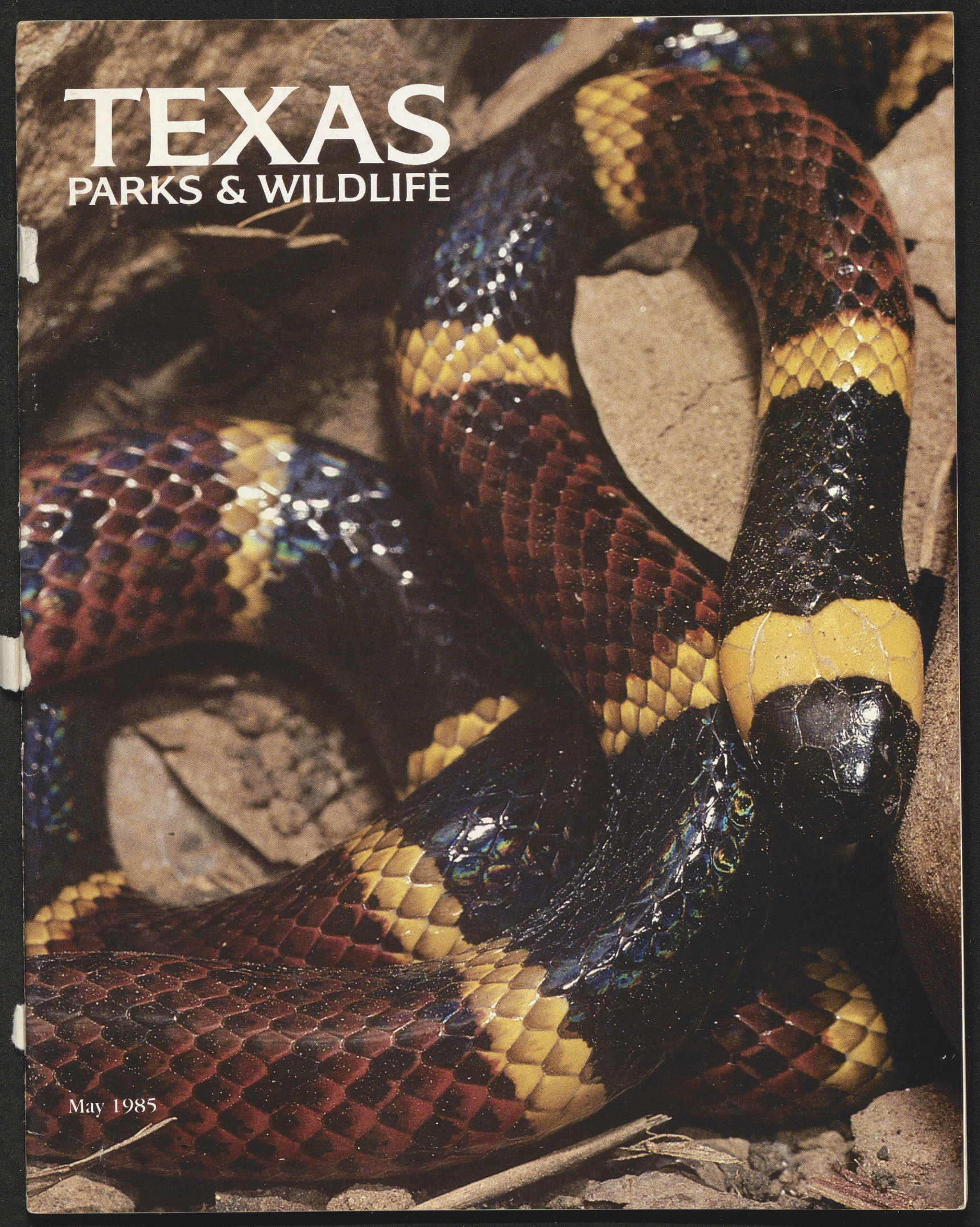


TEXAS

PARKS & WILDLIFE

May 1985





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TEXAS PARKS & WILDLIFE

May 1985, Vol. 43, No. 5

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Front: The coral snake's venom is the most lethal of any Texas snake. For a
look at all the poisonous snakes in Texas turn to page 32. Photo by Leroy
Williamson. **Inside Front:** This springtime landscape is a welcome sight
after the winter just past. Photo by Leroy Williamson.

Sand Dunes

The fragile
barriers along
the Gulf coast

by Michael H. McKann,
Texas General Land Office
and Dr. Jerry W. McAtee

Sand dunes add shape and character to a beach, but the real value of these undulating, sandy hills is more than aesthetic. Dunes protect the bays and mainland from destructive forces of hurricane-driven waves, and they are essential to the preservation of the coastline.

Sand dunes of varying sizes are found along the entire Texas Gulf Coast. Much of the coastline is barrier islands and peninsulas, which are long, narrow landforms made up of sand and shell. Geologically they are young, having formed within the last 5,000 to 6,000 years. From north to south they are Bolivar Peninsula, Galveston Island, Follets Island, Matagorda Peninsula, Matagorda Island, San Jose Island, Mustang Island, Padre Island and Boca Chica Island. The remainder of the Texas Gulf shoreline is flanked by flat marshy plains in the vicinity of Freeport and from High Island to Sabine Pass.

The islands and peninsulas are barriers, lines of defense between the mainland and the open sea. As the first land areas to receive the impact of hurricanes and tropical storms blowing in



Bill Reaves

Leroy Williamson





Bill Reaves



Bill Reaves

Plants such as goatfoot morning glory (left) and evening primrose (opposite page) help anchor the sand and give diversity and beauty to the coastal landscape. Dune plants must be able to withstand harsh conditions and grow rapidly enough to keep from being buried as sand accumulates.

from the Gulf, they dissipate the force of heavy waves and storm surges and thus reduce or even prevent inland flooding. In recent years, the islands also have proven valuable in protecting the bays and estuaries from oil drifting in from offshore spills.

The importance of dunes as a storm defense on the Texas Coast is emphasized by the hurricane probability projections prepared by the Department of the Interior. The Federal Emergency Management Administration (FEMA) reports that the probability of a great hurricane (winds in excess of 120 m.p.h.) striking the Texas Coast in any given year is one of the highest for any stretch of Gulf or Atlantic coastline of the same length. The probability that a hurricane of any strength will strike the Texas Coast ranges from seven to

Awareness of the perils of developing barrier islands and sand dunes led to passage of the Coastal Barrier Resources Act, which seeks to minimize the loss of human life and damage to fish, wildlife and other natural resources.

14 percent for any given year. Only the southeastern tip of Florida is more perilous.

It is the mobility of the sand dunes and their ability to absorb wave energy that make the Gulf shoreline particularly effective as a storm buffer. The sand in the dunes is gradually washed offshore during the storm to form a long, gradual ramp that effectively dissipates wave energy as the intensity of the storm increases. The sand is then returned to the beach during calm weather and blown back to the rebuilding dunes to complete the cycle.

The total value of the dunes is incalculable in attracting tourists, reducing damage to inland structures and estuaries and maintaining the beaches. To be so important, dunes have unpretentious beginnings. The smallest bit of driftwood, seaweed or other debris traps sand blown in by offshore winds and forms a small mound—a copice mound. Dune grasses and other plants colonize this mound and become bar-

riers that slow the wind, causing it to deposit even more sand there. As this process continues, the mound grows to form a dune.

The dune environment in Texas is hot, dry, unstable and deficient in nutrients. Dune plants must be able to withstand these harsh conditions, tolerate salt spray and grow rapidly enough to keep from being buried as sand accumulates. The dominant species nearest the Gulf are the deep-rooted grasses bitter panicum, the familiar sea oats and others, such as the railroad vine or goatfoot morning-glory. Less hardy species grow in the leeward protection of the foredunes to help anchor the sand and give diversity and beauty to the otherwise harsh environment. In late October the back dune areas of Mustang Island are a sea of yellow flowers accented with the gray-green pads and purple fruit of the Texas prickly pear.

Although the barrier islands and dunes may appear to be sound, they are extremely vulnerable to the forces of man and nature. They can restore themselves easily after natural disasters such as hurricanes, but the effects of many of man's coastal activities can be dramatic and long-lasting, especially if sand is removed or withheld from the dunes, beaches and offshore deposits. If sand is excavated, trapped behind bulkheads or seawalls, or released by the removal of vegetation to be blown inland or washed down current, the beach will recover more slowly after storms, and the shoreline may erode.

When the barrier islands were first settled by Europeans, fire and overgrazing by domestic livestock destroyed dune vegetation. Damage by humans has increased steadily with development of the islands, particularly with the construction of large hotels and condominiums in recent years. According to the Department of the Interior, uncontrolled and ill-conceived development has caused irreparable damage to the islands. Dunes are leveled for construction sites; sand is excavated for fill material; bulkheads, groins and similar erosion-control structures withhold sand and aggravate erosion in nearby areas. Development and road construction increase accessibility, bringing more people and vehicles to uproot vegetation and break down the dunes. Overgrazing





Bill Reaves

Goldenrod, sand bluestem and gulf mubly (left) and beach morning glory (below) manage to thrive in the hot, dry, nutritionally deficient dune environment. Overgrazing and trampling of vegetation by livestock is a problem in some undeveloped areas.

Bill Reaves



Bill Reaves



Bill Reaves

and trampling of vegetation by livestock are still a problem in some of the undeveloped areas.

More than 600 miles of barrier islands and peninsulas line the coast from Maine to Texas. Many of them are extensively developed and contain famous recreational and resort areas—Atlantic City, Miami Beach and Cape Cod. Others are relatively undeveloped, and there are those who would like to see them stay that way. Growing national awareness of the perils of developing such coastal areas led to passage of the Coastal Barrier Resources Act, signed by President Reagan on October 18, 1982. The act tries to minimize the loss of human life, minimize wasteful spending of federal money and minimize the damage to fish, wildlife and other natural re-

sources on the Atlantic and Gulf Coast barrier islands.

The Coastal Barrier Resources Act eliminates federal subsidies for development of coastal barriers or the portions of them that the Department of the Interior has identified as undeveloped. For these areas there will be no new federal flood insurance, no VA or FHA loans, no Small Business Administration or Economic Development Administration grants and no federal construction or purchase of roads, sewers, bridges or water supply lines. In Texas, 11 such areas stretching 150 miles, or 40 percent of the coastline, have been classified as undeveloped and are subject to the Act.

Action has been taken at the federal level to meet the critical need for shoreline protection, restoration and

enhancement, primarily through efforts to reduce the effect of erosion. The U.S. Army Corps of Engineers, for example, has built groins and seawalls in eroding areas. But newer methods have replaced these techniques since they have been found to increase erosion. The Corps has spent millions of dollars nationwide during the last several years on beach and dune restoration by dredging sand from the bay or ocean bottom and depositing it on the beach and dunes. Although this method helps by putting sand back into the system, it is only temporary. The long-term trend is continued erosion in areas where sand is scarce. Man has reduced a major source of sand with the construction of reservoirs that trap sediments that otherwise would be carried to the coast.



Bill Reaves



Leroy Williamson

Leroy Williamson



Off-road vehicles (opposite) uproot vegetation and break down the dunes. A summer scene on the dunes includes sea oats, beach morning glory and beach croton (opposite). In autumn the gayfeather blooms (right).



Glen Mills

When hotels and condominiums replace sand dunes and plants such as sea oats and chestnut fimbry (below), the damage usually is irreparable.

The State of Texas is taking an active role in dune protection. The Sand Dune Protection Act, passed by the Texas Legislature in 1973, authorizes counties north of the Mansfield Ship Channel having barrier islands and/or peninsulas to establish a dune protection line up to 1,000 feet inland from the mean high tide. Once a county has established such a line, a permit must be obtained from the county commissioners' court for any activity seaward of the line. The Act also directs the Texas General Land Office (GLO) to identify critical dune areas, those that are essential to the protection of state-owned lands. When a proposed project is within a county's dune protection area and also within an area identified as critical, the project is subject to review by the GLO.

In 1979, the GLO established criteria for designating critical dune areas and set guidelines for assessing activities proposed for these areas. Generally, all activities are considered detrimental to the dunes if they do not con-

form to guidelines which discourage the removal of dune material, construction on foredunes and pedestrian or vehicular traffic through the dunes.

The Texas General Land Office has been working with Nueces County officials for eight years in its dune protection program. The development of

Although barrier islands and dunes may appear to be sound, they are extremely vulnerable to the forces of man and nature. The effects of man's activities can be dramatic.

Mustang Island has been carefully guided by Nueces County with advice from their Dune Protection Committee of selected citizens, developers, government officials and private and resource experts. Permits issued for hotels, condominiums and private residences require that all buildings and site grading be done substantially landward of the foredune area; that elevated, wooden boardwalks be constructed to provide access over the dunes; and that dunes previously damaged by hurricanes and human activities be restored. Fortunately, Nueces County chose to set up a dune permit program and execute it so well, because their portion of the coastline has some of the best sand dunes and beaches in Texas, and therefore some of the most desirable for development.

