

Averting Turtle Tragedy: Saving Lake Jackson's Turtle Populations

What happens when a highway, built before transportation planning law acknowledged environmental concerns, crosses a thriving wetland—and the once-sleepy road becomes a busy thoroughfare? A Florida conservation biologist learned the disturbing answer and resolved to halt an ecological crisis.

BY MATTHEW ARESKO

Highway builders of the modern era constructed thousands of miles of roads in the United States with little regard for the ecological consequences. Prior to the push for environmentally protective lawmaking that began in the mid-1970s, roads often were built directly through wetlands, causing significant loss, fragmentation, and degradation of wetland habitat. Virtually unrestricted dredging, filling, and alteration of hydrologic regimes harmed many wetland species.

Reptiles and amphibians are among the wetland fauna most severely affected by poor transportation planning. Roads often prevent these species from migrating to breeding sites and seasonal habitats and from engaging in normal foraging and population dispersals. Most alarmingly, roads built through or near wetlands often are a significant cause of amphibian mortality. In some areas, roads can cause long-term population declines that eventually may drive local populations to extinction.¹ The experiences of the turtle community that lives near U.S. Highway 27 and Lake Jackson in Leon County, Florida, provide a classic example of this problem.

LAKE JACKSON'S TURTLE TROUBLE

Located just north of Tallahassee in the Florida panhandle, U.S. 27 was built decades ago directly on top of a three-quarter mile stretch of Lake Jackson, cutting off a 50-acre section

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of the lake from the main waterbody. Rather than route the road around the lake, highway engineers ran U.S. 27 through the lake's wetlands, building on top of dredged material and concrete rubble. The new isolated lake they created was called Little Lake Jackson. A round corrugated metal drainage culvert, 12 feet in diameter and 150 feet in length, runs under the highway and is now the only connection between the two lakes.

Lake Jackson is a 4,000-acre state aquatic preserve. It is a closed basin with a highly variable water depth controlled by rainfall and two sinkholes. During drought conditions, water leaks into groundwater through the sinkholes and most of the lake bottom dries; for the past century, this drying has occurred approximately every 12 years. Little Lake Jackson, however, has no active sinkholes and was formed from a deep arm of the lake that was once part of a river channel. It does not dry during drought. Consequently, when Lake Jackson dries, Little Lake Jackson becomes the migration destination for thousands of turtles, as well as hundreds of snakes, frogs, and alligators.

Overland movements of freshwater turtles are common. Turtles often migrate between aquatic habitats, and female turtles move from water to nesting areas

on land.² Migrating across roads has never been an easy proposition for turtles, but it was far easier decades ago when many highways, including Florida's section of U.S. 27, were principally rural. Today, however, migration can mean disaster for Lake Jackson's turtle community.

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major route for trucks bound to Georgia and Alabama. Volume on the highway increased by 162 percent from 1977 to 2001. In 1977, a Lake Jackson turtle migrating across U.S. 27 had a 32 percent chance of survival. In 2001, the probability of successful crossing was only 2 percent.³ Nearly all of Lake Jackson's turtles that try to cross U.S. 27 die in the attempt.

DEATH ON THE HIGHWAY

On a warm day in late February 2000, I was driving north on U.S. 27. As I passed Lake Jackson, I suddenly came upon a horrific scene: dozens of turtles crushed in the road and on the shoulder. I pulled

back toward the lakes, stretching at least 300 feet to prevent animals from simply wandering around the ends and onto the highway. I angled the fences slightly inward to prevent snapping turtles, softshell turtles, box turtles, musk turtles, and other species that are exceptional climbers from clambering over the top edges.

The turtle fences were completed by April 4, 2000—and just in time. April was an exceptionally dry month, and hundreds of turtles migrated from Lake Jackson to Little Lake Jackson. From April to August of that year, the fence intercepted nearly 5,000 turtles. Pulses of turtle migration corresponded to drying episodes in several of Lake Jackson's large pools. During the intense heat of the day, turtles



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over to investigate and found the remains of 90 dead turtles and several other badly injured turtles lying in the grass along the shoulder. Lake Jackson was drying, but Little Lake Jackson still had plenty of water—and the turtles knew it. I was witnessing the beginning of a massive turtle migration that would occur in coming months.

