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From Red Wolves, Lessons in Resilience
They looked and acted like red wolves—but red wolves had long ago disappeared from Galveston Island. The quest to identify these “mystery” canines revealed a surprise: red wolf genes persisted nearly 40 years after the species was thought to be extinct in that region. The author explains the process—and the importance—of this discovery.

By Kelley Christensen

Softener Skills Can Help Mediate Harsh Conservation Disagreements
Francine Madden knows how to reach a collaborative solution, and her approach is bringing civility to discussions between pro and con forces about the future of wolves. Respect, trust-building and listening are her tools, conservation issues her specialty, and focusing on future challenges part of her success. When she steps in, win-win becomes possible.

By Tracy O’Connell

Wolf Watching in Yellowstone: Viewing Versus Habituation
Yellowstone may be the best place in the world to view free-ranging wolves, but that accessibility has several downsides for humans and for wolves. Problems like overcrowding and habituated wolves are complicated. Doug Smith explains how solutions will require behavior changes by the Park Service, the park visitors and the resident wolves.

By Douglas W. Smith
When Hurricane Ike stormed ashore on Galveston Island, a barrier island off the south coast of Texas in the Gulf of Mexico, the massive flooding and vegetation damage impacted more than humans. Ron Wooten, a biologist who lives on the island, lost his dog to a hungry pack of what he thought were coyotes shortly after the hurricane.

Rather than try to ruthlessly hunt down the animals for their crime, Wooten instead sought to study them to understand what would drive them to kill a dog. Also a photographer, Wooten was able to capture images of some pack members. It was then he realized that the animals were not coyotes.

“Seeing that they were unique and did not look like coyotes at all, I searched...
for almost two years to find someone who could help me identify those animals,” Wooten said. “I started thinking that they must have bred with a big dog somewhere down the line, because these animals did not look like coyotes. Much longer legs, much bigger, broader heads, longer ears, longer snouts, and their behavior…”

But other area wildlife managers didn’t seem to share Wooten’s conviction that animals that looked very much like red wolves (Canis rufus) could still exist on Galveston Island. Despite the negative reactions, Wooten continued his study, watching the animals hunt small game and play together as a pack.

Bolstered by Steve Parker, a Galveston attorney who shared an interest in the mystery, Wooten was able to recover tissue samples from pack members that had been struck by cars and left by the side of the road—items he kept in a freezer alongside rattlesnakes, deer hides and a flying fish. Wooten sent the samples to Bridgett vonHoldt, an assistant professor of ecology and evolutionary biology at Princeton University.

“After comparing the samples to images of coyotes, reviewing a few papers on wolf and coyote behavior, and remembering my genetics lessons on island biology, it occurred to me that perhaps this was a specific group of wolves that had become genetically isolated on the island by the physical barrier of surrounding water,” Wooten said.

Having contributed the samples, Parker paints his own experience to solve the mystery of the Galveston Island residents that so clearly were not coyotes.

“In 2000, a friend confirmed there was a pocket of very ‘wolfish’ animals near a container port under construction. One afternoon, we went down the road where one such animal was always seen, and sure enough, there he was, maybe 30 yards away—about 60 pounds, maybe 28 inches at the shoulder, with a big, wide bowling-ball head. He tried to lie down behind a levee but he was so big he just stood out like a sore thumb. Then he looked over his shoulder, turned, jumped 10 feet and was gone.

“I have spent a lot of time outdoors in this area and never had seen anything like him before. I called every U.S. Fish & Wildlife Service and every Texas Parks & Wildlife Department person I could find, thinking the world would spring into action to confirm the presence of these animals. You would’ve thought I’d reported seeing a T-rex!”

And now, before the story of the Galveston Island canids continues, we must travel 1,400 miles away to North Carolina, where a different tale of the red wolf has unfolded…

A Story of Recovery and Decline

The red wolf is one of United States’ greatest wildlife conservation stories. Red wolves were on the brink of extinction along the American Gulf Coast during the late 1970s when the U.S. Fish and Wildlife Service (USFWS) made a bold decision to purposely remove all remaining red wolves from the wild.

The USFWS attempted to trap all wild wolves remaining along the Gulf Coast of Texas and Louisiana to initiate a captive breeding program and recover the species. After several years of successful captive breeding, red wolves were released back onto the landscape in North Carolina in 1987, well before the famous wolf-reintroduction effort in Yellowstone National Park.

“The Red Wolf Recovery Program has accomplished much with very little public recognition,” says Cornelia Hutt, Red Wolf Coalition board chair. “The red wolf is the first predator ever to be restored to the wild after becoming officially extinct in the wild.”

Hutt notes that the technique of pup fostering (placing pups from captive wolves into dens of wild wolf pups) was developed by Red Wolf Coalition program managers and was then used with the Mexican wolf reintroduction.

The reintroduced population in North Carolina grew for 25 years, even while experiencing complex management issues such as red wolves hybridizing with coyotes.

But the wild population is once again dwindling (from a peak of about 150 individuals in 2005 to a mere 25) amidst political controversy, pressure from landowners for the right to shoot wolves on their land, and poaching. In addition to the wild population, there are approximately 200 red wolves in captivity. The entire red wolf population in the United States descends from 14 individuals, of which only 12 are genetically represented.