Strict enforcement of federal, state and local regulations is essential to the preservation of the dunes along the Gulf Coast. But perhaps the best insurance is public education. If people understand the functions of the coastal barriers and sand dunes, they can enjoy those resources and preserve the natural protective system.

In *How to Live With an Island*, Orrin H. Pilkey, Jr. wrote: "The islands are in no danger from nature. They will respond in a perfectly predictable way to whatever nature throws at them. Once you understand an island, you can see that it doesn't need saving—except perhaps from man." Saving them is the responsibility not only of government agencies, but of every individual who lives on or visits the coast.

**



Bill Reaves

MONK PARAKEETS

by George Oxford Miller

On the loose in Texas

Most of the joggers on the Town Lake hike and bike trail in Austin never notice the raucous squawking of a peculiar flock of birds. But those who have ever kept a parrot recognize the call immediately and search the treetops for the source of the screeching and chattering. The noisy birds are neither blue jays nor grackles, crows nor starlings, but exotic monk parakeets.

Monk parakeets are about a foot long and have brilliant olive-green plumage. They have a gray forehead, throat and breast and a yellow-green abdomen. The sight of them flying at liberty near downtown Austin arouses the interest of even those who would never consider themselves bird-watchers. With a flash of green, the parakeets swoop through the trees with rapid wing beats and a darting flight. Perching on utility poles, wires and high in trees, they seem unconcerned about the busy city life below them.

Although monk parakeets hail from South America, they are not really strangers to Texas or the United States. They have been popular cage birds for years, and breed readily in captivity. In 1968, some 12,000 were imported to the United States by the pet industry. Occasionally, some escape and are seen in the company of a flock of pigeons or living alone.

In 1967, a crate of monk parakeets broke open when it was accidentally dropped at JFK International Airport in New York City. The escaped birds

liked their new home, which had a climate similar to much of their native range. The news of the successful flock spread, and soon monk parakeets appeared in Boston and New Jersey.

"The other flocks in New England could not have come from the original birds that escaped at JFK," said Rhea Copening, regional representative of the Southwest Regional Office of the National Audubon Society. She was living in the New York area at the time,

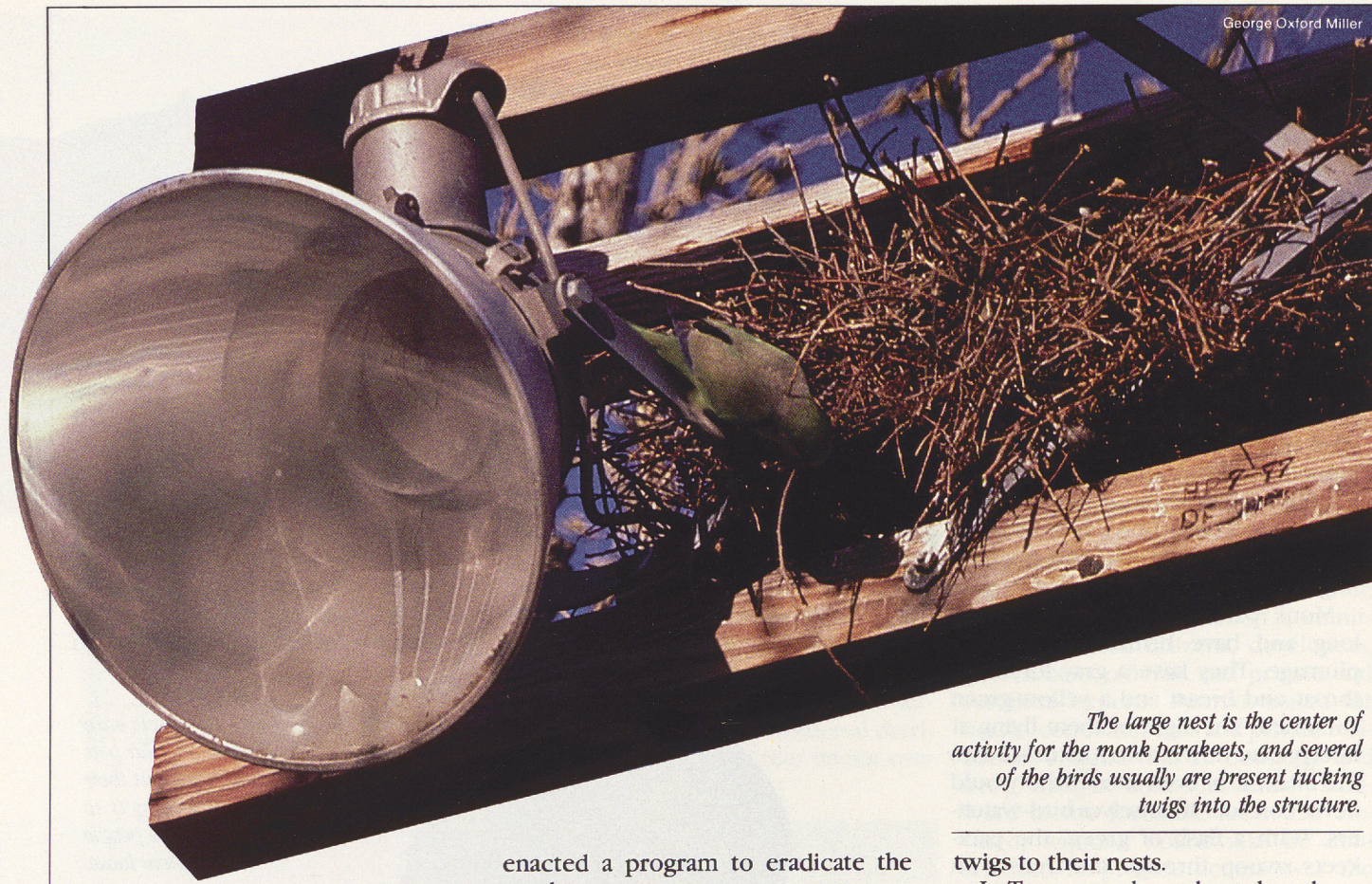
but is now working in Austin. "Nobody knows where they came from. Owners and breeders probably heard about the successful flock in New York and turned their birds loose."

Regardless of their origin, monk parakeets became residents of Virginia, Florida, North Carolina and several other states along the eastern seaboard. They survived the harsh winters and built large colonial nests. Monk parakeets were first reported to hatch

Monk parakeets have been popular pets for years, but their squeaking is so raucous some people turn them loose.



George Oxford Miller



The large nest is the center of activity for the monk parakeets, and several of the birds usually are present tucking twigs into the structure.

young in June 1971, when a lady on Long Island found two babies that had fallen from a nest.

The birds spread, but by isolated releases, not by natural means. An invading species spreads into a new territory by an orderly expansion of their range as their population increases, not in a random manner that skips many suitable habitats. But these popular members of the parrot family had captured the imagination of bird owners across the nation who wanted to see their own birds living free. Within a few years flocks appeared in Oklahoma, Indiana, California, Texas and Illinois.

Many thought the adaptable birds would become widely established in the eastern United States and pose a threat to agriculture, especially orchards. State biologists from New York and New Jersey met with federal officials in April 1973, and declared the parrots a dangerous pest. An eradication program was enforced, and within a year about 100 birds were live-trapped or killed. California also

enacted a program to eradicate the parakeets.

While farmers view the birds as pests, city dwellers look upon the colorful, active parakeets as delightful curiosities. A flock of about 25 monk parakeets has lived in Chicago since 1980. They appeared in a park on the south side, and began frequenting the numerous bird feeders in the area. Since then, they have survived the frigid winters and reared about a dozen young.

One of the reasons for the success of the parakeets is their large communal nests built of sticks and twigs. All other members of the parrot family nest in tree cavities, which may not be abundant in many areas. In their homeland, from the lowlands of Bolivia to Argentina, nests with breeding chambers for up to 20 pairs are common. Flocks number from 10 to 100 individuals. The nest is the center of the social life for a colony of the gregarious birds; they live in the nest year around and some of the colony is usually present. In a large flock, the birds are constantly coming and going, chattering, squabbling and rearranging and adding

twigs to their nests.

In Texas, monk parakeets have been reported in Dallas, Houston and Austin. Several colonies of undetermined origin live in metropolitan Houston. Dr. Stephen Williams, professor of clinical psychology at Houston Baptist University, has monitored a flock of six on the campus for two years. Gary Clark, who organizes the Texas Coast rare bird alert for the Piney Woods Wildlife Society, reports two successful nests in southwest Houston.

The Austin flock has lived along the banks of Town Lake for three years. On Saint Patrick's Day in 1981, a breeder began releasing the emerald birds and eventually liberated 19 parakeets. The breeder fed the flock for several weeks until they homesteaded near Town Lake. The first year was hard on the flock and only three survived. By the second year, they had increased their numbers to five, and after three years of liberty now number eight individuals.

Freedom has had its price for the birds. The city destroyed two of their bulky nests that were constructed on utility poles. But the parakeets were

undaunted and rebuilt after each disturbance. The local bird population has not been too friendly, either. Last spring, a baby parakeet that had been attacked by blue jays was found and given to Wildlife Rescue, Inc. for rehabilitation.

Austinites are as proud of the flashy parakeets as the people in Chicago. Regulars along the hike and bike trail check the wellbeing of the birds and become very defensive at the prospect of harm to "their parrots."

"They're not causing any problems," said one Austinite who had been watching the birds for a year. "There used to be one with the pigeons at my office building, but a flock is much more interesting to watch."

A jogger added, "I always stop to check the parrots. Seeing them in the trees reminds me of Mexico. They're so neat walking on the tree limbs and wires and squawking like a bunch of clowns." The tropical appearance of the birds and their antics endear them to most people.

However, Rhea Copening of the Audubon Society sounds a conflicting note. "Don't turn them loose! Biologically, releasing an imported species is a bad practice. There are too many examples with disastrous results—starlings and house sparrows to name a couple."

The fear of the birds becoming established is not unrealistic, since the United States once had its own resident parakeet. The Carolina parakeet used to be numerous throughout the south. In Texas, it bred along the Red River and wintered along the coast as far south as Corpus Christi. It was the same size as the monk parakeet and had the same basic diet, which brought it into direct conflict with humans. Orchard growers and farmers gunned them down by the hundreds. The last Carolina parakeet was killed in Texas in 1897, and the last of the species died in the Cincinnati Zoo in 1914. Ironically, the last passenger pigeon also died that month in the same zoo.

Ecologically, the monk parakeets fill a niche similar to the Carolina parakeet, and their South American habitat is much like Texas. Their South American homeland is about the same distance south of the equator as most of

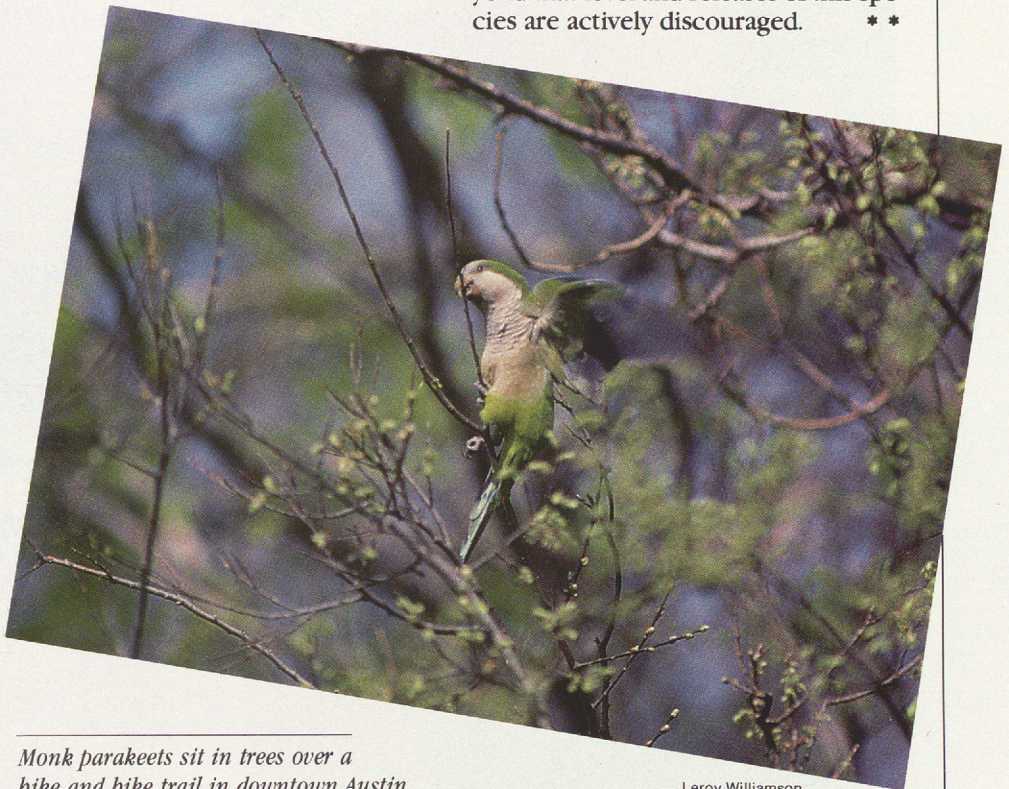
the United States is north, so they are adapted to the climate here. "The coast of Argentina is just like the Texas coast," says Dr. Williams, who has observed monk parakeets in both Houston and South America. "In much of Argentina you would swear you were in South Texas."

