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# TEXAS PARKS & WILDLIFE

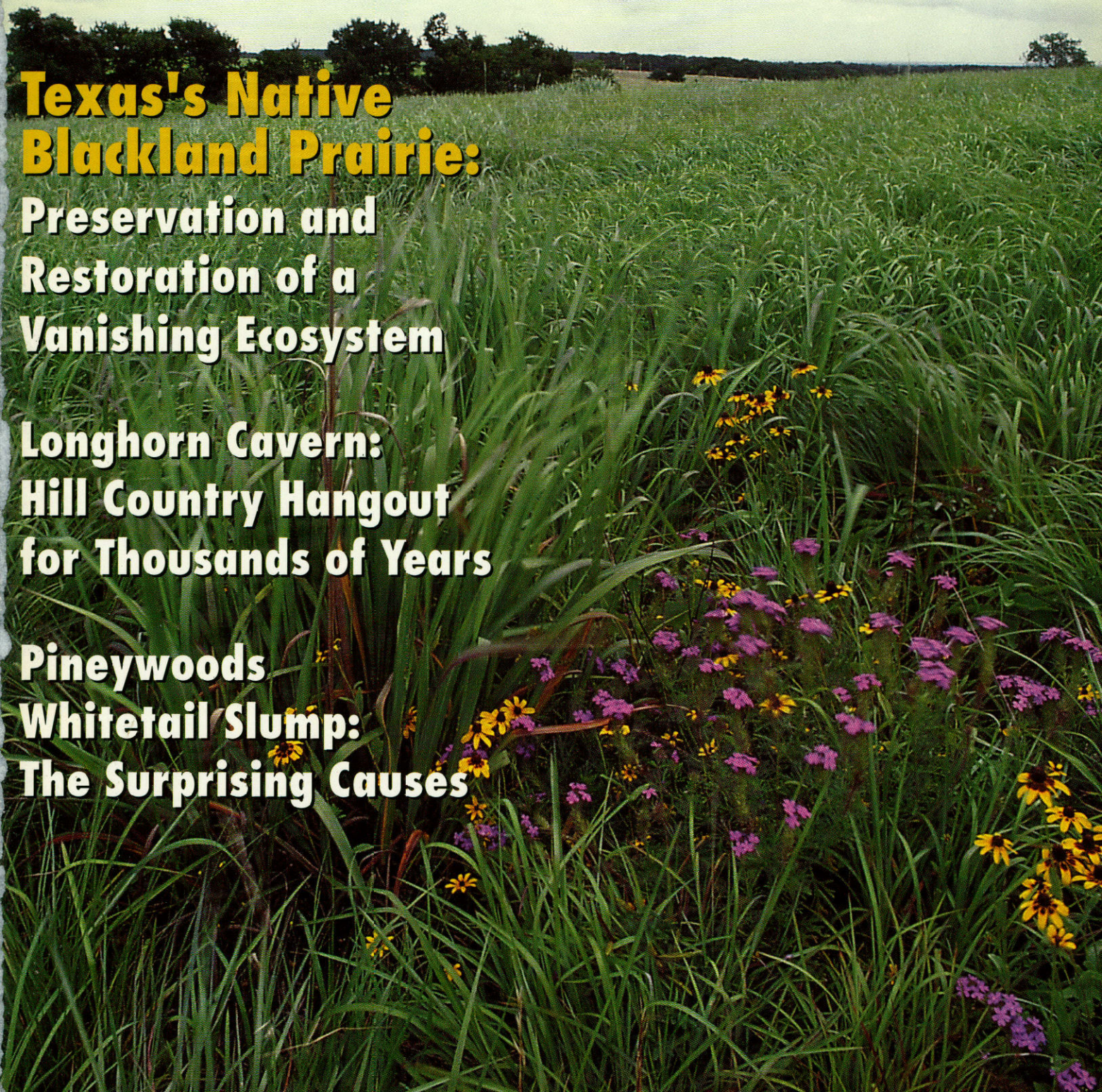
FEBRUARY 1993

## Texas's Native Blackland Prairie:

Preservation and  
Restoration of a  
Vanishing Ecosystem

Longhorn Cavern:  
Hill Country Hangout  
for Thousands of Years

Pineywoods  
Whitetail Slump:  
The Surprising Causes

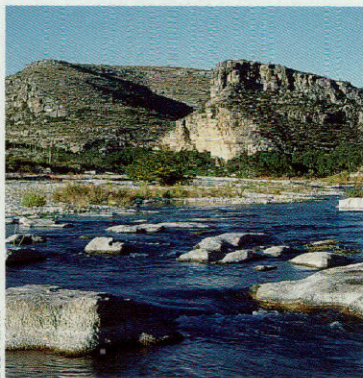






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Bob Parvin

PAGE 4



Paul Montgomery

PAGE 28



Rusty Yates

PAGE 42

C O V E R S

**Front** Leontart Prairie near Marlin is one of the few remaining examples of original Blackland Prairie. (Story on page 28.) Photo by Bob Parvin. Contax 167MT camera, Distagon 72 28mm lens, f/11 at 1/125 second, Kodachrome 54 film.

**Inside Front** Buffalo dancers are the subject of this late prehistoric pictograph at Devils River State Natural Area. (Story on page 4.) Photo by Bob Parvin. Contax 167MT camera, Zeiss Planar f/2.1 30mm lens, f/11 at 1/125 second, Kodachrome 64 film.

**Back Cover** Dolar Falls adjacent to Devils River State Natural Area, is owned by The Nature Conservancy of Texas. Photo by Leroy Williamson. Pentax 645 camera, 55mm lens, 4 seconds at f/22, camera on tripod, Fujichrome 50 film.

**4 PURE BUT NOT SIMPLE** Some 40,000 acres of the Devils River region of Southwest Texas are owned and administered by two separate entities—the Texas Parks and Wildlife Department and The Nature Conservancy of Texas. The two conservation organizations, one public and one private, share a fence line, Devils River frontage and a commitment to protection of this unique resource. *by David Baxter*

**14 DESERT SMALLMOUTHS** The wild and unruly Devils River, virtually teeming with smallmouth bass, is an irresistible temptation to the adventurous angler. But with hidden boulders, surprise waterfalls, and the possibility of flash floods, canoeing the Devils is not for the fainthearted. *by Buddy Gough*

**22 FROM GUNFIGHTS TO DANCES** Longhorn Cavern has been a well-known Hill Country landmark for generations. Comanches camped there and outlaws hid there; there were Saturday night dances and Sunday morning church services. Many caves have interesting geological features, but Longhorn Cavern has a special link with Texas people. *by Elaine Acker Albright*

**28 TALLGRASS ADIOS** When settlers pushing west reached the part of Texas known as the Blackland Prairie, they discovered waving grasses as tall as a man and a variety of wildflowers. The Blackland Prairie covered more than 12 million acres in the state back then; today, some 5,000 acres remain. *by Suzanne Martin*

**38 A TRILL A MINUTE** The Texas Bird Sound Library at Sam Houston State University houses thousands of recordings of the trills and twitters of bird songs. Researchers use the recordings to study how bird songs develop, whether birds can learn new songs and what bird songs mean. *by Kristi G. Streiffert*

**40 SAVING NATURE'S SOUNDS** With recordings of creatures from birds to marine mammals, Texas A&M University's Center for Bioacoustics is expanding our knowledge of wildlife and preserving sounds that may not be heard in another 100 years—or even in 20 years. *by Lyn Fraser*

**42 THE RISE AND FALL OF PINEYWOODS DEER** After reaching a peak of a half-million animals in 1987, East Texas whitetails declined 50 percent in the following three years. Were they overharvested? The experts say no, that habitat and land use caused the decline. Furthermore, they say, the high populations of the 1980s weren't just abundance, but overpopulation. *by Jim Cox*

**48 ANGLER RECOGNITION** Just because the big fish you caught isn't a state record doesn't mean you don't get a memento. You may qualify for a big fish award, a water body record or a catch-and-release pin. And the information you provide helps fishery biologists manage the resource. *by Allen A. Forshage and Danny G. Lewis*

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# AT ISSUE

February 1993, Vol. 51, No. 2

## TEXAS PARKS & WILDLIFE

*Dedicated to the conservation and  
enjoyment of Texas wildlife, parks,  
waters and all outdoors.*

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Ann W. Richards

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**M**y grandfather spent his last years preaching in a tiny little church at Mart, in the heart of Texas's Blackland Prairie country. I remember traveling up there as a child at Easter and looking out the back window of the car at what appeared to be a sea of wildflowers, mostly bluebonnets and Indian paintbrushes, stretching to the horizon.

As an adult, I learned that J. Frank Dobie also was enchanted by Texas's native meadows. He wrote: "The sight of a native turf, whether of shortgrass carpeting the earth or tallgrass waving in the wind, restores my soul."

Dobie, Texas's author laureate, understood the meaning of grassland to Texas. He knew, and his works reflect, that its prairies and plains, more than any other aspect of the landscape that was early Texas, gave us the natural resources necessary for a culture based on cattle, shaped the character of our people and defined our sense of place.

In the Blacklands, as Suzanne Martin describes in this issue, the first Texans confronted a seemingly "endless pasture" of around 12 million acres. Today, we measure what few undisturbed fragments remain in hundreds of acres. These last remnant meadows are among the richest and most diverse of our Texas natural areas, with more than 200 species of grasses and wildflowers. What little unbroken Blackland sod remains is the legacy of farmers who brought ancient management practices with them from Central Europe, setting aside small pastures of native hay each year as an insurance policy for feeding livestock.

Thus as we near the end of the century, we are mindful of the importance of our remaining native Blackland Prairies. That is why, even as it is increasingly difficult to operate our existing facilities, we must continue to make some investment in conservation.

These last native prairies and other vanishing wildlands are truly the heart of Texas. Dobie knew that. Near the bed on which he died was a vase filled with grasses from a Texas native meadow. ★

—Andrew Sansom, Executive Director



Rob Curtis

### In March . . .

*Roseate spoonbills almost disappeared in the early part of this century, but today flocks of the colorful birds arrive on the Texas coast each spring. We'll have a story in the March issue about these unusual birds. Also next month: Mariscal Canyon in Big Bend, Lake Somerville State Park, Lake Somerville fishing and more.*



Western Regional Publishers Association



## Concern for Nature

I really enjoy your magazine. It has fabulous articles on just about everything in nature. I am a sophomore in high school and I am really interested in nature. Biology is my favorite and best subject and I plan on majoring in it when I go to college.

Nature is a wonderful thing and you display the beauty of wildlife in your pictures and articles. You also display your concern for nature. We need more people to do so, that we can save the environment. People who destroy the environment need to go out and see what they are doing. At the rate most people are going there won't be anything for our younger generations to see. They need to have the chance to see what we have gotten to see, which is disappearing before our very eyes.

Keep up the good work in the magazine. I'm glad you are trying to show people the beauty that they are destroying. Maybe people will start to see what they are doing and what they are missing out on if they start reading your magazine.

Amy Jasper  
Silverton

## Anniversary Issue

Thank you so much for the beautiful 50th anniversary issue of *Texas Parks & Wildlife* (December). There are no superlatives great enough to describe the panoramas and wildlife on which our eyes and senses feasted. Thank you for a most enjoyable evening we spent poring over all the photographs of our most beautiful state.

Our sincere thanks and congratulations to the staff and the photographers, and to John Graves for his essay, which helped us appreciate our being fortunate enough to be native Texans. This is truly a keepsake edition that we will save to pass on to our children.

The Bernie Richter Family  
Center Point

I have thought many times about writing to you to tell you how much I appreciate the wonderful articles and fabulous photographs that appear in each issue. But after receiving the 50th anni-

# LETTERS

versary issue, I could not let another day pass without telling you how wonderful I think it is. Thank you for so much enjoyment. There is not another bargain like it in Texas.

Ronnie Blair  
Chappell Hill

Rarely do we as inhabitants of this vast and bountiful land pause long enough to give thanks to those whose life's chore it is to preserve its great beauty and perpetuate the existence of its creatures.

After having read your 50th anniversary issue, I must commend your staff and all Texans who play a role in preserving your great heritage of conservation and natural resources.

As a neighbor in Louisiana, I have had the opportunity and privilege over the past 25 years to be a guest sportsman in many different parts of your state. Without exception, on every adventure, I am awed not only by the quantity and quality of game but the beauty of the habitat. The people of your great state show tremendous pride in their land. Rarely do I see littering along the roadside or in the back country. Please continue to be an example for all of us to follow.

James H. Hall  
Ruston, Louisiana

## Cancellation

The pheasant on the back cover of your November issue was beautiful. Too bad the article inside was about pheasant hunting. When I subscribed to your magazine I didn't realize that a magazine published by the Texas Parks and Wildlife Department would be hunter-oriented.

My way of "(how) we express our love for the outdoors" as recently described by one of your readers does not include killing the animals that live there. Please cancel my subscription.

Mark Morgan  
Eules

## Dumbfounded

As a longtime subscriber and a hunter, I simply do not understand the constant bickering about the magazine's alleged "antihunting" stance. I am very sensitive to the misinformed ignorance of the antihunting factions, but I am simply dumbfounded by any perception that this fine magazine exemplifies it. Every issue seems to have every interest fairly represented.

I would like to thank you for the nice story about the poor little horned lizard (August). As an ardent and longtime T.C.U. supporter, we have been an endangered species for a long time! We're trying to return to our "glory years," and I hope our little mascot does, too.

Bill Robinett  
Fort Worth

## Sunday Mornings

I really enjoyed the beginning of Ray Sasser's article "Buck Fervor" (October). I am a fowl hunter, but Ray's vivid description of humans in nature on an autumn Sunday morning can be appreciated by any outdoorsman.

With all the hoopla over family values, I enjoyed reading what I have known and felt all my life—that God is mighty and that we see that awesome power every time we stop, sit back and observe what he has created. Campgrounds, fields and marshes have been my family's church on many Sunday mornings. Sometimes I get dejected and think no one believes in God or cares about God's awesomeness and creation any more. Ray's article helped me realize that not all hope is lost for the God-fearing and -loving outdoorsman. There really are others out there who realize and appreciate what God, not man, has provided us.

L.L. Machala  
Houston

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*Texas Parks & Wildlife* magazine welcomes letters to the editor. Please include your name, address and daytime telephone number. Our address is 4200 Smith School Road, Austin, Texas 78744. We reserve the right to edit letters for length and clarity.

# Pure but Not Simple

by David Baxter

**I**t was near midnight on July 6, 1883, when 18-year-old Erasmus Keyes Fawcett stopped at Dolan Falls on the Devils River with a flock of sheep he and a group of partners were pushing to California. They had left Del Rio some three weeks earlier, traveling at night to avoid the heat of the day.

They took shelter in a rock overhang on the east side of the river, just upstream from the falls. Fawcett never made it to California, but lived in the overhang or cave for the next four years. Somewhere along the line his partners seemed to have dropped from sight.

The orphaned shepherd boy who lived in a cave eventually came to own some 60,000 acres of ranch land in the Dolan Falls area, and established one of the first large sheep and goat operations in a region that became known for this type of ranching.

Like Columbus arriving in the New World, the effects of E.K. Fawcett and hundreds of other sheep and goat ranchers coming to Southwest Texas can be debated pro and con. Historically it's beside the point; they came and forever changed the landscape.

Long before Fawcett and his neighbors the Bakers, the Whiteheads and others settled up and down the Devils River, Native Americans had been hunting and gathering in these canyons for about 12,000 years. By 1680 Apaches took control of the region, only to be succeeded by Comanches and Kiowas raiding south from bases along the Red River. Kickapoo Indians completed the pincer movement with raids north from Mexico. Little wonder European settlers

did not thoroughly explore or map the Devils River area until the mid-19th century. Confrontations between settlers and Indians continued well into the late 19th century, with one such battle taking place in 1857 near Yellow Bluff close to Dolan Springs. Here the American Second Cavalry skirmished with Comanches.

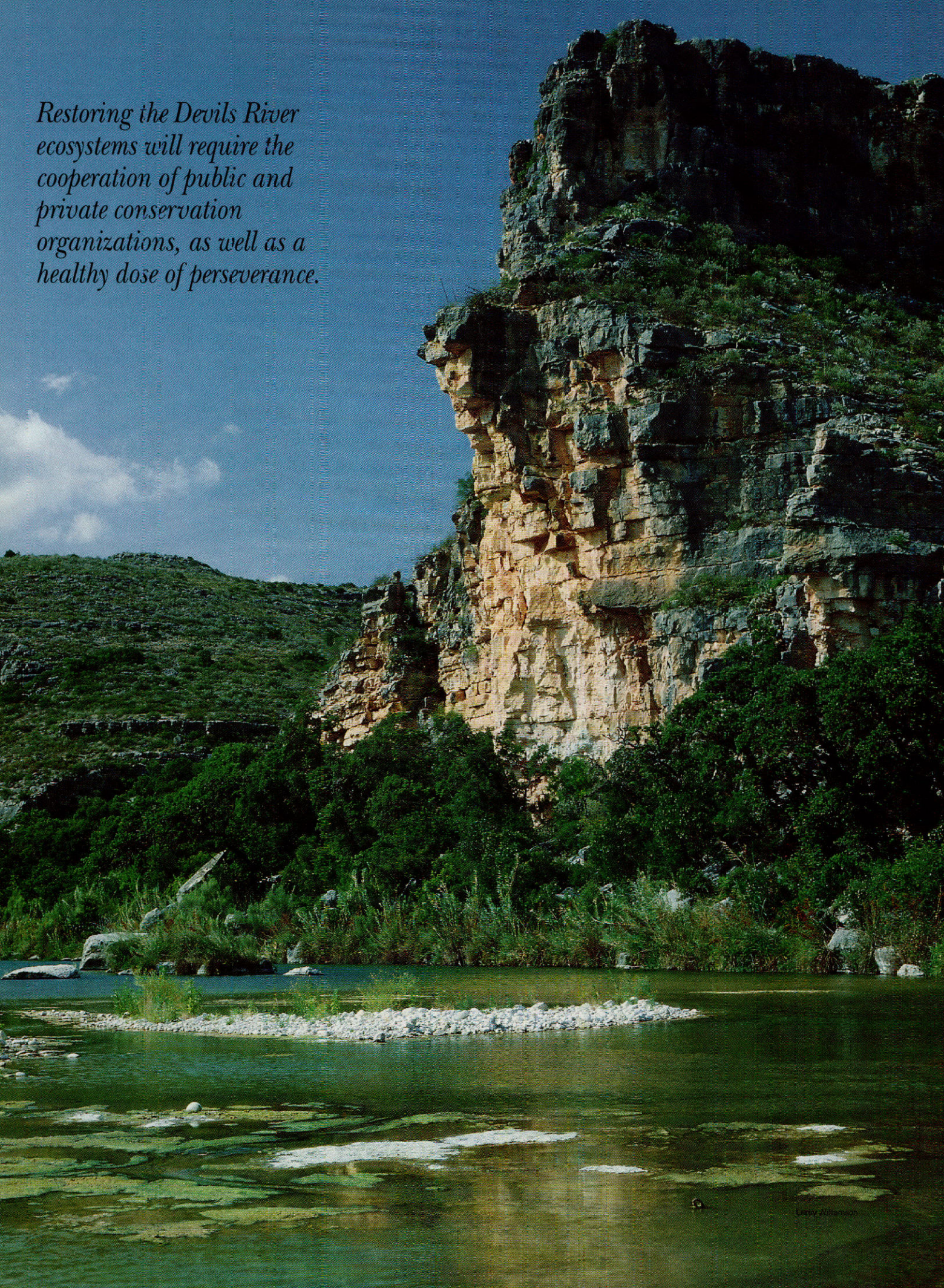
By 1881, the Southern Pacific opened the area to settlement, providing the means for bring-



Leroy Williamson

*E.K. Fawcett spent his first four years at Devils River in a cave (left). His name and other graffiti still are visible on the cave's walls. From here, Fawcett went on to establish one of the first large ranching operations in the region. Yellow Bluff (right) on Dolan Creek is on land still privately held. Springs and pictographs are found along its base.*

*Restoring the Devils River  
ecosystems will require the  
cooperation of public and  
private conservation  
organizations, as well as a  
healthy dose of perseverance.*





Leroy Williamson

waterfall area was a prime target for exploitation. French earlier had purchased the land from the Fawcett family.

