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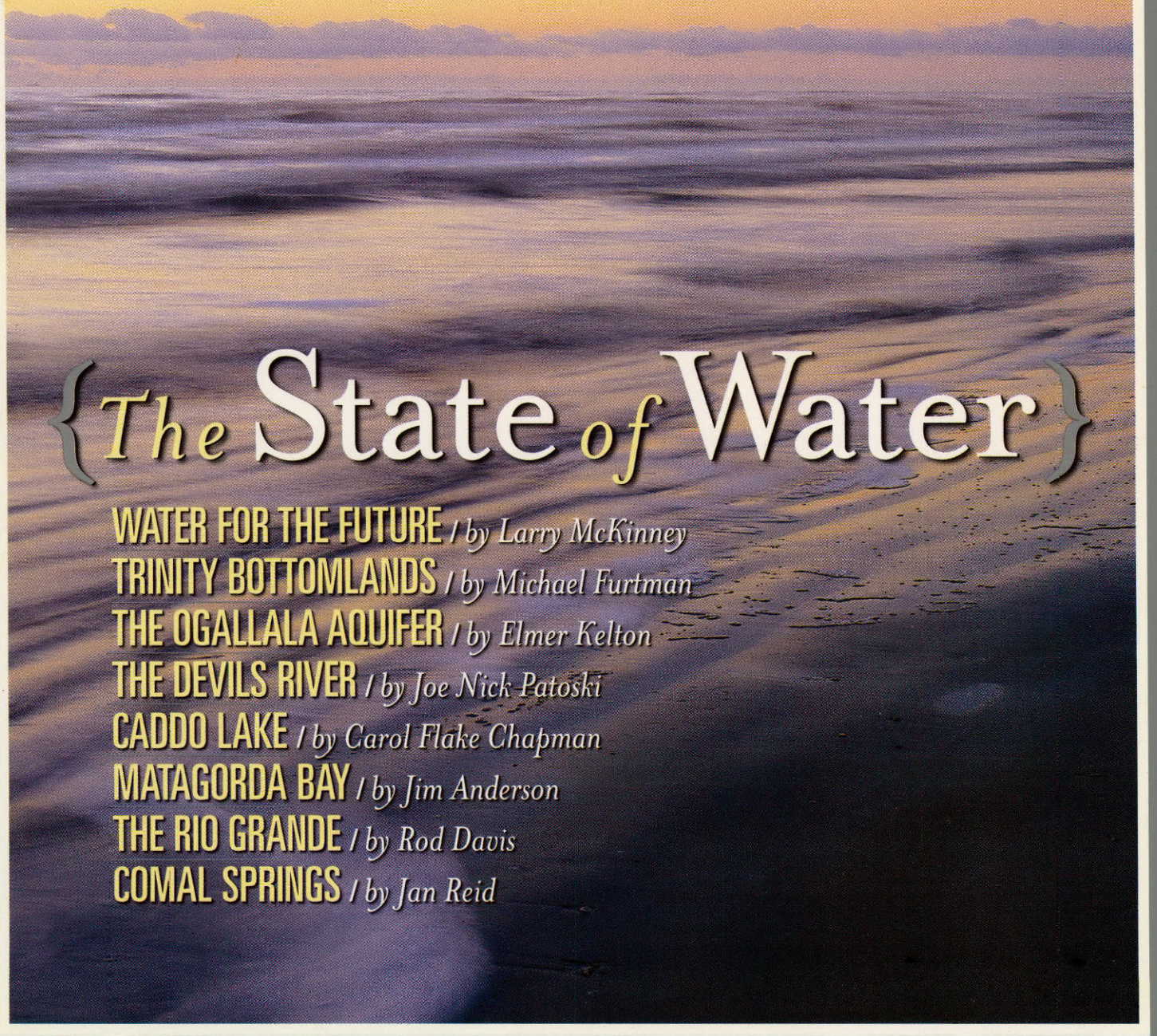
TEXAS PARKS & WILDLIFE

The OUTDOOR MAGAZINE *of* TEXAS



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Features

Six Essays: A Celebration of Texas Water

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JULY 2002

SPECIAL REPORT:

Rio Grande No Más?

by Rod Davis

The Rio Grande is the lifeblood that supports the cities and farms of 13 million people in two countries. Is it beyond salvation?

Rio Grande through Boquillas Canyon © Earl Nottingham

For the latest and greatest parks and wildlife information, check out our Web site <www.tpwd.state.tx.us>

Departments

Covers

FRONT: Water not only is necessary for every biological function, it is a source of aesthetic pleasure, as evidenced by this inviting shoreline of the Gulf of Mexico. Photo © Rusty Yates.

BACK: Drought — the absence of water — is the costliest of all natural disasters. Photo by Earl Nottingham.

This page: Gulf of Mexico. Photo © Rusty Yates

AT ISSUE

FROM THE PEN OF ROBERT L. COOK

Water.

Clean, clear, fresh, water. It's priceless. Central to life itself, we drink it, bathe in it and play in it. We pour it lavishly on suburban lawns and gardens; we wash our cars and our dogs in it.

Some folks, when asked where their water comes from, will reply "from the faucet." Ask Austinites, they'll tell you "mostly from the Lower Colorado River Authority, from our lakes." My friends at LCRA know that the mighty Colorado River feeds our lakes. The truth, of course, is more complex than that: our water comes from rain that falls far northwest of Austin, a rain that is welcomed on the much drier landscape of the Edwards Plateau and the Rolling Plains of Texas.

These rains fall on private land, ranches, and farmland, like the old Bannowsky homestead near Cleo, then drain into Bear Creek before converging with the North Llano River between Junction and Sonora, and on through Kimble, Mason and Llano counties and into Lake Lyndon B. Johnson.

Rains fall on ranching communities such as Eldorado, Sterling City, Eden, Brady and Buffalo Gap. Our "Austin water" comes from rain that has fallen on the eastern edge of the High Plains for millions of years, ever so slowly creating the escarpment that today Texans refer to simply as "The Caprock." The rainfall then flows hundreds of miles down the Colorado River through Borden, Mitchell, Coke, Runnels, McCulloch and San Saba counties before reaching our Highland Lakes.

Together, we can craft a Texas for our children and grandchildren where rivers always flow to the sea, cleansing and nourishing every living thing along the way.

If Austin wants to have plenty of clean, clear, fresh water in the future — and believe me, the folks downstream in Bastrop, La Grange, Columbus, Wharton, and Bay City sure hope that we do have plenty — we must do a couple of things quickly. First, we need to conserve our water by using less. We know how to do this; plus, it saves money as well as water. Second, we need to help the private landowners on those millions of acres far upstream from which our water originates. If we want to have plenty of clean, clear, fresh water, we must begin there, as that is where the most good can be done and where our dollars can most effectively and efficiently be spent.

We can facilitate better range and habitat management far, far upstream. Better habitat management means more native grasses and more groundcover, so that the cherished rainfall soaks into the soil and returns as springwater to the rivers, and more vegetation slowing runoff and erosion, keeping our rivers and lakes clean. We can provide assistance to private landowners upstream to improve both water quality and quantity. The TPWD technical guidance program, which provides habitat for more quail, more turkeys and bigger, better deer also results in improved absorption of rainfall and reduced erosion. When landowners remove noxious brush, which is using up much of our prized water, the better grass and groundcover plants which provide needed forage and cover for wildlife and domestic livestock replenish themselves.

Together, we can craft a Texas for our children and grandchildren where rivers always flow to the sea, cleansing and nourishing every living thing along the way. Now that's priceless.

Texas Parks and Wildlife Department mission statement:

To manage and conserve the natural and cultural resources of Texas and to provide hunting, fishing and outdoor recreation opportunities for the use and enjoyment of present and future generations.

TEXAS PARKS & WILDLIFE

The OUTDOOR MAGAZINE *of* TEXAS

JULY 2002, VOL. 60, NO. 7

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Texas Parks & Wildlife magazine is edited to inform readers, and to stimulate their enjoyment of the Texas outdoors. It reflects the many viewpoints of contributing readers, writers, photographers and illustrators. Only articles written by agency employees will always represent policies of Texas Parks and Wildlife Department.

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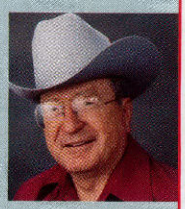
In the Field

LARRY McKINNEY, Ph.D., is Texas Parks and Wildlife Department's senior director for aquatic resources. McKinney grew up near the small farming community of Coahoma in West Texas during the 1950s "Drought of Record," which was a defining point for water development in the state. The McKinney family farmstead has seen continual agricultural production for more than a century and Larry's appreciation for water issues originated from these experiences.

McKinney completed his Ph.D. at Texas A&M University in 1975 and his dissertation was titled: *The Zoography and Ecology of Amphipod Crustacea — Gulf of Mexico and Caribbean Sea.* He was a Smithsonian Fellow in 1976 and a research associate/instructor at Texas A&M University at Galveston from 1977 to 1980. He then was named director of the Texas Environmental Engineering Field Laboratory in Galveston, a position in which he served from 1980 to 1986. McKinney has more than 60 scientific and technical publications and reports to his credit. At TPWD, McKinney's program responsibilities include a broad range of natural resource issues, including inland and coastal fisheries, assessing and securing freshwater inflows to estuaries and instream flows for rivers and reservoirs, wetland conservation and restoration, endangered species conservation and other issues related to the ecological health of Texas aquatic ecosystems.

ELMER KELTON, the legendary Texas author whose writing career has spanned almost half a century, writes about the Ogallala Aquifer in this month's issue. A native of Crane, Texas, Kelton has written 40 novels, including *The Time It Never Rained, The Way of the Coyote, The Day the Cowboys Quit and The Good Old Boys,* which was made into a 1995 movie starring Tommy Lee Jones. Three of his novels have appeared in *Reader's Digest* Condensed Books.

Kelton is the recipient of numerous awards. Four of his books have won the Western Heritage Award from the National Cowboy Hall of Fame. Seven have been recognized with the Spur award from Western Writers of America. In 1987, he received the Barbara McCombs/Lon Tinkle award for "continuing excellence in Texas letters" from the Texas Institute of Letters. The Texas Legislature proclaimed an Elmer Kelton Day in April 1997, and in 1998 he received the first Lone Star Award for lifetime achievement from the Larry McMurtry Center for Arts and Humanities at Midwestern State University in Wichita Falls. A Texas star with his name inscribed on it was placed in the sidewalk at the Fort Worth Stockyards by the Texas Trail Hall of Fame Organization.

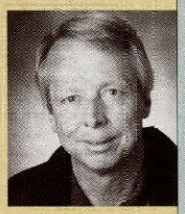


Kelton and his wife, Anna, have been married for 53 years and have two sons, a daughter, four grandchildren and five great-grandchildren.

JAN REID'S much-praised new book is *The Bullet Meant for Me,* a memoir from Broadway Books that explores his near-fatal 1998 shooting by a Mexico City robber and his fight back from paralysis. Published in 2000 by Texas A&M University Press was *Close Calls,* a collection of magazine articles; its endpiece, "Left for Dead," won the PEN Texas Literary Award for nonfiction in 2001.

Reid's other books are *The Improbable Rise of Redneck Rock* (popular

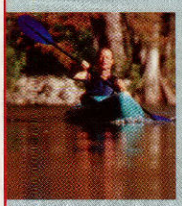
music, 1974), *Deerinwater* (a novel, 1985) and *Vain Glory* (football, 1986). He is a writer-at-large for *Texas Monthly* and has written for *Texas Parks & Wildlife, Esquire, GQ, the New York Times Magazine, Slate, Men's Journal, Mother Jones* and other publications. Reid's writing has been anthologized in *Best American Sports Writing, Texas Short Stories, The Slate Diaries* and *The Best of Texas Monthly.*



His honors include the Dobie-Paisano Fellowship and a grant from the National Endowment for the Arts. As editor, with writer Rick Bass, he shared a 2000 Katie Award for an essay about a hunting dog in *Texas Parks & Wildlife.*

Reid currently is editing a book and researching a documentary on the Rio Grande and working on a novel set during the Comanche Wars. He lives in Austin with his wife, Dorothy Browne. In this issue he writes about his personal connection with Comal Springs.

JOE NICK PATOSKI, who writes about Devils River this month, is a senior editor at *Texas Monthly* and a weekly contributor to KGSR-FM in Austin. Patoski was raised in Forth Worth and has been writing about Texas for the past 30 years. He lived in Austin for 22 years, where he developed a passion for Barton Springs and the springs and rivers of the Texas Hill Country.