Texas may have the right climate, but the pressure to keep the Carolina parakeet's niche vacant is as strong today as it was at the turn of the century. One of the fears is that if monk parakeets become established in Texas, large flocks might damage grain crops and citrus, just as they do in South America. Farmers there shoot the birds and burn their nests to protect their crops. Theoretically, the acres of citrus in South Texas, or the fields of sorghum and corn throughout the state would be very inviting to hungry monk parakeets.

However, the Texas Parks and Wildlife Department does not consider the birds to be a threat at this time. Bruce Thompson with the nongame program says, "Planned or conscious introduction of monk parakeets or any other animal is not approved or favored by the Parks and Wildlife Department.

There is a potential that monk parakeets could survive in Texas, considering that they survived in the eastern United States. Although these birds have presented no major problems to date in Texas, experiences in other states have shown the negative attributes of these birds' raucous vocalizations, destructive feeding habits, and placement of nests." The department does not have an eradication program for any birds or other animals, but does have a harmful fish and aquatic plant list.

Green parakeets and yellow-headed parrots occasionally are sighted in Texas along the lower Rio Grande, yet neither has become established north of the border. Since they were in the area long before agricultural interests were dominant, other factors, such as competition and predation, also are limiting the spread of parrot species. According to records, no parrots have ever been a common resident of the Rio Grande Valley. The destiny of the monk parakeet in Texas will most likely be to remain a novelty bird living in isolated flocks. In the interest of native Texas wildlife, it is hoped that the monk parakeet does not expand beyond that level and releases of this species are actively discouraged. **



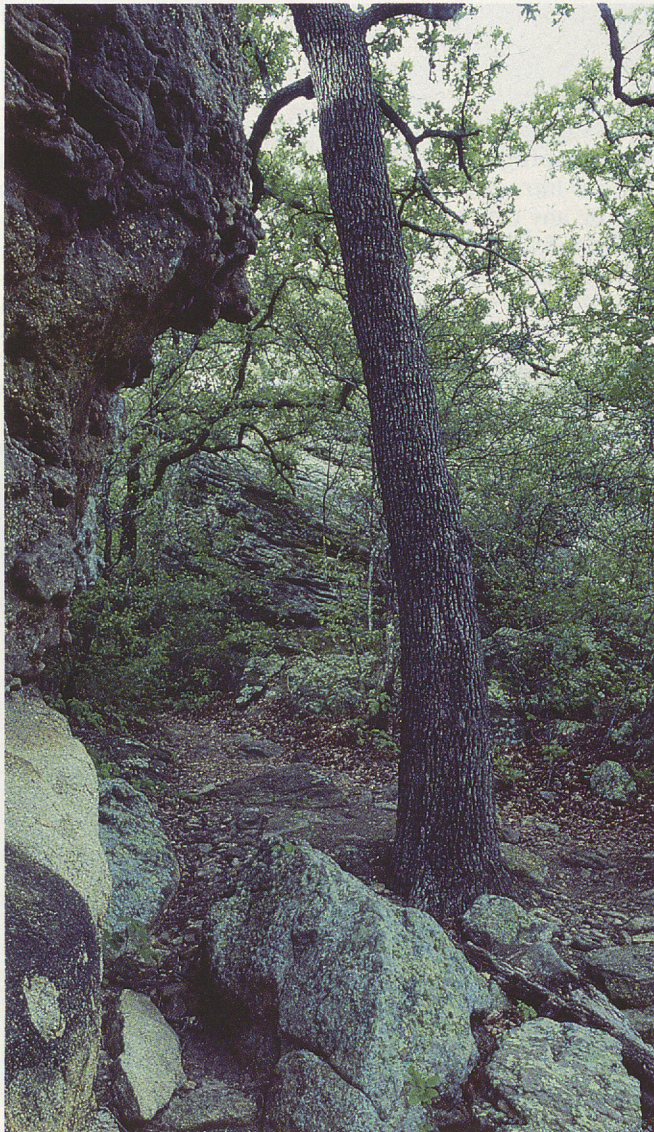
Monk parakeets sit in trees over a hike and bike trail in downtown Austin.

Leroy Williamson

LAKE MINERAL WELLS

North Texas Retreat

Article by Mary-Love Bigony and photos by Leroy Williamson



*j*ust an hour's drive west of the
Dallas-Fort Worth area, Lake Mineral

Wells State Park provides plenty of

activities to while away a few hours or

a few days. The 646-acre lake is the

focal point of the park. Rental boats

are available. Rolling hills dissected by





deep canyons form a backdrop for

activities here. There is a primitive

camping area as well as a camping

area and trail for those who bring

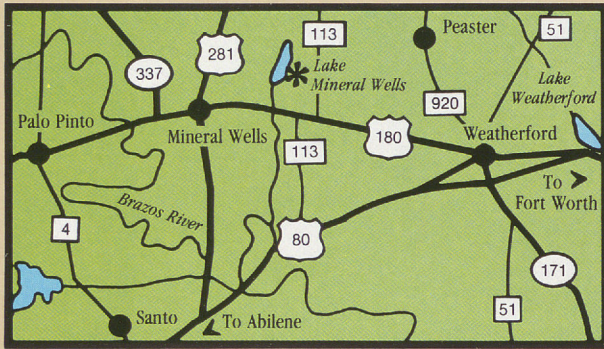
horses. Five miles of hiking trails

include paths leading to fishing piers

and the water's edge. Swim in the lake,





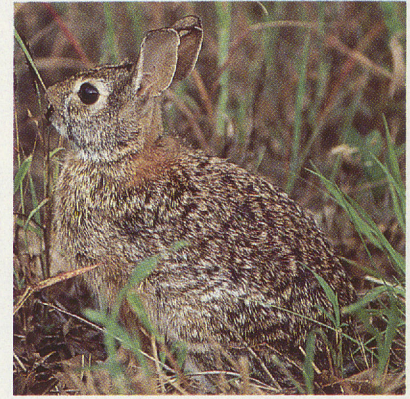


Lake Mineral Wells State Park

Location: Parker County, 48 miles west of Fort Worth on U.S. 180.

Facilities: 78 picnic sites; 77 campsites with water and electricity; 31 campsites with water; 15 screened shelters; group dining hall; five comfort stations; four restrooms with showers; seven fishing piers, one lighted; equestrian camping area; trailer dump station; concession building.

For reservations or information: Call 817-328-1171 or write Lake Mineral Wells State Park, Route 4, Box 39C, Mineral Wells 76067.



camp under the oaks and explore the

canyons. Advance reservations are

recommended at this popular park.







Charles F. Spiekerman, Jr.

It was 7:12 p.m. on March 1st—a time that will never fade in my memory. Twilight had almost disappeared as I drove along a narrow road through a coastal prairie. What followed was etched in my mind like a nature film recorded in slow motion.

Frame one depicted a mysterious, brown form lying across the road, barely in the field of my truck's headlights. At first I thought it was a deer that had been struck by a car. As I eased closer, my vision sharpened and my adrenaline began to flow. Less than 40 feet away was a mountain lion busily grooming himself.

In frame two, this huge cat, which probably weighed about 170 pounds, startled and jumped up just as I stopped the truck and shut off the engine. The mountain lion's composure returned with the evening's solitude. Ignoring me and the still-shining headlights, the

LAGUNA ATASCOSA

Coastal Refuge

by Mike Tewes

cat strolled over to the bar ditch to quench his thirst.

Frame three found me impulsively leaving my truck and sneaking up to this powerful beast. Listening to him lap the water sent shivers of excitement up my spine. He paused a couple of times to look over the waist-high grass, keeping tabs on my truck.

Frame four recorded the mountain lion returning to the edge of the road and discovering my presence—only 15 steps away. The cat, perhaps assuming I was insane (in retrospect I agree), became alarmed and walked briskly down the road away from this peculiar human. I matched him step for step. He stopped again, looked over

Among the 330 bird species found at the Laguna Atascosa are the exotic green jay (above) and the more commonly seen mockingbird (right).

Charles F. Spiekerman, Jr.



Charles F. Spiekerman Jr.

Laguna Atascosa's 45,000 acres provide a home for the great blue heron (right) and a number of mammals, including the raccoon (opposite page). Visitors may tour the refuge on foot or by car.

his shoulder and began a fast trot to escape.

Finally, in frame five the lion bounded over the ditch water and was swallowed by the brush. The entire sequence lasted just over a minute, but it seemed like an eternity.

Although this was a rare event, there are other outdoor experiences to be found on the Laguna Atascosa National Wildlife Refuge in extreme South Texas. Administered by the U.S. Fish and Wildlife Service, the refuge is a 45,000-acre sanctuary that provides a home not only for the mountain lion, but for other feline relatives, including the abundant bobcat, the endangered ocelot and possibly the jaguarundi.

The mountain lion's aliases—cougar or panther—might seem more applicable to this area since there are no mountains, only coastal prairies and marshes intermixed with the Rio Grande Plains. Located 30 miles north of Brownsville in the Rio Grande Valley, Laguna Atascosa Refuge is a treasure for those who find joy in nature and its abundant wildlife.

Laguna Atascosa was used as a gunnery range during World War II and many spent rounds still are found on various ridges. In 1946, following the war, the area became the southernmost waterfowl refuge in the Central Flyway. Acquired mainly as a wintering area for waterfowl, the refuge and adjacent waters host up to 80 percent of the continent's population of redhead ducks. Other types frequently seen are shovelers, pintails, wigeons and buffleheads.

Thousands of ducks fly back and forth from the Laguna Madre to the refuge and pass over Redhead Ridge. This landmark, which runs parallel to the coast, received its name when it was a famous hunting spot in the 1800s. Tens of thousands of redheads were killed there during their traditional overflights and used solely for their fat deposits. The fat was cut out and rendered for saddle ointment, while the rest of the bird was discarded.

Other interesting members of the "wading-bird community" include the



Bill Reaves

reddish egret, white-faced ibis, tri-colored heron and an occasional pinkish delight called the roseate spoonbill. White pelicans dominate the air lanes when their circling flocks glide on the rising heat waves.

Thousands of small passerine birds, such as swallows, flycatchers and warblers, migrate from North America to Central and South America through the Texas Gulf Coast region. During fall or spring days the vegetation at Laguna Atascosa may overflow with exquisite patches of color as these birds flit from branch to branch. With its 330 species, the refuge ranks among the top 10 birding hotspots in the United States.

Besides serving as an important convergent point for many migratory birds in the Central Flyway, Laguna Atascosa Refuge supports another group of interesting feathered creatures. This category includes border birds that barely earn the right to be considered Uncle Sam's citizens, by residing only in South Texas.

The groove-billed ani is a sluggish, comical-looking member of the cuckoo family. Sometimes an ani is mistaken for a grackle when seen at a distance, but close inspection reveals the fine, parallel grooves on its bulbous beak.

The green jay wins the feathered beauty pageant of Laguna Atascosa with its brilliant green body, blue crown and golden outer tail feathers. Honors for the most vocal go to the chachalaca, a relative of the turkey. Its call, which is a loud repetition of its name, booms on spring mornings with



such a resounding force that neither man nor beast can continue sleeping.

Another tropical species edging into Texas is the white-tipped dove. This robust species, formerly called the white-fronted dove, is at home in the refuge's native brush where it prefers to walk on the bare ground under the dense canopy. Currently, the white-tipped dove is the focus of a study by the Caesar Kleberg Wildlife Institute at Texas A&I University in Kingsville. Recent findings show this is a nonmigratory species with a relatively high reproductive potential. Historically, sightings of whitetips in Texas have been rare, but this dove is increasing in numbers in the Lower Rio Grande Valley and its distribution may be expanding northward in South Texas.

Laguna Atascosa Refuge also has its share of unique mammals. The rare ocelot is actively protected by the refuge personnel, and fines up to \$20,000 await those who are caught violating the Endangered Species Act by harassing one of these beautiful cats.

The other half of the cat-and-mouse game played on Laguna Atascosa is the



Charles F. Spiekerman Jr.



Martin T. Fuller

Mexican spiny pocket mouse, whose range extends only as far north as the Rio Grande Valley. In conjunction with research projects, I have captured many of these mice in the refuge's most dense brush, their preferred habitat. They are named for the sharp-pointed hairs on their upperparts and their external, furlined cheek pouches.

Other frequently seen mammals include Mexican ground squirrels, raccoons, striped skunks and coyotes. White-tailed deer and javelina also thrive on this sanctuary. If you are lucky, you may catch a glimpse of a fleet-footed bridled weasel.

