TOP: MICHELLE RILEY/THE HSUS; BOTTOM: LISA BETH WILLEY. OPPOSITE PAGE: MICHELLE RILEY/THE HSUS

"A dog is almost a requirement" for locating the elusive turtles, says Hagood, who adopted Drew after the retriever flunked U.S. Customs training for refusing to jump onto a conveyor belt. Since then, Drew has found her calling, locating hundreds of turtles with the help of students like Nicole Wright and Scott Farnsworth (standing).

JENNIFER HOBGOOD rescues a gopher tortoise from entombment in his deep burrow.

BURIED ALIVE in Florida

As houses and shopping malls spring up from the Florida soil to accommodate the state's seemingly endless population expansion, their foundations often destroy the homes of others whose families have made their claim on the land for eons: burrowing gopher tortoises.

Since 1991, because of a policy that allowed developers to acquire "pay-and-bury" permits, more than 100,000 threatened tortoises have been entombed. In 2007, the state began requiring pre-construction relocation of the animals, but hundreds of developers still operate under grandfathered permits. The resulting mass burials have been devastating to the long-lived, slow-to-reproduce species; biologists estimate Florida population losses at 60 to 80 percent in the past 100 years.

HSUS Florida state director Jennifer Hobgood is in a race to reverse that trend, along with scientists, developers, state officials, philanthropists, volunteers, and fellow advocates. Since 2006, she has helped dig as deep as 15 to 18 feet to rescue tortoises from the brink of death. Without these efforts, some of the tortoises would be crushed by bulldozers; others may suffer underground for months before being dehydrated, starved, or asphyxiated.

Sometimes Hobgood has to talk fast before construction begins. Developers have listened, allowing her and others to step in front of bulldozers about to clear the land. Last summer, with the help of donations and a grant from the Folke H. Peterson Foundation, she and others delivered hundreds of tortoises to Nokuse Plantation, a 48,000-acre conservation area where almost 2,000 of the animals—some more than 60 years old—have been brought to safety.

Though she is grateful for the chance to provide them refuge, Hobgood has mixed feelings about the task. "Relocation is stressful for tortoises under the best of circumstances, when they're handled with utmost care and compassion," she says. "Though I'm always relieved that we're able to give them a second chance, it's sad that they must leave their homes. I can't explain to them why they're being displaced or that we're doing what is best for them under the circumstances."

Gopher tortoise

HELP SAVE FLORIDA'S THREATENED CREATURES by donating at *humanesociety.org/gophertortoise.*

Advocates and scientists hope the methods and data collection will serve as a model for road projects of the future. But in the shadowy stillness of the doomed woods, it's hard to picture what will become of the here and now, of the world as the trees and animals in this space have always known it. As rescuers don required protective gear distributed by the contractor, the sadly comical resemblance of plastic hard hats to turtle shells is inescapable. In the end, though, it will be the humans with their poor and inelegant substitutes who walk out of these woods alive. Even when protected by evolution's best armor, nature cannot save itself.

Extensive research has gleaned enough information to tell us what it would take to prevent the eventual disappearance of the eastern box turtle from the face of the earth: expanses of unbroken habitat that limit collisions with the destructive forces of modern machinery. The adults reproduce slowly, taking years to replace themselves. And there's a reason Hagood and her field assistants are so focused on finding escapees from her relocation sites, celebrating when their telemetry equipment pinpoints "the miscreants" about to step in front of a combine or venture into a roadway. Modeling studies have shown that, in a population of 200 turtles, a loss of only three or four adult females to road collisions or other untimely deaths each year will send that population on what Richard Seigel of Towson University calls a "slow, shallow glide-path to extinction."

It won't happen in 10 years or even 20, but at the current rates of death and development, eastern box turtles may not be long for this world, says Seigel, who chairs Towson's department of biological sciences. Yet they aren't even listed as threatened in Maryland—simply because so many other species are declining more rapidly and resources are scarce. "This is a triage situation," he says.

A TURTLE'S BEST FRIEND

The prognosis may not be bleaker for those other species; it's just more noticeable. When an entire pond's worth of frogs disappears in a year, it's easy to spot the problem, Seigel points out. Quieter, more reclusive creatures don't attract the same attention. While the effects of box turtle losses on the

surrounding environs are not well-known, turtles in general "are very important to the proper functioning of the ecosystem, as predators and as herbivores," says ecologist Matthew Aresco, conservation director of the Nokuse Plantation in Bruce, Fla.

Perhaps the only time their plodding nature is a saving grace is when the race is on to rescue them—and when Drew the turtle-sniffing dog is on the case, working alongside Hagood seemingly round the clock, often directly in front of the bulldozers.