Patoski coauthored the 1993 book *Stevie Ray Vaughan: Caught in the Crossfire* about the Texas blues guitar legend. He also wrote a biography of entertainer Selena, *Selena: Como La Flor,* and collaborated with photographer Laurence Parent for the 2001 book *Texas Mountains.* His outdoor writing has included stories about working with killer bees in Mexico, snorkeling with barracudas on the Bay Islands of Honduras, hiking through Copper Canyon, learning how to survive in the Chihuahuan Desert and chasing tornados in the Texas Panhandle.

For the past nine years, Patoski has made his home outside of Wimberley near the Blanco River, where he can be found doing laps from early spring to late fall.

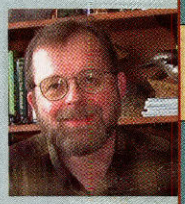
CAROL FLAKE CHAPMAN grew up along Oyster Creek in Brazoria County. As a child she used to spend hours paddling down the muddy creek, which then was surrounded by dense, jungle-like woods, fishing for alligator gar in the murky waters.

Since then, she has traveled the world in search of other adventures, writing articles for *Vanity Fair, Texas Monthly, Harper's, U.S. News & World Report, The New Yorker, The New York Times, The Boston Globe* and other publications. She is the author of two books about horse racing, *Thoroughbred Kingdoms* and *Tarnished Crown.*

Chapman rode camels through Oman and the deserts of Rajastan, India, and rode a camel through Big Bend Ranch State Park, tracing the story of the Texas camel cavalry for the January 2001 issue of *Texas Parks & Wildlife.* She is currently working on a book about the Choctaw Indians, to whom she is related by both blood and spirit. In this issue she writes about Caddo Lake.

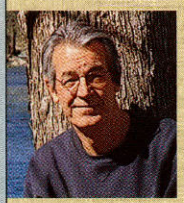
MICHAEL FURTMAN writes in this issue about the ecological and spiritual benefits of wetlands, a subject he's studied from a duck blind for more than 30 years. Furtman is the author of 14 books, including his latest from Ducks Unlimited, *Duck Country,* which is the 2001 Excellence in Craft winner from the Outdoor Writers of America Association. Eight of his books have been on the subjects of fish or wildlife ecology, while several focus on the Boundary Waters Canoe Area Wilderness of northern Minnesota, where he once served as a U.S. Forest Service wilderness ranger. A passionate waterfowler, in 1989 he followed the duck migration from Saskatchewan to the Gulf of Mexico, as told in his book *On The Wings of a North Wind.*

His writing and photography have been featured in numerous magazines, including *Boy's Life, Bugle, CANOE, Fly Rod & Reel, GeoKorea, Gun Dog, Minnesota Conservation Volunteer, Outdoor America, Ducks Unlimited Magazine, Field & Stream, Sky Magazine, Sports Afield, Terra Savauge, TROUT* and *Wildfowl.* He is currently the environmental editor for *Midwest Fly Fishing.*



Furtman co-hosted and co-wrote "Outdoor Ethics," which aired on ESPN2 during 2001 and 2002, and was sponsored by the Izaak Walton League of America and Orvis. He lives in Duluth, Minn., near the shores of Lake Superior with his wife, Mary Jo, and their black lab, Wigeon.

JIM ANDERSON is an Austin-based freelance writer and former advertising executive who grew up near Paris — the Texas version — where saltwater was a sore throat remedy and a river was a wide expanse of reddish mud beyond which lay a mysterious place called Oklahoma. In the years since, he has lived in cities near both the Atlantic and Pacific coasts, and has logged many hours camping and fly fishing on many rivers. He is a continuing student of aquatic nature and an occasional contributor to this magazine.

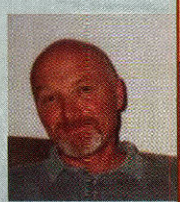


While doing field research for this month's article on Matagorda Bay, Anderson spent several days along the Gulf Coast, by boat and land, learning firsthand some of the intricacies of various estuary ecosystems and talking to people who depend on the Gulf directly, indirectly, emotionally or all of the above. When new water policy proposals were formalized in February, potentially affecting the future of Matagorda Bay and the Lower Colorado River watershed, it seemed timely to focus on that specific region for this special issue.

ROD DAVIS, who writes about the Rio Grande this month, is the author of a six-part series on the Texas-Mexico border called "A Rio Runs Through It," which will appear in *The Best American Travel Writing 2002,* an annual anthology published by Houghton-Mifflin.

Davis is an award-winning journalist and editor who is currently travel editor of the *San Antonio Express.* His work has appeared in numerous publications including *Southern Magazine, The Boston Globe Magazine, Los Angeles Times, Playboy, Men's Journal, Texas Monthly, Destination Discovery, The Texas Observer, The Progressive, San Francisco Bay Guardian* and *Old Farmer's Almanac.*

His versatile professional career includes stints as executive editor at *Cooking Light,* a Time, Inc. magazine, and as a former editor of *The Texas Observer,* The Associated Press, the Texas Film Commission and *American Way,* the magazine of American Airlines. He was also a senior writer at *Houston City* and *D* magazine and a reporter for *The Rocky Mountain News.* He is author of the book *American Voudou: Journey into a Hidden World,* a study of West African religion in the United States.



An eighth-generation Texan on his mother's side, Davis has lived most of his life in Texas and the South, and currently resides in San Antonio.

MAIL CALL

PICKS, PANS AND PROBES FROM PREVIOUS ISSUES

FOREWORD

Water has always played an important role in my life; from the stock tank brimming with bluegill on my Papaw's farm where I caught my first fish, to the lakeside home of my youth and a lifetime of fishing, swimming, sailing, rafting, canoeing and kayaking.

As a youth, I took for granted that my beloved creeks, rivers, lakes, swamps and bays would always be there.

Shortly after graduating from college, I gained my first magazine job at *Cleveland Magazine*. This was six years after Cleveland's Cuyahoga River caught fire, in June 1969, and the city was still reeling from the national ignominy. The image of the burning river ignited the public's awareness of the deteriorating plight of our nation's waterways and led to the passage of the Clean Water Act. It was a personal wake-up call for me to take heed; to never take rivers, or water, for granted.

Thankfully, partially as a result of the Cuyahoga fiasco, water quality has somewhat improved across the nation. The Cuyahoga itself has become healthier. But as we enter the new millennium, there are signs that our progress may be unraveling. Populations are exploding. Man's heavy hand on nature and water takes a toll, and we are, doubtless, greedy and thriftless with water. It is no longer about just water quality; it is about quantity, about flow itself. Will there be enough water?

John Graves has been kind enough to pass along to me one of his works, *The Water Hustlers,* a collaboration with Robert H. Boyle, who discusses New York's water plight, and T.H. Watkins, who details California's. Graves gives a fine account of the Texas water mess in the '60s. The book was published in 1971.

It is prescient. I hope you will seek it out, and also read Walter Prescott Webb's *More Water for Texas.*

Water defines Texas. It has; it will.

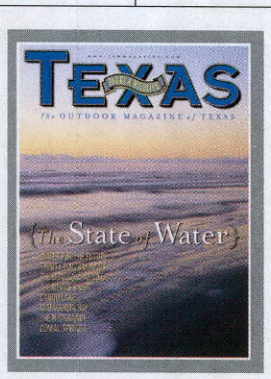
This issue — the largest one *Texas Parks & Wildlife* magazine has ever published — owes much to TPWD Senior Director for Aquatic Resources Larry McKinney, who has championed our efforts from the beginning. Also, to Brazos Mutual Funds and the Brazos River Authority, each of which has shouldered some of the additional expense of producing this issue.

You will find writers in these pages who have not been here before: Elmer Kelton, recently named Best Western Author of the 20th Century by the Western Writers of America; Joe Nick Patoski, a Texas treasure and engaging travel writer; Michael Furtman, whose passionate journal following waterfowl migration, *On the Wings of the North Wind,* convinced me he knows a swamp's place in the world; Rod Davis, a nationally acclaimed author, whose Rio Grande series in the *San Antonio Express-News* is to be part of *The Best American Travel Writing 2002* anthology.

Plus, we welcome back celebrated author and former *Texas Parks & Wildlife* Senior Editor Jan Reid, Carol Flake Chapman and Jim Anderson, who have contributed mightily to this magazine, and do so again.

Now, go read this magazine; then read some more about Texas water history, law and planning. Put your thoughts into action.

Then, go get out on the water!



Order additional copies of this special July issue, Texas: The State of Water, by sending a check for $5.00 per magazine to: Texas: The State of Water, 3000 S. IH35, Suite 120, Austin TX 78704. Please include phone number, with area code, on check.

Susan L. Ebert,
Publisher & Editor

LETTERS

TEXAS PARKS & WILDLIFE LIBRARY, TO GO!

I HAVE roughly 100 old issues from the 1960s and 1970s that are in very good condition. I want to get rid of them but not throw them away. If anyone is interested and willing to pay the shipping charges from Oklahoma City, e-mail me at: marc.mccord @philips.com

I want to send them all; not individual copies.

MARC MCCORD

BOYHOOD DREAM

THE June issue of *Texas Parks & Wildlife* magazine has such a wonderful cover photo. I think every son's mother can look at that picture and remember her son in the same situation. Along with that, every man can remember sitting, fishing and thinking that they looked much the same as that precious young man in the photo. Thanks for bringing back wonderful memories!

NANCY INMAN
Admiral Nimitz Museum State Historic Site

THE front cover photo on the June 2002 issue is without a doubt the best cover photo of any magazine I have ever seen; and I've seen many. The theme, subject, blocking, lighting and especially the look of study, concentration and hope on the boy's face are magnificent.

ANDREW BJORN
Kingwood

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MAIL CALL

BIRDY BEST!

YOU listed Cygnet among the "10 Birdy B&Bs," (April 2002) and boy, were you right! We thought it would be a convenient place to call home for a couple of nights while we explored the Gulf Coast around Port Aransas and Rockport. Instead, we had a hard time leaving the peaceful birding on the 10 acres around this semi-secluded cabin. Migrating swallow-tailed kites seemed to greet us as we arrived and warblers splashed in their water hole while we dined. Although we hated to leave, we'll soon go back.

WOODY AND PATRICIA RAINE
Austin

MY husband and I are new birders, and we have started traveling to places where we can look for birds to add to our list. We just returned from our second trip to Goose Island State Park. On our first trip, in February, we saw mostly water birds. But our most recent trip was even more rewarding. The park has a feeding and watering station set up on Warbler Way, at the restroom site. In two days we saw 19 different species.

Not only did we see a lot of birds, we met people from all across the United States, Canada and England. Everyone talked about how great it was that the park went out of its way to make such a nice birding spot, and that was why they came back every spring. We were told that the state parks division in Austin is looking into doing away with this feeding station and others like it at other parks. This would be a big mistake.

We all agreed that there should be birding sites like this one at other state parks. After all, the April issues of *Texas Parks & Wildlife* magazine are what made us interested in birding in the first place. I'm sure there are others who feel the same way. We try to use our state parks about every three weeks on Friday through Sunday. But it can be hard to find good birding spots.

WANDA OATMAN
Marlin

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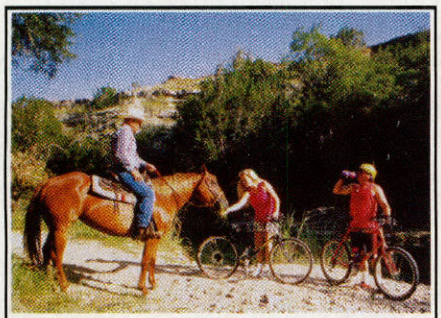

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MAIL CALL

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I enjoyed the article in the February 2002 issue about mushrooming in Texas. My father is an avid mushroom hunter in Kansas. I was born in Michigan and grew up in Kansas, both of which are good mushrooming locations. My father taught me not to use a paper bag to collect mushrooms because the spores become trapped inside the bag. Use a mesh, loosely woven bag so the spores can fall back to the ground and cultivate your next year's crop. Please pass this tidbit along to Mr. Walsh, and happy hunting!