Devils River/Dolan Falls stands at the crossroads of three major ecological areas, with elements converging from

*Numerous springs (left) flow into the Devils River from along the Parks and Wildlife side. Across the river is Conservancy-held land. Dolan Creek flows into the Devils River a few hundred yards above where Dolan Falls spans the river (below).*

ing in goods and getting the ranchers' products to market. This set the stage for E.K. Fawcett and other pioneer ranching families.

Fawcett moved out of his cave, built a log cabin, then a house and began accumulating land. In 1902 he married Frances Baker, who hailed from nearby Baker's Crossing. Together they built a thriving ranch and family, descendants of whom still live in the Del Rio and Devils River area.

One of the descendant families, the Finegans, operated their spread, known as the Dolan Creek Ranch, for many

years until the Texas Parks and Wildlife Department bought it and part of the Whitehead and Fawcett Ranch in August 1988, totaling 20,500 acres. What became known as the Devils River State Natural Area is a flat tableland cut by deep canyons feeding water that eventually reaches the Devils River.

As much as 75 percent of the water in the Devils River at Dolan Falls, however, comes from springs named Dolan, Pecan, José Maria and others in the vicinity. During the droughts of the 1950s, Dolan springs still flowed when others failed above what is now the state natural area.

This constant water supply was a major reason for prehistoric settlement in the area, and artifacts of that presence are scattered about the state natural area. The Parks and Wildlife Department acquired the land in large part because of the water, the archeological sites and habitat for species such as the black-capped vireo.

In November 1991, The Nature Conservancy of Texas purchased 18,500 acres that included E.K.'s cave and Dolan Falls, touted as the largest waterfall in Texas that spans the entire width of a river. At the time TNC bought its property from L.R. French, Jr. of Midland, real estate developers were closing in and the scenic



Glen Mills

*The endangered black-capped vireo finds nesting habitat in the shin oak and other brush that grows in the Devils River/Dolan Creek area. Parks and Wildlife has mapped many of the birds' nesting sites.*





## DEVILS RIVER

the Chihuahuan Desert to the west, the Edwards Plateau of Central Texas and the Tamaulipan Brushlands of northern Mexico.

Although the two pieces of property are the same ecologically, they are owned and administered by two separate entities—the Texas Parks and Wildlife Department owns the Devils River State Natural Area and The Nature Conservancy of Texas owns Dolan Falls Preserve. The two groups, one public and one private, control some 40,000 acres.

Together they share a fence line, Devils River frontage and a common vision of protection and preservation for this unique resource.

According to TNC executive director David Braun, their Dolan Falls Preserve is part of the Hill Country conservation initiative, one of the so-called “Last Great Places” TNC has identified for preservation. “Once our resident staff is in place,” said Braun, “we will start an inventory of the Dolan Falls birds, fish and plants. Our goal is

to understand and manage for the most natural ecosystem we can. There is much to be learned about Dolan Falls, and we have to start with basic research to build up baseline information.”

Braun emphasized that TNC is not throwing open the Dolan Falls gates to the general public. “We don’t have staff or other resources for a general visitors’ program,” he said. “TNC will conduct very controlled numbers of field trips and education/research programs.”

Devils River State Natural Area is

Leroy Williamson



open only on weekends to no more than 10 people at a time, also because of limited staff. The state has two employees to manage the 20,500-acre spread, or one staffer to about 10,250 acres.

Park Superintendent Bill Armstrong lives in and administers the natural area from the old Finegan family ranch house. "We require that all our visitors 17 years and older have a Texas Conservation Passport," said Armstrong. "We can offer primitive camping, use of a bunkhouse and tours of the area by reservation."

Armstrong was quick to point out that they cannot allow access to the Devils River for fishing. "Many people who used to visit the ranch to camp and fish are disappointed to find a locked gate on the road to the river," he said. "The old river campsite is in the middle



Leroy Williamson



Wyman Meinzer



Leroy Williamson

*Rio Grande turkeys fly upslope (top) or the Devils River Area. White-tailed deer (left) have relocated toward traditional water supplies after many of the natural area's windmills stopped pumping. Desert willow (above) commonly blooms during the summer.*

of a major archeological site, spring-time nesting habitat for endangered black-capped vireo and delicate spring ecosystems with threatened fish species (Devils River minnow and Conchos pupfish). With just two people, we can't escort folks to the river to fish and make sure they don't trash out the place or trespass on private property."

Park rules do allow, however, for access to the Devils River by reservation only, for groups with at least four canoes. This has caused concern among

some of the landowners up and down the river from the natural area.

That's not all that worries landowners about the Devils River area and Dolan Falls Preserve. Jim Finegan, son of the former ranch owner, continues to live on the natural area and is the other state staff member. Finegan is working to allay fears about predators, canoeist-trespassers and other threats both real and imagined.

"Right now things are fairly calm,"

said Finegan, "since there are not a lot of people coming out. But we can't have neighbors calling and screaming at us about folks trespassing from the park. Since this is a natural area, some neighboring landowners are worried about our harboring lions, eagles and even restocking the area with wolves.

"In the years I've lived out here, I have never so much as heard a coyote;

## DEVILS RIVER

there always have been some bobcats about and possibly a mountain lion. The area is part of a native route travelled by lions and I'm sure they pass through on a regular basis.

"As far as trespass by canoeists is concerned, fewer than 20 ranches border the river from its source to Lake Amistad, and it's a problem to those streamside landowners."

H.K. Fawcett, E.K.'s grandson who now lives in nearby Del Rio, echoes this perception by his former neighbors. "Landowners are taking a wait-and-see attitude," said Fawcett. "They are worried about predators on both bodies of land, and about Parks and Wildlife allowing access to the river for canoeists."

"Character of ownership has changed from the Fawcetts and Finegans to their

heirs," said H.K. "Many don't live on the land any longer but have residences in Del Rio. They maintain old ranch houses as weekend or summer residences. Some have 40,000 to 50,000 acres but little or no daily contact with the land. They don't see lions or eagles if they are not out working the land regularly."

"I think most predators get a bum rap when it comes to killing livestock," continued H.K. "They probably don't do as much damage as most people think. There has been very little research, and much emotionalism on both sides."

According to Fawcett, ownership is not the only thing that has changed on the Devils River/Dolan Falls area. "I've heard it told that my grandfather could ride horseback along the Devils River

and never get out of the shade of live oaks, sycamores and pecan trees," he said. Grass grew so high that sheep would balk at walking through it, and shepherders would drag a log between two horses to flatten the grass. Dolan Creek was a stream that meandered through grassy banks, rather than the scoured, flood-ravaged cobble of today.

Most of the trees are gone now, washed away in the titanic floods of the 1930s and 1950s. According to David Riskind, the Texas Parks and Wildlife Department's Natural Resources Program director, grazing and other land-use practices in the watershed that stripped away grass could have exacerbated the effects of these catastrophic

*(Continued on page 11)*



*Dolan Creek once meandered through grassy banks shaded by oaks, pecans and sycamores. Grazing destroyed most of the grass, and heavy rain raced unchecked into the creek, sweeping away the trees. Yellow Bluff stands in the upper portion of the photo.*

Robert W. Parvin

# Devils River State Natural Area

**Entrance Fees:** A \$25 Conservation Passport is required of everyone 17 years old and older for access to the park. Passports are available at Devils River, other Texas Parks and Wildlife Department facilities, Whole Earth Provision Company in Austin, Dallas and Houston and REI in Austin.

**Facilities:** *Bunkhouse* with five rooms and two single bunks per room; two restrooms with showers. *Dining hall* with large kitchen, two sinks, one refrigerator, one reach-in cooler, gas stove and electric range. Dining hall also has large conference and dining areas. *Tent camping area* is a two-acre area for primitive camping. Visitors must bring their own drinking water, restroom facilities are very limited, all trash must be carried from the park, ground fires are limited to the fire ring behind the dining hall.

**Fees:** Bunkhouse use fee is \$70 per night for the first one to eight people; \$5 per person thereafter; maximum of 10 people. Dining hall fee is \$65 per day. Tent camping area fee is \$4 per night per four people.

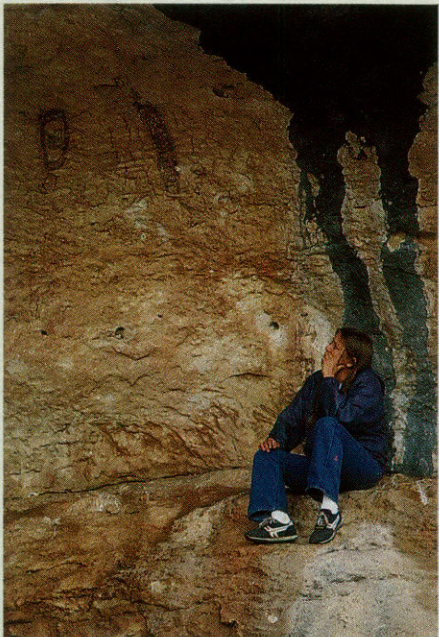
**What to do:** Visiting archaeological sites and canyon tour of the Devils River area and springs is on a preapproved basis. The tours will be conducted by the park staff, usually on Saturdays. Some hiking is permitted in certain areas of the park, although many areas will be off limits to protect springtime nesting habits of the endangered black-capped vireo.

As a warning to anyone visiting Devils River, it gets very hot in this part of Texas during the summer, so dress and prepare accordingly. Also, it is a natural area, with no picnic tables, concessions or other amenities found in traditional state parks. Come prepared with food,

water and any supplies you will need for a stay in rugged Southwest Texas. A general store is located in Loma Alta, a 25-mile drive from the park headquarters over a dirt road. Del Rio is 65 miles from the park. The park is accessible by passenger car, but sudden rains can wash out the roads overnight.

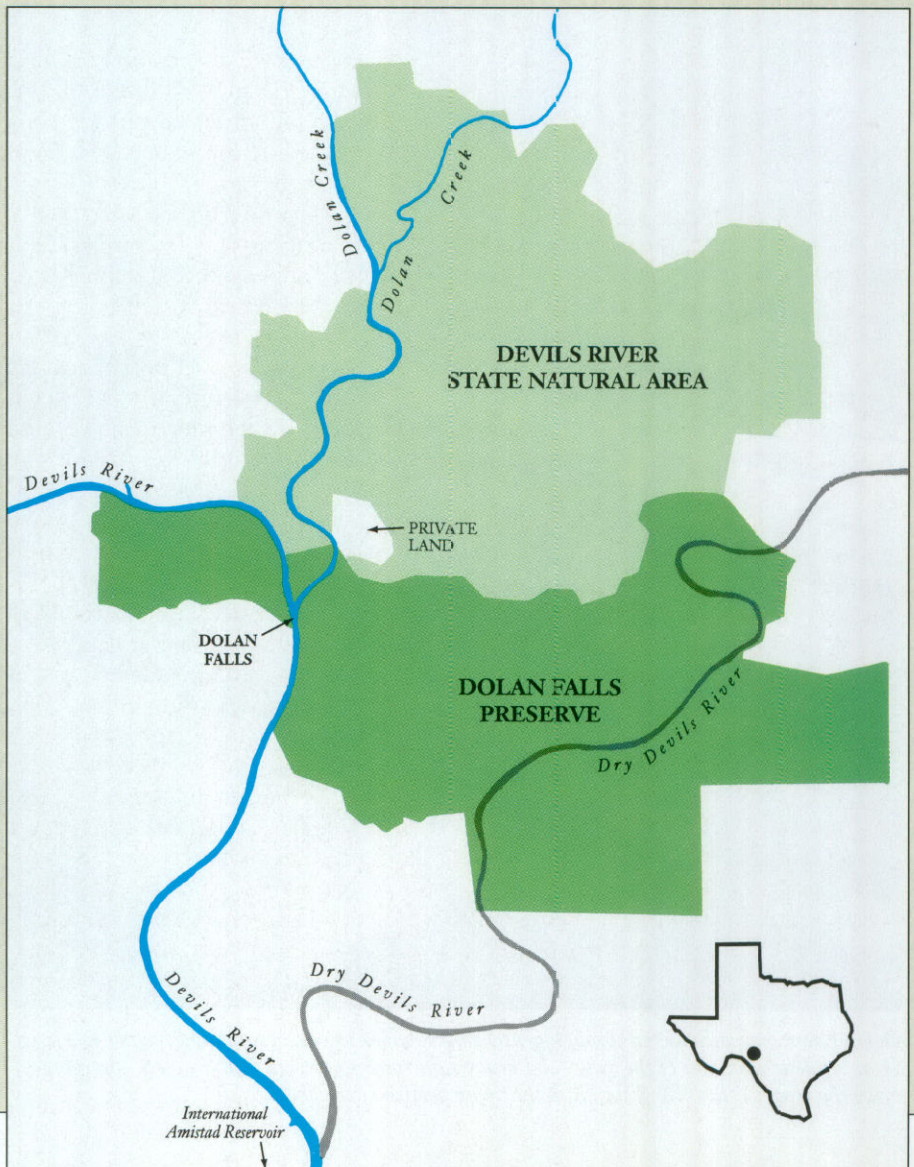
Contact Devils River State Natural Area, FCR-1, Box 513, Del Rio, Texas 78840; 512-395-2133.

Dolan Falls Preserve is owned by The Nature Conservancy of Texas, the state chapter of The Nature Conservancy, an international nonprofit organization. Visitation to Dolan Falls is limited to members of the Conservancy. For membership information, contact the Conservancy at P.O. Box 1440, San Antonio, Texas 78295-1440, 210-224-8774.



Robert W. Parvin

*Dr. Solveig Turpin of the Texas Archeological Society ponders ancient pictographs found in some of the Devils River overhangs. Dark streaks of manganese are leaching down the overhangs and covering much of the art.*





Leroy Williamson

*Wood ducks are some of the many migratory waterfowl that stop in the Devils River area during the winter. These woodies are feeding and loafing at José Maria Springs, which feeds into Dolan Creek.*

*(Continued from page 9)*

floods. But these levels of flooding were so huge that grass-covered hillsides could not have slowed the run-off enough to save the trees.

“Floods happen in natural systems,” said Riskind. “But because of contemporary man’s presence, there is minimal chance for the landscape to heal. We are now into geological time scales for the land to heal and rejuvenate itself, which underscores the importance of what habitat remains in the Devils River/Dolan Falls area.”

There still are large arbors along the Devils River and Dolan Creek. Some provide roosting sites for Rio Grande turkeys; others are archeological sites. Water, shade and game have been attracting man to the same areas for thousands of years.

“This remnant habitat is like a string of pearls,” said Riskind, “similar to the bits of habitat preserved in the Big Thicket of East Texas.

“Habitat is fragmented all over the state, not just at Devils River. I think it’s time we started looking at habitat from a landscape perspective, a broader view. Things might be going well on a local level, at a specific ranch, but from a regional perspective it might be entirely different.”

Riskind would like to see a manage-

ment strategy that encompasses both TNC and Parks and Wildlife land. “We (Parks and Wildlife) have done some work at Devils River State Natural Area that might be applicable to TNC’s Dolan Falls property,” he said. “We’ve mapped nesting sites for birds such as the black-capped vireo, and in 1989 the Texas Archeological Society conducted a field school on the natural area.”

According to field school participants Dr. Solveig Turpin and Michael Davis, the TAS identified more than 239 historic and prehistoric sites on the state land. The Devils River/Dolan Creek region lies on the border of two of Texas’s largest archaeological provinces, the Trans-Pecos and Central Texas. There is no distinct boundary between the two provinces, but generally the archaeological sites of Central Texas are characterized by middens of burned rock. They vary in size, some more than an acre in area and six feet deep. The cracked and burned limestone usually is mixed with charcoal and other debris built up over the millennia.

The Trans-Pecos sites are characterized by rockshelters, many adorned with pictographs and petroglyphs. Some of the more famous shelters are found in nearby Seminole Canyon State Park on the Pecos River arm of Lake Amistad.

A chronology of man’s occupation of the Devils River/Dolan Falls region

stretches back 12,000 years, with little known about the earliest inhabitants. Those Paleo-Indians seem to have depended on now-extinct forms of large animals such as mammoths or the huge bison, which they would stampede over cliffs. At one such site, the Bonfire Shelter east of Langtry, some 120 of the ancient bison were driven over a bluff and then butchered below. Carbon-14 dating puts the jumps at about 8,000 B.C.

Also at Bonfire Shelter there are remains of an extinct horse, bison, elephant and camel.

After the bison disappeared, these aboriginal Americans wandered regularly from valley to upland and back again, in search of plants and small animals. For more than 8,000 years the culture and technology of these people changed very little. The projectile points they used to tip darts and spears changed, but only superficially. For 80 centuries the people hunted the same animals with the same weapons and relied on the same plants for food.

When the Spanish arrived, they brought metal, guns, disease, slavery and an end to this hunter/gatherer way of life. All that remains is what attracted these early humans to the area in the first place—water.

In his introduction to the University of Texas’s Natural Area Survey of the Devils River, Griffin Smith, Jr., writes: “It is the water that one remembers longest: the river and sky against the bleached limestone, blue against white, a desert resonance of the Aegean . . . . The Devils River is a Hill Country river in a Trans-Pecos setting, serene in its accustomed moods but merciless when the floods come.”

The Devils River is claimed to be the last unpolluted river in Texas. The purity of its water is the baseline against



Robert W. Parvin

*In 1989 the Texas Archeological Society conducted a field school at Devils River State Natural Area (above). TAS volunteers identified more than 239 such archeological sites. Dolar Falls (below) spans the width of the Devils River. A remnant of the once-numerous live oaks still shades the west bank of the river at the falls.*

Robert W. Parvin





Robert W. Parviri

*TAS workers enter Fawcett's Cave on the state natural area. The cave drops 110 feet below the surface.*

Springs, where they would be found naturally, had no wells been drilled.

"My great-grandfather starting drilling wells around the turn of the century," said Finegan. "Eventually we had a water trough to every square mile. Our deer herd was an animal to about 18 to 22 acres. Now I estimate we have one deer to every 30-plus acres."

The Finegans derived some 50 percent of their income from whitetail and exotic animal hunting when they ranched the land. Texas Parks and Wildlife has held hunts for exotics at Devils River for the past two years. According to Riskind, one of the P&W's top priorities is to remove exotics such as aoudad sheep and axis deer from the Devils River property, as part of managing and restoring it to a natural area.

"We have to determine our objectives with land such as Devils River," said Riskind. "Are we raising wildlife for harvest or restoring and maintaining a natural area and allowing wildlife to seek water and food without our interference?"

This is echoed by John Karges of TNC. Karges is the Conservancy's land steward for West Texas, and Dolan Falls is part of his responsibility.

"Artificial distribution of water—

wells—probably is artificial distribution of wildlife," said Karges. "Additionally, the more wells we have going on Dolan Falls land the higher the likelihood we deplete our ground water."

"We (the P&W) really don't need to get a product out of the land, be it fiber or animals," added Riskind. "Our product is landscape restoration, interpretation and education. But just because we are not extracting something from the land doesn't mean we are not handling the land well and getting something of value from it. It's hard to put a price on a good ecosystem, especially if you think of land values in terms of what you take from it or grow on it."