Habitat management at Laguna Atascosa Refuge is designed to benefit specific wildlife species while contributing to the greatest natural diversity of indigenous wildlife. Activities range from no intervention with natural processes to intensive manipulation of soils, water and vegetative cover. Milo is planted in the spring and green browse crops such as winter wheat, winter peas and coastal rye grass are planted in September and October. These benefit geese, ducks, sandhill



Bill Reaves

cranes, javelina, bobwhite quail, deer, rabbits and rodents. Specific refuge areas are hayed, mowed, burned and grazed on a rotational basis to provide green succulent growth for migrating birds during winter months. These same activities enhance grasslands and prevent the encroachment of brush.

Laguna Atascosa Refuge provides visitors with a variety of recreational opportunities. The diversity of birds creates a haven for the bird-watching enthusiast and hiking, biking and nature photography are additional incentives to enjoy the outdoors. Shaded picnic grounds adjacent to the Visitor Center can provide sites for an evening meal.

If you wish only to make a wind-shield survey of the refuge, there are two auto tour routes. One is a paved, 15-mile wildlife drive that dissects an expansive coastal prairie and extends to the Laguna Madre. On a clear day, South Padre Island is visible on the horizon. The other drive is a short jaunt to the scenic inland lagoon from

which the refuge derives its name. Literally translated, Laguna Atascosa means "muddy lagoon," thus giving a hint of its murky nature.

The refuge's policy of multiple-use by the public is exemplified by archery and gun hunts for white-tailed deer and feral hogs each fall. According to refuge manager Gary Burke, "The archery hunt provides the general public with a quality, wildlife-oriented recreational experience and an opportunity to utilize a renewable natural resource." The gun hunt maintains the deer population at a level compatible with the habitat.

With all these activities, it is not surprising Laguna Atascosa Refuge receives so many visitors. "Approximately 80,000 people visit each year, with the highest peak during the months of October through April," said Burke. "This is due primarily to the influx of winter Texans, seasonal visitors who seek the Rio Grande Valley's moderate climate."

Black skimmers mingle with immature laughing gulls in the waters adjacent to the refuge. Archery and gun hunts in the fall help maintain the deer population at a level compatible with the habitat.

In addition to the values already ascribed to Laguna Atascosa Refuge, there is also an important scientific value. This area provides an outdoor laboratory for scientists attempting to unlock the secrets of nature. The absence of human-induced alterations to the plant and animal communities is essential for many studies. After the results of such endeavors are known and applied to other wildlife populations in Texas, the value of Laguna Atascosa Refuge extends well beyond its physical boundary.

So here you have a distant corner of the state, embellished with a diverse array of wildlife. And inhabiting this wide-open range is a mountain lion that remembers one particular day when a strange human was on the prowl. * *



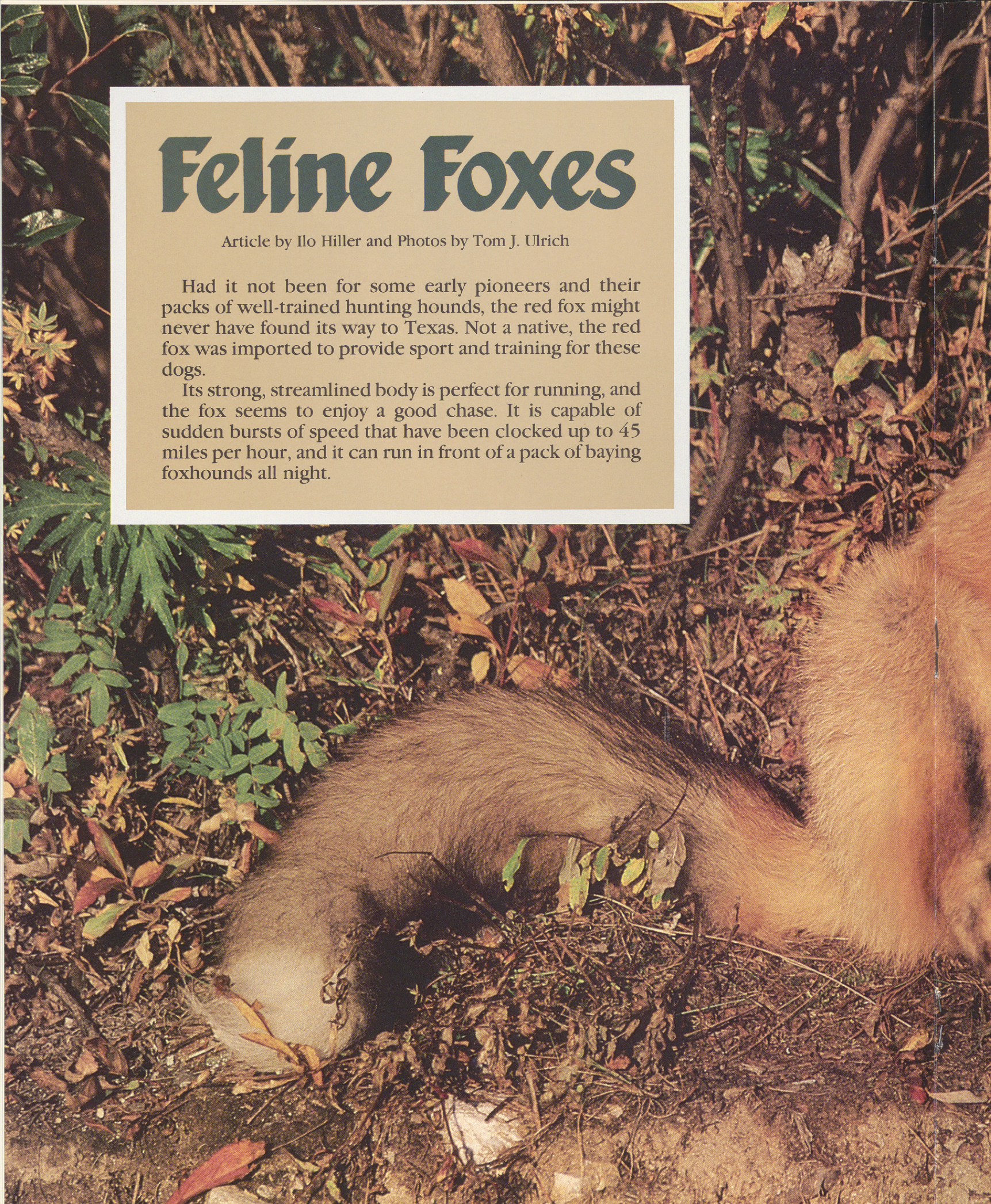
C.J. Simmons

Feline Foxes

Article by Ilo Hiller and Photos by Tom J. Ulrich

Had it not been for some early pioneers and their packs of well-trained hunting hounds, the red fox might never have found its way to Texas. Not a native, the red fox was imported to provide sport and training for these dogs.

Its strong, streamlined body is perfect for running, and the fox seems to enjoy a good chase. It is capable of sudden bursts of speed that have been clocked up to 45 miles per hour, and it can run in front of a pack of baying foxhounds all night.





The Central Texas red fox population probably stems from a nucleus of 40 animals released between 1890 and 1895 near Waco, four miles north of where the Bosque River flows into the Brazos. Offspring from these, plus an additional 60 imports, soon spread into the surrounding counties. Releases in other parts of the state further increased the fox's range. Now it can be found in Southeast, East, Trans-Pecos and North-Central Texas, but highest populations occur in the North-Central portion of the state.

Early pioneers were not the only ones to recognize the red fox's value for sport and dog-training purposes. According to a short item published in a 1959 issue of our magazine, 38 red foxes were trapped in Brown and Coleman Counties in Central Texas and shipped to East Texas to be housed in artificial dens and trained to run hounds in that area. Cages were placed at these den entrances until the foxes were established in their new homes. Then the cages were removed so the foxes could roam free and get to know their surroundings.

The next step in the training program was to introduce the hounds. When the fox left its den, a lantern was placed at the entrance to keep the fox from re-entering. The dogs were released and the fox was forced to make two or three rounds with the dogs in pursuit. Then the lantern was removed and the fox was allowed to enter its den. After a few training sessions, the foxes learned what was expected of them and the lanterns no longer were needed to keep them out of their dens. They even seemed to enjoy giving the hounds the run-around. Offspring of these foxes still may be giving East Texas hounds the run-around, but the foxes are on their own now.

The red fox is a member of the dog family (canid), but it displays quite a few catlike (feline) characteristics. The young hiss and spit like kittens, and adults can make short mewling cries and high-pitched screams. The fox also may assume the cat's lateral threat posture, standing with its back arched and its fur erect. This

display may be followed with a broadside, stiff-legged charge.

Canid eyes normally have round pupils, but the fox has elliptical (vertical-slit) pupils like those of a cat. Its sensitive face whiskers also are proportionately longer than those of other canid species, and its feet are more catlike. The flexible paws have small toe and foot pads as well as partially retractable front claws. The rest of the foot is soft and covered with hair that may make it more touch-sensitive during the fox's catlike stalk. Its daggerlike canine teeth, short muzzle and strong jaw muscles allow it to make a killing bite on its prey.

Usually canids and felids use distinctly different hunting strategies, but according to J. David Henry, a biologist who has spent six years studying red foxes in Canada, the fox hunts the same kind of prey species as cats, and its hunting habits are more feline than canid.

Hunting methods of dogs are not based on stealth, but on detection, with scent playing its part. They often hunt in packs, approaching their prey openly and relying on endurance to run it down. If they get close enough, they repeatedly bite the prey's vulnerable rump and hind legs. Weakened by the wounds or chase, the prey is pulled down and eviscerated.

Cats are solitary hunters, relying on a surprise attack, combined with a burst of speed, to take their prey.

The red fox also is a solitary hunter, perhaps because the prey it takes usually is only large enough to feed one. It is a skilled predator and adapts its method of hunting to the particular prey it is stalking at the time.

Insects offer little challenge. If one is spotted on the ground the fox merely walk over, picks the insect up by mouth and eats it. If the insect hops or flies the fox must search for it by nosing into the vegetation or tapping around with its forefoot (catlike) to cause the insect to move. It is then grabbed by mouth.

Birds and squirrels are hunted by a stop/start method. Anyone who has ever watched a cat stalk a backyard bird will recognize this hunting technique. The fox synchronizes its movements with those of the prey to mini-









mize visual danger clues. This also allows any movement noises made by the fox to coincide with those of the prey. When the prey looks away or begins to eat, the fox advances in a crouched position with its belly almost touching ground. The advance may be at a slow stalking pace, a trot or a gallop. The fox never takes its eyes off the prey. When the prey looks up to check its surroundings, the fox freezes and remains motionless, sometimes in mid-stride, until the prey resumes feeding. At the end of the stalk the fox makes a horizontal jump and attempts to catch the bird or squirrel in its mouth.

Rabbits are hunted by a method that combines both feline and canid techniques. When the prey is sighted, the fox crouches and begins its catlike stalk, but once the rabbit bolts, the fox switches to the canid method. It pursues the rabbit with a bounding gallop and attempts to bite the legs or rump. If the fox manages to get a bite hold, the rabbit is pulled off its feet and both animals collapse on the ground. When the fox regains its footing, it stands on the prey to pin it to the ground and then bites its neck and/or head to kill it.

When hunting small mammals that rely on sound to detect a predator, the fox is more careful to minimize movement noise. The approaching stalk is made slowly with the fox testing each step for a possible sound warning. The forefoot is put down lightly and may be moved a couple of times before the fox is satisfied that shifting the weight to the foot will not produce a noise. The hind foot is then advanced to the exact same place where the forefoot was located. Since visual warnings are not as critical, the fox may lift its head and cock it from side to side to locate the prey's exact location. When the fox has advanced within striking distance, it crouches low and then lunges through the air in an arc trying to pin the prey to the ground as it lands. This arcing lunge normally varies from two to six feet but the fox can cover as much as 15 feet from a standing start. Hunting on the downhill side of a trail increases the length of the lunge and the fox can stay airborne for a distance of 25 feet.

Red foxes are opportunistic feeders in that they will take whatever food is available. Eggs, carrion, berries and garbage are eaten as readily as live prey.

The breeding season for red fox in Texas begins in December and January when the shrill squalls of a ready female (vixen) bring answering barks from any nearby males. If more than one male responds to the vixen's call, they compete for her attention, and the winner of the resulting fight gets her. The pair then must find a suitable den and prepare it for the young that will be born some 51 days after mating takes place.

Litter size may vary from four to 15, but the birth of five or six pups is more common. The lead-colored pups, which are almost indistinguishable from kittens, are born blind. Their eyes open in nine days, but they remain inside the den where the female gives them constant attention. Since she must remain with them for the first few weeks, the male brings food to her and stands guard over the den. Should danger approach, he warns the family with a bark and then tries to lure the intruder away.

When the pups grow older, they are fed at the mouth of the den, venturing outside to wrestle and fight with their littermates over the food. But whether they are fighting over food or just rolling and tumbling together in play, they are amazingly quiet, uttering only a small squeak of protest when one gets too rough.

During the next four months the young spend most of their time outside the den being taught how to find, stalk and catch live prey. They also are taught to eat grapes, berries and other fallen fruit.