JANET COOMES
Austin

Errata: Because of a typesetting error, an Outdoor Marketplace ad on page 63 of the June 2002 issue of Texas Parks & Wildlife *was incorrectly titled "Stagecoach Inn." The correct name of this property is "Texas Stagecoach Inn." We regret the error. The full, correct text in this ad appears on page 112 of this issue, and below:*

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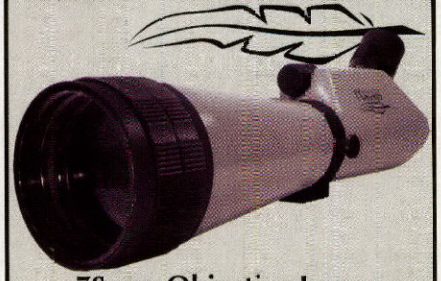

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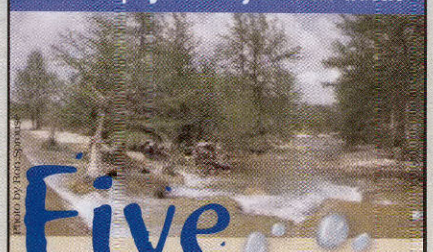

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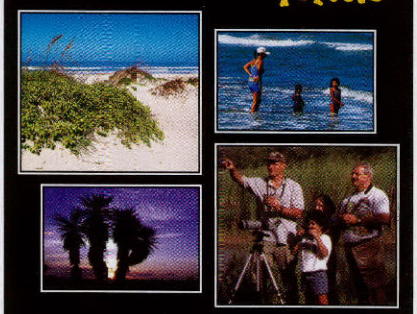

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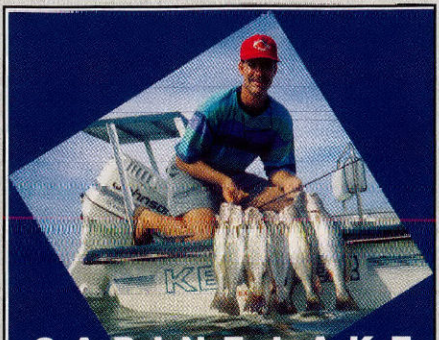

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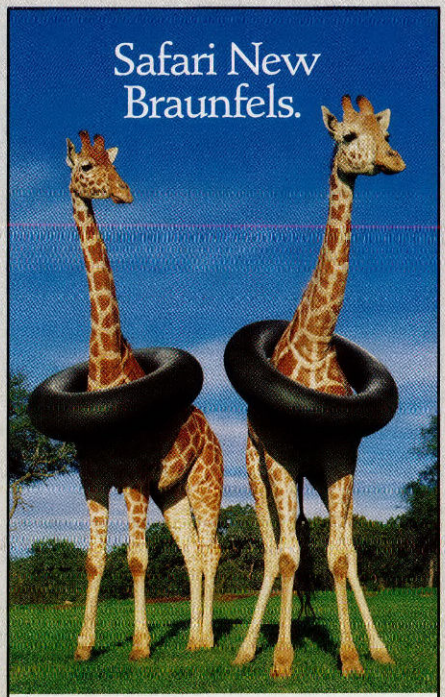

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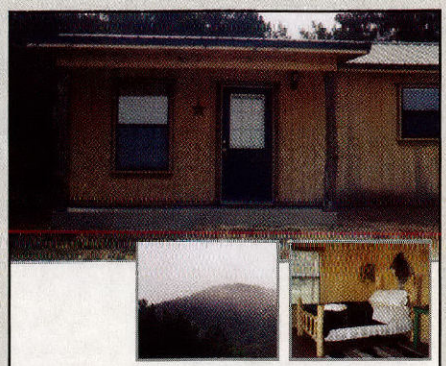

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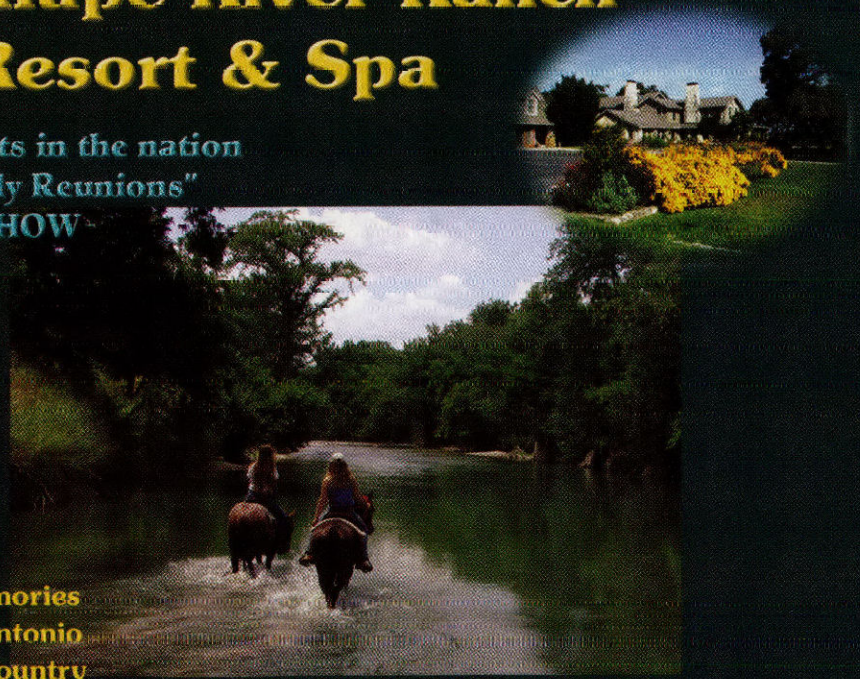

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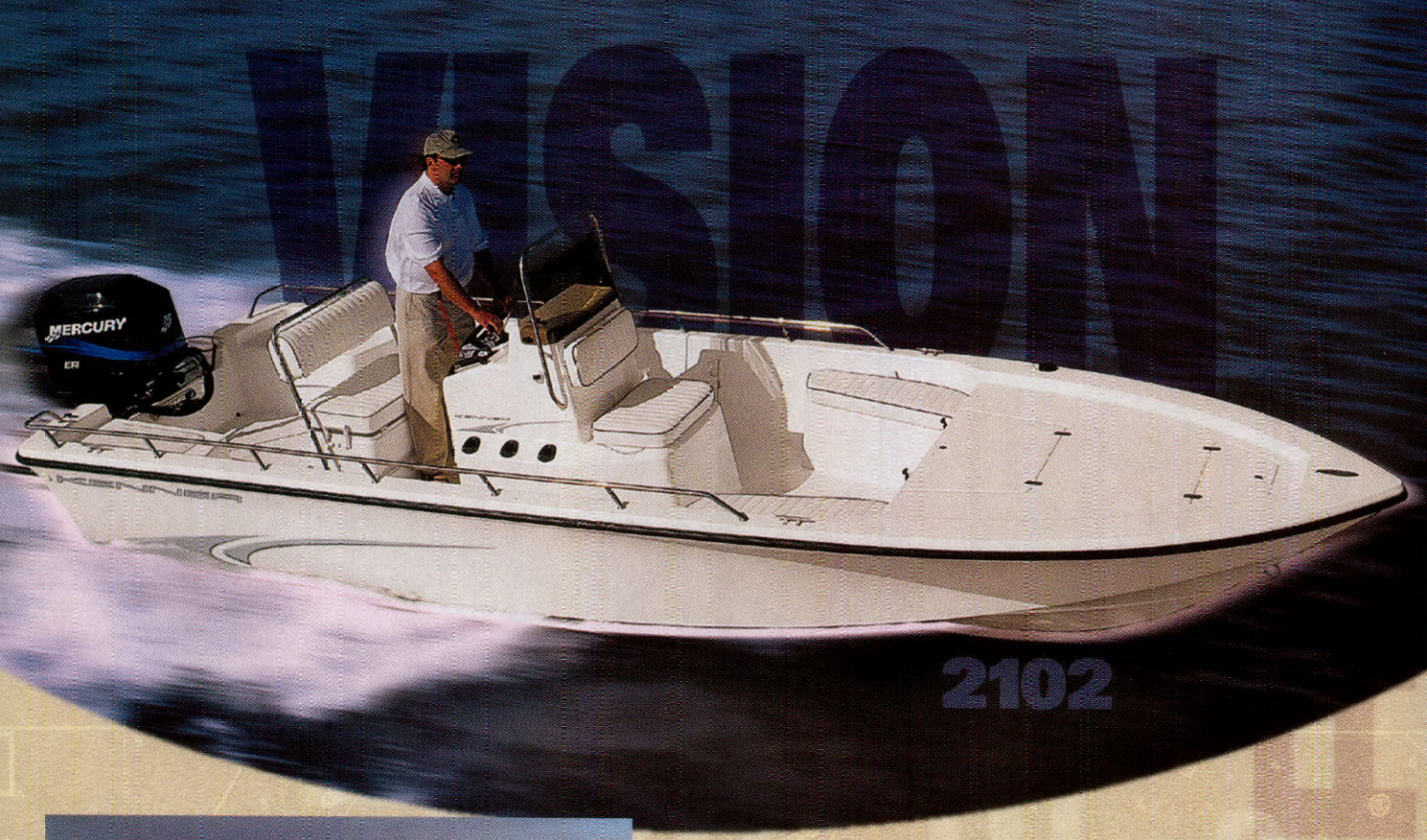

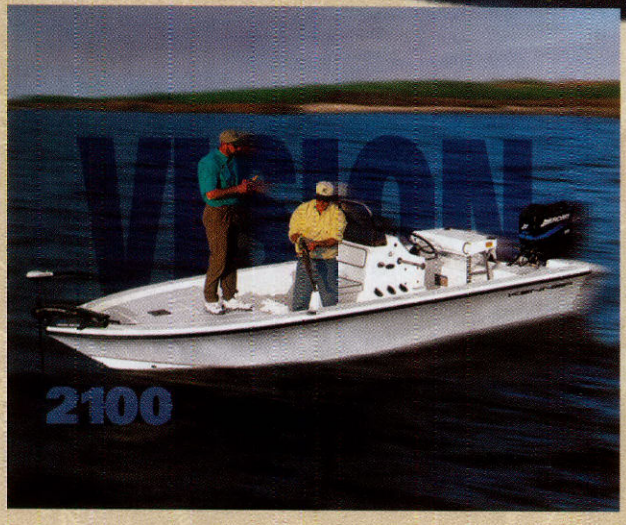

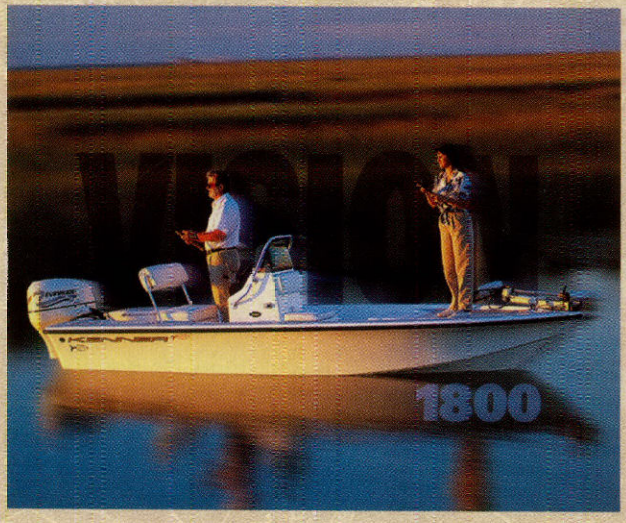

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SCOUT

NEWS AND VIEWS IN THE TEXAS OUTDOORS

When Good Passes Go Bad

To dredge or not to dredge? That is the question.

Cedar Bayou is a narrow pass between the north end of San Jose Island and the south end of Matagorda Island. Its importance is far greater than its size indicates.

"The Texas Coast is unique in that it has barrier islands that close off bays from the Gulf," explains Ed Hegen, regional director of Texas Parks and Wildlife Department's Region 2 coastal fisheries division. "All the bays along the lower Texas Coast have or have had at one time a connection to the Gulf."