Devils River/Dolan Falls might be a crossroads for more than just ecosystems. It could be a crossroads in the development of a land management philosophy based on a broader view of things covering a longer span of time than the lives of those who are formulating policy and setting it in motion. Is the value of land to be measured by traditional standards of the tangible wealth it produces for its owners of the moment? Or is its value intrinsic, a function of how well it's cared for and how it is healed and restored from one owner to the next? ★

which the quality of other rivers is judged. Except for the rains of late spring and early fall, the water of the Devils River comes from far underground. In spots along the Devils on the Parks and Wildlife side, it gushes out of limestone cliffs as though some errant children had managed to open a fire hydrant and were hiding in the thick river cane, just waiting for us to move on before they continue play.

But as Smith writes: "... the immense outpouring of cool water is powerless, tantalizingly powerless, to rescue the ridges, slopes and flats from semidesert grassland."

And things are getting drier on the uplands of both pieces of property. There are windmills built by the Finegans and Fawcetts, but since P&W/TNC acquired the land most of the wells are not pumping and wildlife have relocated in response. According to Finegan, white-tailed deer and exotic species of mammals in the Devils River State Natural Area are starting to concentrate toward the river and other sources of water such as José Maria



Leroy Williamson

*Morning sun illuminates the bluffs along Dolan Creek as a new day begins for the Devils River area.*

# Desert Smallmouths

Article and Photos by Buddy Gough

The law west of the Pecos wasn't so great on the other side of the river either.

The region bounded by the Devils and Pecos Rivers and the Rio Grande in what is now Val Verde County has long been a land of contention between horse soldiers and Apaches, outlaws and Texas Rangers, settlers and an unforgiving environment.

This tough country was, in fact, one of the last areas in Texas where the West was won by some pretty tough

*bombres* in the 1880s.

That it was considered worth fighting and dying for begs the question, why?

The answer is water, the mother lode of *aqua vitae* flowing down those river channels and seeping from springs in adjacent canyons.

Never mind that the rivers were as wild and unruly as the people who laid claim to them. As if mocking mere men, the Devils and Pecos Rivers would all too frequently explode with awesome



flash floods and smash all in their paths. The Devils River didn't get its name for nothing.

For would-be river runners, the point is that things haven't changed much in the past 100 years, either with the rivers or the people who claim them. Yet, these

*Jim Kuper of San Antonio (left) caught this beautiful 29-inch smallmouth bass on the final day of a four-day boat trip on the Devils River in West Texas. Above is a typical whitewater stretch on the history-rich stream.*



*bronzebacks make rigorous Devils River float trip worthwhile*



waters retain the power to mesmerize, to tempt beyond resistance.

I was hooked with one look into the translucent depths of a Devils River pool during a visit to the Devils River State Natural Area in spring 1991. Standing at river's edge in the new state park was like gazing into a sorcerer's crystal ball. Hanging suspended in the emerald-tinged water were no fewer than eight chunky smallmouth bass, and probably a half-dozen sunfish of a half-pound or more. Into this spectacle swam a four- or five-pound channel catfish. It lazed along on the surface, nosing among the rocks within a few feet of where I stood in rapt attention.

From this captivating sight, my eyes were drawn to movement on the bottom of the pool. A flathead catfish a yard long was coming cross current to hide in the shadows of rock beneath my feet.

Dazzled by a vision of fabulous fishing, I saw that my fate and the Devils River were intertwined. Jim Kuper of San Antonio and fellow stream-fishing fanatic wasn't hard to recruit.

The immediate task was planning and launching a trip down one of Texas's most inaccessible rivers, one marked with controversy and rife with tales of unpleasant confrontations between canoeists and riverside landowners. From its headwaters in northern Val Verde

County to its confluence with Amistad Lake, the Devils River flows almost entirely through private ranches where some landowners claim property rights to the entire riverbed. A Texas Attorney General's opinion to the contrary in 1973 hasn't made much difference. One of the milder stories of unfriendly treatment of canoeists and trespassers goes like this:

A group of paddlers had settled in for the night at a riverside campsite. A landowner approached and asked, "Do you fellows love this river?" They gave enthusiastic assurances of their love. "Then get back on it now," the landowner demanded, forcing the canoeists back



*Claimed to be the cleanest Texas river, the Devils offers a superb blend of scenic beauty and quality fishing for those willing to endure the rigors of an extended float trip.*

on the river in the dark of night.

Not surprisingly, no established canoe outfitters exist on the river. Making a trip is strictly a do-it-yourself, go-at-your-own-risk thriller.

Preparations started with diligent research that included obtaining county and topographical maps, and contacting the National Park Service in Del Rio for general information on river miles and access points. (A detailed canoeing guide to the Devils River in the new 1992 edition of "Rivers and Rapids" guide would have saved a lot of time and effort.)

We learned generally that the standard run is from a private riverside campground at Baker's Crossing to the Rough Canyon Recreation Area where the river meets Amistad—a distance of nearly 48 miles. From Baker's Crossing, the major landmarks along the river include a low-water crossing at the nine-mile mark, Dolan Falls at 16 miles, another low-water crossing at 25 miles and the Weir gauging station at 34 miles. Below the Weir dam the river starts to be influenced by Amistad. The last eight to 10 miles to Rough Canyon feature wide, deep water and fierce headwinds that can defeat the hardest canoeists.

Another priority in our preparations was to call the International Boundary and Water Commission for water flow levels. The flow at the time we called was an above-average 343 cfs (cubic feet per second) at the Weir. A flow of 250 cfs is considered low, and canoeing below that level requires a lot of canoe dragging.

We were especially warned to beware of flash floods, because the river

flow can increase quickly and fluctuate wildly. This past spring, for example, the peak flow reached a strong 2,270 cfs, but that's a drop in the bucket compared to the all-time record. On September 18, 1974, the flow at the Weir fluctuated between an astounding and decidedly devilish 123,000 and 250,000 cfs!

Before setting off, we also talked to a half-dozen people who had made trips on the river. Most helpful were Dave Ross, an Amistad catfishing guide who has made many trips on the river, and Mike Morris, the district game warden supervisor for the Texas Parks and Wildlife Department.

We were cautioned about fallen trees, hidden boulders and surprise waterfalls in whitewater runs up to Class III. We were told to expect to drag the canoe at times and to fight headwinds in long, wide pools. Ross said Dolan Falls was a must-portage and Morris warned of nasty rapids about three miles below the falls.

To help us avoid the open, windy stretch at the end of the run, Ross arranged for a shuttle and pick up at the 25-mile crossing. (This access now is closed, but Rough Canyon Marina is providing shuttle and pickup services, and the state park now is accommodating groups of at least four canoes.)

Both men noted the potential for landowner conflict, and advised us to camp on islands or as close to the river bed as possible, between the vegetation line and the water's edge, and far from any signs of habitation. But both also spoke of fabulous fishing—smallmouth bass up to five pounds, largemouths to

seven pounds, sunfish of a pound or more, hordes of channel catfish and huge flatheads. That conquered all concerns, and we launched our adventure.

### DAY ONE:

The snorting of deer and the pounding of their hooves woke me from a shallow slumber on the banks of the Devils River.

The deer apparently had come down to the river's edge for a predawn drink and, much to their surprise, had stumbled into the side of our tent. The disturbance momentarily silenced the rap songs of frogs that had begun their unceasing serenade at sundown hours earlier.

Peering into the darkness, having heeded the warning to hug the riverbed, I intently eyed the water's edge to see if there had been any ominous rise from unseen rain upstream. The water had come quite close during the night. Falling flat on your face in the door of the tent would have risked drowning.

The previous evening Kuper and I had launched at Baker's Crossing Campground, the site of the original homestead of David Shepherd Baker, who settled on the river in 1883. From a 100-year-old, two-story home overlooking a grove of huge live oaks and pecan trees, Mary Baker Hughey presides over the gateway to the river for all (smart) downstream travelers. After some last-minute advice from Hughey about respecting the unspoiled nature of the river and landowners' rights, we had set out intent on moving downriver an hour or two before camping, allowing the next four days for taking the river at a leisurely pace.

Experienced river runners with good whitewater equipment easily can make 15 river miles a day on the Devils, but we had neither the skill nor the equipment. Our square-stern fiberglass canoe with three keels along the bottom had the buoyancy and maneuverability of a locomotive on rails, but with a great deal of caution and pushing and pulling and portaging it earlier had carried us down the wild and rugged Pecos River.

Nevertheless, from hard lessons learned on the Pecos, we were determined to travel as lightly as prudently possible. Our water and ice supply were one and the same, consisting of gallon jugs of frozen water. Our staples were

mostly dry soup mixes, noodles, rice, flour and a few vegetables. Our clothing was lightweight cotton or nylon blends that would dry quickly after inevitable wetting.

We counted our neoprene wading shoes with thick rubber soles as key equipment, having found that standard canvas or leather tennis shoes wouldn't hold up to the wear and tear of rock walking and frequent immersion. Indeed, on the Devils we found that the alkaline quality of the water made the

surface of boulders and bedrock extremely abrasive—good for sure-footed rock hopping, but tough on shoes.

Our fishing tackle was ultralight spinning and our lures mostly were small jigs and spinners, with only a modest supply of full-sized bass lures, such as quarter-ounce jigs, tube worms, grubs, plastic worms and crankbaits. Although we had been told of large bass in the river, we figured them for only occasional catches, with most of the fish running to 10 inches, as is the case on most Hill Country rivers.

This was the first major miscalculation of the trip.

In fact, the river began to surprise us from the start. Whereas the Pecos flows mostly between narrow canyon walls, the Devils typically has a wide basin backed by high, flat-topped hills rising to 1,800 feet, arid and rocky on top but greening considerably on the lower slopes. The size and abundance of large live oaks, pecans and sycamores lining many stretches of the channel was unexpected, as was the wealth of weed and moss beds in the water.

Also a surprise was the width of the river and the length of the pools, as wide as 50 yards and as long as a half-mile even in the upper stretches. The river flow was shades of green, ranging from light lime in the shallows to a deep emerald in the deep holes, yet the water was clear enough to see the bottom at eight feet.

Most of the rapids encountered the first day were shallow, boulder-strewn obstacle courses frequently ending in small but sharp drops or waterfalls. We floated a few and dragged through some. By evening, scouting the rapids became increasingly necessary. One long, curving whitewater run had two obvious and inviting channels, right and left, but each ended in abrupt drops at canoe-crunching boulders.

All the while, the fishing continued to exceed our expectations. Two hours into the first day, it was obvious we were on a catch-and-release rate of 40 to 50 bass a day each. The majority of them were smallmouths most frequently found at the upper and lower ends of the pools and in shaded areas along narrow channels. In weedy slack-water areas, largemouth bass occasionally came calling. The action encouraged us to experiment with the larger lures,

which turned out to be an eye-opening endeavor.

Kuper soon caught a big-headed, four-pound largemouth on a crankbait, but more impressive was a two-pound smallmouth that fell for a big tube worm, which would turn out to be our best bait. The bigger smallmouths definitely preferred a fast-sinking lure fished slowly near the bottom. Although their strikes were almost imperceptible, the smallmouths were ferocious in battle. They jumped and thrashed the surface and dove deep for weed beds and the shelter of crevices.

We thought the two-pound smallmouth worth photographing, but we hadn't seen anything yet.

The highlight of the day was a deep, swimming-pool-sized hole in the middle of a long stretch of flat, shallow table rock. It yielded nearly a dozen 14-inch-plus smallmouths, the largest a thick-shouldered three-pounder.

The pool also produced channel catfish, which we had seen in amazing numbers since we started down the river. The cats, many of them three or four pounds, were spawning and were seen roaming in pairs about every 50 yards or so or gathered in schools in the deeper holes.

The problem with hooking and boating either the larger bass or the occasional catfish was line that simply was too light to withstand the inevitable abrasion of the rocks. Ten-pound-test line would have been better.

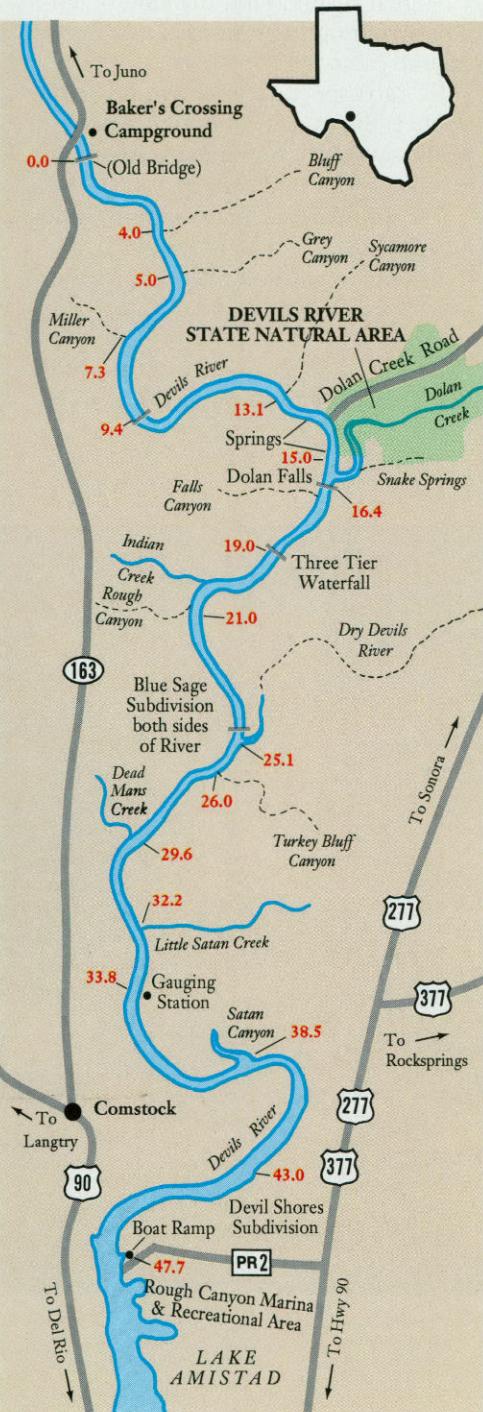
In late afternoon we reached our first major landmark, the nine-mile crossing. We pulled across the six-foot drop and entered what was to be the most scenic stretch of the river. Limestone cliffs up to 400 feet tall towered over the shoreline and the water flowed over bedrock fluted with deep channels.

We camped on a beautiful but tight spot between a cliff and rushing whitewater. As we fished nearby, a small gray fox visited the camp to sniff our tent and canoe, emphasizing the remoteness of our location.

**DAY TWO:**

We began what was to be the best fishing day of the trip with a new kind of obstacle.

We entered a long, wide pool that was more like a small lake filled with weedy growth and surrounded by a wall



of river cane. Many small, narrow channels emptied from this pool. Finding the right one was like exploring a maze on foot. Again, we found ourselves wading the canoe through more rapids than we ran, but the river scenery was consistently the most impressive of the trip. Even so, the scenery had a hard time competing with the quality of fishing action, which was all of the above and then some.

Lazing from pool to pool, we caught and released maybe three dozen smallmouths between one and three pounds and too many smaller fish to recall. An unforgettable incident was drifting directly over a pair of enormous flathead catfish, their heads appearing a foot wide in the clear water. Before the day was out, we saw several more of similar size.

At day's end, we camped on a tiny rock shelf only inches above water level, and not far from Dolan Falls. With the roar of the falls sounding in the distance, we enjoyed especially memorable fishing action. Kuper unlimbered his fly rod and caught five 14-inch-plus smallmouths in a row.

### DAY THREE:

On the third day, it was as if the river came to collect for its generosity, for it was surely the devil to pay. Gusty winds rocked our tent during the night and dawn broke with low cloud cover and a thick mist shrouding the hills.

The first significant feature of the day was passing a great spring at the Devils River State Natural Area. It was all of 100 yards long and gushed from the base of a cliff to swell the flow of the river.

Next stop was Dolan Falls, where a great rush of water spills over a 12- to 13-foot drop. As one of the largest natural falls in Texas, Dolan Falls is regarded as the most scenic spot along the Devils. It didn't disappoint. However, the falls are a MUST portage, except perhaps for Evel Knievel. We worked the left side of the channel and got through fairly easily with a 40-yard drag.

Below Dolan Falls, the flow of the river is roughly doubled. The average drop of the Devils River varies from seven to 11 feet per mile, but increased flow downstream from the falls made a

big difference. The rapids became deeper, stronger and tougher. We began to encounter haystacks or standing waves high enough to bury the bow.

Then, about three miles downstream of the fall we met a rapid we named the Devil's Hook.

Try to picture this. The channel opened wide, deep and smooth on the right side, almost beckoning, before twisting sharply into a blind right-hand turn down a steep, bumpy run to a sheer rock face. Then the narrow channel swept abruptly into a hairpin curve to the left, finally doubling back to the right to drop over three back-to-back waterfalls . . . and a canoe-killing boulder for a parting shot.

We dragged through on the left side of the river channel.

We began to fight headwinds in pools up to a mile long. We also discovered that we were slowly sinking, the constant rub of rock having worn a hole in the canoe. We pushed onward, relying on the first rule of seamanship—as long as the water level outside the boat doesn't match the inside, you are still under-way. All in all, we suffered through

the hardest work of the trip, but the fishing and the scenery remained great all day.

### DAY FOUR:

More of the same.

By early afternoon, we came in sight of the first cabins of the Blue Sage subdivision that stretches along four or five miles of the river above and below the 26-mile crossing. We figured the best was behind us, but for Kuper the best came 200 yards from the take out. Shooting through a short, deep pool, he cast into the swirling current and caught a 20-inch smallmouth, the kind of trophy smallmouth enthusiasts fish a lifetime to catch.

In retrospect, Kuper would pronounce the run a "piece of cake." I would say it had its moments of toil and trouble, agony and ecstasy.

We would agree on two points—the Devils River is wild and beautiful, and its fishing was the best river action we've ever experienced. ★

*Buddy Gough has been outdoor editor of the San Antonio Light for the past eight years.*



# Keep Off the Grass

by Buddy Gough

Whenever an article on river recreation appears anywhere in Texas, there is one sure response—a letter from Arthur Nagel.

A kindly, soft-spoken gentleman living near the banks of the Guadalupe River near Boerne, Nagel is the strong voice (and president) of the Riverside and Landowners Protection Coalition, Inc.

Nagel was the leading organizer of the Coalition that was formed five years ago over concern about the crush of canoeists, rafters and tubers on the Guadalupe and other rivers and their effect on private shoreline property.

Today, the Coalition is approaching 600 members with properties on 58 Texas rivers from the Canadian to the Rio Grande.

“Once we organized, we found that every river across the state has the same problems as the Guadalupe: recreationists leaving the river and getting on private property to explore, to cook, to use it as a trash disposal area and a restroom,” he said.

He insists that the aim of the Coalition is not to stop recreation on rivers, but “to educate river recreationists (state agencies, legislators and outdoor writers) that people can enjoy the rivers without getting on the adjacent private property.” All involved parties have dangled well got the message by now. Put me down for a half-dozen instructive missives.

With respect to the Devils

River, Nagel has heard of additional problems from the vigilant and vocal landowners along its banks.

“The Devils River has had people leave the river and explore the canyons and climb the cliffs to the rock shelters of the ancient Indians. There have been examples of pilferage and defacement of artifacts. There was even a case of someone setting up a hidden hunting camp in one of the canyons,” he said.

The Devils River also brings a sharper focus on the issue of trespass because it’s a river where canoeists often stay more than one day, camping out overnight. “That just increases the problems of trespass, trash and fires,” Nagel said.

He has no problem with canoeists camping on islands in the stream, but the bank is a contentious matter. For example, the canoeists’ standby rule of camping between a river’s permanent vegetation line and the water’s edge doesn’t quite cut it for Nagel.

Nagel, who repeatedly has reviewed laws and court cases concerning public vs. private property issues on Texas rivers, rests his case on the term “gradient boundary.”