In the fall, the family separates and the young must find a relatively uncontested place to live. This can be a very stressful experience since other foxes will not allow the intruders into their territory. During their search the young may fall victim to predators, automobiles or man. Only the resourceful ones survive to take their place in our state's complex wildlife community. **

Outdoor Roundup



The Sneed pincushion cactus is endangered.

Three Texas Plants Get Endangered Status

Three native Texas plants have been classified as endangered by the U.S. Fish & Wildlife Service.

The plants are the *Dyssodia tephroleuca* (ashy dogweed), found in Zapata County; *Frankenia johnstonii* (Johnston's frankenia), found in Zapata and Starr Counties; and the *Styrax texana* (Texas snowbell) found in Edwards, Kimble, Real and Val Verde Counties.

The reclassification places the three plants under the protection of the Texas Parks and Wildlife Department. Endangered plants on public land may not be damaged or disturbed, and those found on private property may be removed only with the written consent of the landowner, according to TP&WD officials. A copy of this written consent must accompany the plant through all wholesale sales to the retailer.

Addition of the three plants brings to 12 the number of endangered plant species in Texas. The others are: Texas wildrice (*Zizania texana*); Parks (Navasota) ladiestresses (*Spiranthes parksii*); Texas poppymallow (*Callirhoe scabruscula*); Tobusch fishhook cactus (*Ancistrocactus tobuschii*); Nellie Cory cactus

(*Coryphantha minima*); Sneed pincushion cactus (*Coryphantha sneedii* var. *sneedii*); Lloyd's hedgehog cactus (*Echinocereus lloydii*); Black lace cactus (*Echinocereus reichenbachii* var. *albertii*); and Davis green pitaya (*Echinocereus viridiflorus davisii*).

TP&WD Selected For Award by Fishing Hall of Fame

The Texas Parks and Wildlife Department has been selected by the National Freshwater Fishing Hall of Fame organization for its first World Government Entity Award.

Hall of Fame officials said the department was singled out for the honor because it has "... excelled in its recent intensive programs concerning fish propagation, introduction and varied programs to enhance that state's fishery."

Officials said a plaque will be presented to the department, and a companion plaque will be placed in the museum rotunda at Hall of Fame headquarters in Hayward, Wisconsin.

Deer to be Stocked In Four Areas

Despite having the highest deer population of any state in the nation, estimated at 3.8 million in 1984, Texas still has areas of potential deer habitat which are devoid of brood stock.

The Texas Parks and Wildlife Department has stocked more than 32,000 deer since 1939 in efforts to establish the popular species in as many areas as are suitable, according to Charles Winkler, big game program director.

"Although the stocking program has diminished as most of the state's deer range has become populated, the department still stocks several hundred deer each year," he said.

This year the Wildlife Division will attempt to stock about 450 deer at four sites. The Caddo Wildlife Management Area in Fannin County is scheduled to receive 250 white-tailed deer from this year's trapping effort, Winkler said. Other sites are located in Navarro, San Augustine and Stone-wall Counties.

Winkler said deer are trapped in areas of the state which have surplus deer. "Most come from private ranches, and we get some from state parks which are not hunted," said Winkler. "About 75 percent of the deer we take are females."

Winkler said several misconceptions about deer translocation seem to persist. "Transplanting deer into an area which already has an established deer population usually is unproductive, because there always is a reason for a population not exceeding a certain level," he said, explaining that a lack of suitable habitat is the most common factor in low or nonexistent deer populations."

Trapping also has been suggested as a substitute for hunting when deer population reductions are needed. "Several hundred thousand deer would have to be trapped annually to have any effect on deer populations in Texas, and there isn't enough unoccupied deer habitat in the state to accommodate that many deer," said Winkler.

The cost also would be prohibitive, since the per-deer cost of trapping and transporting currently is between \$200 and \$275.

How successful have the department's past deer stocking programs

been? "The program was evaluated in 1974, when we found that more than 80 percent of the sites stocked since 1946 supported sustaining and huntable deer populations," Winkler said.

Reciprocal Fishing Agreement Changed

The reciprocal agreement between Louisiana and Texas that exempts residents of each state 65 years old and older from purchasing a fishing license to fish in the other state has been amended to include persons under 16 years of age.

The amendment, effective April 1, 1985, means that in addition to persons 65 years and older who are now covered under the agreement, residents of either state under 16 years of age also may fish in the other state without being required to purchase a fishing license as long as they have proof of age.

Proof of age must be in the form of a birth certificate, driver's license or military record which states age.

June in . . .

TEXAS PARKS & WILDLIFE

Few events in the fishing world have been anticipated as eagerly as the opening of Gibbons Creek Reservoir. National media coverage preceded the March 11 opening, and anglers with visions of monster bass vied for the chance to try their luck. In the June issue we'll take a look at the fanfare surrounding Gibbons Creek and the outlook for the famous reservoir. People who find an irresistible fawn often want to take it home and care for it, but don't do it. Keeping a wild animal as a pet is cruel to the animal, dangerous to the humans and illegal. We'll explain why next month. Also in the June issue are articles on nonpoisonous snakes, Pineywoods wildflowers, a clean-up project at three Texas lakes and a Young Naturalist feature on fossils.

COMPILED BY THE PARKS AND WILDLIFE DEPARTMENT'S NEWS SERVICE

Parks & Wildlife Department Acquires Peach Point Marsh For Wildlife Management Area

An unprecedented land donation by six major petrochemical companies will preserve 8,580 acres of prime waterfowl habitat in Brazoria County and convey its future management to the Texas Parks and Wildlife Department.

In an agreement announced in a March meeting of the Texas Parks and Wildlife Commission, the Peach Point Marsh that was recently acquired by the Texas Nature Conservancy (TNC) will be transferred at their cost to the Parks and Wildlife Department under a lease/purchase arrangement.

The Texas Nature Conservancy obtained the partial donation from the following six companies, each of which held a one-sixth undivided interest in the land: Phillips Petroleum Co., Shell Oil Co., Dow Chemical Co., Crown-Rancho Pipeline Corp., Continental Pipeline Co. and CITGO Petroleum Corp.

Officials said the land is valued in excess of \$5 million, but the department's cost will be only \$1.5 million. The property qualifies for reimbursement of up to 75 percent of the \$1.5 million price under the federal Pittman-Robertson Act.

The purchase of the 8,580 acres will be funded from revenue generated by sales of State Waterfowl Stamps and art prints. This is the department's second wetlands acquisition with these funds, the first being the 1,530-acre Stofer-McNeel Trust in Calhoun County, which was purchased in late 1984.

Edwin L. Cox, Jr., chairman of the Parks and Wildlife Commission, praised the six companies for making the land available. "With extreme pressures on our ever more limited state revenues, the kind of private sector initiative demonstrated in the protection of this magnificent area is essential to our wetland habitat conservation program here in Texas," said Cox.

The marsh area is part of the original Peach Point Plantation of Stephen F. Austin, who was known as the Father of Texas, and it was acquired by the TNC as a part of the organization's National Wetlands Conservation Program.

Charles J. Hedlund, chairman of the national board of governors of The Nature Conservancy, said the marsh has been ranked for many years as one of the top priorities for preservation by the U.S. Fish & Wildlife Service and the Parks and Wildlife Department. "What makes this project exciting is the tremendous commitment to land conservation embodied by the generosity of these six companies," he said.

Texas Parks and Wildlife Department officials said the Peach Point Marsh winters more white-fronted and Canada geese than any other marsh in Brazoria County. The goose flock of the San Bernard National Wildlife Refuge, which lies just to the west, makes heavy use of the area throughout the fall and winter. The Jones Creek ridge, on the eastern side of the tract, winters over 500 sandhill cranes. The tract is within the Freeport area of the National Audubon Society's Christmas Bird Count. Each winter, about 200 species of birds are recorded during the Christmas Count making the area one of the top two or three areas, in terms of numbers of species, within the continental United States. The marsh supports a wealth of wetland dependent wildlife and provides essential spawning and nursery grounds for shrimp, finfish and crabs.

The department plans to manage the marsh as a wildlife management area featuring waterfowl and other wetland wildlife. The tract lies within the department's Upper Coast waterfowl management region. This region accounts for about half of all Texas waterfowl hunters and about half of the annual Texas waterfowl harvest of about one million birds. The Upper Coast is the single most important waterfowl wintering area for ducks and geese of the Central Flyway.

The department encourages Texans who are not hunters to contribute to the wetland habitat acquisition program by sending tax-deductible donations to: Waterfowl Habitat Fund, Texas Parks and Wildlife Department, 4200 Smith School Road, Austin, Texas 78744.



Events Scheduled For American Rivers Month

Special events are scheduled across the state for American Rivers Month in June. For more information about any of the following outings, contact the organizations at the address or telephone number listed for each.

June 1: Rowlett Creek—Canoe Clean-Up, Sponsored by Woodland Basin Nature Association, Parks and Recreation Department, P.O. Box 469002, Garland, Texas 75046-9002, (214) 276-3848. Bring canoes, trash bags and long arms.

June 1-5: San Marcos River—Texas Water Safari, 260-mile non-stop canoe race. Sponsored by Tom Goynes, Goynes Canoe Livery, Route 1, Box 55R, Martindale, Texas 78655, (512) 357-6113. \$25.00 per person.

June 8-9: Trinity River—Dallas, Canoe Lessons and Trip. Sponsored by Sierra Club, Hans Weichsel, 5801 Rockhill, Ft. Worth, Texas 76112. (817) 451-6374. Free.

June 15: San Marcos River—Annual Meeting of the Texas River Recreation Association. River outing, clinics, movies, business meetings and dinner. Outings coordinator: Robert Burnett, Texas River Recreation Association, P.O. Box 12734, Austin, Texas 78711. (512) 459-0505. \$10.00 per person.

June 29: Buffalo Bayou—Historical Float Trip. Sponsored by Don Greene of Whitewater Experience, 3835 Farnham, Houston, Texas 77098. (713) 522-2848. \$24.00 per person.



Trans-Pecos copperhead by D. Craig McIntyre

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Western diamondback rattlesnake by D. Craig McIntyre

PART ONE: VENOMOUS

Texas Serpents

by Belva McKann

If you knew that more people in Texas died, during the period from 1969 through 1983, from insect and spider bites and stings than from snakebite; or that most cottonmouths and copperheads would much rather avoid you than bite you; or that snakes are far more effective in controlling destructive rats and other vermin around a rural homestead than cats will ever be, would you feel differently about snakes than you do now?

No animals in Texas or elsewhere have more fervent friends and foes than do snakes. The state's 113 kinds of snakes (15 of which are considered

dangerously venomous) vary greatly in their habits and appearance and are the objects of intense fascination.

Among the most interesting of snake facts is that snakebite accounts for fewer deaths than any other outdoor mishap (see sidebar). Even with no treatment at all, the great majority of people bitten by Texas' venomous snakes would not die, and with modern medical care fewer than one percent of them do. The Antivenin Institute of America reports (out of 308 copperhead bites nationwide over a 10-year period) not a single death, regardless of the kind of treatment, if treatment were administered. Assuming that you are an adult, if you are not a snake buff out looking for snakes and dragging them out of their hiding places, a laborer working in heavy

brush or around piles of rubbish or a very careless or uninformed camper or backpacker, your chances of running afoul of a stray lightning bolt are far greater than of your being killed by a Texas snake.

But, even if they fall short of their reputations as harbingers of quintessential evil, the venomous snakes found in Texas are worthy of our curiosity. They belong to the viper and elapid families generally, with four mildly venomous rear-fanged species belonging to the colubrid family. (The mildly venomous varieties will be discussed in Part II of this series.)