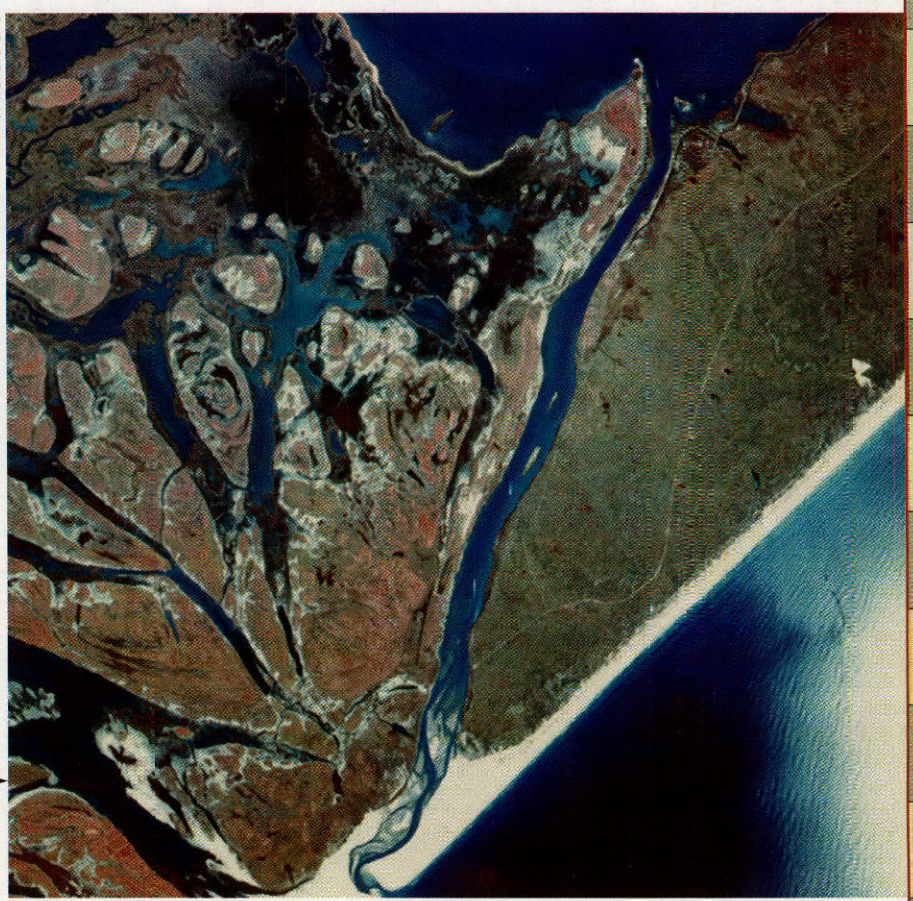
"The passes are critical to fisheries of all kinds," adds Larry McKinney, senior director for aquatic resources for TPWD. "The mixing of fresh water from river inflows with sea water entering the bays and estuaries through the passes creates differences in salinity levels that are necessary for completion of the life cycle of 90 percent of our recreational and commercially important fish. If you put a cork in the bottle and the developing fish can't get into and out of the bays, they can't complete their life cycle."

All along the Texas Coast, natural passes that facilitate the mixing of Gulf waters with freshwater inflows from rivers have closed for a variety of reasons. Cedar Bayou has closed and reopened in the past and appears to be in danger of closing again. A controversy is looming over whether the pass should be dredged to keep it open, or whether nature should be allowed to take its course.

Part of the problem is that nature no longer can take the course it followed for centuries. "Several factors have led to the closing of fish passes all along our barrier islands," says McKinney. "In recent years we have had diminished inflows from rivers, and the construction of the Gulf Intracoastal Waterway and dredging and deepening of harbors and channels to harbors have created more places for water to escape from the bays, reducing the hydrological pressure that used to force water through the passes and keep them open."

The answer seems simple: Dredge the channels to keep them open. But dredging is expensive and creates other issues, such as who pays, who benefits, where spoil is dumped and who compensates landowners if their land is eroded away as a result of the dredging. And dredging is only a temporary solution. "When you dredge, you create a deep hole in a shallow nearshore area, and the most likely place for sand carried by currents to settle is in that deep hole," says Hegen. "Maintained passes have to be dredged

TPWD GIS LAB



Cedar Bayou is closing up where it meets the Gulf of Mexico, bottom.

almost constantly to keep them open."

Human alteration of the hydrology of the coast means the passes no longer play as big a role as they once did, says Rollin McRae, wetlands conservation program leader for TPWD. "Reduced freshwater inflow means there is less freshwater in proportion to saltwater, and we may not need so many passes to bring in sea water," he points out.

Hegen agrees the issue of whether to dredge Cedar Bayou is not clearcut. "Data from our 25-year monitoring program indicate the bays are in good, healthy condition right now coast-wide," he says. "There is still a salinity gradient between the Gulf and the bays, and that maintains itself through the passes. But there is also an economic issue. Estimates are it will cost about $800,000 to dredge Cedar Bayou. From where will that money come? Will we continue to spend money to keep the pass open? If you are someone who wants to fish — and Cedar Bayou is a fantastic fishing area — you'll be in favor of dredging. But we don't know how the economic impacts and benefits of dredging balance out against the costs. We need to have all the interested partners involved — the Corps of Engineers, county governments, fishers — and make our decision based on the balance of those facts."

"Artificial maintenance of Cedar Bayou will be very expensive and long-term," says McKinney. "We need better cost-benefit data before we can tell if dredging is a good idea."

— LARRY D. HODGE

¡Agua Caliente!

El Paso faces the prospect of running dry.

What happens to a city when it runs out of fresh water? El Paso, the fourth-largest metropolis in Texas, has no intention of finding out.

The city received an ominous verdict after an El Paso Water Utilities' assessment determined that the city was pumping its primary fresh water supply, the Hueco-Mesilla Bolson, faster than the aquifer could recharge. If the city's water usage continued at its year 2000 rate, fresh water supplies could be depleted in as little as 25 years.

Fortunately, El Paso authorities and concerned citizens were already moving forward with water shortage solutions by the time they discovered the bad news. If the city's efforts prove successful, the results may help determine the way other urban areas across the country address their own water crises.

El Paso utility authorities recognized an impending water shortage as early as 1940. Their first water-treatment plant, designed to treat a percentage of the city's allotment of Rio Grande water, succeeded in providing 20 million gallons per day of potable water. Over the years, city authorities have increased river water treatment capabilities to 80 million gallons per day and will add another 20 million this year. The city's water allotment was established almost 100 years ago and was historically diverted for agricultural use.

While El Pasoans initially acknowledged their need to address water shortage issues by the mid-1900s, another 50 years passed before they established the first conservation water ordinance in 1991. Since then, the city has participated in a $10 million water conservation, education and enforcement program that has financed rebates for xeriscaping and water-saving gadget give-aways. In addition, water reclamation has become a large part of the program. It is the city's hope that reclaimed water ultimately will account for as much as 15 percent of total water usage, keeping golf courses and athletic fields green and satisfying industrial and manufacturing needs.

TEXAS WATER TIMELINE

By Cindy Loeffler

10,000 BC Prehistoric people camp near what is known now as Barton Springs.

1709 Brother Isidro de Espinosa, a member of the Espinosa entrada and one of the first Europeans in Central Texas, notes in his journal that the waters of the Colorado River are "the best we have found."

1729 San Antonio River first diverted for irrigation at Spanish missions.

1856 Supreme Court of Texas recognizes a riparian system of water rights. This system allows landowners adjacent to rivers to divert water.

1880 Peak of the steam-powered grist-milling industry, the most widespread industry in Texas at the time.

1889 The Irrigation Act is passed. Prior Appropriation Doctrine replaces Riparian Rights. Now "first in time is first in right" when diverting water from rivers.

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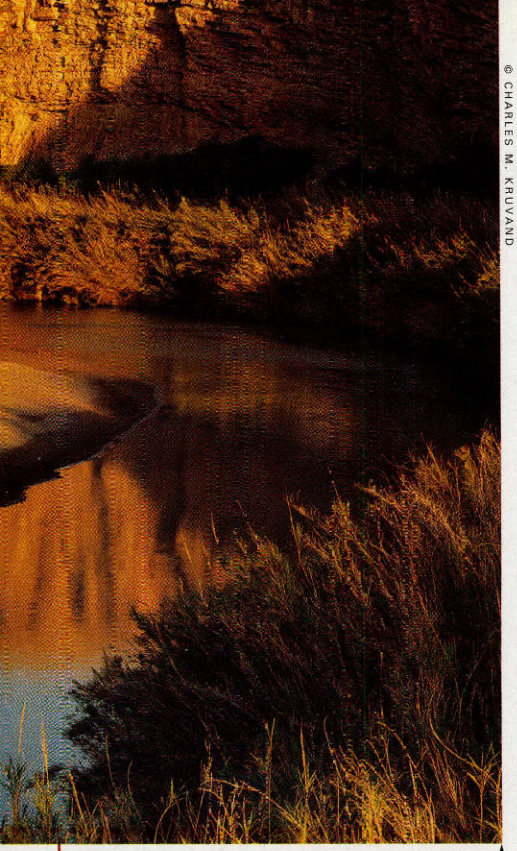
1893 Austin Dam, the first major dam on the Colorado River, is completed.

1900 Floodwaters destroy the Austin Dam, killing 47 people.

1900 The Galveston Hurricane kills an estimated 8,000 people. It is the worst natural disaster in U.S. history.

1904 Constitutional amendment is adopted, authorizing the first public development of water resources in Texas.



© CHARLES M. KRUVAND

Desert wildlife depend on accessible water sources, such as the Rio Grande.

However, El Paso Water Utilities, the agency charged with implementing the city's water plan, recognized that conservation alone cannot save enough water to meet the demands of the city's population. In addition, uncontrollable factors such as the lack of snow melt at the Rio Grande headwaters and the dryness of long-term weather patterns could affect the amount of water made available from the city's river source. The purchase of ranches and water rights from property owners in West Texas may provide a limited insurance policy against the decline of fresh water supplies. But the logistics of transporting water long distances could compromise the solution's cost effectiveness.

El Paso actually has a bountiful source of water if they can overcome the challenges of treating it. Estimates show that six times as much brackish water lies within the areas of precious fresh water available from the Hueco Bolson aquifer. It is still not clear how much can be economically recovered through desalination. Like the ocean, this briny water is too salty to drink. But with desalination technology, authorities may have found a way to provide some of the fresh water the city requires. As a start, a cooperative effort with the neighboring Fort Bliss has produced preliminary plans and designs for the Hueco Bolson Desalination Project. The facilities are expected to provide 27.5 million gallons of potable water per day once completed.

Conservation of the Hueco Bolson's groundwater supply, both fresh and brackish, will benefit not only citizens of El Paso but also surrounding wildlife.

"Managing existing groundwater supplies with a focus on long-term sustainability hopefully will take the pressure off any excessive surface water usage," says Larry McKinney, Texas Parks and Wildlife Department's senior director for aquatic resources. Migratory and resident birds, and the insects they depend upon, require surface water as part of the their day-to-day life cycle. And while many species of desert wildlife obtain some of their water requirements from the plants and organisms that make up their diet, they also depend on existing, and accessible, water sources such as the Rio Grande for hydration.

"Proper groundwater management leads to conservation of our surface water," explains McKinney, "and together, they will help to secure a future for our wildlife and its habitat."

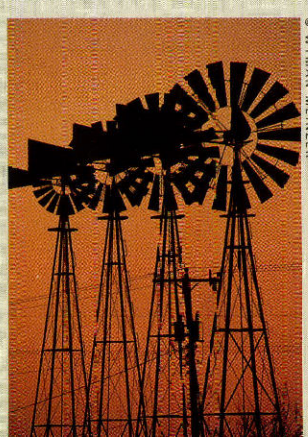
Despite the city's plans to conserve the fresh water supply of the Hueco Bolson, including the $80 million spent over the last 10 years, the future of the aquifer may be as much in the hands of El Paso's neighbor as in their own. Juárez, the Mexican city sharing the river border as well as the underground water supply with El Paso, serves a population of approximately 1.2 million people — more than twice that of El Paso. Yet Juárez has only just begun to address water shortage issues. With no treatment facilities to take advantage of water from the Rio Grande, the citizens of Juárez rely solely on the Hueco Bolson for drinking water. Without new alternatives, estimates indicate that Juárez could run out of fresh water in as little as five years.

"Juárez' issues are the same as El Paso's," explains EPWU hydrologist Bill Hutchison. "The solution for both will come from what we can do, what they can do, and what we can do together."

— E. DAN KLEPPER

TEXAS WATER TIMELINE

1904 "Rule of Capture" becomes law, allowing landowners to pump as much groundwater as can be put to beneficial use, regardless of the effect on neighboring wells.



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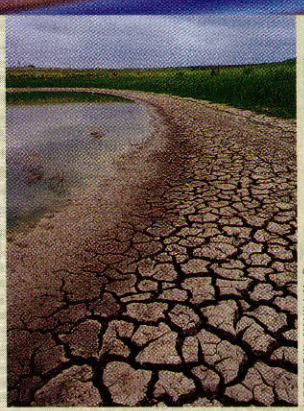
1913 The Texas Legislature creates the State Board of Water Engineers to administer surface water rights system.