As the dividing line between public and private property, gradient boundary by the court’s definition is “a line inside the fast (set) banks of a river that parallels the water’s surface and is relatively close to the water in normal flow.” Nagel points out the problem with this term and line is that the line is not drawn on the ground and fencing cannot be placed on it.

That definition suggests that at normal, and certainly above normal flows, it is illegal to set foot on the bank of a river above that line.

Keep in mind, too, that Nagel is talking about “navigable rivers” with publicly owned riverbeds.

This also is a matter of contention, particularly on the Devils River.

According to a 1973 opinion from the Texas General Land Office, the

Devils River from Baker’s Crossing to Amistad Lake is a navigable stream. However, two landowners immediately below Baker’s Crossing assert that the river at their property isn’t wide enough to be designated as a navigable stream. So, they contend, the bed is private property.

So we have problems of all kinds on Texas rivers.

Nagel recognizes that some of the trespass, and trash troubles are created by local river users and not the normally respectful and conscientious river recreationists out of metropolitan areas, but some landowners don’t give that full consideration. “Their first thought is that some dirty canoeist did it. I hate to see a few people mess up the whole river recreation system for everybody, and that’s what’s happening in a lot of instances,” he said.

Does he have any solutions?

As for the larger issues of navigable waters and the boundary line between public and private property, Nagel looks to the state for help.

“We want to get the General Land Office and (Texas) attorney general to take another look at the (designated) navigable rivers in Texas available for recreation. We sorely need an update that can be nailed to every flagpole in the state,” he said.

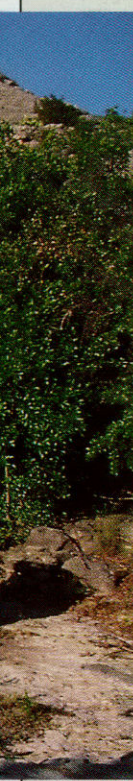
He would also like a better definition and more specific rules for delineating public and private property along navigable streams.

Regarding the Devils River, Nagel believes the Texas Parks and Wildlife Department took a positive step to allow canoeists to use the Devils River State Natural Area as a public access point.

Nagel strongly supports a program for the department to erect signs at access points on navigable rivers advising the distance and time to reach the next exit point. Nagel, in praising the department, says these signs should help in guiding recreationists so they will not enter the abutting private property and run afoul of the law.

“I can’t imagine river recreationists not appreciating being informed by these signs,” Nagel said.

In the meantime, expect another letter in the mail. ★



*The Devils River winds through a region of private ranches, so floaters have to be mindful of streamside landowners’ property rights, especially when it comes to picking a campsite (left).*

## Using 35mm like 4x5

Article and Photos by Leroy Williamson

**T**he 35mm camera has become immensely popular because of its light weight, portability and ease of operation. Modern 35mm single-lens-reflex cameras are small computerized instruments capable of holding films. They are far more sophisticated than cameras of a few years ago and are capable of handling practically any photographic situation. Today's cameras are better, lenses are better and films are better, yet many photographers still have difficulty getting quality pictures.

Often, the very features that attract so many people to 35mm photography are the culprits that prevent excellent pictures. Yes, it's wonderful to hang a camera around your neck and have the capability of making a photograph anytime you desire. But we often make a handheld exposure at a slow shutter speed or in less than ideal lighting, only to be disappointed when our film is processed.

For one of the best photographic learning adventures you'll ever have, put your 35mm camera on a tripod and use it as you would a large-format view camera. Of course you won't have the features of a view camera such as lens swings and tilts or a tilting, rotating camera back, but you will be amazed at the quality photographs that come out of your little 35mm camera.

Here is your assignment:

**Equipment:** You will need a tripod, a camera body, your favorite lens or lenses, a roll or two of your favorite film and a cable release.

**Shift your mind into slow gear:** This may be difficult, but you have to change your picture-taking methods for this adventure. Your goal is to get a full roll of excellent pictures for every roll you expose.

**Composition:** Large format photographers do a lot of looking, thinking and



waiting before making an exposure. After selecting your subject, study all the compositional possibilities. Select what you consider the best composition and set your camera in place. Compose and focus carefully. Check and recheck everything. You may find it necessary to make adjustments in camera placement to improve your composition. Take your time. This is going to be a good picture.

**Lighting:** Is the lighting good now? Will it be better in 15 or 30 minutes, or perhaps in an hour? If it is going to be only a matter of minutes until the best light, stay with your camera and make the exposure at prime time. If you have to wait 15 minutes or longer for the best lighting, use the delay to scout for other photo possibilities in the area.

**Exposure:** When photographing scenery, use the smallest aperture possible that will permit a shutter speed fast enough to stop any motion, if stopping

motion is what you want to do.

For flowing water, blowing flowers or fast-moving clouds, a slow shutter speed that records the movement often will enhance a photograph. Small aper-

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*A small aperture, long exposure and a rock-steady, tripod-mounted 35mm camera created these two photos, which are comparable to photos produced by a larger format camera. You'll work slower and shoot fewer pictures, but you'll come home with some excellent exposures. A zoom lens allowed me to change the composition for the photo at right without getting my feet wet. Long exposures capture the movement of the water, giving it a silky-smooth look of flowing liquid. A small aperture provides an adequate depth-of-field to keep everything acceptably sharp, even in a close-up. Both photos were shot in the soft light of early morning with a Pentax LX camera, Pentax 70-210mm zoom lens, four seconds at f/32. I used a Benbo heavy-duty tripod and Fuji RD 100 film.*

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tures permit great depth-of-field, creating a photograph with sharpness throughout. When photographing wildlife or other moving subjects, use your creativity to record the photograph you want to see on film. This may be the fastest shutter speed possible with your lens set at its widest aperture, or it may be a shutter speed that will stop most of the action with the lens set at an aperture that will provide some depth-of-field.

**Use a cable release:** Whenever your camera is mounted on a tripod, it is a good idea to use a cable release (or an electronic shutter release for motor drives and auto-winders) to prevent any camera movement that would be created by manually depressing the shutter release. For every exposure, be sure your camera is steady.

**Other accessories:** Although not re-

quired to obtain excellent photographs, some accessories can add punch to your pictures. Since you will be working slowly, you'll have time to consider the use and effect of various filters. Of course, you know from previous Picture This articles that one of my favorite filters is the polarizer. This one filter alone can make a dramatic difference in your pictures. But there are other filters that you can use creatively. Fog and diffusion filters can add a dreamlike effect. Warming filters can add a golden glow, especially to early morning and late evening scenes. And there are many special effects filters that, when used creatively, can produce amazing results.

If you are close to your subject, you might consider using flash for fill or as your primary light. At night, you can open the camera's shutter and paint a large area with multiple flash. Some

calculation and planning are required, but remember, you're working slowly and have time to solve every problem before the exposure begins.

For starters, I'd recommend exposing one roll of film for this adventure—and make that a roll of slow speed film. Whether your preference is color negative or color slide film, select a film with an ISO of 25 to 100 for fine grain and the best color saturation.

This is a wonderful weekend assignment for one 24- or 36-exposure roll of film. The results will astound you, for you will have exposures that may be the sharpest you've ever made, pictures that can be enlarged to 16 by 20, 30 by 40, or even larger, with little or no grain and superb sharpness. ★

*Leroy Williamson retired in August as chief photographer for the magazine.*



# From Gunfights to Dances

by Elaine Acker Albright

One by one, visitors stoop and shuffle through Lumbago Alley. At the end of the passageway, the tour guide waits until all have gathered in the semidarkness before throwing the light switch and illuminating the Hall of Marble. The unexpected underground exhibit, with its smooth, desert-colored surfaces, resembles abstract Southwestern pottery. It is one of nature's exclusive works shown in Longhorn Cavern's vast underground gallery.

Located in Longhorn Cavern State Park near Burnet, Longhorn Cavern is one of the state's largest scenic caves. The park sits on 708 acres of rugged Texas Hill Country where subterranean tunnels and chambers secluded early Texas Indians, soldiers and outlaws. Diverse limestone formations found throughout the cavern offer clues to Texas's geological origins.



*A popular stop on the guided tour is the Hall of Marble, with its smooth limestone walls that resemble marble.*



*Longhorn Cavern has been a Hill Country hangout for millions of years.*



Stephan Myers

By geological standards, Longhorn Cavern is young, carved only during the last few million years. But the Ellenburger limestone encasing the cavern is estimated to be 500 million years old, formed during the Ordovician Age. Flowing underground streams and rivers charged with oxygen and carbon dioxide gradually dissolved the carbonate rock. Strong currents pushed through the limestone, carrying sand and silt that enlarged the intricate maze of tunnels and shaped and polished the ceilings, floors and walls. Whirlpools filled with grit swirled tiny domes in the ceilings, and mineral deposits formed as the water level receded.

There are more than 30 distinct features on the guided tour, as though each room were designed to showcase sculptures created by different artists. Walking through Crystal City or the Hall of Diamonds is like walking into a diamond vault. The walls are jeweled with large calcite crystals up to 12 inches in size, formed by standing pools of calcium-saturated water. Deeper in the cavern, an unmistakable likeness of Abraham Lincoln, formed naturally from a large bed of chert, protrudes from a ceiling crevice 30 feet overhead.

Other mineral deposits such as lime deposits called "cripstone" created stalactites, stalagmites, columns and draperies throughout the cavern. "Flowstone" formations of travertine, deposited by mineral-laden water, create an illusion of watery movement at the Frozen Waterfall. The water evaporated, but its mineral image remained etched in stone. The tour route ends at another flowstone formation, The Rock of a Million Layers, 130 feet deep in the earth. The rock's banded patterns are the result of intermittent periods of growth, like rings on a tree stump, and its weathered exterior resembles an ancient boulder of petrified wood.

Evidence suggests that the caverns have been used for many thousands of years—first by animals that preyed on prehistoric camels, elephants and bison, and later by man. Archaeologists working in Longhorn Cavern have discovered animal bones, arrowheads, bullet molds, guns, a bayonet and human skeletons.

Many of the artifacts were unearthed in the cavern's main room, now called



Stephan Myers

the Indian Council Room. Comanches camped there in the 1840s; Confederate soldiers manufactured gunpowder there in the 1860s; and celebrated outlaws such as Sam Bass took refuge there during the 1870s. In his book, "The Geologic Story of Longhorn Cavern," William H. Matthews III retells the most famous legend of the Indian Council Room—a one-sided battle between three Texas Rangers and a band of Comanches:

"The Indians, leaving a trail of death and burned cabins, had raided San Antonio and captured Miss Mariel King.

Three Texas Rangers, Logan Van Devere, Captain McGill and Colonel Noah Smithwick, trailed the war party to their camp in the Council Room of Longhorn Cavern. There by the dancing firelight they saw Miss King against the wall with her hands bound behind her while the braves sat around the fire. At a given signal each of the rangers shot one of the Indians and the rest of the party fled into the darkness of the cavern. Taking advantage of the surprise, the rangers rushed in and freed the girl. To supply the storybook ending, Miss King and Logan Van Devere

were later married and made their home in nearby Burnet.”

The cavern became a well-known area landmark. After the turn of the century, a local rancher laid wooden planks on the cavern floor and opened the Longhorn Ballroom. Every Saturday night, ladies in flowing dresses circled the dance floor to country music with ranch hands and oil field workers. Just down the hall, the Cathedral Room served as Texas’s first “air conditioned”

*Multilayered limestone deposits resemble petrified wood at the Rock of a Million Layers (left). The two-hour guided tour begins at the cavern entrance built by Civilian Conservation Corps workers in the 1930s (right). See page 26 for a schedule of tours.*



church where sinners could repent on Sunday mornings.

Acquired by the State of Texas in the early 1930s, the park opened to the public on Thanksgiving Day 1932. In addition to its underground attractions, the park’s hiking trails along Backbone Ridge enable visitors to explore the rugged uplands. A one-half mile interpretive nature trail introduces the Hill Country flora, and another 1.5-mile trail ends near an observation tower overlooking portions of the Llano uplift region.

The observation tower, along with most of the improvements on site today, were projects built by the Civilian Conservation Corps (CCC). Organized after Franklin D. Roosevelt’s inauguration as President in March 1933, the CCC provided jobs for young men during the Depression years. Longhorn Cavern is one of 31 state parks that grew from this era of despair.



*After the turn of the century, ladies in flowing dresses circled the dance floor with ranch hands and oil field workers in the Longhorn Ballroom.*

Photo courtesy of Longhorn Cavern State Park



Laurence Parent

*CCC crews used native stone and timber to build the sturdy building, walls and walkways. The administration building the corps members built (above) now houses exhibits detailing life in a CCC camp in the 1930s.*

Only three months after its organization, the CCC employed more than 274,000 men nationwide. Recruits assigned to Longhorn Cavern's Company 854 were enrolled for six-month periods and paid \$30 per month. At least \$25 of each month's pay was sent directly to the recruit's family back home.

Crews worked at the cavern between 1934 and 1940, constructing stone buildings and elaborate stone walls and walkways leading to the cavern entrance. The architecture emphasized the use of native materials, and workers quarried stone and felled timber to erect sturdy limestone buildings that reflected pioneer techniques.

The most ambitious work at Longhorn Cavern took place underground. CCC workers cleared 2.5 million cubic yards of debris from passageways, and installed a lighting system consisting of nearly four miles of electrical wire and 550 lights. An interpretive center, housed in one of the CCC's buildings, details life in a CCC camp during the 1930s.

Company 854 hosts an annual reunion at Longhorn Cavern, scheduled the weekend before Memorial Day each May. These workers constructed a time bridge that joins modern visitors with Texas's pioneer past. Other commercial caves offer spectacular geological exhibits, but Longhorn Cavern's halls present a special blend of natural science and human history. ★

*Elaine Acker Albright is a regular contributor to the magazine.*

## LONGHORN CAVERN STATE PARK



Map by Debra Morgan

Longhorn Cavern State Park is located six miles west and six miles south of Burnet on Park Road 4, off U.S. 281. Day-use activities include picnicking, hiking and cavern tours, and facilities include a gift shop and snack bar. Overnight camping is available at nearby Inks Lake State Park.

Ronnie Waggoner, park concessionaire, has designated the months of April and October "Scout Months." The park waives the usual minimum group requirement of 25 persons, and offers the \$3.50 group rate to any size scout group participating in regularly scheduled tours of the cavern. Scouts providing volunteer community service for the park also may receive Texas's Junior Ranger certification.

Guided tour schedule: **Labor Day through February:** 10:30 a.m., 1 p.m. and 3 p.m. Monday through Friday

and hourly, 10 a.m. to 5 p.m. on Saturday and Sunday. **March, April and May:** hourly from 10 a.m. to 4 p.m. Monday through Friday, and 10 a.m. to 5 p.m. Saturday and Sunday. **Memorial Day through Labor Day:** 10 a.m. to 6 p.m. daily. The tour lasts two hours. Fee is \$6 for adults and \$4 for children age five through 12. Texas Conservation Passport holders are admitted free.

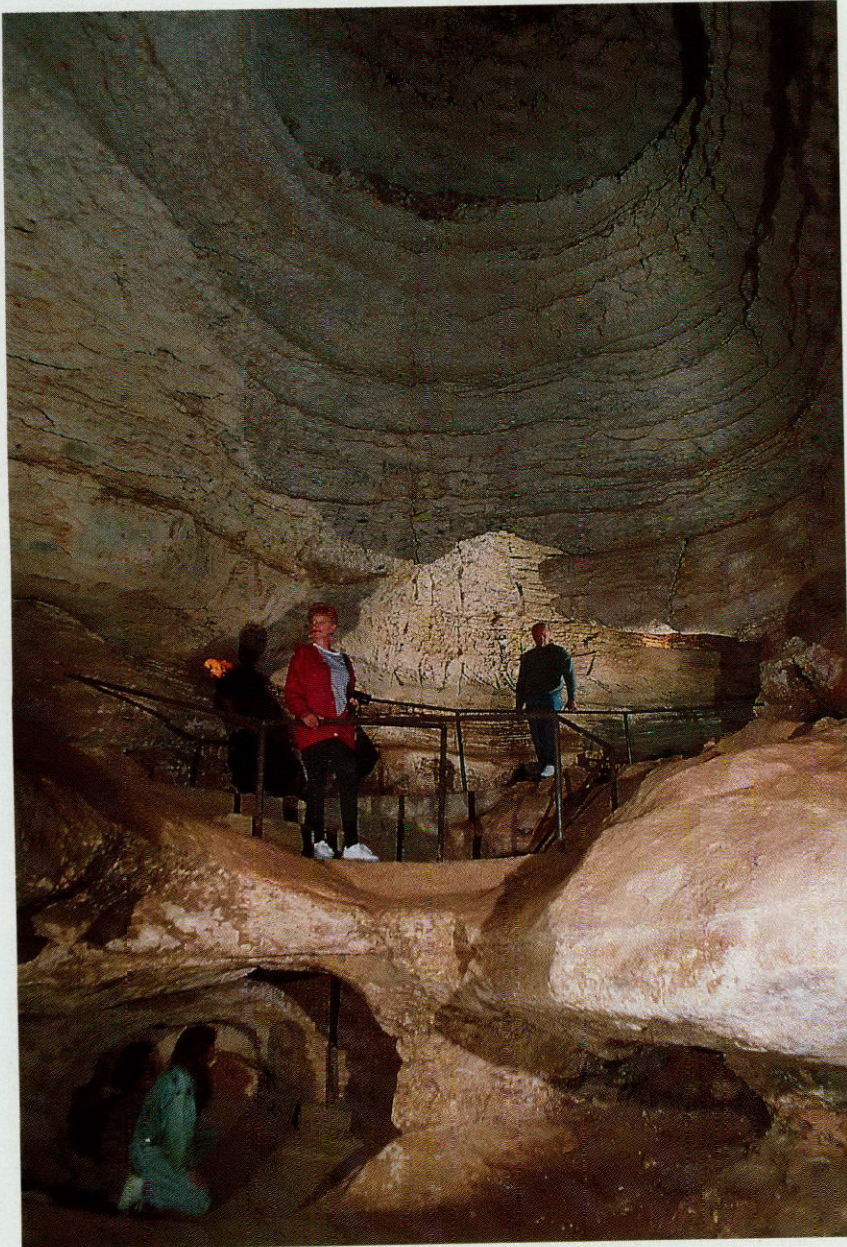
Tours follow a 1 1/4-mile path, and comfortable, rubber-soled walking shoes are recommended. The temperature in the cavern is a constant 64 degrees, and some visitors prefer wearing a light jacket.

For more information write: Longhorn Cavern State Park, Route 2, Box 23, Burnet, Texas 78611, or call 512-756-6976 (tour information) or 512-756-4680 (business office).