The challenges the red wolf faced in the 1970s are essentially the same that threaten the species today: persecution by humans, habitat loss, hybridization and disease.

Ghosts of the Past, Wolves of the Future

During the ongoing debate on how to recover the red wolf, a team of researchers including scientist Kristin Brzeski,
assistant professor in the Michigan Technological University School of Forest Resources and Environmental Science, who worked with vonHoldt as a post-doctoral researcher, discovered high amounts of red wolf ancestry in canids living on Galveston Island.

“Our discovery that red wolf genes persisted in Texas after being declared extinct in the wild was very surprising,” Brzeski said. “It introduced positive opportunities for additional conservation action—and also some difficult policy challenges.”

Brzeski and her coauthors published their findings, “Rediscovery of Red Wolf Ghost Alleles in a Canid Population Along the American Gulf Coast” in December 2018 in the journal Genes. This report intended to support the 2010 publication in the Southeastern Naturalist by Mech and Nowak of possible red wolf genetic representation in north-central Texas.

**Canis rufus Persists**

There are just two recognized species of wolf in the United States: the gray and the red. Red wolves, native to the southeastern U.S., are smaller and more slender than their northern cousins. The red wolf population has also been under threat from hybridization with coyotes.

“Red wolf research is exciting, frustrating, sad and uplifting at the same time,” Brzeski said. “They neared total extinction, were saved through captive breeding, and have been demonized by opponents, all the while continuing to be a successful, reproductively viable species that keeps on ticking—with the help of incredibly dedicated biologists, managers, captive facilities and dedicated volunteers, of course.”

The red wolf alleles—variant forms of a given gene—appear to have persisted in a population of canids on Galveston Island because of their isolation from coyotes, and the resultant improbability of interbreeding and hybridization.

The research group Brzeski was part of obtained tissue samples from two roadkill canids (not the same animals Wooten took pictures of) on Galveston Island and conducted analyses with genome-wide, single nucleotide polymorphism and mitochondrial DNA from 60 animals that represented all potential sources of ancestry for the Galveston Island canids: coyotes, red wolves and gray wolves. Brzeski and others found that the Galveston Island canids have both red wolf and coyote alleles, likely related to species interbreeding during the 1970s as coyote populations expanded across North America.

“I had the privilege to work with wild red wolves in North Carolina for my PhD dissertation and hear them howl in the wild. Their reintroduction has shaped wolf reintroductions since. What scientists learned changed how they did Yellowstone and influenced what they’re doing on Isle Royale,” Brzeski said. “Finding them (red wolves) in Galveston and Louisiana is so exciting because that’s where they came from. There is some sort of reproductive isolation occurring with zero human management.”

The Galveston Island animals—known to wildlife biologists as admixed canids—do not share all variant genes with contemporary red wolves, but they are genetically closer to red wolves than they are to coyotes.

This is significant; it means that red wolf genetics persist in the American south nearly 40 years after the species was thought to be extinct in that region. The canids on Galveston Island, and possibly elsewhere, may represent a “reservoir” of red wolf genes that could be used to bolster other red wolf populations.

“This research shows hybrids can have conservation value through harboring extinct genes from endangered parent species,” Brzeski said.

**Next Steps**

In the past decade, red wolves have been under attack by opponents of the conservation program who claim
this animal is not genetically distinct from coyotes and therefore not eligible for protection under the Endangered Species Act.

Research reveals the need for further genetic sampling of coyote populations in Louisiana and Texas to survey for red-wolf ghost alleles. Additionally, researchers note a need for assessments of morphological differences in canids with red wolf ancestry. The discovery of the Galveston Island canids could also create an opportunity for future reintroduction efforts outside of North Carolina.

Brzeski says, “Our discovery opens up a new chapter in their story: red wolf ancestry has persisted independently without focused management action. How will this impact recovery efforts? Can we recover extinct genes through selective breeding with newly identified admixed canids? These are difficult but exciting questions, broadly important beyond red wolves, that will influence wildlife conservation in an era of major climate and landscape change.”

In March 2019, the National Academies of Sciences, Engineering and Medicine released the “Consensus Study Report Evaluating the Taxonomic Status of the Mexican Gray Wolf and the Red Wolf,” sponsored by the U.S. Fish and Wildlife Service. The conclusions of the report are that historic red wolves were a taxonomically valid species, that extant red wolves are distinct from gray wolves and coyotes, and that extant red wolves trace some of their ancestry to the historic red wolves. Based on these conclusions, the report asserts that the extant members of the species in North Carolina, Galveston Island and in small pockets in the American South, are indeed *Canis rufus*.

It is Wooten’s hope that red wolves will continue to exist successfully on Galveston Island alongside humans. Brzeski and Hutt, too, close their eyes and hear the wolves howling in the North Carolina dark. These people hope that red wolves thrive despite the challenges, so that future generations might hear their song in darkened forests and witness their crab hunts on the beach.

Kelley Christensen is a science writer at Michigan Technological University, where she is also pursuing her doctorate in environmental policy. Prior to her current position, she worked in newspaper journalism in Montana and Nebraska, and as science editor for IEEE Earthzine.

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