1917 Conservation amendment of the Texas Constitution adopted. This amendment declares that conservation of all natural resources of the state, including water, are public rights.

1921 Unofficial 24-hour rainfall record is set by town of Thrall in Central Texas — residents report 38 inches of rain.



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1939 The Rio Grande Compact, which dictates how Texas, Colorado and New Mexico will share the river, is ratified by Texas Legislature.

1944 The Rio Grande Treaty is signed. The treaty allocates water between the U.S. and Mexico below Fort Quitman.

1949 Groundwater is recognized as private property, not state property, and is subject to the "Rule of Capture."

1950-1956 Texas experiences a drought so severe that 94 percent of its counties are declared national disaster areas. The drought ends abruptly with serious flooding in the spring of 1957.

Sulphur Bottom Blues

If Dallas water planners have their way, one of the last bottomland hardwood forests would be lost.

Los Angeles was a dusty desert town until the city fathers stole — that is, discovered — a reliable source of water in the Sierra Nevada, piped it 200 miles to the coast, and made the desert bloom. Dallas is no desert, but like pre-war L.A., the Metroplex's next half-century of growth is limited only by the amount of water available to feed its thirsty lawns and swimming pools. And like L.A., Dallas water planners believe they have found their future just over the eastern horizon: the Sulphur River in Northeast Texas.

Between the Cooper Lake dam near Commerce, about 40 miles east of Dallas, and Lake Wright Patman just south of Texarkana, the Sulphur River runs through some of the most sparsely populated areas east of Interstate 35, carrying with it an enormous amount of unallocated (that is, unclaimed by any user) water. The river also passes through one of the last large, truly wild stretches of bottomland hardwood forest in Texas, an area prized by sportsmen for generations. If Dallas planners have their way, this uncommon habitat in Titus, Morris and Red River counties will be at the bottom of a 72,000-acre lake, the Marvin Nichols Reservoir.

The reservoir, along with the 170 miles of pipeline required to get the water to Dallas, has a price tag of at least $1.7 billion. It's just one of many large, capital-intensive projects in the new State Water Plan, which contains proposals for dozens of new reservoirs and pipelines and will cost a minimum of $17 billion. But by virtue of its sheer size, cost — and, critics say, wastefulness — Marvin Nichols has become by far the most controversial.

© DAVID J. SAMS

Marvin Nichols Reservoir would inundate family farms as well as bottomland hardwood forests.

Dallas, which already has among the highest per capita water-use rates in the state, has virtually no provision for

TEXAS WATER TIMELINE

1956 Flash floods between the West Texas towns of Sheffield and Langtry produce an 86-foot-high wall of water that rampages down the Pecos River Canyon.

© WYMAN MEINZER

1957 Texas Water Planning Act enacted in response to severe statewide drought.

© RUSTY YATES

1959 Passage of the Texas Open Beaches Act recognizes the public's right to use Texas Gulf Coast beaches.

1961 Comanche Springs near Fort Stockton ceases to flow, the victim of drought and groundwater overpumping.

1961 The Colorado River experiences a massive fish kill extending 140 miles from Austin to Matagorda Bay, the result of contamination from several million gallons of runoff from a pesticide manufacturing plant in Austin.

1967 Water Quality Standards adopted under Federal Water Pollution Control Act and Texas Water Quality Act.

1967: Water Rights Adjudication Act requires registration of all unrecorded surface water rights, limiting claims to actual use.

1968 The first State Water Plan is adopted. This plan include a recommendation for moving water from the Mississippi River into Texas.

1969 Texas voters narrowly defeat a $3.6 billion bond package to fund the 1968 Texas Water Plan.

1975 Texas Water Development Board directed to study relationships between freshwater inflows and biological productivity of Texas bays and estuaries.

conservation in its regional water plan. The National Wildlife Federation has estimated that if the Metroplex reduced its per person water use by 22 percent over the next 50 years, the reservoir would be unnecessary. (How feasible is that? San Antonio, for its part, lowered its per capita use by 30 percent in just 13 years.) Dallas planners instead are currently projecting an increase in per capita water use in the coming years.

What makes bottomland habitat unique, according to Tom Cloud of the U.S. Fish and Wildlife Service, is frequent flooding, which has the dual effect of making the land rich in nutrients — which means abundant plant and animal life — and unsuitable for farming, which limits human development. The mature hardwood forests of the Sulphur bottoms host a wide variety of Texas species, including barred owls, deer, wild turkeys and bald eagles. There have even been sightings of the Louisiana black bear in the area, according to Cloud. "Bottomlands are rapidly diminishing, studies show, because of reservoir development and [timber] clearing," Cloud says. When large tracts of high-quality land are taken for projects such as reservoirs, federal law requires that additional lands be set aside and managed to compensate for the loss of habitat. But so much bottomland has already been flooded or cleared in Northeast Texas, Cloud says, that finding suitable mitigation land will be a tall order. "The habitat has become very fragmented," he says.

Marvin Nichols also would inundate scores of family farms, mainly hog and cattle grazing operations, many of which have been held by the same families for generations. Local opposition to the plan has been growing steadily.

"We could see public hearings this summer with more than 1,000 folks there," predicts Dave Moldal of the National Wildlife Federation. "It would also flood some of the most important bottomland hardwood forests remaining in Texas. The alteration of stream flow would negatively impact bottomland forests downstream of the dam and reservoir as periodic floods are reduced in duration and frequency. This will degrade wetland habitats, and thus wildlife."

Farmers, sportsmen, environmentalists, and now even an area timber company have joined forces to oppose the project. Design and permitting for a project of this size can take more than a decade to complete. In the meantime, opponents plan to pressure local politicians, as well as the Texas Water Development Board, which has ultimate authority over the State Water Plan, to reject Marvin Nichols as too costly and too detrimental to the Sulphur and its inhabitants.

Speaking at a public hearing in Mount Pleasant last fall, Max Shumake, a local landholder and fifth-generation Texan, seemed to sum up the feeling in the bottoms: "I hate going to meetings, and I hate speaking in public," he said. "The only thing I can think of that I might hate worse is knowing that I couldn't go to the Sulphur bottoms anymore."

— NATE BLAKESLEE

The Guad Squad

The San Marcos River Foundation wants to save water for wildlife.

On April 2, 2002, American Rivers, a nationwide river advocacy group based in Washington, D.C., declared the Guadalupe Basin one of the nation's Top Ten Most Endangered Rivers in 2002. The San Marcos River Foundation (SMRF), a non-profit conservation group, nominated the Guadalupe because of their concern about increased competition for water. American Rivers warned that if Texas continues to grant new pumping rights, commonly called water rights, in the Guadalupe Basin it is possible that the river could be overpumped during dry periods when most pumping occurs.

As might be expected, not everyone agrees that the listing is warranted. The Guadalupe-Blanco River Authority, responsible for managing the river, strongly disagrees with the designation. GBRA and the Texas Water Conservation Association (a professional organi-

TEXAS WATER TIMELINE

AUG. 4, 1978 Official 24-hour rainfall total established; Albany in Shackelford County receives 29 inches of rain.

© EARL NOTTINGHAM

1987 Texas Water Development Board and Texas Parks and Wildlife Department are directed by Senate Bill 683 to jointly conduct studies of the effects of freshwater inflows on coastal bays and estuaries.

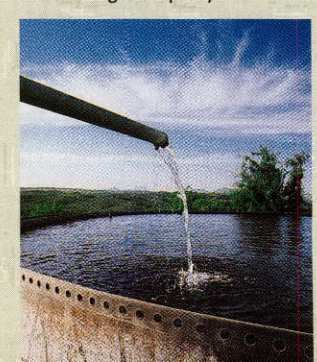
1997 Consensus-based Water Plan released. This is the first state water plan to include recommendations that address environmental concerns.

1997 Senate Bill 1 is signed into law by Gov. Bush. This legislation calls for the development of 50-year regional water plans that protect agricultural and natural resources.

1998 Texas agriculture suffers estimated losses of $11 billion, the result of multi-year drought.

1999 Legislature creates Drought Preparedness Council to coordinate drought response activities statewide.

1999 Texas State Supreme Court upholds the "Rule of Capture" in response to landowner protests against a bottled-water manufacturing company.



© WYMAN MEINZER

zation of Texas water managers, developers, etc) is also concerned about the impact of a water right application filed by SMRF. The filing of that water right application was based on the same reasons that prompted SMRF to nominate the river.

SMRF applied almost two years ago for a water right for 1.15 million acre-feet per year. An acre-foot of water is the amount of water it would take to cover an acre of land one foot deep, or 326,000 gallons. This is the first time in Texas, however, that someone has requested a water right for water to be left in the river, in this case the Guadalupe River and its major tributary, the San Marcos River. SMRF based its water right request on scientific studies funded by the state legislature, and conducted by Texas Parks and Wildlife Department and the Texas Water Development Board. These studies recommend that 1.15 million acre-feet per year be left in the river to sustain fish and preserve other wildlife. New water availability models created for Texas Natural Resource Conservation Commission (the state agency that regulates water matters in Texas), indicate that the water is presently available. In a normal year, even if the 1.15 million acre-feet needed to protect the estuary is set aside, there would still be nearly .5 million acre-feet leftover for new uses.

A nonprofit civic group formed in 1985, the San Marcos River Foundation has as a focus the environmental protection of the San Marcos River, its watershed and estuaries. SMRF applied for a water right to provide "life insurance" for the river, the estuary and the rural communities and industries that rely on water from the Guadalupe Basin. Fishing, tourism, hunting and birdwatching on the Texas Coast generate billions of dollars a year for the Texas economy. The Texas Coast depends on adequate water from rivers to dilute bay salinity to the proper level to support life like shrimp, crabs, fish and birds.

SMRF has stated their intent to give the water to Texas Parks and Wildlife Department for "deposit" in the Texas Water Trust. The Trust was created by the 75th Texas Legislature as a way to keep water in rivers so it may flow downstream into the coastal bays and estuaries by dedicating existing or new water rights to environmental flow protection.

Whether one agrees or disagrees with the SMRF water right application, and many do not, everyone agrees that the organization's action has brought the issue of how best to assure water for the environment to the forefront. Natural resource and regulatory agencies, conservation and water management organizations and, most important, the Texas Legislature, have taken up the issue. It is encouraging that, with some exceptions, the debate is not whether to meet environmental needs but how. It is an important debate and the outcome will likely determine the future of fish and wildlife in Texas.

— CINDY LOEFFLER

© CHARLES M. KRUVAND

San Marcos River Foundation has applied for water to be left in the Guadalupe.

TEXAS WATER TIMELINE

DECEMBER 2000

The San Marcos River Foundation applies for a surface water right of 1.15 million acre-feet per year from the Guadalupe River near

© LAURENCE PARENT

the mouth to protect freshwater inflows to San Antonio Bay.

© EARL NOTTINGHAM

MARCH 2001

The Rio Grande ceases flowing to the Gulf of Mexico for the first time in recorded history.

JUNE 2001

Tropical storm Allison dumps 37 inches of rain on Houston, creating the costliest natural disaster in Houston's history.

NOVEMBER 2001

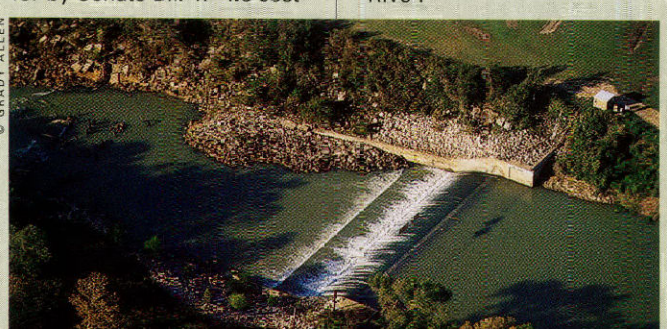
The Guadalupe-Blanco River Authority applies for all the remaining unappropriated flow of the Guadalupe River.

JANUARY 2002

The 2002 State Water Plan is released, the product of 16 regional water plans called for by Senate Bill 1. The cost to implement the plan is approximately $18 billion.

FEBRUARY 2002

The Lower Colorado River Authority and San Antonio Water Systems jointly agree to study the feasibility of providing water to San Antonio from the Colorado River.