Laurence Parent

*Calcite crystals sparkle on the walls of Crystal City and the Hall of Diamonds. The crystals were formed by standing pools of calcium-saturated water.*

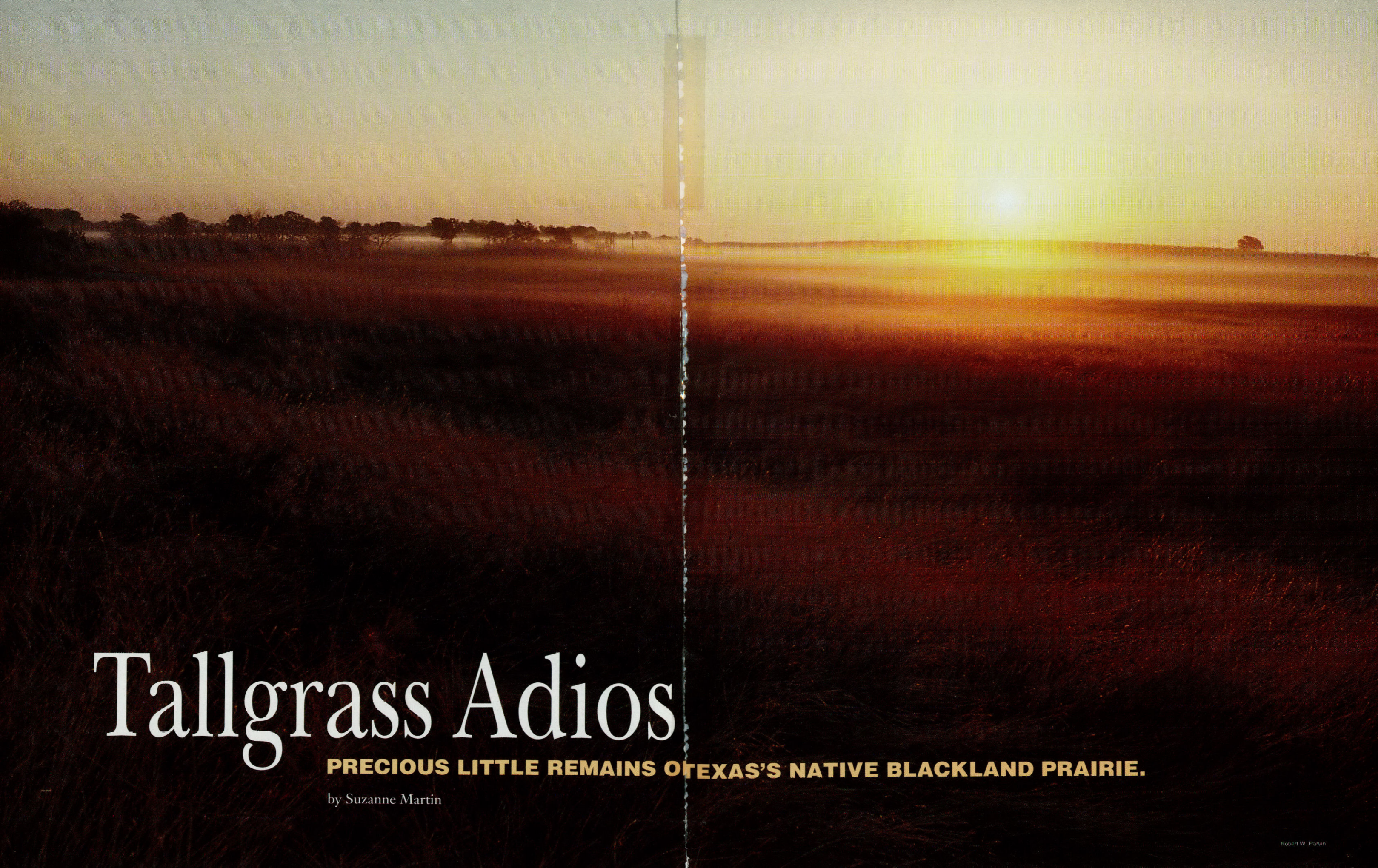


Laurence Parent



Laurence Parent

*This profile resembling Abraham Lincoln (above) was formed naturally from a large bed of chert. Flowing underground streams carved this intricate maze of tunnels and shaped ceilings and walls (left).*



# Tallgrass Adios

**PRECIOUS LITTLE REMAINS OF TEXAS'S NATIVE BLACKLAND PRAIRIE.**

by Suzanne Martin



Paul M. Montgomery



Grady Allen

Red-shouldered hawks glide above the prairie watching for rodents and insects.



**T**he Blackland Prairie stretches like a cornucopia through the broad heart of Texas. From a narrow slice near San Antonio, the Blackland widens for 400 miles northward to the Red River. Today the black, waxy soil supports pastures for livestock grazing and rhythmic rows of cotton, wheat and sorghum. Big cities and small towns sprawl across the landscape. Concrete highways and blacktop backroads dissect the once-open prairie.

*Prairies once covered more than 12 million acres in Texas. Today the 5,000 acres of native Blackland Prairie that remain are in pockets scattered throughout the area. From Central Texas in the eastern portion of Hays County (previous page) the region known as the Blackland Prairie fans out northward toward the Red River. Tickseed, Indian blankets and beggar's ticks bloom amid green gayfeather in Mokan Prairie in Williamson County (right). Coneflowers bloom in Triders Prairie in Lamar County (above), near the northeastern edge of the Blackland Prairie region.*

Before plowing and paving, the Blackland belonged to wild creatures, waving grasses that grew as tall as a man and wildflowers of every shape and color. The untamed prairie comprised more than 12 million acres of Lone Star land. By most estimates, only about 5,000 acres of native Blackland Prairie now remain, relics of a vanishing place and time in Texas.

The tallgrass prairie swept from Texas north into Canada. But the physiographic region known as the Blackland Prairie stops at the Red River. As late as the 1880s, natural grasslands still blanketed about 80 percent of Texas. By the turn of the century, only 20 years later, most of the virgin sod had been broken, forever changing the face of the original prairie. The hard clay of the Blackland Prairie succumbed to steam-powered machinery and steel plows. What small pockets of native prairie survived the furrowing and farming did so as hay meadows where landowners



*Agriculture forever changed the face of the original Blackland Prairie.*

Paul M. Montgomery



Paul M. Montgomery

saved the rich grasses for livestock forage and hay crops. Those rare and widely scattered patches of surviving native Blackland Prairie now lie tucked away amid farm and livestock land. They shimmer like ghostly remnants of the vast and diverse prairie ecosystem that once thrived as far as the eye could see.

The Blackland Prairie slowly rolls from smooth hills into wide, shallow valleys. The ever-changing landscape differs from north to south and from upland to bottomland. About 30 percent of the prairie sinks its roots into sandy, loamy soil. But heavy clays dominate the region and give the Blackland its name. The rich, dark soil bakes to a hard, cracked crust under the Texas sun. So in rain it swells into a sticky mud strong enough to bog down most vehicles. The different soil types and varying amounts of rainfall once supported 200 to 300 native plant species. Oak, pecan, elm and hackberry trees lined the edges of streams that flowed through the valleys. Wildflowers and tall grasses shared the open land.

In northeast Collin County, about an hour's drive north of Dallas, one of the few remaining relics of Blackland Prairie is being closely tended by the Collin County Open Space Program. Known as Parkhill Prairie, the 436-acre site encompasses almost 60 acres of native



tallgrass prairie and offers a small glimpse of a landscape that once covered much of North-central Texas.

"Very few people understand the prairie," said Bill Fraser, manager of the Collin County Open Space Program. "But those who go out and look at the area love it."

Stand at Parkhill's southern high point, look northward and the native prairie comes into view. During early spring, wildflowers wash color over the land. Delicate meadow pinks grow low amid clusters of red-orange Indian paintbrushes. Wild petunia opens its trumpet-shaped blooms against the sunrise, then withers after only one day. The small, greenish-yellow flowers of

*Clouds gather over Clymer Meadow in Hunt County. Clymer Meadow is protected under The Nature Conservancy of Texas's Land Stewards' Society, an organization of landowners who agree to protect sensitive natural areas on their privately owned land.*

prairie parsley adorn stout stems that can grow two feet high. As summer spreads across the prairie, azure sage and several species of aster mix with bright Mexican hats. Tall, spiked gayfeather shows off in purple and pale lavender.

**A**utumn brings to life the warm-season tall grasses for which the Blackland Prairie is well known. Unlike the shallow-rooted, short grasses of the plains, the roots of prairie grasses can grow 16 feet deep. Above ground, the stems can tower to eight feet. The leaf sheaths of big and little bluestem cast a bluish hue. The plumes of Indiangrass vary from yellow to bronze. Switchgrass, with its upright, thick stems, grows in lower, moister places. In the spring and early summer, eastern gammagrass produces heads that look like corn tassles.

"In the low areas, along the river

bottoms, they said the grass was taller than a man on a horse," said Arnold Davis, who serves on the board of directors for the Native Prairies Association of Texas. "In upland blackland, the grass might have been as tall as the stirrup on a saddled horse. We don't really know, but I think that's pretty close."

Davis has worked with the Collin County Open Space Program in its effort to add 30 acres of restored prairie to Parkhill's existing 60 acres of native prairie. The reconstruction began in spring 1991, made possible by the combined involvement of private citizens and public institutions.

Bit by bit, the prairie at Parkhill has been pieced together like a jigsaw puzzle. Not far from Parkhill, a native prairie plot of fewer than three acres was discovered on private land. The undisturbed sod was purchased, carefully dug and transported to Parkhill as part of the restoration. The Nature Conservancy of Texas allowed seeds to be collected from the established prairie of Clymer Meadow in nearby Hunt

Robert W. Parvin





Farming prospers in the fertile black soil of the Blackland Prairie (left). Monarch butterflies pause on a Blackland Prairie sunflower during their autumn migration (below).

Robert W. Parvin

County. A prairie near Waco provided seed hay, and the City of Richardson donated use of a blower that broke down the hay bales and literally shot the debris across the reconstruction site. From Montague County, the Thomsen Foundation contributed wildflower seed. More was bought from wildflower research areas. All of the seeds were distributed through no-till planting methods.

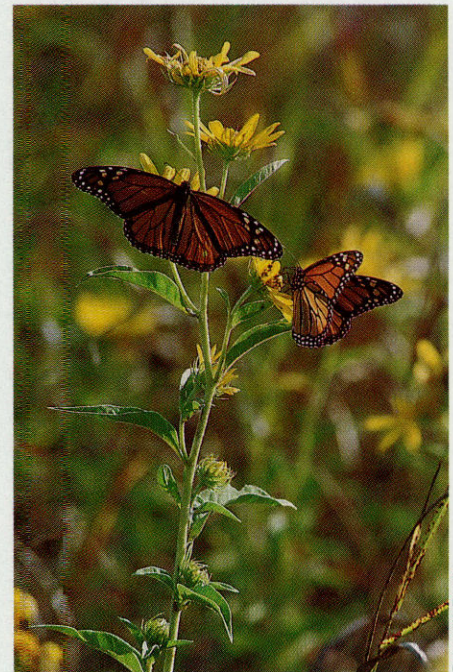
“Overall, it’s been very successful,” Bill Fraser says of the restoration. “In terms of land form and plant composition, we can come close to matching a native prairie. But you can’t restore all the microorganisms that might have been in the native soil. For the casual observer, though, it will be very similar to the native prairie. That’s our goal.”

**P**art of the challenge in reconstructing native prairies is that mysteries still remain. Ken Steigman, curator of collections at the Heard Natural Science Museum and Wildlife Sanctuary in McKinney, stumbled onto one of those mysteries at Parkhill. He was researching the ecology of the tallgrass prairie when he noticed a number of crawfish

burrows. He collected specimens from the burrows and sent them to the Smithsonian Institution in Washington, D.C. for identification. One of the crawfish turned out to be a new discovery and became known as *Procambarus girardilla steigmani*, named for Steigman.

“They’ve been found on the relic prairies in this area,” said Steigman. “Their distribution probably is linked to flora type, so I’m fairly sure they can be found elsewhere. But we’re just not sure. We need more studies. We don’t really know what there is out there, much less what the relationships are among species.”

Little of the original prairie is left to study. Once the virgin sod was broken and the soil aerated, native vegetation disappeared. There is no clearinghouse, no master list of what remains untouched. The Texas Parks and Wildlife Department’s Texas Natural Heritage Program has logged locations of about 130 relic native prairies. The Nature Conservancy of Texas holds a handful of Blackland Prairie sites. Recent work at the Kachana Prairie in Ellis will help conserve another 30 acres of Blackland Prairie. Some citizens have saved small prairies on private land. Members of the Native Prairies Association of Texas identify and preserve Blackland Prairie



Robert W. Parvin

wherever they can find it—along railroad tracks, beside highways and in parks.

Although these miniature prairie sites mirror the timeless image of the once-expansive Blackland Prairie, some bigger pieces of the prairie puzzle have been lost forever. Before European settlement changed the prairie, wildfires periodically raced across the land,



Robert W. Parvin

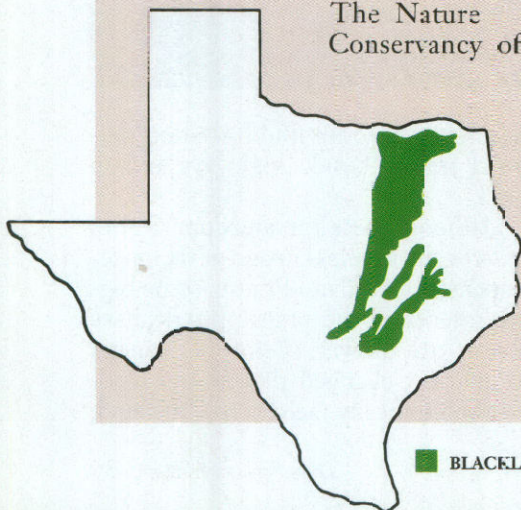
Goldenrod blooms at a City of Austin nature preserve near Onion Creek (above). Smiley Woodfin Meadow (right), owned by the Woodfin family of Paris, is across the road from Triagens Prairie in Lamar County and is protected under the Texas Land Stewards' Society. These miniature prairie sites let modern Texans see what the land looked like when prairies stretched as far as the eye could see.

## IN SEARCH OF BLACKLAND PRAIRIES

Searching out a remnant Blackland Prairie can be a bit like a scavenger hunt. Not all are open to the public. Some must be visited through guided tours or during special events.

Parkhill Prairie in northeastern Collin County is probably the most easily accessible native Blackland Prairie. It's located north of Farmersville off Farm Road 36. Just follow the signs. The park is free to the public and open sunup to sundown every day. Covered picnic tables and restrooms are available. Walking trails wind through the area.

The Nature Conservancy of



Texas hosts tours of several prairies in the Blackland region. The organization also can provide printed material about the individual prairies. Contact the Conservancy by writing to P.O. Box 1440, San Antonio, Texas 78295-1440; or call 210-224-8774.

The Native Prairies Association of Texas sponsors regular prairie field trips. The group also publishes a quarterly newsletter for members. For more information write to 301 Nature Center Drive, Austin, Texas 78746; or call 512-327-8181.

The Texas Parks and Wildlife Department is working on a prairie restoration project with the Native Prairies Association at Granger Lake Wildlife Management Area. Other TPWD areas with native prairies are Cedar Hill State Park in the southwest corner of Dallas County and Kreische Brewery State Historical Park in Fayette County.

Call 214-291-3900 for information about Cedar Hill and 409-968-5658 for Monument Hill/Kreische Brewery.

clearing vegetative litter and burning woody plants that would have encroached on the grassland. In their wakes, the fires left decomposing matter that quickly returned nutrients to the prairie soil. In the southern part of the blacklands, grizzly bears most likely wandered in from the Hill Country. Throughout the region, huge herds of bison migrated south across the Red



River to graze the nourishing grasses. Packs of prairie wolves chased their bison prey.

Today, the coyote is the largest predator on the prairie, sharing it with raccoons, striped skunks, armadillos and opossums. Prairie kingsnakes and yellowbelly racers slither through the grass. Hawks, falcons and harriers swoop down on cotton rats and prairie deer

mice. Yellow-breasted eastern meadowlarks breed and conceal their nests in shallow ground depressions. Conspicuous scissor-tailed flycatchers twitter and swoop in the sky. Migratory dickcissels return each May to nest in the open country.

Life on the tallgrass prairie may be a mere shadow of what historically thrived on the deep, black soil. But even the

small patches that remain intact today harbor surprises and new knowledge. And for those who linger long enough amid the spring wildflowers or autumn grasses, these slices of Blackland Prairie still reflect the calming beauty of a once wild and immense space. ☆

*Suzanne Martin grew up in the Blackland Prairie region.*

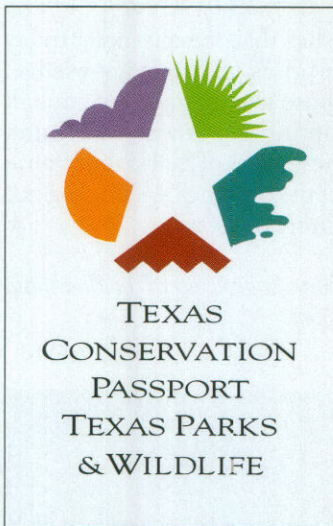


Robert W. Parviri

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# OUTDOOR DATEBOOK

\* The activities marked with this symbol are available to people who have a Texas Conservation Passport, which may be purchased for \$25 at most state parks, Parks and Wildlife offices, Whole Earth Provision Co. locations in Austin, Houston and Dallas and REI in Austin.



## FEBRUARY

Feb.: \* Nighttime Houston toad tour, Bastrop State Park in Bastrop County, each Tuesday and Saturday, 512-321-2101

Feb. 3: \* Wildlife corridor tour, Las Palomas WMA and Lower Rio Grande NWR, 210-383-8982

Feb. 5: \* Marine life in South Texas slide show and tour, U.T. Coastal Studies Lab, 210-350-4490

Feb. 6, 20: \* Bus tour with chuck wagon lunch, Big Bend Ranch State Natural Area, 915-229-3613

Feb. 6, 13, 20, 27: \* Lower Edwards Plateau ecosystem tour, Honey Creek State Natural Area in Comal County, 210-438-2656

Feb. 6, 13, 20, 27: \* Twin Falls nature trail walk, Pedernales Falls State Park in Blanco County, 210-868-7304

Feb. 6, 13, 20, 27: \* Bald eagle tour, Fairfield Lake State Park near Fairfield, 903-389-4514

Feb. 6: \* Cavern tour, Kickapoo Cavern State Natural Area near Uvalde, 210-563-2342

Feb. 6: \* Goose and sandhill crane roost watch, Mad Island WMA, 512-576-0022

Feb. 10: \* Birdwatching and nature study tour, Bentsen-Rio Grande Valley State Park, 210-585-1107

Feb. 13: \* Nighttime wildlife viewing, Lake Colorado City State Park near Colorado City, 915-728-3931

Feb. 13: \* "Wings on the wind of spring" tour and slide show, Fairfield Lake State Park near Fairfield, 903-389-4514

Feb. 13: \* Slide show and fish hatchery tour, GCCA-CPL Marine Development Center at Corpus Christi, 512-939-8745

Feb. 14: \* Interpretive horseback riding tour with mount and lunch provided, Hill Country State Natural Area and Running R Ranch in Bandera County, 210-796-4413

Feb. 20: \* Penn Farm walking tour, Cedar Hill

State Park at Joe Pool Reservoir, 214-291-3900

Feb. 20: \* Bird-banding observation and birding tour, Kickapoo Cavern State Natural Area near Uvalde, 210-563-2342

Feb. 28: Quail hunting season closes statewide

## MARCH

March: \* Nighttime Houston toad tour, Bastrop State Park at Bastrop, each Tuesday and Saturday, 512-321-2101

March 2: \* "Bounty of the sea: from the boat to the table," Fulton Mansion State Historical Park at Fulton, 512-729-0386

March 3: \* Fishing seminar, Lake Livingston State Park near Livingston, 409-365-2201

March 3: \* Wildlife corridor tour, Las Palomas WMA and Lower Rio Grande NWR, 210-383-8982

March 4, 11: \* Photography workshop focusing on close-up shots, Lubbock Lake Landmark State Historical Park at Lubbock, 806-765-0737

March 5: \* Birding tour focusing on endangered species, Kerr WMA near Ingram, 210-238-4483

March 5: \* Marine life in South Texas slide show and tour, U.T. Coastal Studies Lab, 210-350-4490

March 6: \* Montezuma quail slide show and calling demonstration, Kickapoo Cavern State Natural Area near Uvalde, 210-563-2342

March 6, 20: \* Bus tour with chuck wagon lunch, Big Bend Ranch State Natural Area, 915-229-3613

March 6, 13, 20, 27: \* Lower Edwards Plateau ecosystem tour, Honey Creek State Natural Area in Comal County, 210-438-2656



Leroy Williamson

*Texas Conservation Passport holders can tour historic Fulton Mansion and ride a boat to the nearby lighthouse on March 27.*



Larry Ditto

South Texas birds such as the Audubon's caracara may be seen by Texas Conservation Passport holders on birding tours at Bentsen-Rio Grande Valley State Park on February 10 and March 10.