Over the next five weeks, I spent many hours patrolling the roadside for migrating turtles. Vehicles killed 343 turtles in just 40 days between February 22 and April 3, 2000: Florida cooters, yellow-bellied sliders, musk turtles, mud turtles, Florida softshell turtles, snapping turtles, and box turtles. Time after time, I was forced to stand helplessly on the shoulder and watch as the dangerous rush hour traffic obliterated new hatchlings, ancient turtles, and turtles of all sizes, types, and ages. I was sad, angry, and frustrated that I could not save these slow-moving animals that, as a turtle conservation biologist, I deeply loved.

IF YOU BUILD IT, THEY WILL COME

I sent the Florida Department of Transportation photos of the remains of the 90 dead turtles, and proposed a simple, low-cost, and temporary solution: a low fence that would prevent turtles from crossing the highway and instead direct them into the culvert that connects the lakes. Department officials finally agreed to donate some woven nylon fencing typically used to control erosion at construction sites. I set up 3,000 feet of fencing along each side of U.S. 27. The fences reached 18 inches above the ground and their north and south ends curved

burrowed into the soupy mud amidst the dead and dying catfish, bowfin, and gar. In the early evening, turtles of all sizes emerged by the hundreds, caked in mud, and began migrating in unison towards the sun setting over Little Lake Jackson. Some turtles traveled nearly a mile before they reached the fences. By the time Lake Jackson's final pool turned to dry cracked mud in late June, I was finding 200 turtles per day at the fences.

The fences prevented many turtles from reaching the highway, but they still had the difficult task of searching for the culvert—the single route across the highway—along the 4,000-foot stretch of road. The fences required vigilant daily monitoring so that turtles could be brought to the culvert before they overheated in the hot sun or were killed by predators. I walked the length of each fence every day from April of 2000 until November 1, 2003. In 2000 and 2001, I monitored the fences four times per day; in 2002 and 2003, I patrolled twice per day. I collected turtles walking along the fences and transported them across the highway in large plastic containers, sometimes toting as many as six 18-gallon tubs full of turtles at once. Moving along with the turtles was a menagerie of other reptiles and amphibians, including many green water snakes, banded water snakes, mud snakes, water moccasins, pig frogs, leopard frogs, and alligators; I also transported many of these animals across the highway.

By the end of July 2000, the northwest part of Lake Jackson was completely dry and the turtles were safely in Little Lake Jackson. Turtles began migrating back to Lake Jackson following heavy rains in

September 2000. This return migration accelerated in spring of 2001, when 3,300 returned to Lake Jackson, now replenished by heavy spring rains and two tropical storms. Once again, temporary fences, combined with intensive daily monitoring, prevented 99 percent of the turtles from being killed on the highway.

DISTURBING TRENDS

While shepherding and transporting turtles, I also measured and determined the sex of each. I found that sex ratios of three turtle species were dramatically male-biased: 65 to 80 percent of the turtles were male. Adult sex ratios of freshwater turtles normally are nearly

By November 1, 2003, I had spent 1,367 days and 5,664 total hours guiding and protecting the Lake Jackson turtles. I had discovered that the rates of road mortality and the number of turtles attempting to cross U.S. 27 are higher at Lake Jackson than similar statistics recorded anywhere else in the United States. A total of 8,842 turtles of 10 species attempted to cross a three-quarter mile stretch of road in four years. Of these, 8,230 were saved by the fences, but 612 were killed on the roadway.⁶ While drift fences and intensive monitoring greatly reduced turtle road kills, many reptiles, amphibians, and other wetland wildlife are better climbers than turtles: most of the 1,400 individuals from the 34 non-turtle species found along the highway