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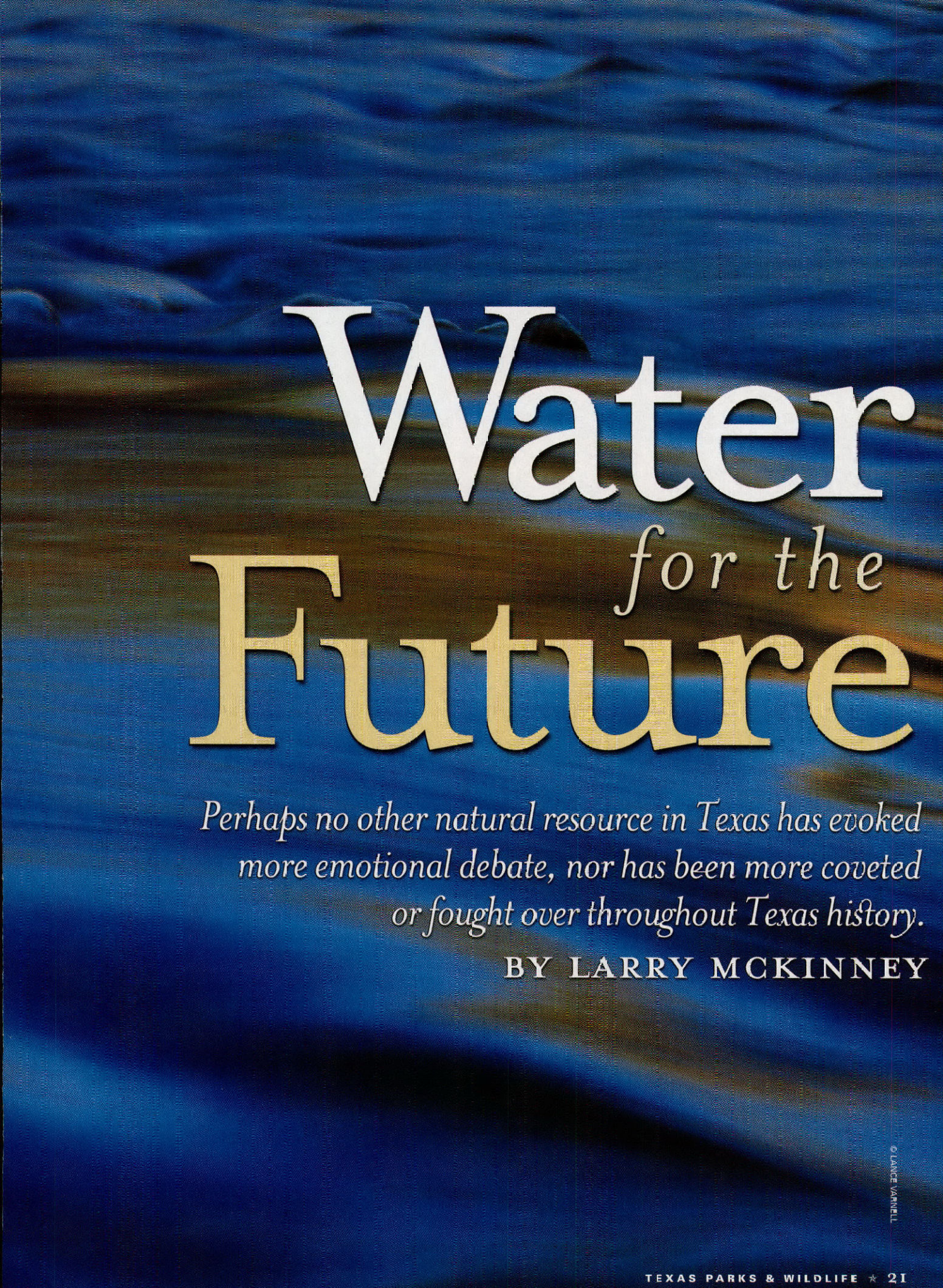


Water for the Future

Perhaps no other natural resource in Texas has evoked more emotional debate, nor has been more coveted or fought over throughout Texas history.

BY LARRY MCKINNEY

© LANCE VARNELL

Water.

Oil pales beside it, and the value of the land itself is measured by it. Texas differs little from many western states in this regard. Water not only has been the definer of our natural setting but the great limiter of growth and development.

Texas.

It is a state dominated by a system of rivers and streams that empty into a series of coastal estuaries. The Texas landscape has been continually sculpted by its 15 major river systems and more than 11,247 named streams and tributaries that course along 80,000 miles of streambed. Excepting the Canadian, Red and Rio Grande, the headwaters and major drainages of these rivers are almost entirely within the state. All but four rivers — the Canadian, Red, Sulfur and Cypress — eventually drain into one of the seven major estuaries, or several associated minor ones, that line the margin of Texas' 400 miles of coastline.

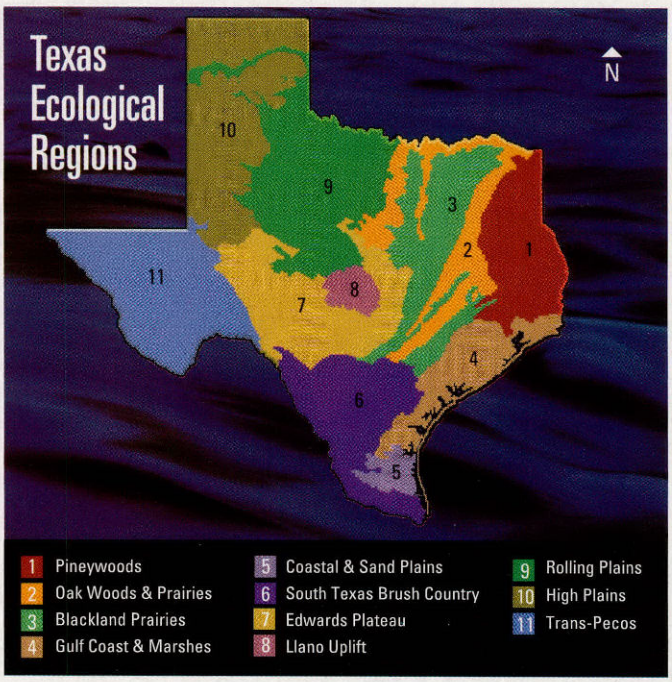
Until you see a map on which vegetation, cities and roads have been stripped away, leaving only the remaining natural topography, you cannot fully appreciate how much water dominates the state. It is the great integrator, linking and melding our 11 distinctive ecological regions. Such a map is even more impressive when you include the vast quantities of water hidden beneath the ground in a system of intermeshed aquifers. The influence of the state's nine major and 16 minor aquifers has been subtle and often unrecognized, except for the unique and spectacular expression of the Edwards Aquifer as seen at Comal and San Marcos Springs.

Ever since the first settler forded a river and stepped onto Texas soil, water has been the magic fluid shaping the state's development. Rivers and bays were the first Texas highways; every great city in the state grew where it did because of water. Water nurtured wildlife and the land.

Today, our ability to alter this network of water has grown so tremendously as to boggle the mind. The management and diversion of entire river systems is not only contemplated but is being accomplished. More than 200 major dams have been constructed in Texas to provide flood control and municipal water supplies. Our discharges into rivers often exceed natural flows, and seasonal patterns of flow and flood have in some cases been reversed to meet our needs.

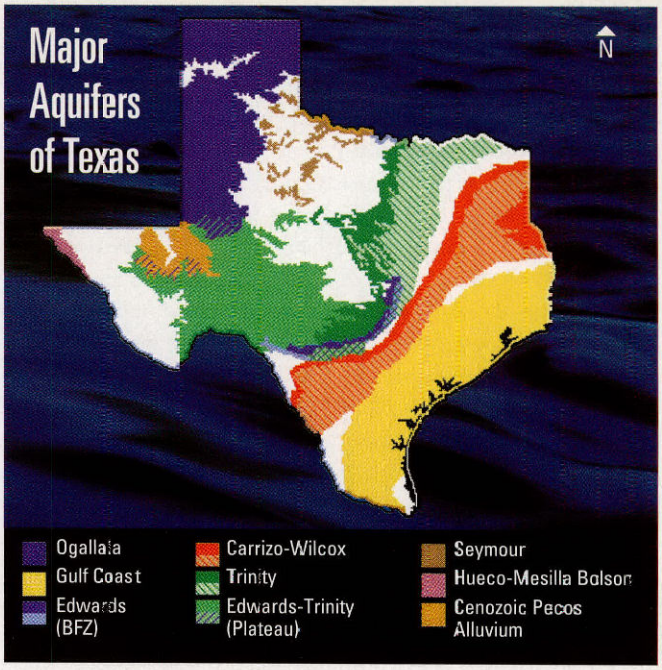
What we now think of as "natural" in some cases is far from it. In 1913 there were only eight reservoirs in Texas. Today we have more square miles of inland water than any other state except Minnesota, the land of 10,000 lakes. If new reservoirs now in the planning stage are built, we will pass Minnesota at a dead run within the next 20 years.

Yet today, Texas faces the possibility that rivers could be dewatered and its vibrant coastal ecosystem irreparably harmed.



MAP ILLUSTRATIONS BY MARTY BAUMANN

Almost 900 Texas cities will not have enough water from current sources to meet their needs in 2050. Texas is a growing state, with the population expected to double — from 20 million to 40 million — by 2050. According to the newly adopted state water plan, Water for Texas 2002, Texas currently has an unmet need of 2.4 million acre-feet of water annually. By 2050 unmet needs are projected to triple, to 7.5 million acre-feet. During a 2050 drought, almost half the water needed by Texas cities will not be available unless supplies are increased or demand is decreased.



WILDLIFE NEEDS WATER, TOO

While water is essential for human health, economic growth and quality of life, it is also essential for flora, fauna and fish. Texas has streams and rivers that are the key element in maintaining much of our state's natural heritage. Those ecosystems provide the water that flows into 212 major reservoirs and eventually into seven major estuaries along the Texas Coast, supporting the best inland and coastal fisheries in the United States. Healthy aquatic communities in Texas rivers, reservoirs and estuaries provide water not only for drinking, industry and agriculture, but also direct recreational benefits.

Wetland habitats support migrating birds and provide a valuable link with other ecosystems. The wetlands and the vegetated (riparian) corridors associated with streams and rivers and the marshes and seagrass beds of coastal estuaries are an integral part of aquatic ecosystems that play a key role in protecting water quality, preventing erosion and providing nutrients for fish and wildlife.

Groundwater also is important to wildlife. Springs fed from aquifers support a rich diversity of endemic aquatic species and through springflow contribute to rivers and streams. In many areas of the state, particularly West Texas, these springs and streams depend on good range management to generate and sustain surface water. All these forms of groundwater and its manifestations are critical to wildlife.

The process that fuels both groundwater and the river systems, precipitation, is in turn a product of the prevailing climatic conditions as expressed in weather. In Texas this means variable, and there is real truth to the old-timers' saying about Texas weather: "If you don't like the weather, just wait a minute and it will change." Nonetheless, there are some definite trends in temperature and rainfall that are reflected in the regional character of Texas rivers.

Our state's variable weather helps create a variety of habitats for wildlife in Texas rivers. In East Texas, for example, rivers have year-round constant flows and more predictable seasonal floods. In the south and west, less frequent rainfall means intermittent rivers and floods that are typically violent and difficult to anticipate. The diversity of aquatic systems we see today reflects this gradient. In combination with a variety of landforms — from silty clays and sands to limestone and granite — these aquatic systems provide our state with some of its most valuable and interesting natural heritage and the basis for Texas' unparalleled biological diversity.

PLANNING FOR A POPULATION BOOM

With Texas' population doubling to almost 40 million in the next 50 years, existing water supplies cannot sustain that growth unless action is taken to better conserve our supplies and supplement them where necessary to meet need.

According to the newly adopted state water plan, the individual regional water plans that comprise it call for eight new major reservoirs to be added to Texas' existing 214 major reservoirs during the next 50 years. These new reservoirs would increase surface water availability by 1.2 million acre-feet per year. That is dependable yield (water calculated to be available during the worst recorded drought period), not storage capacity, which in most cases would be considerably greater than firm yield capacity. Our best estimate is a total storage capacity of 3 million acre-feet in those reservoirs.

If we cannot meet that future demand with surface water, some or all of it will come from groundwater. Yet we are mining groundwater at an unsustainable rate. Texas already gets 57 percent of its water from groundwater — and we have paid a price for our heavy use of this resource. Of the 281 major and historical springs that once flowed in Texas, some 63 had dried up by 1973 — a number that by one estimate has doubled since then. None of those springs ceased from natural causes.