March **6, 10, 13, 17, 20, 27** \* Twin Falls nature trail walk, Padonales Falls State Park in Blanco County, 210-568-7304

March **6** \* "Sni'in' 'em out!" c dog demonstration, Richland Creek WMA in Freestone and Navarro Counties, 903-389-4514

March **10**: \* Birdwatching and nature study tour, Bentsen-Rio Grande Valley State Park, 210-585-1107

March **13**: \* Penn Farm walking tour, Cedar Hill State Park at Joe Pool Reservoir, 214-291-3900

March **13** \* Bird-banding observation and birding tour, Kickapoo Cavern State Natural Area near Uvalde, 210-563-2342

March **13, 27**: \* Nature tour, Gene Howe

WMA near Canadian, 806-492-3405

March **13**: \* "Wings on the wind of spring" tour and slide show, Fairfield Lake State Park near Fairfield, 903-389-4514

March **14**: \* Interpretive horseback riding tour with mount and lunch provided, Hill Country State Natural Area and Running F. Ranch in Bandera County, 210-796-4413

March **20**: \* Border birding on the Black Gap WMA in Brewster County, 915-376-2216

March **20**: \* Cavern tour and Greer Cave bat flight observation, Kickapoo Cavern State Natural Area near Uvalde, 210-563-2342

March **27**: \* Peregrine falcon tour, Black Gap WMA in Brewster County, 915-376-2216

March **27**: \* "Blossoms in the brush" slide show and tour, Chaparral WMA in Dimmit and LaSalle Counties, 210-676-3413

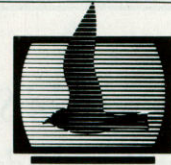
March **27**: \* Birdwatching on the Rio Grande, Las Palomas WMA/Ocotillo Unit, 915-837-2051

March **27**: \* Birding and banding spring migrants in the wetlands, Richland Creek WMA in Navarro and Freestone Counties, 903-928-2251

March **27**: \* Mountain bike trail ride, Dinosaur Valley State Park near Glen Rose, 817-897-4588

March **27**: \* "A tale of two houses," mansion tour and boat ride to lighthouse, Fulton Mansion State Historic Park at Fulton, 512-729-0386

# TEXAS PARKS & WILDLIFE



## TELEVISION SCHEDULE

Watch for our companion television series, "Texas Parks & Wildlife," on your local PBS affiliate. The following is a partial listing for February. All times p.m. unless otherwise noted.

CITY/STATION	DAY	TIME
<b>Austin</b>		
KLRU, Ch. 18	Check Local Listings	
<b>Austin, KLRU-TOO</b>	Monday	7:30
Cable Ch. 31	Friday	3:00
<b>College Station</b>	Tuesday	7:00
KAMU, Ch. 15	Wednesday	11:00
<b>Corpus Christi</b>	Thursday	7:30
KEDT, Ch. 16	Friday	10:30
<b>Harlingen</b>		
KMBH, Ch. 60	Saturday	6:30
<b>Killeen</b>	Thursday	1:30
KNCT, Ch. 46	Friday	11:05
<b>Lubbock</b>		
KTXT, Ch. 5	Thursday	1:00
<b>Odessa</b>		
KOCV, Ch. 36	Saturday	7:30
<b>San Antonio</b>		
KLRN, Ch. 9	Check Local Listings	
<b>Waco</b>		
KCTF, Ch. 34	Thursday	11:30

Programming schedules are subject to change, so check your local listings.

*In stereo where available*

The Texas Bird Sound Library houses thousands of recordings of bird songs and calls.

# A Trill a Minute

by Kristi G. Streiffert

For most of us, the twitters and trills of bird sounds fall on our ears, cheering and intriguing us. Researchers, however, use their eyes to study bird sounds. Dr. Ralph Moldenhauer, founder of the Texas Bird Sound Library, looks at songs all the time.

Moldenhauer, with the help of Kelly Bryan (who now is superintendent of Davis Mountains State Park), established the Texas Bird Sound Library in 1979 at Sam Houston State University in Huntsville.

"It started," recalled Moldenhauer, "with Kelly Bryan's graduate thesis." Moldenhauer, professor at Sam Houston State University, was Bryan's advisor. "He studied the song of the prothonotary warbler and when we got done, we had reels and reels of songs and wondered what to do with them."

Today, the Bird Sound Library, under the auspices of the Division of Biological Sciences at the university, houses more than 2,000 recordings of individual bird songs, calls and other sounds. About 400 species are represented. The recordings, converted into graphs called sonograms or audiospectrographs, are used as data for research. The greater the number of recordings available for each species, the greater the research value of those recordings.

This field of study, called avian bioacoustics, asks a myriad of questions. How do bird songs develop? Is song innate or learned? Can birds learn new songs? Why do some bird species have

a regional dialect and others don't? What do songs and other vocalizations mean? Why does the brown thrasher sing more than 2,000 songs and the chipping sparrow only one?

Kelly Bryan's prothonotary warbler study revealed that the note patterns found in prothonotaries' songs are notably uniform. Research showed a conspicuous lack of geographic song variation throughout this swamp-loving warbler's North American range. Yet Moldenhauer recently completed a study of another warbler, the northern parula, which showed that this species has two distinct, and geographically determined, primary songs. Although the two songs sound alike to human ears, a sonogram shows that a warbler in Florida sings a measurably different song from a warbler in Texas. Moldenhauer believes this proves there are two races of northern parula warblers. Interestingly, this fact was asserted by early ornithologists, but rejected by modern scientists. Until now.

Although many questions await scientific study, current work is based on a fundamental knowledge of bird song. The vocal sounds of birds are produced by a special sound organ called the syrinx. This is similar to the larynx of mammals, but is found at the lower, instead of the upper, end of the trachea. Inside the syrinx, membranes vibrate with the passage of air, producing sounds controlled by a complex system of muscles.

This sonogram shows the song of a northern parula warbler recorded in Florida. Beneath it is the imprint of the same species recorded in Texas.

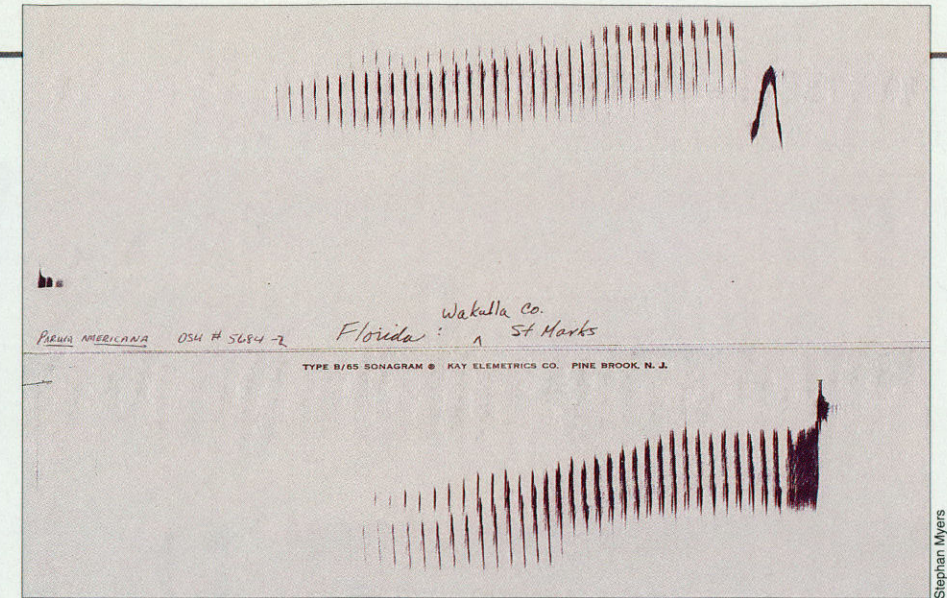
These sounds serve a number of functions. Birds distinguish their own kind from other species; males claim and maintain territory and attract mates. Communication between parent and offspring, and communication between different species, such as the jay's alarm call, are other functions.

The range and complexity of bird sounds evolved, researchers believe, from necessity. Since many birds may be singing at once, species and individuals must use sound and pattern complexity to rise above the crowd with distinctive sounds. Shifting frequency and amplitude combine into distinctive phrases and song. Complexity is increased by the astounding ability of birds to produce two different tones simultaneously.

Thus, from the fundamental need to communicate, we humans are treated to the slurred glissando of a cardinal, the *tea-kettle, tea-kettle, tea-kettle* (available in 40 different renditions) of the Carolina wren, and the intense *konk-la-reeeeeeee* of the red-winged blackbird on a cold April morning.

Sounds are recorded in the field with the aid of a reel-to-reel or cassette tape recorder, or even with a compact disc recorder and a unidirectional or parabolic microphone. These specialized mikes cut down on the background noise of cars, airplanes, wind or even other birds. Background noise sometimes can be eliminated by the use of filters since most man-made sounds are of low frequency and bird song is of high frequency.

These recordings then are analyzed at the Bird Sound Library by a computer called an audiospectrograph. The resulting audiospectrogram is a three-dimensional rendition of the sounds, which are graphed in frequency, time and amplitude. Looking at this graph reveals modulations, length of note or song, and relative loudness—recorded



Stephan Myers

by darkness on the graph (the third dimension).

The Texas Bird Sound Library is used by biology students at Sam Houston State University in class demonstrations and projects, by graduate students for thesis research and by other scientists from around the United States. Researchers from the University of Florida, Texas A&M, University of Massachusetts, University of North Carolina and many others have used the library's recordings for projects. The library specializes in Texas birds, but has recordings of birds from several other states, as well as from Canada, Mexico and Venezuela.

Educators and others interested in bird acoustics are encouraged to use the library. The library has assisted elementary and secondary teachers presenting units on birds and curators in the preparation of natural history exhibits for museums. Sounds from the library have been featured on radio programs. The library also is a sound record file documenting unusual species, state records and declining species.

Many of the recordings are made by Moldenhauer. Another major contributor is Greg Lasley of Austin, regional editor for the national magazine *American Birds*. He has contributed songs from about 300 bird species. "I find the library is an important method of documenting Texas rarities," Lasley said. "Recordings are just as diagnostic as a photograph. You don't even have to see the birds."

Although there are at least three other major bird sound collections in the U. S., including those at Cornell University, Ohio State and Florida State Museum, the Texas Bird Sound Library at Sam Houston State University is the only one that focuses on a specific region. And Texas is appropriate for such a collection, since more bird species occur in this state than any other.

Birders love to be serenaded. Luckily, our favorite feathery puffs of color can delight us with their music and answer scientific queries at the same time. ★

Kristi G. Streiffert is a regular contributor to the magazine.



Stephan Myers

Dr. Ralph Moldenhauer, founder of the Texas Bird Sound Library, uses a special microphone to record bird sounds in the field.



Steve Barntsen

The calls of this male red-winged blackbird can be captured on paper for scientific analysis.

Bioacoustics is expanding our knowledge of wildlife.

# Saving Nature's Sounds

by Lyn Fraser



Lone Star Photographics

During the transition from night to day, birders enjoy one of their most exhilarating experiences: hearing the dawn chorus of sounds as birds wake up, sing and move around in the most active part of their day. Dr. Robert Benson, who directs the Center for Bioacoustics at Texas A&M University,

electronics. During his junior year of high school in Pasadena, Texas, Benson was going through the school library and found a copy of Roger Tory Peterson's "A Field Guide to Birds." Fascinated by the pictures, he checked the book out, and on long walks home during the late fall he would become spellbound by identifying birds. One day he was hiking along the Houston Ship Channel and discovered a group of roseate spoonbills, beautiful wading birds. "Seeing such unusual birds, with their striking colors, coupled with having the bird book with me so I was able to recognize them, was the beginning of an interest that has remained with me," he said.

captures these morning songs as well as the sounds of marine mammals in the Gulf of Mexico and many other kinds of animals, all for the benefit of those who care about nature.

By recording the sounds of today's natural world, Benson is preserving sounds that may not be heard in another hundred years. Or even in 20 years. "If we could turn on tape recorders now and listen to the dawn choruses that Audubon heard or the animal sounds encountered by the early pioneers of this country, we could learn so much about the impact of humanity on North America," he said. "If we can preserve the sounds we hear now, we will provide some answers for the future."

In 1990 and 1991 Benson produced the program "Birdnote" for public radio. He has served as president of the Texas Ornithological Society, editor of its *Scientific Bulletin*, and currently oversees the Society's Sabine Woods Bird Sanctuary in East Texas.

Trained as a physicist, Benson combines an interest in birds that began in junior high school with his expertise in

When he went to Texas A&M University to work on a doctorate in physics, Benson—by then a trained pilot—read in the student newspaper that Dr. Keith Arnold, an ornithologist in Wildlife and Fisheries Science, was looking for a pilot to fly graduate students around Texas to count bald eagles. After meeting Dr. Arnold, Benson said he'd do it for free. "It was just fantastic, I couldn't believe the experience. It was my first contact with the culture of people who cared so much about birds."

Hired by the Engineering Technology Department at Texas A&M, Benson wanted to combine his interest in birds with physics and engineering. He decided to take the approach of using modern signal processing and apply it to a signal that was a little out of the ordinary: animal vocalizations.

The same sort of approach is used in engineering to make machines that can recognize human speech and sort out submarine types in the ocean. Benson has completed a wide range of acousti-



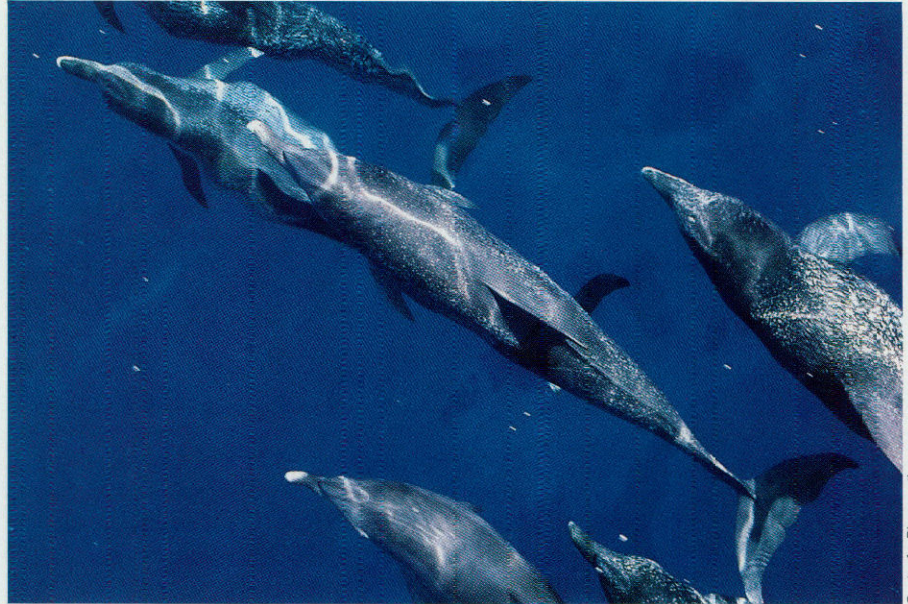
Center for Bioacoustics

Bioacoustics can be used to track the movements and daily habits of birds such as the mockingbird (top).

Dr. Robert Benson (above) combined a love for birds with engineering and physics in his bioacoustics research.



*Scientists are learning more about dolphins (right) and other marine mammals through bioacoustics research.*



Center for Bioacoustics

cal projects. In conjunction with Scott and White Hospital in Temple, he studied low-frequency sounds associated with coronary arteries as a diagnostic tool for the early warning of coronary artery disease.

One project was serendipitous. While out birdwatching and recording on the Brazos River bottoms and searching for a woodpecker in a pecan grove, Benson noticed the sounds of cars passing on Farm Road 50. "The changing pattern of sound was something I knew about: the Doppler shift, the lowering of the pitch as cars passed. For example, the pitch of a train whistle is higher when it is coming toward you; it drops to a lower pitch as it passes." He recorded the sounds of several cars. Back at the lab, he made simple calculations and was able to determine the velocity of cars going by, whether they were decelerating or accelerating, and in which lane of the highway the cars were traveling. Based on this approach, he completed a study for the Texas Highway Department to classify traffic sounds.

Another project has involved acoustics to measure time delays of bird sounds. Using an array of microphones, Benson mapped out bird territories and determined where and how birds spent time in the territories. "I took advantage of the fact that the speed of sound is constant in air, and the arrival time allows you to determine the positions from which the bird is singing," Benson explained. "As the bird moves around in its territory, I can map out with a computer and the proper kind of software the position of the bird, the time span in various locations, and what the bird is doing, such as feeding young or trying to attract a mate."

Texas A&M's Center for Bioacoustics, which Benson directs, recently was upgraded from laboratory to center status, which he thinks will help in terms of facilities and financial support. Because

Benson's sound collection is relatively new, he uses only digital equipment. Although not the only person using the digital equipment to record animal sounds, Benson is one of the first and is also the only one whose collection is wholly digital, resulting in a higher quality of sound than the older analog technology. For archival situations, storing recordings for hundreds of years is not possible with the analog process because the tape medium eventually deteriorates and falls apart.

Benson and the Center for Bioacoustics currently are involved in a multi-million dollar federally funded project through the Texas Engineering Experiment Station and the Texas A&M Research Foundation. The consortium also includes Texas A&M University at Galveston, Oregon State University and the National Marine Fisheries Service. The objective of the project is to determine the abundance and distribution of marine mammals in the central and eastern Gulf of Mexico by using aerial surveys, visual observation and bioacoustics. Benson serves as the principal investigator for the bioacoustics team, which tows a 600-foot line of hydrophones behind a ship to record the sounds of marine mammals in the Gulf, documenting their number, diversity and migration patterns.

On the most recent research cruise aboard the R/V Pelican, his team recorded 140 acoustic biological signals made up primarily of sperm whales and several species of dolphins. The team has documented the existence of some

species never seen alive in the Gulf, including Fraser's dolphin that 20 years ago was known only from skeletal remains, and melon-headed whales that were not expected in the Gulf. In the first year, just completed, the researchers have greatly increased the knowledge of the number and kinds of marine mammals in the Gulf of Mexico.

"What I care about," Benson says, "is recording any living thing that makes a sound in the natural world." ★

*Lyn Fraser is a freelance writer, no relation to Fraser's dolphin.*

## To order tapes and CDs

Benson's recordings containing the vocalizations of Texas birds, dawn choruses, and narratives about each bird will be available to the public in a series of audio tapes and compact discs (coauthored by his wife, ornithologist Karen Benson) beginning in spring 1993 from the Texas A&M University Press. The first release will be a sampling of Texas birds, some rare and some common, including the northern mockingbird, hermit thrush, dickcissel and lesser night-hawk. For order information, contact the Texas A&M University Press, Drawer C, College Station, 77843-4354; telephone 1-800-826-8911; fax 409-847-8752.

# THE RISE AND FALL OF PINEYWOODS DEER

by Jim Cox

*East Texas whitetail  
populations crashed in the  
late 1980s, but the causes  
may surprise you.*

The Pineywoods deer boom of the 1980s has now entered the archives as a remarkable, if temporary, phenomenon. After nurturing the white-tailed deer population through the lean years, East Texans during the mid-1980s pointed with pride to the fact that whitetails had become as familiar a sight in the piney glades as jackrabbits are on the western plains.