The most highly evolved venomous snakes in Texas are the pit vipers (cottonmouths, copperheads and rattlesnakes), so named for the small, dark depressions on either side of the face

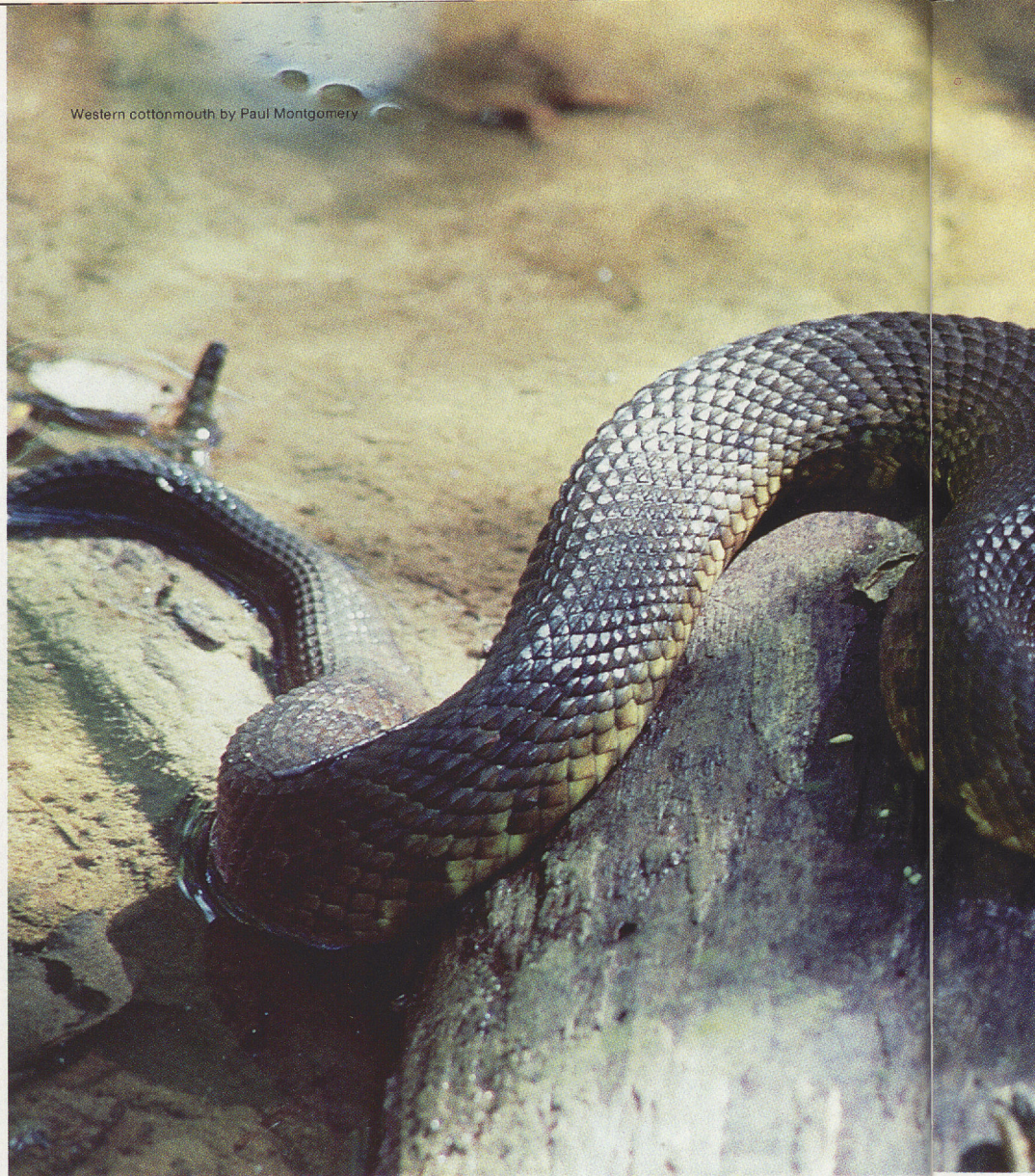
The protective coloration of the Trans-Pecos copperhead helps it to survive in the hostile environment of West Texas. Snakes' forked tongues pick up smell-taste particles.

between eye and nostril. These depressions house a heat-activated, strike-guidance system effective even where no light exists. Additionally, the rattlers have been shown to possess, as a part of this system, small organs in the roof of the mouth that are used in the final stages of a strike. While the snake's mouth is wide open and its head is back, these organs direct the fangs accurately toward the prey.

Alan Tennant, author of *The Snakes of Texas*, says that pit vipers' venom is composed of 12 to 31 lethal proteins, most of which are targeted toward specific portions of the circulatory and nervous systems of their prey. In his book, Tennant explains the function of pit viper venom: "To derive full advantage of its sophisticated blend of toxic enzymes, the snake's (venom) must not kill until its victim's failing circulatory system has had time to disperse (it) throughout the body, where, even before the creature dies, these corrosive secretions begin disintegrating its muscles and organs so rapidly that what the viper swallows minutes later is a substantially predigested carcass."

Within seconds of a bite from a pit viper, venom literally becomes part of the body. Rather than acting as a foreign substance, a liquid held passively in the "cup" of the wound, pit viper venom proteins are equipped with molecular hooks that rip and invade, cell by cell, the blood and tissues of the recipient. For this reason (and also because snakes may not inject venom at all during a bite), damage done to the area of a snakebite in an effort to retrieve poison can only risk great harm for no good reason. The best plan of action is to immobilize the stricken limb with a snug, wide, elastic bandage, splint the limb, wrap it again and get to a good, modern hospital with all reasonable haste. Except in the case of a small child, the venom requires some time to reach its maximum destructiveness and, in the majority of cases, reaching a hospital equipped to administer antivenin within several hours affords an almost certain chance of survival. (In such a medically sophisticated environment, even the occasional allergic reaction to antivenin can be handled successfully.)

The vipers' venom delivery system is the most sophisticated of all the



Western cottonmouth by Paul Montgomery

snakes'. They possess long, curved front fangs that can swing forward within jaws able to open so wide that the mouth can form an almost flat surface. The fangs are able to bite or stab, depending on the decision of the animal. They work like hypodermics, conducting into the wound venom that has been hydraulically pumped through them by strong compressor muscles. When the snake's mouth is closed, the fangs lie folded back, like the blades of a pocketknife, into slots in the roof of the mouth.

Included in the family of vipers in Texas are four species of "moccasin" (the cottonmouth and three kinds of copperheads). *Cottonmouths* are numerous along the edges of lakes, rivers and rice fields in the eastern half of the state. Very few people are bitten by them because most cottonmouths

either lie quietly or try to escape when approached. They are short, heavy snakes, generally measuring 20 to 30 inches long and weighing around two pounds.

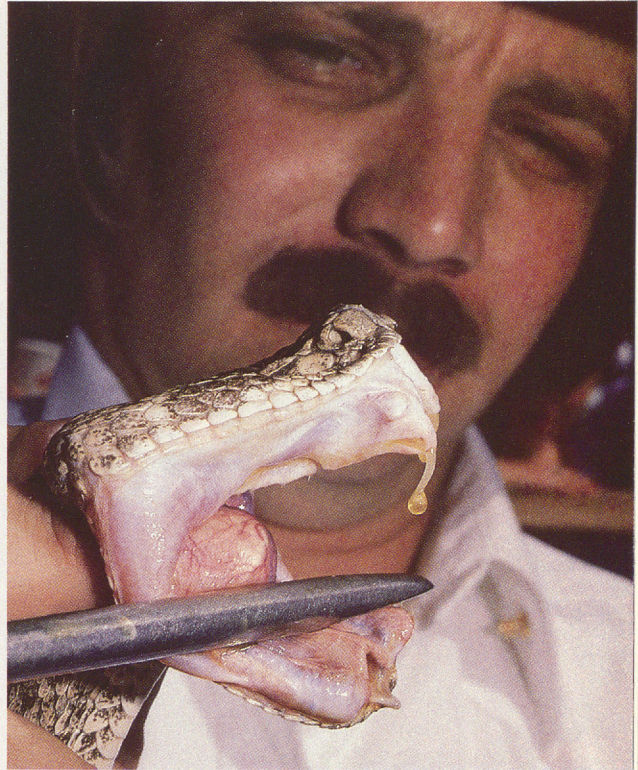
Cottonmouths in North-Central Texas sometimes share dens with copperheads, while coastal cottonmouths shelter during cold weather in crayfish holes, beneath rotting stumps in forested areas and in mammal burrows on the prairie. You might also find one under a beached boat. It is a myth that these snakes are unable to bite underwater, since a large portion of their diet is fish, frogs and other snakes (some of which are aquatic).

A cottonmouth can strike in 1/50 of a second, including the injection of venom, *individual* readjustment of fangs for accuracy and a controlled and precise release and backing-off



Western cottonmouth by Paul Montgomery

Rattlesnake venom by Grady Allen



Cottonmouths and rattlesnakes, like all pit vipers, possess very sophisticated venom delivery systems featuring long, curved retractable front fangs. These snakes can decide at the moment of biting whether or not to envenomate, and even the biggest diamond-back can deliver only about 1/3 of its full supply. Before striking, cottonmouths usually display the creamy interior lining of the mouth in a warning gape in order to discourage would-be predators.



action. Newborn cottonmouths reportedly "fish" by excitedly wriggling their yellow or chartreuse tail tips in the water, which attracts small frogs or minnows.

Cottonmouths have a lining of creamy white inside the mouth, visible when the snake adopts a defensive, gaping posture. The coloration on their bodies is somewhat variable, mostly grayish-brown with 11 to 15 darker crossbands that appear darkest near the belly. Cottonmouths closely resemble the blotched, yellowbelly and diamondback water snakes, all of which have no fangs and no venom and are harmless to humans. The cottonmouth's swimming is punctuated with periods of floating, while other water snakes will sink if they pause in their wriggling swimming style.

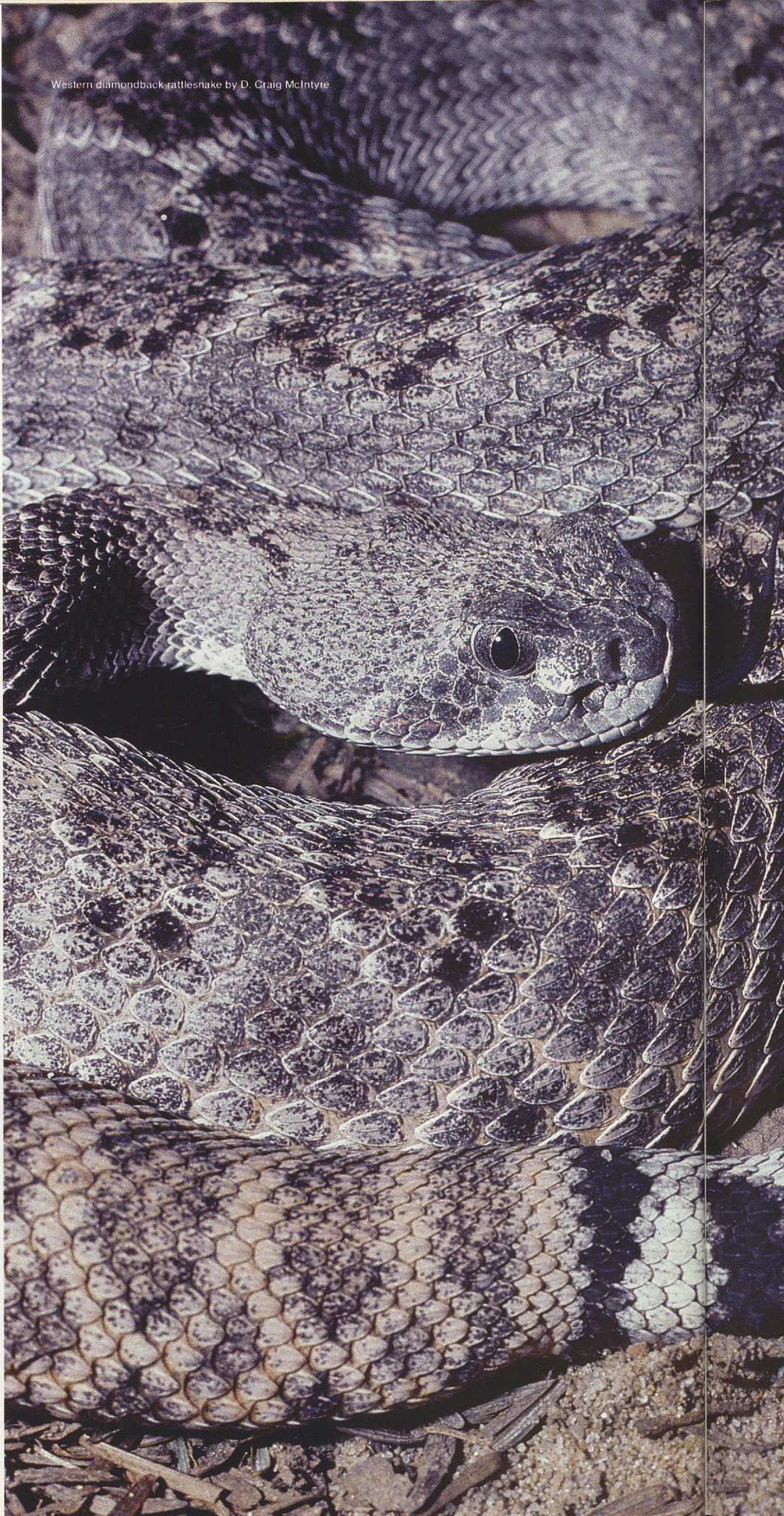
Copperheads live mostly in wooded areas in Texas. The three subspecies found in the state closely resemble each other in appearance: the *southern* copperhead is tan with brown bands which narrow over its back; the *broad-banded* copperhead of Central and North Texas has even, reddish-brown crossbands; and the *Trans-Pecos* copperhead, which lives in shrub deserts and canyons, is slightly more rusty-colored. This subspecies is protected by state regulations.

Copperheads and cottonmouths are retiring animals, and it is possible to blunder into their immediate vicinity without being bitten. The snake usually will hold still, try to flee or, in the case of the cottonmouth, threaten you with open mouth. Coiling and striking usually are reserved for people who insist on touching or otherwise molesting them.

There are 10 *rattlesnake* species and subspecies in Texas. Of these, four are most likely to provide serious bites to humans: the western diamondback rattlesnake, the prairie rattlesnake, the Mojave rattlesnake and the eastern timber or canebrake rattlesnake. These snakes collectively are found over the entire state.