SOLVING THE WATER EQUATION

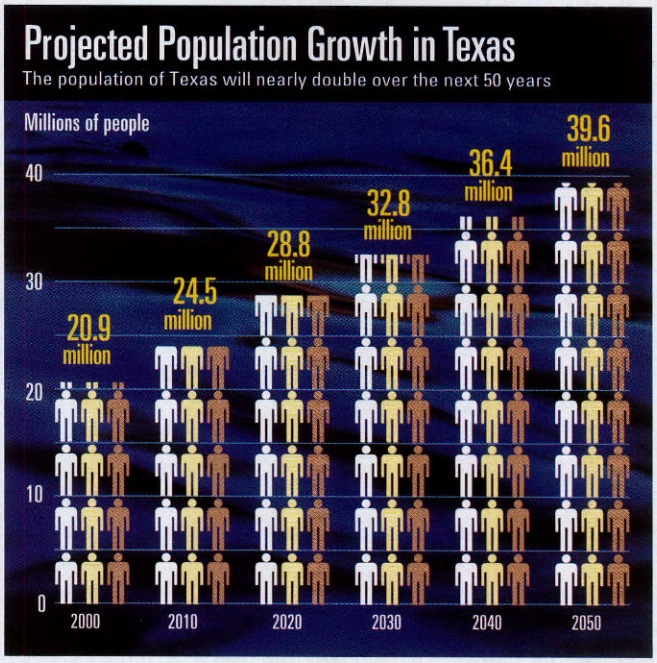
The newly adopted state water plan summarizes 16 regional plans that advance a series of water management strategies to assure that we meet water needs for the foreseeable future. The current plan defines these needs in terms of municipal, indus-

trial and agricultural demands upon existing and future water supplies. Environmental water — instream flows for rivers and freshwater inflows to coastal estuaries necessary to maintain their health and productivity — is not identified as a separate need.

In most cases, water rights issued before 1985 for the development of water-supply projects had no environmental requirements. The needs of wildlife and provisions for instream flows to maintain the health of aquatic habitats were not considered, or were considered only on a piecemeal basis as part of the water-permitting process. Despite the importance of water to quality of life in Texas, when it came time to divide up the limited supply, wildlife and the environment were not part of the equation.

Before the 1980s, we could afford to ignore environmental water needs in solving that equation. Like many natural resources in Texas, water was generally seen as abundant — where it occurred. Our primary limits were that we physically could not access it or move it very efficiently to where it was not abundant (West Texas). From the 1980s until now, we have been able to address environmental water needs as part of individual permits. All permits since the mid-'80s have included an environmental assessment, and many include conditions to protect instream flows and freshwater inflows.

But now, as we look to the future, it is clear that such an approach will not be sufficient to conserve our natural heritage. Increasingly, we will have to manage and develop water on a regional scale, and regional solutions will be required to meet environmental water needs. If we are successful in finding such solutions, the adverse impact of individual projects will be greatly diminished or even eliminated. Balancing the water equation in this manner must be our goal to assure a prosperous and healthy Texas.



TOOLS TO INCREASE SUPPLY

To make the best use of available water, tools such as reservoirs, interbasin transfers of water and reuse (see sidebar) are strategies that will come more and more into play as the state water plan advances to meet its goals. These tools — despised by the environmental extreme and seen as salvation by water hustlers — must be seen as tools of opportunity. That's because, if we wish to save some water for wildlife while providing water for 20 million more Texans, these tools are an inevitable necessity to meet the needs of the latter.

Building a reservoir to catch and hold water is the best understood of these strategies. Eight new major and 10 minor reservoirs are contemplated in the state plan at a cost of $3.05 billion. The creation of reservoirs has advantages, although many would note they do not counter the disadvantages. Lakes not only supply water, they also provide tremendous recreational potential. They attract freshwater anglers who annually generate $6.4 billion in economic benefits; some of Texas Parks and Wildlife Department's most popular state parks line the shores of lakes.

But the resource costs downstream can be high. When rivers are dammed, habitat is not only drowned at the site, but hydrology and ecology of rivers and hardwood bottomlands downstream can suffer. Reservoirs may capture, in whole or part, floods that are critical to these ecosystems and to the coastal estuaries into which they empty. Some 90 percent of all commercially and recreationally important shellfish and finfish — which annually generate $2.6 billion in economic benefits — depend upon freshwater inflows.

Some adverse impacts of reservoir creation can be mitigated, or compensated for by acquiring and managing other similar lands. Seasonally adjusted water releases may help as well. The problem is that the "easy" projects are already done. Some of those now contemplated, like Marvin Nichols in East Texas, are to be sited in the most ecologically valuable bottomlands remaining in the state.

Another tool is the interbasin transfer — the movement of water from a watershed that has water to one that doesn't. We have seen many such transfers in the past, but interbasin transfers currently proposed — like the piping of water from the Colorado and Guadalupe rivers to supply the city of San Antonio — are on an unprecedented scale. If water remains in a basin, its ecological contributions to the health of that system basically remain. Not so if the water is moved to flow down a different stream and into a different estuary. Potential ecological problems are obvious. On the other hand, interbasin transfers have potential benefits and may represent the best means to regional solutions. Moving water from far East Texas to Houston, for example, could also benefit the Sabine and Galveston bay estuarine systems — restoring historic seasonal patterns to the former and replacing diverted fresh water to the latter. Similar opportunities exist in Central and South Texas.

WATER FOR WILDLIFE IS STILL LACKING

Ironically, the full burden of environmental protection may fall on the last applicants for water — wildlife and the environment. Senate Bill 1, passed in 1997, mandated that environmental impacts be considered in the water planning process. For the first time, wildlife and the environment were given a place at the table. However, as noted above, the vast majority of Texas water rights were appropriated before this law

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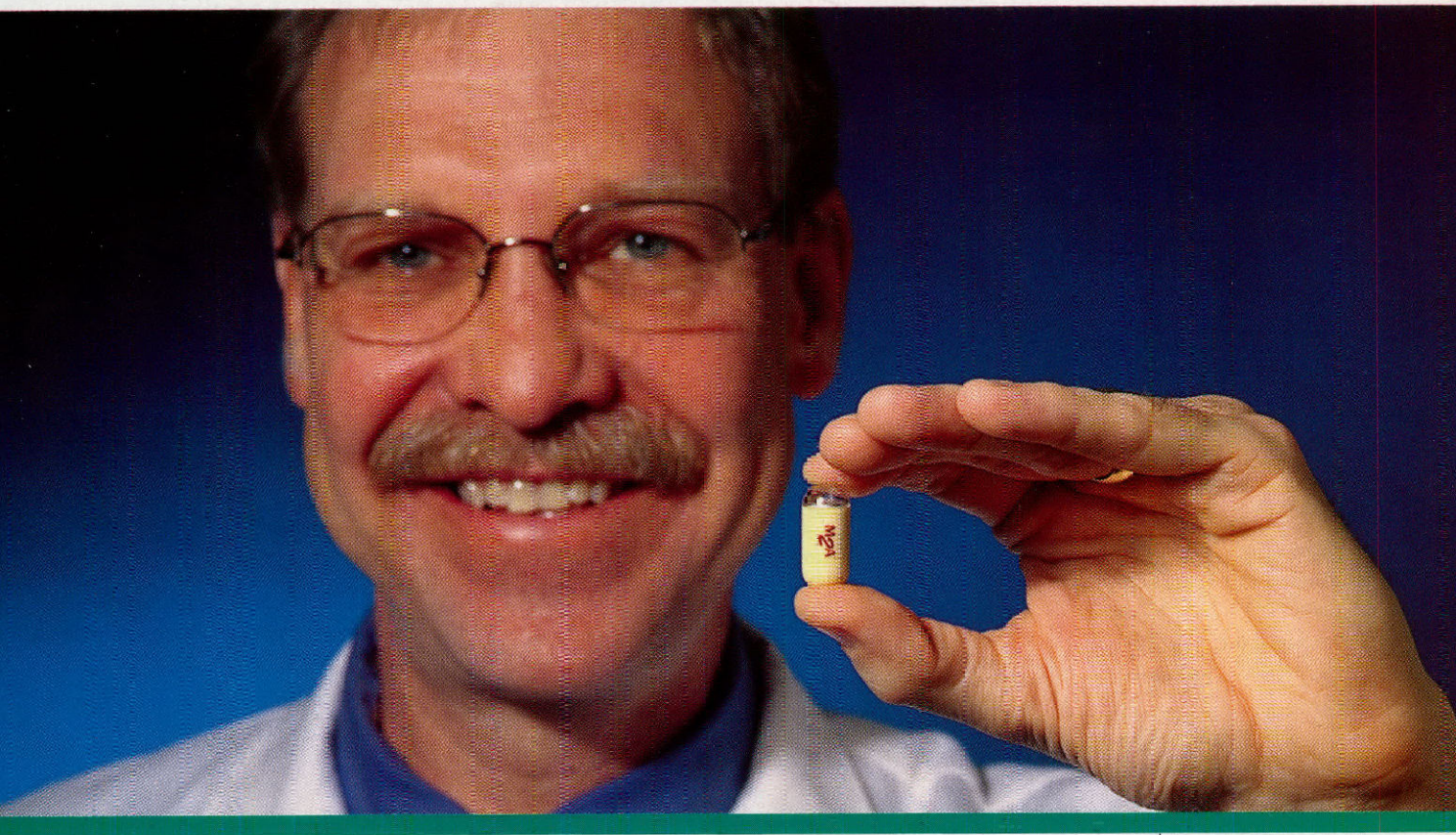

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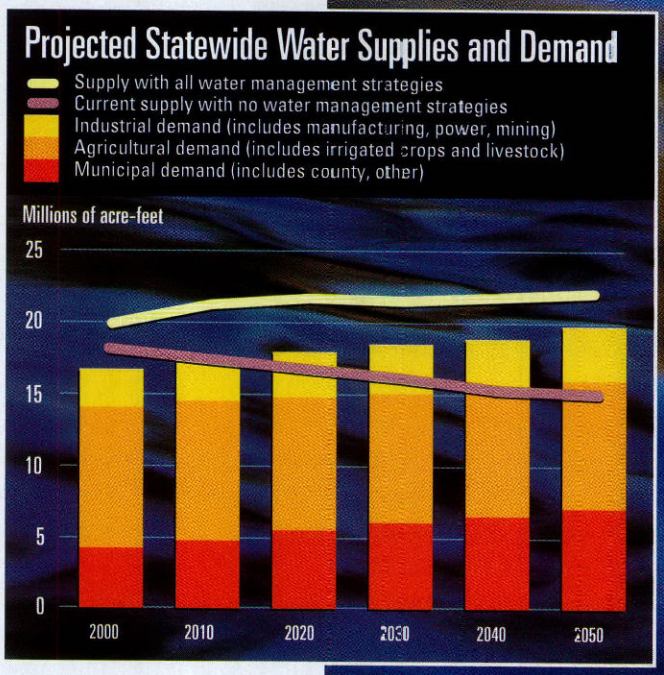
was passed. Therefore, many river systems and estuaries may not be managed to the good of the ecosystem. The deck is stacked in favor of cities, industry and agriculture.

The current water plan does not identify environmental water needs as a separate demand. While it defines municipal, industrial and agricultural demands for the future, the needs of instream flows for rivers and freshwater inflows to coastal estuaries are largely ignored. As we look to the future, it is clear that this approach will not be sufficient to conserve the natural heritage of Texas.

This is the key problem we face now in Texas. It is one that our political leadership will struggle to solve in the face of a state growing so fast and changing so quickly as to defy easy comprehension.

NOW IS THE TIME

The important message is that it is not too late. We have time to plan for the future, but we must do so now or lose the opportunity, perhaps forever. No one denies that water for people is important. Yet if we wish to continue enjoying the fish, wildlife and recreational resources of Texas and, more important, if we want our children to enjoy them, we have a stake in making sure that water for wildlife is a part of the water equation in Texas.



Senate Bill 1 set out the procedure to be followed in planning for Texas' future water needs. Sixteen regional planning groups were formed to solicit and act on public input, leading to the development of 16 regional water plans that now form the basis of the state water plan. Some 450 representatives in these regional planning groups held nearly 900 public meetings across the state over a three-year period. Work has already begun on revising these documents for the 2007 state water plan.

Over the next 10 years, the first decade of the new millennium, we will make the choices that define the future for the natural heritage of Texas. That is a bold statement perhaps, but not an overstatement. One major river, the Rio Grande, which defines our southern border, stopped short of reaching the sea early last year.