Proving on every mission how critical a dog is to the effort, Drew dances in circles each time she's picked up a turtle in her mouth, presenting the creatures to Hagood like tennis balls. Shouts of "Turtle!" ring out among the half-dozen volunteers gathered at the park. Holly Shipley, the environmental compliance specialist for the contractor on this section of the highway, works with two students to help weigh and measure the animals, record their capture locations, carve identifying notches into their shells, and move them into the woods outside the fenced-in demolition zone.

Underscoring the effort at North Branch is the hope that one day, maybe decades from now, some other researcher will happen upon these creatures, alive and well. Unlike the Boyds turtles, who had to be moved far from areas where habitats were completely destroyed by another section of the highway project, these animals will land just a few hundred feet away in adjacent parklands. Any attempts to return to their capture locations will be blocked by a turtle-proof fence.

Volunteer Sandy Barnett counts shell rings—or "scoot ridges"—that help indicate the age of this turtle, whose attempt to return to the dead zone has been stymied by newly installed turtle-proof fencing. The animals can live for 60-plus years; one found at a federal wildlife refuge is believed to be in his 80s.

The chocolate Lab of this industrious rescue crew, trained via the decidedly low-tech method of habituation to a turtle-scented towel, has obvious incentives to keep her nose to the ground: the promise of peanut butter rewards. The motivations of her two-legged companions are more complicated.

"People ask me, 'Why box turtles?'—and I have yet to come up with something that is satisfying to them and to me," says Hagood, who, when she's not rescuing turtles, is studying the effects of roads on their genetic diversity. "They're so vulnerable, and they face such challenges in the world we've created, yet require so little of us to survive."

Whatever devotions she's unable to articulate are evident in Hagood's actions as she tries to stay one step ahead of construction crews. A phone call last summer about an impending clearing for county soccer fields prompted her and Drew to comb the land for weeks until all the trees were gone. They worked with other volunteers to rescue 48 turtles, also finding a dead hatchling, shell fragments, and carcasses. There may have been many more, Hagood laments: "They keep me up at night, these turtles. You're just haunted by the ones you couldn't find."

Drew works for peanut butter, safely retrieving turtles for Hagood as if they are tennis balls.








Road Warriors

When Ray Sauvajot began studying animal movements in Southern California, he was skeptical about the chances of the area's larger carnivores making it across major highways.

But bobcats and coyotes and mountain lions—one of whom used the same underpass beneath a busy freeway 18 times—proved him wrong.

Though the area didn't yet boast any wildlife crossings designed for animal use, many creatures were making their way through existing tunnels and culverts where Sauvajot used cameras, radio collars, and "track stations" to identify species by pawprint. "I was pleasantly surprised," he says.

As chief of planning, science, and resource management at the Santa Monica Mountains National Recreation Area, he is part of a growing movement of scientists, environmentalists, transportation planners, and wildlife advocates trying to reconnect the fragmented American landscape. Highway-induced habitat degradation and vehicle-wildlife collisions are so widespread that universities are now devoting entire research centers to addressing the problem. *Road Ecology*, a seminal 2003 book by a Harvard University landscape ecologist and 12 coauthors, issued a clarion call for a multidisciplinary approach.

60
mammalian and reptilian species have been documented trying to cross U.S. Highway 27

Those trying to prevent further human encroachment find the new collaboration encouraging. "If you told me 10 years ago that the radio telemetry and home-range maps of mountain lions would be hanging in the planning offices of the District 7 [California Department of Transportation's] building in downtown L.A., I would have said, 'You're crazy,' " says Sauvajot. "But that's what's happened."

Though mortality is the most obvious negative consequence of car-crazed cultures, scientists are also researching other, longer-term effects on animals. Local populations of some species, including reptiles, need large territories to promote genetic diversity. But many are isolated in ever smaller pockets of habitat. The more roads they have to cross in search of mates and food, the more some give up or die trying. In one stretch of a Florida highway dividing a lake, ecologist Matthew Aresco documented more than 11,000 animals—representing 45 species of reptiles and amphibians and 15 species of mammals—attempting to cross in a seven-year period.

Aresco has galvanized support for the construction of the proposed Lake Jackson Ecopassage over U.S. Highway 27, joining a trend that started decades ago in Europe and has been championed in recent years by the Federal Highway Administration (FHWA). According to a recent survey by the National Cooperative Highway Research Program, the U.S. now has 663 terrestrial wildlife crossings and 692 aquatic crossings.

Many such projects are prompted by mandates to mitigate the effects of new construction on the surrounding environment. But the nation's vast network of existing highways—most built before anyone gave much thought to habitat connectivity—need even more attention, requiring creativity and effort to modify and monitor.

"If Highway 27 was built today, there'd be a mile and a half of raised highway—a bridge, essentially—and there wouldn't be a problem," says Aresco. "But in the case of retrofitting old highways, it's not feasible to remove the highway and build a bridge. … It gets expensive, and there's a lot of resistance."