Rattlesnake venom, like that of other pit vipers, is composed of both neurotoxins (substances which work on the nervous system of prey) and blood- and tissue-destroying enzymes. Symptoms of pit viper poisoning are immediate severe pain (caused by pain-inducing elements released by the body's

Western diamondback rattlesnake by D. Craig McIntyre





The "coon-tailed" western diamondback rattlesnake, by far the largest rattlesnake in Texas, feeds principally on mammals such as mice, cottontails and jackrabbits by envenomating them and swallowing them whole.

own blood cells as they are attacked by the venom), swelling, sweating and chills, faintness or dizziness, elevation of pulse rate, vomiting (sometimes severe) and swelling of the regional lymph nodes.

Most rattlesnake encounters with humans occur around rural outbuildings where grain is stored, because the reptiles look here for small mammals to eat. Piles of driftwood, unused lumber or trash are also likely places to find rattlesnakes sheltering.

The *western diamondback* rattlesnake, the biggest and most widespread venomous snake in Texas, can be as long as 7½ feet and is responsible for virtually all the state's serious cases of venom poisoning. Diamondbacks may be yellowish or pinkish tan to dark gray-brown above, their backs usually are highlighted with white-edged vertebral diamonds and they have alternating black and white bands on the tail.

The *prairie rattler* is a smaller snake that lives mostly in the grasslands of the Panhandle. It has brown, dark-

edged blotches on the upper part of its body, lengthening into transverse crossbars farther back. Alternating brown and tan bands appear along the tail.

The *timber rattlesnake* is feared because of its perfect camouflage and its ability to lie motionless when approached. This snake is widely distributed over the eastern third of Texas; it is pinkish-beige, with dark brown dorsolateral chevron-shaped blotches and a rust-colored stripe down the back. Its comparatively mild temperament in captivity, where almost nothing short of severe injury will provoke it to strike, has made it a popular choice among snake-handling religious cultists.

The *northern blacktail rattlesnake*, otherwise known as the "green," "velvet-tail," or "dog-faced" rattler, inhabits West Texas' wooded canyons and mountains. This snake sometimes appears olive-green, but most often is silvery-gray or brown. It possesses a dark tail, a dark mask and patches of pale scales enclosed in a blackish-brown stripe running along the spine.

The *Mojave rattlesnake* is found, in Texas only along the Rio Grande west of Big Bend. Its venom rivals that of the western diamondback, which it resembles.

Southern copperhead by D. Craig McIntyre



Timbe

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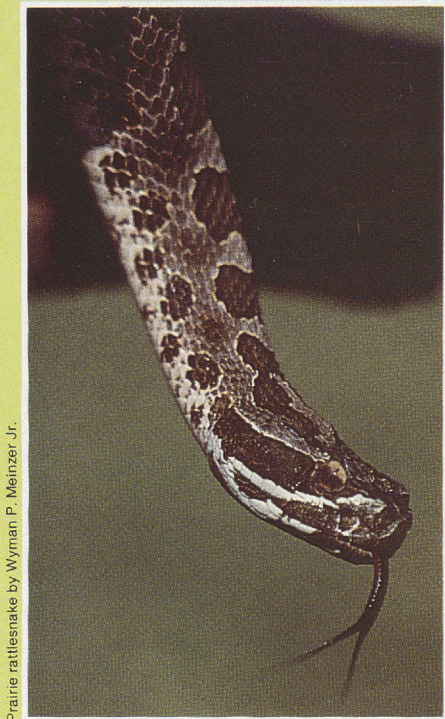


Common in woodlands throughout the eastern third of the state, the southern copperhead gets its Latin name contortrix from the cinched hourglass-shaped bands that appear over the spine. The Mojave rattlesnake's venom is the most lethal of any snake's north of Mexico, sometimes approaching the toxicity of cobra venom. The coral snake is the only black-, red- and yellow-ringed Texas serpent whose red and yellow bands touch. Also, only the coral's rings completely encircle its body. Timber rattlesnakes are generally less irritable than western diamondbacks.

Mojave rattlesnake by D. Craig McIntyre



Coral snake by Grady Allen



Prairie rattlesnake by Wyman P. Meinzer Jr.

OUTDOOR-RELATED CAUSES OF DEATH IN TEXAS*

Year	Snakebite	Insect & spider bites & stings	Lightning	Drowning	Auto
1968	7	5	7	496	3,412
1969	5	7	5	483	3,522
1970	2	3	8	490	3,635
1971	2	2	13	463	3,589
1972	3	10	13	508	3,783
1973	1	6	7	588	3,688
1974	1	4	3	589	3,119
1975	1	5	12	581	3,455
1976	0	5	9	483	3,236
1977	5	10	4	504	3,674
1978	2	6	5	566	3,981
1979	1	4	11	585	4,156
1980	2	2	5	570	4,295
1981	1	5	4	569	4,580
1982	2	1	13	531	4,199
1983	0	4	5	592	3,899
TOTAL	35	79	124	8,598	60,223
YEARLY AVERAGE	2.2	4.9	7.8	537.4	3,763.9

*Data provided by the Bureau of Vital Statistics, Texas Department of Health

The *mottled rock rattlesnake* has evolved the protective coloring of its surroundings: broken desert, canyon and evergreen mountain areas. This rattler appears pinkish on the igneous boulders of the Davis Mountains and pale gray on Hill Country limestone and southwestern desert country. This subspecies is protected by state regulations.

The *banded rock rattlesnake* is found only in Texas' two westernmost counties, El Paso and Hudspeth. It has distinct black cross-bands that make it attractive to reptile collectors. These snakes also are protected from capture by state regulations.

The *western massasauga* is a small, nocturnal rattlesnake that lives on the prairie. It can be identified by its closely spaced brown dorsolateral blotches and narrow head with large plates on top of the head.

The *desert massasauga* is a pale-colored version of the western massasauga, living in Northwest and South Texas. These snakes also have small rattles and large head plates.

The *pigmy rattlesnake*, because of its tiny rattle, is known as the "rattleless" ground rattler. It is secretive and bad-tempered, but possesses comparatively little venom. The pigmy is a small

gray-blotched snake with an orangish-tan vertebral stripe and large plates on top of the head.

The *Texas coral snake*, the state's only elapid, is related to the deadly mambas, kraits and cobras of the Old World. It averages about 26 inches in length, with females being longer than males, due to a somewhat longer growth period. The Texas record for a coral snake is 47¾ inches. These snakes frequently are found in rock crevices, including those on patios and the environs of suburban swimming pools.

The coral snake's full Latin name *Micrurus fulvius tenere* means "small-headed, red (ringed) and tenacious." Although this venomous snake resembles a few nonvenomous species, it can be distinguished from them by the brilliant red, yellow and black rings that completely encircle its body. The milk snake and scarlet snake, which mimic the coral, lack these complete rings. Also, the coral snake is the only red, yellow and black-ringed Texas snake with black rings as wide as the red rings. The most well-remembered characteristic for most people is the arrangement of the snake's colors: "Red against yellow, kill a fellow; red against black, venom lack." Unlike the pit vipers, whose large eyes have verti-

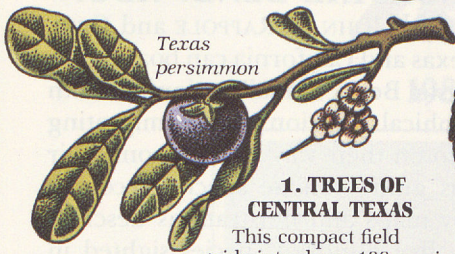
cal cat-eye pupils, the coral snake has tiny black eyes, with circular pupils.

The Texas coral snake's venom is the most lethal, drop-for-drop, of any snake's in Texas: many times as toxic as that of the western diamondback rattler. Unlike the complex venom of pit vipers, which is used to start the actual digestion of the victim, the coral snake's toxins are meant only to kill its prey. Coral snakes can be aggressive, particularly upon being picked up and handled. For this reason, children attracted by the beauty of the snake are often its victims.

An observation made by Shaw and Campbell (*Snakes of the American West*) concerning the prairie rattler might be considered appropriate for other Texas snakes: "Today . . . the object of human predation, it still hangs on, seeking to avoid discovery, defiant when discovered . . . as much a part of the western scene as the screech of a bobcat or the howl of a coyote. Cars run over it; bulldozers root it out; people kill it. Yet in it remains something of nature and something of beauty."

In Next Month's Issue:
Part II, Nonvenomous Snakes

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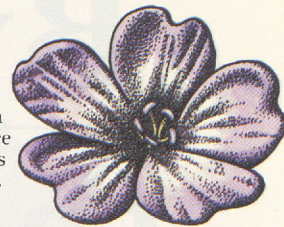
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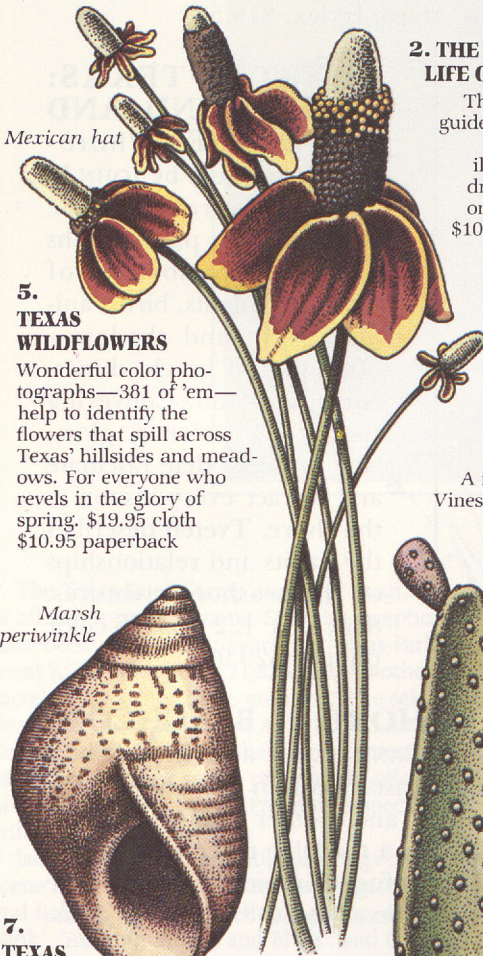
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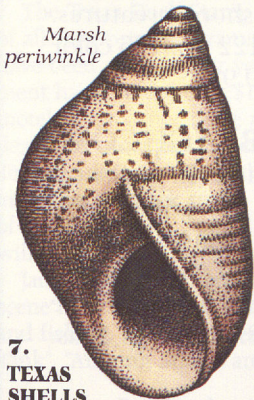
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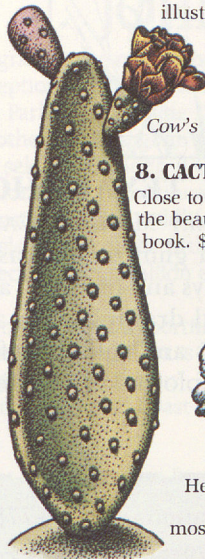
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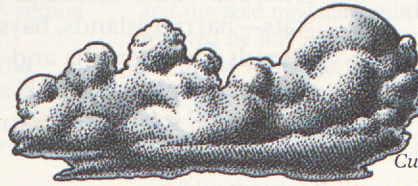
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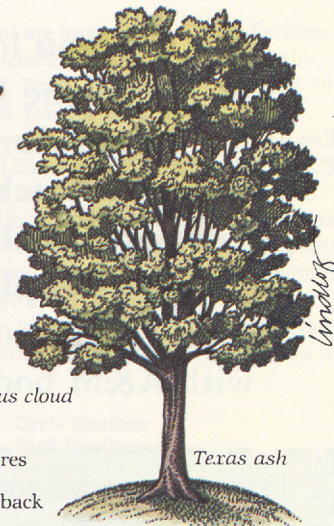
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TEXAS II

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JOHN P. COWAN

The Texas Duck Stamp and Print Program is the most successful of all state print programs. Since its inception in 1981, 43,100 prints have been sold. In four years, the Texas Parks and Wildlife Department has received over \$1,875,000. No other state program remotely approaches these numbers. The selection of John P. Cowan's design of snow geese over a rag spread for Texas V continues the Texas tradition of using the best and most collectible wildlife artists for its duck stamp program. In celebration of the fifth year of the Texas Duck Stamp Program, a special gold medallion edition will be available.

Jack Cowan's incomparable paintings of the coastal sporting scene have made the Cowan name synonymous with Texas hunting and fishing. His limited edition prints, such as "Memories", "Hot Tank", "Autumn Snows and Blues", and the 1983 Gulf Coast Con-

servation Association Stamp Print are among the most collectible in sporting art. His many honors include being selected Ducks Unlimited Artist of the Year in 1977, Texas Artist of the Year 1978-79, and Trout Unlimited Artist of the Year for 1982.

The image size of the signed and numbered limited edition will be 6½" x 9"; overall size will be 12½" x 14". The print will be \$125. The accompanying stamp will be \$5. The special gold medallion print edition will be \$255 including stamp. Both the regular edition and the gold medallion edition will be limited to wholesale orders received by July 31, 1985. There will be no remarques. Shipment of the prints will be in the fall of 1985.