Now comes an attitude adjustment period for Pineywoods residents who have seen this source of regional pride slip to less than spectacular numbers. The most difficult adjustment they must accept, in the view of wildlife experts, is that the 1980s deer heyday represented not just abundance, but an overpopulation of classic and destructive proportions. Nature deals with overages of a species in a rather harsh manner, as animals on overcrowded ranges suffer a host of problems, chiefly malnutrition and loss of reproductive success. Meanwhile, some observers tend to blame the decline on a variety of factors, often ignoring the most basic concept of all—that habitat can support only a finite number of white-tailed deer, and when that number is exceeded damages accrue to both the herd and the habitat.

Biologists first saw the danger signs during the late 1970s when deer numbers began rising in some areas of East Texas. The increase became an explosion between 1983 and 1987, and the department responded by increasing the numbers of antlerless deer hunting permits issued to landowners for distribution to hunters. In 1987, biologists issued 88,887 permits, but the resulting harvest of only 20,221 antlerless deer was not enough to control the runaway herd. The East Texas deer explosion became another case history of overpopulation in the textbook of deer management.

After reaching a peak of some half-million deer in 1987, white-tailed deer populations fell by 50 percent in the following three years. Understandably, this decline troubled East Texas folks who had grown accustomed to seeing multitudes of deer in areas where rabbits and squirrels were the main wildlife attractions only a few decades ago.

While the whitetail nosedive probably surprised many, it was not unanticipated by wildlife biologists who had predicted that the superabundance of

*The Pineywoods region of East Texas is capable of producing impressive bucks if landowners and managers properly utilize the basics of whitetail management.*

deer wouldn't last. The reasons behind the decline also may be a surprise to all but those who make a practice of observing subtle and cumulative habitat changes.

"The most obvious way to explain the deer decline is to blame hunting regulations or your neighbor across the fence," said Texas Parks and Wildlife Department biologist Gary Spencer of Jasper. "But the truth is, regulations are not going to save East Texas's deer, because the rise and fall of deer populations is controlled primarily by other, less obvious factors, mainly related to habitat and land use."

Fears among East Texas landowners and hunters that overharvest depressed the herds is understandable, since the deer population slide roughly coincided with a change to the either-sex system of bag limits in most Pineywoods counties in the late 1980s. "The decline was underway before either-sex bag limits went into effect, and the decline also occurred while doe harvest was controlled by permit," said Spencer. "During the years when deer populations were high, hunters were taking only about 10 percent of the herd. The 1987-88 harvest accounted for a very small portion of the total reduction in deer numbers observed between those two years. It's been well documented that an annual harvest of up to 25 percent is not detrimental."

If hunting did not cause the decline, what did?

"There are several reasons, but the stage was set by overpopulation of deer and overbrowsed habitat that resulted from excessive deer numbers," Spencer explained. "Then, two factors accelerated the populations' decline. A severe early-spring freeze in 1987 killed the acorn crop for that entire year, along with part of the fruit crop. This was followed by a drought in early 1988. This created a nutritional stress period that led to losses of adult deer and poor fawn production and survival." In fact, Spencer said, fawn survival for the Pineywoods between 1987 and 1991

was only about half of that seen 10 years earlier.

Residents of the region find it difficult to accept that a deer die-off can happen without their actually seeing dead deer. Spencer said, but such an occurrence is not unusual. "Die-offs of deer are seldom very obvious. In East Texas they go virtually unnoticed because of thick cover and lower visibility in the dense woods," he said. "Also, fawn mortality generally occurs during summer when people aren't usually out in the woods. We have carefully monitored deer carcasses in the woods to see how long they last. They disappear in a

day or two because of predators, scavengers and rapid decomposition."

Hunting pressure, Spencer believes, is not the cause of the overall slump in deer populations in the Pineywoods, but there is a problem with a disproportionate harvest of bucks in relation to the doe harvest. Wildlife biologists from both governmental and private sectors point out that heavy hunting pressure on the buck segment of the deer herd has resulted in an imbalance in the population. This is reflected by a reduction in the average age of bucks harvested in the region, a problem that has been addressed by instituting the "one buck"



Grady Allen

*Pine forests mixed with hardwoods can provide good deer habitat (right), but a thick pine overstory, especially in mature pine plantations, is unfavorable for whitetail production.*



Grady Allen

limit throughout East Texas. Studies have shown that fully half the bucks harvested in the Pineywoods are extremely young, 1½ years old or younger. On the other hand, the age structure of does examined in the survey reflected light hunting pressure, as 48 percent were older than 2½ years. However, department biologists say that herd dynamics in the long haul are influenced less by legal hunting than by fundamental changes in habitat.

How healthy is the Pineywoods deer habitat? "Weather conditions have been favorable for deer during the past two years, with rainfall bringing an improved mast crop," Spencer said. "We already are seeing signs that deer populations have stabilized and are rebounding in some areas. However, there are some basic habitat problems brought about by changing land-use patterns, and unfortunately many of these problems appear to be getting worse instead of better."

Challenges to the Pineywoods ecology are coming from several directions, Spencer said:

- Conversion of forests to pine monoculture continues to reduce wildlife

diversity on large acreages, and practices such as aerial application of herbicides to kill competing plant species add to the damage.

- Conversion of woodlands to pasture has increased dramatically in recent years. "The Pineywoods is not a natural grassland, so landowners grazing cattle are forced to use nonnative species such as coastal bermuda that provides poor deer forage. This grass monoculture is of little or no value for deer and other wildlife," Spencer said. Also, introduced grasses often require herbicide applications to control weeds, he added, further reducing deer forage.

- Cattle grazing in woodland areas causes direct competition with deer. "It's a widely accepted misconception that cattle don't compete with deer, since they are grazers and deer are browsers," said Spencer. "But when cattle occupy an overgrazed woodland they turn to many of the browse species of plants that are important deer food, especially in winter when grass is scarce."

- Lignite strip-mining has impacted areas of East Texas, where topsoil is removed to expose coal formations. "Reclaiming" of strip-mined lands usu-

ally means replacing the lost habitat with a grass monoculture that is poor for supporting wildlife.

- Reservoir construction already has removed an estimated 600,000 acres of the most productive wildlife habitat in East Texas by flooding hardwood bottomlands. Studies completed in 1980 indicated that 63 percent of Texas's original bottomland forests already have been lost, and more reservoir projects are on the drawing board. "The loss of bottomlands hurts, and you also have to remember that shoreline developments compound the loss of habitat in wide areas around reservoirs," Spencer said.

- Urbanization and a growing human population in East Texas will continue to remove chunks of wildlife habitat. "The experts have predicted a population of as many as 20 million people in Texas by the year 2000," Spencer said. "We already have a high human population density, and more people are moving out of the cities and into the country." This reverse migration trend brings a host of habitat-degrading factors, including road and utility construction and the inevitable brush clearing that accompanies the

establishment of subdivisions and homesteads in rural areas.

From a wildlife biologist's point of view, the damage already done to the Pineywoods habitat in many cases may take decades or longer to reverse. What can be done to preserve and enhance the habitat that's left? "The answer lies mainly in the hands of landowners, because more than 90 percent of the Pineywoods is privately owned," Spencer said, adding that an estimated two-thirds of the deer range is within small private tracts. "The department can provide guidance and set regulations, but in the final analysis it's landowners and groups of landowners working together who can make the difference."

Landowners, assisted by hunters and the Parks and Wildlife Department, were important cooperators in ensuring the return of the whitetail to East Texas where the animals virtually were nonexistent at the turn of the century. Deer fell victim mainly to illegal hunting and small-farm agriculture during East Texas's early settlement days.

The deer comeback in postwar East Texas happened because of demographic and land-use changes. As small farms lost their economic viability, many farm families moved to urban areas to find jobs. This opened the door for an invasion of woody plant species into open fields that once produced row crops. At the same time, postwar hunting regulations were made more restrictive and law enforcement became more effective against poachers. Timber companies and other landowners,

who formerly allowed open hunting, began to tighten control, and lease hunting became established.

One of the most important factors in the return of whitetails to East Texas was a 50-year period of restocking programs by the department, beginning in the 1940s. Vast areas of the region had habitat but no deer, so the department trapped more than 12,000 surplus deer from other areas of the state and released them in the Pineywoods. Now most areas that possess adequate habitat have self-sustaining populations of white-tailed deer.

Spencer already sees encouraging signs that the East Texas deer herd is making a comeback, but he warns that

hunters cannot, and should not, expect deer populations to climb back to 1987 levels. "With the exception of certain well-managed tracts where controlled hunting kept deer numbers in check, most of the Pineywoods was overpopulated by deer in 1987," Spencer said. "When this happens, it causes damage to the habitat that cannot be repaired in a couple of years, even if the deer herd is reduced." Landowners and managers, then, should take the initiative at this time to improve deer habitat and at the same time maintain a consistent harvest of the antlerless segment of the herd to prevent recurrence of the overbrowsing effect. "When deer populations go down, the tendency is to



Glen Mills



Bill Fraeves

*A big reason for the return of whitetails to East Texas was stocking of deer from other parts of the state. The biologists above are fitting a fawn with a radio collar for a telemetry study.*

*Clearcutting (left) is a controversial timber management technique, because it creates temporary deer habitat that deteriorates as the plantation grows to maturity, crowding out vegetation used by whitetails.*

# A TALE OF TWO HERDS

by Jim Cox

**O**ne white-tailed deer herd flourishes while another crashes. Wildlife biologists say these two textbook case histories, offering classic examples of the good and the bad in deer management, are among a host of examples from the past to guide us in the future management of East Texas's deer resources. But are we heeding the lessons of history?

The following two case histories of study areas in East Texas offer contrasting examples. Mismanagement on one of the areas sent a healthy deer herd to ruin in a remarkably short time, while on the other tract the application of a few deer management basics maintained the herd in healthy condition year after year. Extremes at both ends of the spectrum still can be observed today in the Pineywoods. Biologists warn that without effective stewardship the white-tailed deer resource in the Pineywoods may be headed for trouble.

The first case history is an excellent illustration of how *not* to manage a deer herd.

## Red River Arsenal Bowie County

Wildlife biologists of the Texas Parks and Wildlife Department began monitoring the white-tailed deer herd on this 36,000-acre, federally owned munitions storage area in 1955. Acquired by the government in 1941, the tract contained abandoned farmlands that initially provided excellent deer habitat because of the growth of brush and young forest. Deer were stocked there in 1949, and the first hunt was held in 1954, when 25 bucks were harvested.

Deer population surveys on the arsenal in 1955 revealed that whitetails already had exceeded the range's carrying capacity, with approximately 60 deer per 1,000 acres. Forty deer per 1,000 acres was considered best for the area. In an effort to reduce the deer population and prevent further overbrowsing of the range, the department initiated a program of antlerless deer harvest. However, an insufficient number of antlerless deer was harvested to bring the herd under control.

Meanwhile, Red River Arsenal leaders had embarked on a massive pine tree reforestation program beginning in 1958, seeding or planting virtually all the old agricultural fields with fast-growing pines. Thus, at the same time deer populations were expanding, food supplies were gradually being diminished by the shading effect of maturing pine forest, which inhibited the growth of plants needed as food for deer.

Deer populations began leveling off in 1959, but remained high until 1965, when the combination of too many deer and deteriorating habitat triggered a deer die-off. The deer mortality went unnoticed by RRA personnel, even though a large work force was present.

After three consecutive years of declines, the deer population reached a low of only 15 deer per 1,000 acres in 1967. Subsequent surveys demonstrated that the area could support only a relatively low deer population compared to previous years.

"The RRA deer herd offers another classic example of a deer herd responding to declining habitat conditions," said

Texas Parks and Wildlife Department biologist Gary Spencer of Jasper. The overpopulation of deer combined with habitat loss opened the door to malnutrition and die-offs, he said. Deer harvest records through 1991 indicate the deer population may only now be recovering somewhat as a result of heavy thinning and controlled burning projects in the pine stands.

Almost the same scenario can be seen in records from the Longhorn Army Ammunition Plant in Harrison County, Spencer said. This government tract started with excellent habitat in the form of fallow farmland in the early 1960s. But, similar to the Red River area, lack of controls over a runaway deer herd combined with an intensive pine reforestation program spelled trouble for deer. After peaking in 1963, the herd crashed in 1964 and has remained at low levels thereafter.

## Bear Creek Hunting Club Sabine County

This 11,000-acre tract of commercial forest land adjacent to Sam Rayburn Reservoir offers an example of how a deer herd can be harvested and managed to avoid the "boom and crash" cycle of overpopulation and die-offs.

This hunting club lease, which is owned by Temple-Inland, Inc., did not start out with high deer populations, Spencer said. Prior to coming under the control of the hunting club in 1974, the area was open to the public for virtually unrestricted use. Poaching and unregulated hunting had depressed deer populations, even though most of the habitat was rated as "good to excellent."

The club initially had problems controlling poaching, since the property was bordered by public lands, small private tracts, subdivisions, state highways and county roads. Despite these problems, deer populations gradually increased to near carrying capacity by 1984, 10 years after the property was leased to the hunting club.

Instead of allowing the deer herd to overpopulate, the club acted on recommendations by TPWD to increase the



Bill Reaves

*Pine monoculture (above), urbanization, conversion of woodlands to pasture and reservoir construction are a few of the factors affecting Pineywoods deer populations.*

antlerless harvest. Since 1984, antlerless deer have represented fully half the annual harvest, allowing a highly favorable ratio of approximately one buck to 1.6 does. One of the results of this ratio is the presence of more bucks in the herd than are found on the average Pineywoods lease, Spencer said. "Deer populations are healthy, buck quality is above average and fawn production is high," he said. "Because of heavy hunting pressure on doe deer, the female segment of the herd is very young, but good range and body conditions allow more than enough fawns to survive each year to replace the annual harvest."

Spencer said that as long as habitat conditions remain stable, the Bear Creek herd should sustain the current annual harvest indefinitely. "Bear Creek is a good example of how a sustained yield of healthy, quality deer can be maintained through a proper harvest of deer of both sexes. Further, the 'boom and crash' cycle seen in less-managed herds has been averted at Bear Creek." ★

reduce hunting harvest below what is required, especially on antlerless deer. However, an underharvest generally leads to another cycle of overpopulation and habitat damage," Spencer said. "A harvest strategy aimed at keeping populations within the range's carrying capacity can produce a healthier deer herd—and one that doesn't experience the 'boom and crash' cycles we've seen in the past few years."

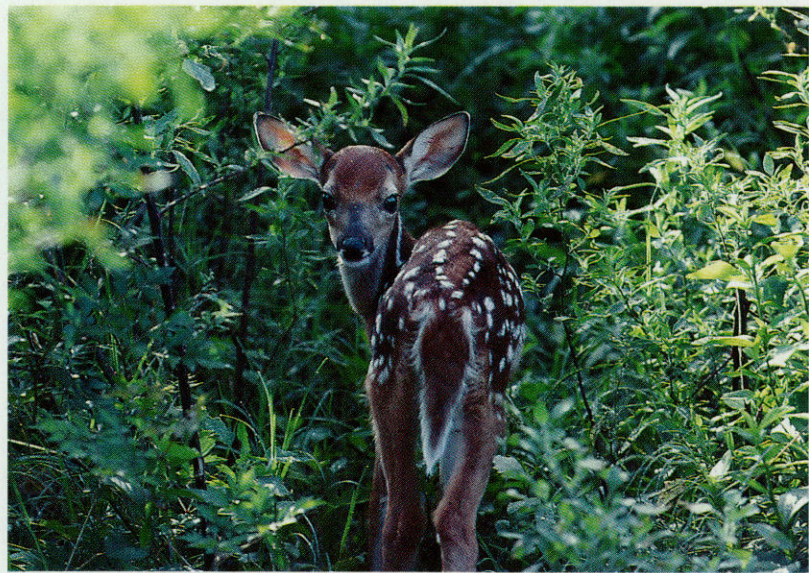
One of the social roadblocks to good deer management in the Pineywoods is the suspicion by some landowners that their efforts to manage deer and their habitat are scuttled by uncaring neighbors who "shoot all of our deer." This attitude is especially noticeable in East Texas because of the existence of large numbers of relatively small land holdings. And there are examples of too many deer taken off too few acres. Another stumbling block is the attitude by landowners that deer management does not work on small tracts of land, and that they have no control over their deer population.

"There are many documented cases where proper management has improved deer herds on relatively small tracts," Spencer said, "but where this really can work is when a number of landowners get together for a coordinated effort." A team effort involving

several landowners and perhaps several thousand acres can set the stage for quality deer management, including improved law enforcement, setting harvest quotas, collecting data and improving habitat.

"The Parks and Wildlife Department can provide the guidance and expertise, but it's up to landowners to work on their own land to make conditions better for wildlife," Spencer said. This is not a new or untried concept, as cooperatives have been set up in various parts of the state with good results. In fact, landowner agreements are a vital part of the eastern turkey restoration program that is steadily bringing the species back to prominence in East Texas after being eliminated from the region more than a half-century ago. Spencer believes the same concept works for deer.

"Land-use trends in the Pineywoods limit the ability for deer to maintain high numbers," Spencer said. "If more habitat is degraded or lost over time, deer numbers in turn will decline. Landowners, hunters, governmental agencies and others must become partners in cooperative efforts to ensure the future of the deer resource. Habitat conservation and management is the key. The future of that resource is in our hands." ★



Rusty Yates

*Poor fawn survival due to overpopulation and drought set the stage for the Pineywoods deer population crash of the late 1980s.*

# Angler Recognition

*You don't have to catch a state record fish to get into the record book.*

by Allen A. Forshage and Danny G. Lewis

So you caught a big fish?

What kind? Largemouth bass?

A nine-pounder? Wow! I guess that's the biggest bass you ever caught in your life, right?

Too bad it misses the state record by about eight pounds.

But wait. Just because your fish isn't a state record doesn't mean you have to be satisfied with a one-column picture in the local weekly and the envy of your fishing buddies.

If your prize catch happens to be the biggest bass ever caught from Old Mossback Lake you could get a Water Body Record certificate from the Texas Parks and Wildlife Department.

Also, since a nine-pounder is over the minimum weight that qualifies that species for an award, you may be eligible for the department's Big Fish Award certificate.

Or, if you measured the fish in the

presence of a witness and released it, you would be eligible for a Lunker Catch and Release pin to recognize your catch and show your commitment to catch-and-release fishing.

Once you've caught a big fish the rest is easy, because all the department's four major fishing awards programs can be applied for on the same fish record application form. These forms are available from department offices across the state as well as from tackle shops, marinas and game wardens. You also can get one by writing or calling department headquarters in Austin.

While catching a state record fish might be difficult, big fish awards are not out of the reach of an angler with determination and a little luck. The easiest of all may be the water body list, where the newness of the program results in a number of unoccupied record slots for the state's reservoirs.

These "angler recognition programs" were conceived mainly to recognize trophy catches, but they also help fishery biologists gather data about a sport fishery that they might not obtain from the normal sampling techniques. For instance, electroshocking and net surveys tell biologists a lot about fish population dynamics. However, trophy fish rarely are caught with these sampling techniques, so biologists need help from anglers to collect information to evaluate this segment of the fish community.

These awards programs increase angling interest and participation. Program standards give anglers a goal to shoot for, and the award itself, with the associated feeling of accomplishment, is very important. Promotion of successful fisheries in newspapers, chamber of commerce literature or in national fishing magazines can do a great deal to attract nonresident anglers or even lure dejected anglers back into action. State and water body records are used to gauge the quality of the fishery. Anglers can examine the state fish record list, the water body record list and the "Texas Top 50 Largemouth Bass List" to assess the offerings of various water bodies.

After implementation of management strategies such as harvest restrictions, fish stocking or habitat manipulation, the returns to a recognition program can be used as an indicator of success as it affects fish populations. It also can help document the occurrence of rare species, the range and magnitude of historical fisheries and determine maximum length and age of a species.