Courtesy of M. Aresco

1:1. This trend was alarming, but not inexplicable. In a typical non-drought year, turtles attempt to cross U.S. 27 for various reasons: to nest, seek better habitat, or heed the instinctive demands of species dispersal. Some male turtles attempt to migrate between the lakes, but significantly more females can be found on land near the road: highway roadsides create disturbed, open habitats that are attractive—albeit deadly—to nesting female turtles. Thus, the unbalanced ratios reveal the long-term effects of chronic, annual road mortality on turtle populations. An estimated 6 to 22 percent of all adult females in four of the lake's turtle populations are killed by vehicles every year while attempting to nest along the highway shoulder.⁴ Male-biased sex ratios inevitably result. Even small increases (less than 10 percent) in the annual mortality of a turtle population's mature females may lead to a long-term population decline when the species, such as the Florida cooter, is characterized by relatively slow maturation rates and naturally low levels of recruitment.⁵

during the four-year period had climbed over the fences and been killed by traffic.

FINDING LONG-TERM SOLUTIONS

How can we eliminate road mortality of wetland species at Lake Jackson and elsewhere? Although the nylon silt fences were an effective short-term solution to the turtle mortality problem, they require constant maintenance and monitoring. The fencing material degrades rapidly in direct sunlight and is easily damaged by mowers, vandals, all-terrain vehicles, and stormwater runoff. Also, because there is only one culvert for the entire stretch of highway at Lake Jackson, turtles often have difficulty finding it and must be carried across the road. Although I have been able to accomplish this task for the last four years, a more permanent and structural solution clearly is necessary, both for the Lake Jackson stretch of U.S. 27 and for other high-risk roads.

Road-associated wildlife mortality can be averted by the creation of permanent wildlife crossings, or "ecopassages," consisting of

guidewalls and a system of multiple culverts. Ideally, ecopassages should be designed to mitigate the effects of highway mortality and habitat fragmentation for the full diversity of fauna affected by a highway. The Florida Department of Transportation recently constructed a prototype for such a multi-species ecopassage along two miles of U.S. Highway 441, south of Gainesville. The ecopassage consists of a lipped, four-foot high concrete guidewall and a series of culverts. This system



Courtesy of M. Aresco

has proven effective in diverting wildlife migrating among sections of the Paynes Prairie State Preserve away from the highway, virtually eliminating road-associated mortality.⁷

In September 2002, I began a grassroots effort to work with the Florida Department of Transportation, the Leon County government, and other agencies to secure funding for a permanent ecopassage along U.S. 27 at Lake Jackson. The citizen's action group that resulted from that effort, the Lake Jackson Ecopassage Alliance, works to develop and demonstrate broad-based public and political support for the ecopassage project. The support the group has generated recently convinced the Florida Department of Transportation to allocate \$125,000 for a feasibility study assessing the most appropriate way to address the Lake Jackson road mortality problem and reestablish natural wildlife migration patterns. Although the design and construction of

a permanent ecopassage may still be years away, this study is an important first step toward meeting Federal Highway Administration requirements for obtaining federal funds that will be critical to a future construction project. In the meantime, I continue to walk the fences and carry turtles across the highway. The 2004 rainfall deficit is steadily increasing and the water level in Lake Jackson is slowly dropping, and Ecopassage Alliance volunteers are readying the fences for another mass migration of turtles.

Turtles possess a tenacity for survival that reflects millions of years of adaptation to dynamic environments. Yet the resiliency of turtles and other wetland species too often is overshadowed by their vulnerability to habitat destruction and fragmentation and the dangers posed by roads and highways. A migrating turtle knows where it wants to go and moves with single-minded purpose toward its goal. As stewards of our wetland ecosystems, we should follow that example and ensure that turtles and other wildlife are protected from the hazards that we create. ■

RESOURCES

For more information about the status of turtles migrating between Lake Jackson and Little Lake Jackson and the activities of the Lake Jackson Ecopassage Alliance, please go to the alliance's website: <http://www.lakejacksonturtles.org>.

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