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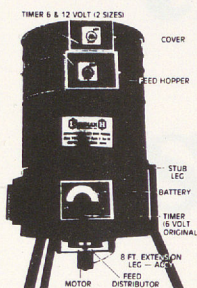
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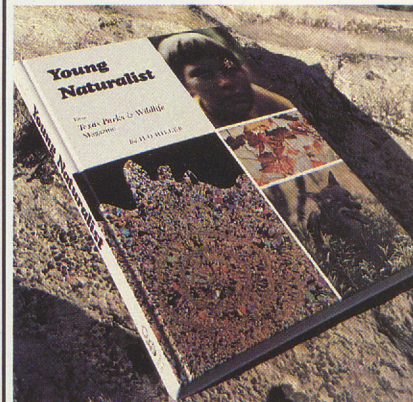
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Most of us are well aware of the job that Ducks Unlimited has undertaken in restoring and preserving waterfowl habitat in Canada, certain Northern States in the United States, and Mexico. Ducks Unlimited, for almost fifty years, has worked unrelentingly to ensure that the present generation and generations to come will enjoy the heritage which mankind has no right to take from future generations.

Texas Ducks Unlimited has played a major role in the endeavor to assure the availability of financial resources that are necessary to preserve this heritage. Texas Ducks Unlimited also realizes the importance in preserving the habitat to which waterfowl return each winter. Because of Texas Ducks Unlimited's concern with rapid deterioration of our coastal plains, our piney woods, and our upland water reservoirs, we are undertaking the responsibility to assist what could well be the most optimistic wetlands projects to be conceived by any state, Texas Parks and Wildlife's Waterfowl Habitat Program.

Over the past four years, a trust fund has been growing, funded by the sale of the Texas Waterfowl Stamp, to enable the acquisition and management of wetland habitat within the State of Texas. However, the task may fall considerably short of the goals which have been set by the Texas Parks and Wildlife Commission because of financial constraints being placed upon State agencies.

Realizing the consequences that would face our waterfowl if something is not done NOW, Texas Ducks Unlimited has come forth with a commitment to assist the Texas Parks and Wildlife Department in this endeavor.

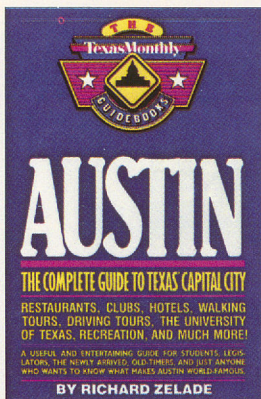
Through the sale of a limited edition Texas Ducks Unlimited/Texas Parks and Wildlife print, Texas Ducks Unlimited will be raising funds to assist our Parks and Wildlife Commission in its efforts to assure the availability of winter waterfowl habitat in Texas for generations to come.

The Texas Wetlands Print will be published by Texas Ducks Unlimited from the original watercolor by John P. Cowan entitled "Coming' Home," through the generosity of Meredith Long Galleries of Houston and with the cooperation of Collectors Covey, Dallas. One hundred percent of the net proceeds from the sale of this special print will be given by Texas Ducks Unlimited to the Texas Parks and Wildlife Department. These funds, along with monies provided by Ducks Unlimited, Inc. to the State of Texas through its MARSH Program, will represent a major portion of the waterfowl funding requirements.

John P. Cowan and his art need no introduction to Texas sportsmen. He has been documenting the Texas hunting and fishing scene for over twenty years. His limited edition prints, such as "Memories," "Hot Tank," "Autumn Snows and Blues" (Ducks Unlimited), and the 1983 First Gulf Coast Conservation Association Stamp and Print are among the most collectible in sporting art. Jack Cowan's many honors include being selected Ducks Unlimited Artist of the Year. His design of snow geese has been selected to be featured on the 1985 Texas Duck Stamp and Print.

The image size of the Texas Wetlands Print will be 19" x 26½". Each signed and numbered print will be \$125. There will be a gold medallion edition available for \$250. A very special remarked gold medallion edition limited to 100 prints will be available for \$1,000 each. The edition size for the signed and numbered edition and the gold medallion edition will be limited to the orders received by Texas Ducks Unlimited by May 31, 1985. Contact your local D.U. Chapter or Collectors Covey, (214) 630-4981, to place your order. Make checks payable to Texas Ducks Unlimited. Visa, MasterCard, and American Express accepted. Shipping will be \$6 for each order. Shipment anticipated Summer 1985.

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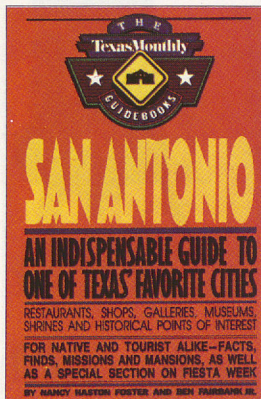
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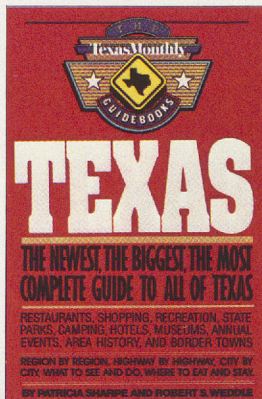
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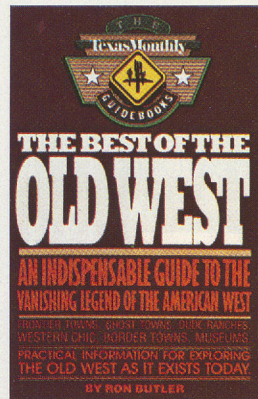
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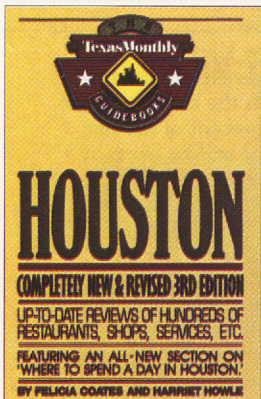
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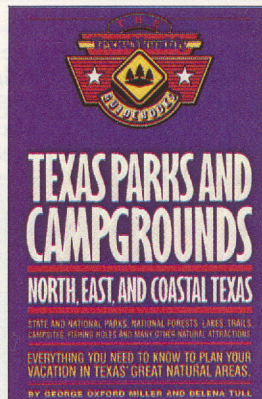
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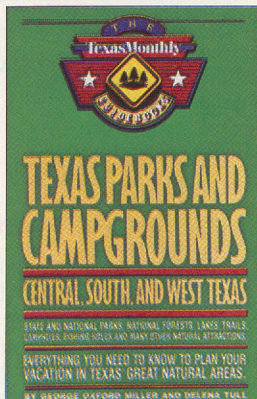


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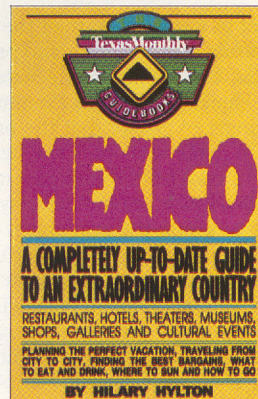
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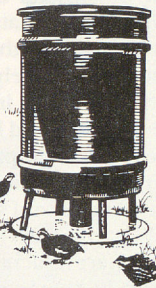


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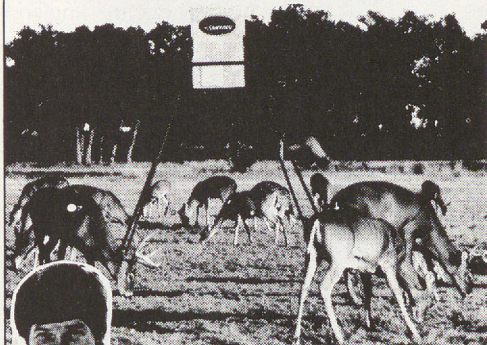
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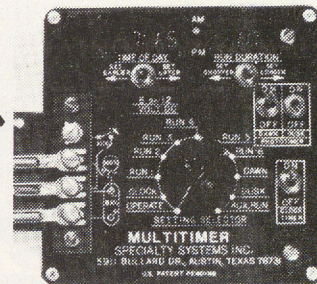
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Letters

Antlerless Permits Underused

For the past five years I have been in charge of a game management program on my family's ranch near Campwood. In that time we have harvested more than 60 does, 30 spikes and only five mature bucks. Deer quality has improved in all aspects. But unlike myself and a few other landowners, the majority of hunters in Real County—and I would venture to say in Texas—do not obtain and use state-issued doe permits. The ultimate result is a compromise on the part of those hunters by shooting bucks exclusively. I have surveyed more than 100 deer in the storage lockers of Real County and have concluded, by using the tooth-wear pattern, that more than 90 percent of all bucks harvested fall within the 4½-year and younger range.

The problem is obvious: not enough bucks are reaching full maturity, leaving reproduction to the immature. This affects overall deer quality, which leads to my question. Why won't the state allow does to be harvested without supplementary permits? Even if there were just one open doe tag on the hunting license it would have a major effect on population control and herd improvement.

Kelly Sutton
Austin

■ Your observation that most of the bucks taken are less than five years old follows the same pattern biologists have seen. There are many factors involved in deer harvest. Younger bucks are easier to take than older bucks. Most hunters in the Hill Country have a feeling for what they think is a harvestable buck and take that buck when the opportunity arises. Also there always are more young than old bucks because of annual production and mortality factors—hunting being only one.

Statistics indicate that only 25 to 35 percent of all antlerless permits are used. Reasons for this range from landowners not issuing them to hunters to procrastination by hunters about using the permits. The result is that a low number of permits are actually used and some deer ranges are subjected to continual abuse from overcrowded deer herds.

Publicity about the need to harvest more antlerless deer is gradually making an impact on landowners and hunters. There is evidence that the public wants a less conservative program aimed at generating a

greater deer harvest. It is possible that a more realistic program will be developed after careful consideration is made of all aspects of such a program.

Avian Visitors

Thanks for the great January 1985 kickoff. What a magazine!

I was delighted to find the sandhill crane story as we had a long-legged visitor to our fish pond for almost a month last fall. But I'm crestfallen to find out that the big attraction wasn't my modest 20- by 25-foot pond and the eight goldfish that disappeared from it, but the 10 acres of maize and alfalfa growing to the west of us.

I'll gladly keep the pond stocked for passing travelers. We have regular spring visits from egrets and the crane hopefully will repeat his trip next fall. And once during a terrible freak storm with high winds during the El Nino year a curlew happened by.

Mrs. Ruth Sims
Odessa

Masses of Ladybugs

We were fortunate enough to see a mass gathering of ladybird beetles as pictured in your February 1985 issue. We saw them about 25 years ago and have never seen a like gathering again. The surprising aspect of our experience was that the little insects were massed on the trunks of trees surrounding McDonald Observatory.

Mr. and Mrs. Galen H. Remmers
Santa Fe

Brazos Bend

On the last day of 1984 my wife, a son and grandson and I drove through the chill rain, past fields of thousands of feeding geese to see the newly opened Brazos Bend State Park featured in your March 1984 issue. We were not disappointed.

But our big discovery, which was worth the whole trip, was something not even shown in your story. It may be worth your going back, as I intend to do.

I've always had a warm spot in my heart for those greatest of nature's plants, the trees. And I've seen some great ones all over the U.S. and abroad. But I've never seen anything that quite compares with the clusters of live oaks on either side of the

entrance to the park. I say "clusters" because these giants grow in a tight bed with four or five great trunks spreading from a common, solid base, with the whole superstructure soaring out over thousands of square feet. I saw one limb touching the ground out of sheer weight then rooting and soaring up again. These massive limbs are festooned with Spanish moss and tree ferns. Beneath, on the ground, is a lush, green cover spotted with deer droppings here and there. What a photography opportunity.

The effect of this virgin timber, said to be 350 years old, is awesome. I felt like I was in a great, spiritual presence, as one might feel in a cathedral.

I had to share it with you.

Al Hilliard
Houston

Thanks

Let me commend you on a great magazine. It contains some fascinating and interesting stories, such as "Texas Thumpers" and "Whittling Birds" in the December 1984 issue. The cover photos are all outstanding.

A friend who lives in Dallas gave me a gift subscription to your magazine, and I am pleased he did. He also reads *Texas Parks & Wildlife* so may I use your letters page to say thank you to J.D. Pipkin for introducing me to such a varied and interesting magazine. Keep up the good work. Hunting, conservation or just simply features, this is one reader who enjoys the lot.

E. Appleyard
West Yorkshire, England

BACK COVERS

Inside: Found throughout the state, red-winged blackbirds nest in a well-woven cup attached to reeds, grasses or brush. Redwings breed from April through mid-July, and each pair of blackbirds often produces two or three broods every season, building a new nest for each clutch. Photo by Leroy Williamson.

Outside: Early pioneers imported the red fox into Texas in the late 19th century to provide sport and training for hunting dogs. This member of the dog family displays a number of cat-like characteristics. (See story on page 24.) Photo by Tom J. Ulrich.