Climate change will likely encourage the migration of species to new habitats at the same time that state transportation departments are evaluating the need to replace bridges. With funds for these projects dwindling, highway planners will need to examine the possibility of designing new structures to address diverse challenges, including not only storm surges and increased traffic but also wildlife movement, says Mary Gray, an FWHA environmental protection specialist. As with the mountain lion, some animals figure out what to do on their own. Gray tells the story of a pedestrian tunnel with unexpected visitors: Constructed under an Oregon highway to provide access to a park, the tunnel now also serves as a crossing for mule deer—a species that hadn't been seen on the other side of the road since the highway was constructed, says Gray.

"We live together on this planet," she says. "Recognizing the ecological benefits of designing tunnels, culverts, and bridges for multi-purposes is a win-win."

Research by Aresco, Sauvajot, and other scientists helps convince officials that the problem is dire but not unsolvable. In the Santa Monica area, Sauvajot's work supports collaborative efforts to reconnect habitats through modification of existing structures and construction of new ones. The hope is to eventually create links throughout the sliced-up landscapes so wild animals can quietly go about the basic business of living.

"A lot of this has been driven by more and better science—[and the recognition that] many of these species need large areas to continue to roam," says Sauvajot. "Those are going to be critical to their long-term survival."

PASSAGE TO SAFETY

It's a sentiment Mary Jo Bartles can relate to. The sight of six dead box turtles in the same small patch of Maryland road five summers ago led the Greenbrier State Park ranger to call The HSUS for help. When Hagood got involved, it wasn't long before the two women hatched a plan to stop the carnage: They'd erect barriers of the sort installed along a Florida highway where, in one day in February 2000, Matthew Aresco had found the remains of 90 dead turtles in a ⅓-mile stretch of highway dividing a lake. By using low nylon silt fencing to divert some turtles to an existing culvert—and to allow for the rescue and hand transport of many others lumbering along the perimeter—Aresco has since saved more than 9,000.

Inspired by his success, Bartles and crews of HSUS and Greenbrier volunteers installed 1.7 miles of fencing, pounding stakes into rock over five cold and sometimes snowy weekends in 2005. Since then, Bartles has devoted hundreds of hours to monitoring the turtles and repairing the deteriorating barrier. The efforts have paid off; turtle mortality has dropped to about one animal per year.

Like Hagood, Bartles is so familiar with the animals that she can tick off their quirks: "One of them squeaks when she's closing up," she says. "One has a notch where the rain comes in." Another, adds Hagood, is missing a foot.

Using a camera and an infrared motion sensor, Bartles and Hagood have documented turtles who've used the fencing as intended by crossing through a culvert. They've also gotten a snapshot of the rest of the local wildlife population: mugs of surprised raccoons leaning into the camera, full-body images of befuddled squirrels baring their bellies, risqué portraits of skunks flashing their backsides. Through this modest underground passageway have also crossed snakes, birds, chipmunks, voles, moles, groundhogs, opossums, and rabbits who might otherwise fall victim to the crush of car wheels.

Because construction of new wildlife crossings is expensive and difficult, Hagood wants to assess whether, in the absence of funding to build them, more of the millions of existing culverts across the U.S. could be modified to provide safe turtle passage. Though the Greenbrier culverts have helped some animals make their way across, maintenance of the fencing, now stretched long past its advertised shelf life of 18 months, is intensive. And the passageways shown to be most inviting to critters are wider and brighter and occur more frequently on long stretches of road.

For Greenbrier's animals, though, additional help is on the way. Last year, the federal Transportation Enhancement Program validated this pioneering effort—another first of its kind to protect the eastern box turtle—by agreeing to grant $130,000 for the construction of permanent fencing and improved culverts.

The boost in resources gives hope to Hagood, Bartles, and other turtle advocates. As they walk along the road checking fencing and looking for their beloved charges, Hagood says this is one turtle hot spot she doesn't have to lose sleep over. "It's so nice to be able to sit back and know that this woman is out here 24/7," she says of Bartles. "It just goes to show that local activists are so important and can do so much to help wildlife. People call organizations like ours for help, but we can't do it without local support."

In other words, though it is humans who have sent eastern box turtles and other species inching toward their own demise, it is also humans—with a little help from each other and from four-legged friends like the turtle dog named Drew—who can bring them back from the brink. ■

This nylon silt fencing leading turtles to culverts along U.S. Highway 27 in Florida has helped ecologist Matthew Aresco save more than 9,000 from certain death. It was the inspiration for a similar project undertaken by The HSUS and a state park ranger in Boonsboro, Md.

THIS PAGE: MATTHEW J. ARESCO. OPPOSITE PAGE: COYOTE AND BOBCAT COURTESY OF NATIONAL PARK SERVICE; ALL OTHERS BY MARY JO BARTLES AND THE HSUS