Most Texas anglers would agree that angler recognition programs are helpful, but unfortunately a considerable percentage of them are not aware the programs exist. While anglers are reporting more and larger fish each year, Texas still lags in participation behind several other states that have similar



Martin T. Fuller

*You don't need a fancy boat or even a huge fish to get credit through the department's various angler recognition programs. Many lake records are unfilled, so setting a record might be easy.*



programs for recognizing anglers.

Participation in Texas set a record with 593 certified catches reported through October 1992, but this represents only one out of every 2,000 licensed fishermen in the state. By comparison, Virginia certified 3,600 awards in 1982, and Ohio issued 3,104 during the same year. Even Nebraska, not known as a fishing hotspot, sends out some 2,500 awards annually.

Here are the department's four angler recognition programs and how to apply for them:

### STATE FISH RECORDS

The Texas Parks and Wildlife Department has been maintaining state fish records since taking over the responsibility from the Texas Outdoor Writers Association in 1970, at the group's request. A state record list is maintained for all public waters (freshwater and saltwater) and, since September 1992, private waters. Since the program began, state records have been established for 227 species. During the first two decades, the department's fish records committee certified more than 548 state records from some 60 water bodies.

Approximately 72 percent of state record applications have been for saltwater fish, but perhaps more publicity has been generated by the largemouth bass record. In 1981, Jim Kimbell of Pittsburg caught a 14.09-pounder to break the 37-year-old record. Since then, the bass record has fallen six times in an 11-year span. All the state record bass caught since 1981 were either introduced Florida largemouth bass or its hybrid, illustrating how a records program can document the success of a particular stocking or management program.

To get a potential state record fish certified, the angler first needs the fish record application form. The applicant needs to be aware that, unlike the other programs, a state record application has to include notarization of the angler's and witnesses' signatures. A state record



Many of Texas's smaller lakes and streams not only provide good fishing but also the opportunity to set a water body record.

John Suhstet

fish must be positively identified by a representative of the Texas Parks and Wildlife Department or other professional fisheries person (biologist, university professor, etc.). Also, the application must be accompanied by a photograph of sufficient quality to clearly identify the fish's species and full length in relation to some object of recognizable dimension. Fish must be weighed on certified scales in order to qualify for awards programs based on weight.

### BIG FISH AWARDS

This category of records is for fish that are not big enough to be state records, but nevertheless are worthy of recognition. To qualify, you need only catch a fish that weighs more than the minimum required for that species. Minimum weights for the 19 eligible

species are found, along with other instructions, on the state fish record application form.

If your fish is certified, you receive a "Big Fish Award" certificate listing the fish's weight and signed by the executive director of the department.

Largemouth bass make up 44 percent of all big fish awards, and striped bass are second with 21 percent of the total. E. V. Spence Reservoir near Robert Lee has produced 221 catches and Lake Fork near Quitman has produced 142 big fish awards.

### WATER BODY RECORDS

Before 1988, records of the largest fish caught from lakes, rivers or bays were kept unofficially by marinas, newspapers or interested fishermen. When the department assumed the task, it used state fish records and big fish awards to form the basis of the water body awards program, since the information on these fish was considered accurate.

Some water bodies that had not produced a state record or big fish award for a particular species of fish still have open slots that can be filled, without even having to satisfy a minimum weight. What makes it even easier is the fact that all fish, including carp, buffalo and freshwater drum, are eligible in addition to game fish.

As with big fish awards, largemouth bass dominate the water body record list, making up 27 percent of the total. Flathead catfish are second with 10 percent. Lakes Mackenzie and Whitney are two of the most active lakes, each with more than 14 water body records set or broken in the past five years.

### LUNKER CATCH AND RELEASE

This is the newest, and perhaps least familiar, of the department's angler rec-



Glen Mills

Lunker Catch and Release pins (right) can commemorate catches of big fish that were released alive by the angler.

ognition programs. This program awards colorful pins depicting the species caught and released by the fisherman. The fish must meet the minimum length requirements indicated on the application. The shift in emphasis from weight to length is important, because measuring a fish is quicker than weighing it. Keeping the fish out of water a minimum length of time tends to increase survival, which is the main object of catch-and-release fishing.

To certify your catch, one witness to the live release of the fish must sign the fish record application and the fisherman signs the angler affidavit portion of the form. The fish's length must be recorded, but not the weight. The proper method for measuring the length is illustrated on the application.

While the program started slowly, applications are increasing as the catch-and-release concept gains acceptance among the state's anglers. Issuance of pins has been dominated by largemouth

bass in fresh water and red drum in salt water.

### BE PREPARED

Before heading out to the lake or Gulf, be sure to pick up an Angler Recognition Program pamphlet, which clearly explains all the rules and identifies eligible species and minimum sizes for all awards. Carry a TPWD Fish Record Application form whenever you fish. Even if you don't want recognition or an award, TPWD would appreciate the data on all catches of large fish. If you would like a current copy of water body record listing or other awards program reports, write or call the Texas Parks and Wildlife Department, Angler Recognition Program, 11942 FM 848, Tyler, Texas 75707, 903-566-1615.

*Allen Forshage is a regional director for the Wildlife and Fisheries Division. Danny Lewis is a former systems support specialist for the department.*

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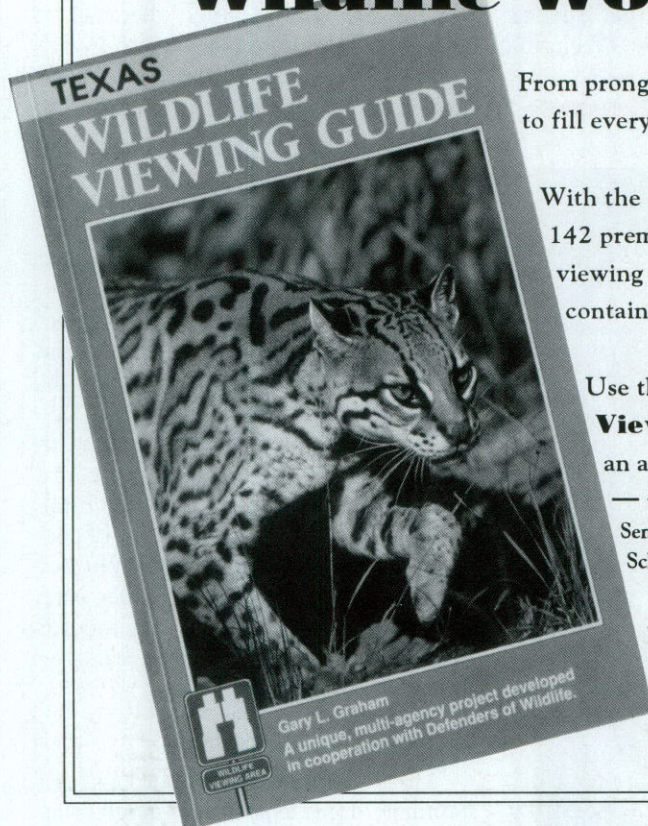
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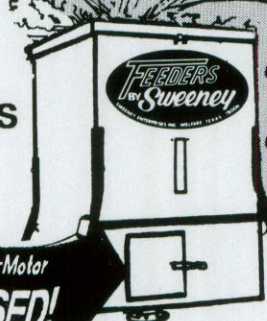
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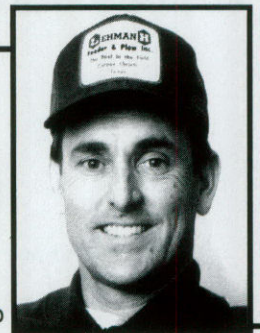
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# O U T D O O R R O U N D U P

## Hueco Tanks Reopens Under New Guidelines

Hueco Tanks State Historical Park near El Paso has been reopened to the public, but under a strict set of guidelines aimed at preventing spray paint vandalism that has damaged much of the ancient rock art at the park.

The park was closed briefly in November to prevent further vandalism, and a public hearing was conducted in El Paso to find ways to deal with the problem.

Officials said new guidelines include higher entrance fees, more restricted access to rock art sites and educational programs. The park now is operating under the following guidelines:

- A Texas Conservation Passport is required of each individual for access into the park. Any visitor under 17 years old must be accompanied by a passport holder. The \$25 passport is good for one year from the date of purchase and provides free daily access to state parks across Texas, overnight camping discounts, special guided tours of wildlife areas and more.

- Access to the interior of the park is

allowed only through guided tours or a special individual back country permit.

- Vehicle access is limited to designated parking areas near the park headquarters and campground. Vehicle access to the west side picnic area is prohibited.

- Camping is permitted only in the existing campground area.

- Solid fuel fires are prohibited. Cooking is permitted with containerized fuel only.

- Hours of operation are from 8 a.m. until dark, seven days a week.

"We had to make a difficult choice among management options that would protect the rock art at Hueco Tanks from vandalism and still allow appropriate visitor access," said Carolyn Schaffer, TPWD park operations director.

"The Texas Conservation Passport requirement was the best option. The purchase of the passport is an investment in the preservation of the site. And while it may cost a little more up front, in the long run local visitors will probably save money, since they'll have free entry to the park for one year with the passport."

In mid-October, park staff discovered a series of serious vandalism incidents. At one site, Cave Kiva, vandals had spray painted what appeared to be a marijuana leaf over part of a well-known pictograph. At another site, Red Horse, vandals painted a six-foot by 10-foot image over another well-known three-foot by four-foot rock art image of a horse.

The public hearing also focused TPWD staff attention on the fact that visitation at Hueco Tanks has jumped from 40,000 visitors in 1982 to 140,000 in 1992. The growth of visitation and impact at the site is also a significant factor in new management policies designed to control visitor access.

In addition to Hueco Tanks, department staff encourage the public to consider Franklin Mountains State Park near El Paso for picnicking and other

day-use activities. For information on Franklin Mountains, contact Superintendent Carolina Ramos at 915-877-1528. For Hueco Tanks information, call Superintendent Darrel Rhyne at 915-857-1135.

## TPWD Given Park Site On San Marcos River

The Texas Parks and Wildlife Department has received a 5.5-acre tract of land across the San Marcos River from the A. E. Wood State Fish Hatchery, providing improved access to the river for canoeing and boating and offering a place for picnicking and other recreational opportunities.

The site, known as Thompson's Island, was donated by John J. Stokes, Sr. of San Marcos.

The area, on the upper reaches of the San Marcos River, is a valuable recreational and natural resource. Preservation efforts have placed most of the river frontage east of Interstate Highway 35 into public ownership. Officials said acquisition of this additional river frontage will contribute to an overall greenway preservation concept for the San Marcos River.

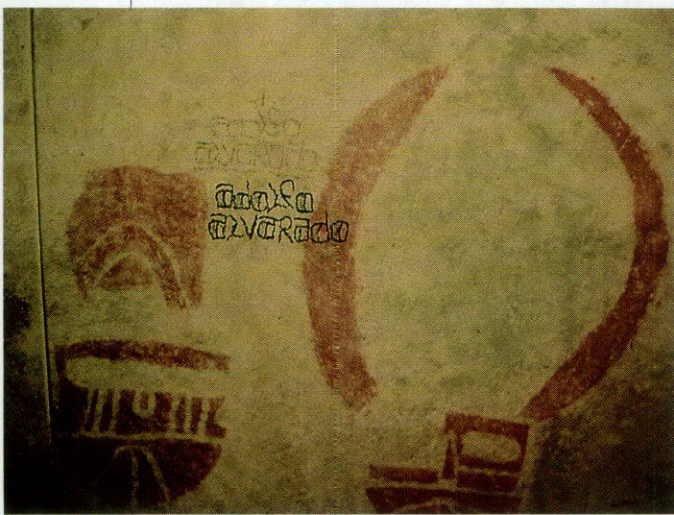
The site will be operated through a management agreement with the city of San Marcos.

## Operation Game Thief Launches New Program

Operation Game Thief, already acclaimed as a success, will add a new program designed for those individuals who have the most impact on compliance with state wildlife regulations—the sportsmen of Texas.

A tax-deductible \$100 annual donation will entitle a person to become a "sponsor" of the new Respect Wildlife campaign. Sponsors will receive a cap, window decal and a subscription to the quarterly newsletter. For a \$25 annual donation, an individual can become a "member" and receive a window decal and subscription.

An advisory board of directors will identify and secure sponsors and mem-



Ron Ralph

*Vandals have damaged a number of ancient rock art sites at Hueco Tanks State Historical Park near El Paso, causing officials to restrict access to the pictograph areas. This incident occurred at Cave Kiva.*

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Grace A. Perez

Balladeer Jerry Jeff Walker sings his new song "Hill Country Rain" at Guadalupe River State Park. Walker stars in a video being produced by the TPWD, the Texas Department of Commerce and volunteers to promote Texas as a tourist destination.

bers. Advisory board members will serve for two years while sponsors and members will renew annually. "Through this new program the Operation Game Thief Fund will be substantially increased, which will enable the OGT Committee to provide additional reward payments for information leading to the arrest and conviction of those found guilty of violating game and fish laws in Texas," said Stuart Stedman, OGT Committee chairman.

Additional information about the new program and the existing Operation Game Thief program may be obtained by contacting Steve Pritchett, OGT, 4200 Smith School Road, Austin, Texas 78744, or by calling 1-800-792-1112, ext. 4626, or 512-389-4526.

### License Sales Down But Revenue Increases

Texas hunting and fishing license sales declined just more than 1 percent dur-

ing 1991-92, a period when fees for many licenses and stamps increased. The increased fees brought a 38 percent increase in revenue.

Texas Parks and Wildlife Department figures indicate an estimated 3,167,444 licenses and stamps were sold, down from 3,203,937 in 1990-91.

One reason for the increased revenue is the new \$5 turkey stamp. The department sold 157,000 turkey stamps during the first year of the stamp. Revenue from the stamp sales will directly benefit turkey stocking and research.

Total hunting licenses sold was 1,048,706, down from 1,101,882 the previous year. License sales narrowly avoided dropping below one million hunters for the first time since 1971.

Resident hunting license sales dropped after the previous fee increase in 1985-86, then increased for two years before dropping each year since 1988-89. Resident hunting license sales were down last year to 1,011,583, a decrease

from 1,067,763 in 1990-91.

The department sold 523,689 combination hunting and fishing licenses, 328,627 resident hunting licenses and 156,831 special resident hunting licenses. Resident hunting sales were up 26.57 percent from the previous year, most likely because more people chose not to purchase the combination license, said Paul Israel, license section supervisor. In previous years, a combination license saved the purchaser \$3 over the cost of hunting and fishing licenses bought separately. Now the savings is only \$1.

Nonresident hunting license sales numbered 57,123 up from 34,119 the previous year, and the highest total ever. The largest increase came from the nonresident five-day special hunting license, which increased from 17,323 to 19,670.

Total fishing license sales dropped from 1,897,224 in 1990-91 to 1,705,958 last year. There were 1,599,357 licensed resident fishermen in Texas last year,

# OUTDOOR ROUNDUP

*Continued*

down from 1,778,669 the previous year.

The department sold 982,611 resident fishing licenses, down from 1,075,500 in 1990-91, and the first time sales have dropped below one million since 1984-85. Once again, Israel said, the fee increase helped one license while hurting another. While resident fishing and combination license sales are down, the temporary (14-day) resident fishing license doubled from 42,711 in 1990-91 to 85,500 this past year.

Nonresident fishing licenses decreased from 118,555 to 106,601 after climbing for six consecutive years. Beginning with 87,248 in 1983-84, sales had risen each year to 118,555 in 1990-91. "Even though we dropped a little in nonresident fishing licenses, I think people from out of state realize what a great outdoor bargain we've got in Texas," Israel said.

The addition of the turkey stamp helped increase overall hunting stamp sales last year to 384,368, up from 224,803 in 1990-91.

White-winged dove stamps were popular with sales of 54,433, an increase from 38,282 the previous year, and the highest number on record. Archery hunting stamps declined from 75,438 to 72,259, the lowest since 1986-87. Waterfowl stamps dropped from 109,990 to 99,888, the first time on record waterfowl stamps have been below 100,000.

Both fishing stamps decreased. The saltwater stamp dropped from 605,783 to 530,880. The freshwater trout stamp decreased from 31,034 to 25,429.

"Early indications (based on license and stamp distribution) are that license and stamp sales for 1992-93 probably will be similar to last year's numbers," Israel said. "This largely may be attributed to excellent hunting and fishing forecasts."

## Grass Carp Increasing In Trinity River

Texas Parks and Wildlife Department fishery surveys are indicating that a large grass carp population exists in the Trinity River below Lake Livingston, according to biologists.

From July 1991 to September 1992, more than 13,000 pounds of grass carp were caught from the river by commercial fishermen. Biologists say that is a large number because grass carp are extremely difficult to capture.

Dr. Earl Chilton, TPWD inland fisheries biologist, said there are at least two possible explanations for why there are grass carp in the Trinity River. First, there probably were a number of escapees from Lake Conroe as well as illegally stocked fish from smaller ponds. Second, some of the escaped fish may be reproducing in the river. Reproducing populations of grass carp represent a potential threat to aquatic vegetation that is vital to fish and wildlife, both in freshwater rivers and lakes and in Texas's coastal bays.

"To verify possible reproduction, our biologists began looking for grass carp eggs and fry during the last spawning season," Chilton said. "No larvae have been found, but a number of healthy grass carp eggs, very close to hatching, have been found."

This find represents the first documented case of grass carp spawning in North America outside the Mississippi

River drainage. Although the presence of grass carp eggs does not prove there has been successful growth to a catchable size, the case is certainly strengthened, he said. TPWD biologists continue to look for larval grass carp and juveniles to determine if recruitment is occurring.

"It must be emphasized that if spawning and recruitment of grass carp is going on in the Trinity River, it is not because of the recent legalization of triploid (sterile) grass carp," said Chilton, who has studied the triploid grass carp in Texas. "One of the reasons the staff recommended limited use of triploids was concern about the large number of diploids occurring in public water, especially the Trinity."

Triploids are functionally sterile and the probability of reproduction is extremely low. If reproduction is taking place it is a result of normal (diploid) fish being introduced into the system, either from mature fish escaping from Lake Conroe or from illegally stocked fish escaping from other areas over the years.

"The situation in the Trinity River certainly is disturbing," Chilton said. "We would be much less concerned if the fish currently in the Trinity River were triploid. Triploids could only enter the system through escape from other areas and it would be much easier for us to limit escapement of triploids than to control reproduction of diploids."

TPWD biologists will continue looking for grass carp eggs and larvae during this spring's spawning season, and will conduct radio-tracking studies to determine grass carp movement in the Trinity River as well as the likelihood of migration into other systems.

## GameCoin Celebrates Silver Anniversary

Game Conservation International, one of the world's leading wildlife conservation organizations, will host sportsmen and women, artists, educators and scientists from several nations at its Silver Anniversary Conference February 3-7 at the San Antonio Convention Center.

GameCoin applies revenues from art and safari auctions plus registration fees to support wildlife management and restoration programs worldwide.

For more information on the conference contact Larry Means, executive director, at 512-824-7509.



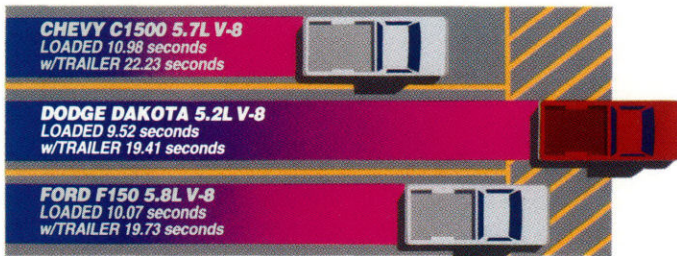
*Actor and country singer Kenny Rogers prepares for a showdown with some bad hombres in a television movie entitled "Rio Diablo," filmed recently at the Texas Parks and Wildlife Department's Big Bend Ranch State Natural Area.*



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