Overall, the fish and wildlife of Texas, our rivers, lakes and estuaries, remain healthy and productive, but the warning signs, such as the Rio Grande, are flashing. Now is the time to plan how to conserve, safeguard and wisely manage our water resources in ways that will protect human health, allow for economic growth and enhance quality of life. The current choices we face about water planning provide an opportunity to look around and see what our heritage means to us — and what it will mean to our children.

HEALTHY WATER ECOSYSTEMS ARE VITAL TO THE ECONOMY

- About 30,000 commercial fishers catch 100 million pounds of coastal fish and shellfish worth $200 million each year.
- When considered altogether, Texas estuaries provide a non-polluting, self-sustaining industry worth $2.5 billion to Texas each year.
- Canoeing and kayaking rivers would be impossible without flowing water.
- Texans spend more than $3 billion annually on trips to fish, swim, boat and water ski.
- Texas is the number-two sport-fishing state in the nation. Freshwater anglers alone spend $1.9 billion annually in the state.
- Agriculture contributes $45 billion annually to the Texas economy. Irrigated crops include cotton, wheat, corn, sorghum grain, fruit, hay and rice.
- Texas is the largest livestock producer in the nation. Water use by the livestock industry accounts for about two percent of water use in the state.
- Texas rivers and estuaries assimilate huge volumes of wastewater discharges and other pollution, protecting water quality for all of us.

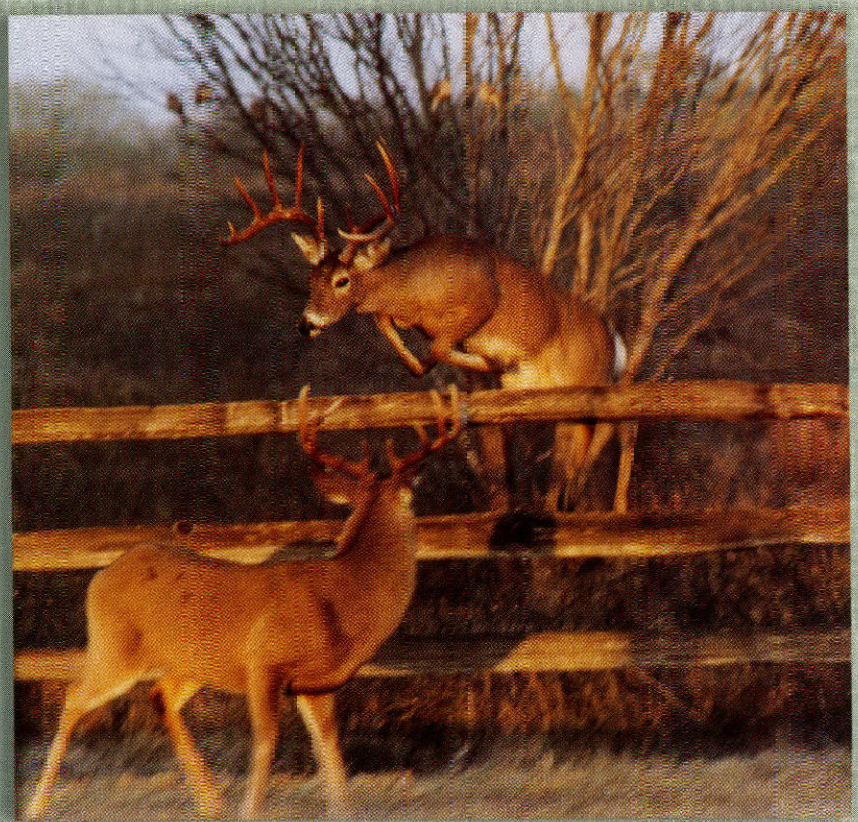
WATER REUSE

The good news about water reuse is that someday we will all be drinking treated wastewater, the joke goes. The bad news? There won't be enough to go around.

Reuse may be the least familiar of all these strategies and, until understood, the most disgusting to the uninitiated. It is basically "reusing" treated wastewater for other purposes. We mostly think of gray water, like running the washing machine water on the lawn or, on a municipal scale, a golf course. We do not do a lot of this in Texas (about 10 percent of all wastewater is reused) but other countries like Israel use as much as 60 percent. It just depends on your definition. Anyone on the Trinity River downstream of Dallas likely enjoys the benefits of reuse water and, whether they know it not, depend upon it. Fortunately for them, Dallas takes their water quality responsibilities seriously.

Reuse, as with the other strategies, may have both positive and negative impacts on wildlife. It is sensible to make the best use of water you already have. It means less water taken from rivers and groundwater. In Texas we have seldom been that efficient, except in San Antonio, El Paso and Corpus Christi, where they know the value of water. Most water used in cities is merely borrowed to wash clothes, flush toilets, etc. Only 10 percent or so is consumed. The rest goes through the wastewater treatment plant and back (return flow) into the river where it provides important instream flows and thence on to users downstream. We have come to count on that ecologically and economically. In some basins we have come to depend on return flows for both needs. As we become more efficient in reuse, those return flows will diminish and perhaps their associated ecosystems as well.

Hunt on Your Own Ranch



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The Hidden Lake

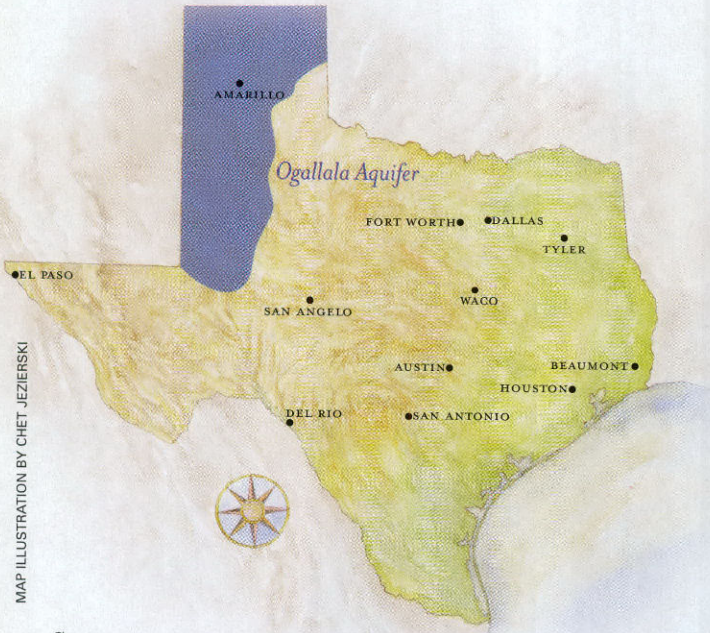
Underlying the Texas Panhandle and stretching upwards across the continent is the largest aquifer in North America. Now, it is endangered.

BY ELMER KELTON

PHOTOGRAPHY BY WYMAN MEINZER

On a blistering July day in 1877, a troop of 10th

cavalry buffalo soldiers abandoned a hunt for Comanche raiders and began a desperate quest for water to save their own lives. They were lost in the dry sands west of present-day Tahoka, Texas, and long since had emptied their canteens. Staggering from thirst and heat exhaustion, several soldiers would die without reaching the life-saving waters of brackish Double Lakes.



MAP ILLUSTRATION BY CHET JEZIERSKI

Some years ago I visited a spot where the troopers spent an agonizing night after turning back. A windmill was pumping cool water into a steel trough for nearby cattle. Ironically, the thirsty troopers had no way of knowing that just beneath their feet lay the largest aquifer on the North American continent, the Ogallala.

Slow erosion of the Rocky Mountains through uncounted ages built the sands of the Ogallala. The water being used so rapidly today was accumulated over thousands of years by slow percolation from rivers, streams and a myriad of shallow natural playa lakes that shine like mirrors across the undulating plains after a rain. The aquifer underlies all or parts of 46 Panhandle counties and stretches northward into South Dakota. Since prehistoric times its clear, clean waters have risen to the surface in hidden springs long known only to Native Americans and to an astonishing variety of wildlife.

Now the Ogallala is an endangered aquifer. Specialists have estimated that on the Texas High Plains, half of the original groundwater already has been pumped out, mostly in just the last 50 years. Even under an ambitious long-range state conservation plan, half of what remains today may be gone by the year 2050. As bad as that figure looks, it may be overly optimistic, especially in heavy-use counties.

The Ogallala produces three-fifths of the groundwater used in Texas. About 90 percent goes for irrigated farmland, yielding much of the nation's grain and cotton. The rest goes to municipal, industrial and livestock interests. Amarillo, for example, derives about 40 percent of its water needs from groundwater.

Adding to the already darkening clouds, in the Ogallala's future are controversial proposals to export groundwater to distant urban areas. At the time of this writing, six landowners, most prominently T. Boone Pickens and a utility company subsidiary, have applied for permits to move water out of Roberts County at the rate of about 150,000 acre-feet per year. This would be comparable to present levels of use in heavily irrigated counties such as Carson, Dallam or Hartley.

Roberts is mostly native-grass rangeland not suited for cultivation. Pickens' own Mesa Vista Ranch north of Pampa is typical of the rough, rolling terrain. For years conservationists have regarded his ranch as an excellent model of range management and wildlife enhancement. Opponents see his proposal to pump water from beneath the ground as a contradiction to his extensive conservation work on the surface. They fear this extra water withdrawal would cause rural communities to dry up for the benefit of the investors and distant urban areas.

Because Roberts County has little irrigation, drawdown of the aquifer beneath it has been minor. Many landowners have been offered as much as $350 per acre for water rights, probably $100 to $125 more than the sale value of the land itself. It has been said that water flows uphill toward money. Ranchers beset by years of low cattle prices see sale of water as a potential windfall. Many support it.

Groundwater in Texas is managed by landowners under the Rule of Capture, or by landowners and groundwater conservation districts working together. The Texas Supreme Court adopted the Rule of Capture in 1904, on the grounds that groundwater was "too secret, occult and concealed" for regulation. Under the Rule of Capture, which the Texas Supreme Court upheld in a 1999 decision, landowners can pump groundwater regardless of impacts to neighboring landowners. Groundwater conservation districts have been created in some parts of the state to manage groundwater through such means as well spacing and pumping rates. Today local groundwater conservation districts are the state's preferred method for groundwater management.

The question of Panhandle water exportation remains tied up in litigation. However, precedents already exist. Amarillo and the Canadian River Authority have acquired rights to drill 40 wells on more than 40,000 acres in Roberts County. The City of Amarillo has bought 71,000 acres adjacent to Pickens' ranch. Pickens and other landowners argue that if they are not allowed to pump water from beneath their land, others will siphon it off, anyway.

(CETA CANYON, OGALLALA AQUIFER)

{WHEAT FIELD ON THE TEXAS HIGH PLAINS}

The controversy points up the fact that future water shortages are Texas' number-one long-range problem, and they will not be confined to the High Plains.

It is easy, though painful, to visualize a future when Texas irrigated farming will be only a memory, and towns and cities will send delegations to Austin to fight over depleted remnants of groundwater. Water engineers agree that most logical dam sites in the state have already been developed. They see little prospect for new lakes to provide significant additional surface water. Underground water will become more and more valuable as the supply becomes scarcer.

Texas uses more groundwater per day than any state except California. The Ogallala is one of Texas' nine major aquifers, all of which are facing similar basic problems in varying degrees. Other large ones include the Gulf Coast Aquifer, underlying 54 counties, and the Edwards, underlying central West Texas. San Antonio is the largest city depending solely upon an aquifer, the Edwards, for its water supply.

Smaller aquifers include the Trinity in North Central Texas; the narrow Carrizo-Wilcox stretching snakelike from Northeast Texas all the way to the Rio Grande; the Seymour in scattered patches just east of the Ogallala; the Cenozoic Pecos Alluvium along the upper reaches of the Pecos River; and the Hueco-Mesilla Bolson at the El Paso tip of the state.

The Edwards has one fortunate characteristic the Ogallala does not. Its water table can sink to an alarming degree, then begin rising within days after rain falls in the porous hills along the Frio and Nueces watersheds. The Ogallala recharge rate is so slow as to be negligible. Where water levels in much of it have declined two feet a year, the annual natural recharge may be as little as one-tenth of an inch.

Like surface lakes, the Ogallala tends to be shallow around the edges and deeper in the middle. The Texas High Plains are on the southern extreme, where depletion shows its effects more than in, say, Nebraska, which has deeper saturated thickness. In some edge counties to the south and west, economics have forced many farmers to revert to conventional dryland operations.

As a practical matter, most farmers will not pump the water table dry to the underlying red bed. The cost of bringing water to the surface becomes prohibitive before that point. Pumps operate on gas or electricity. As fuel costs continue to rise, the market for farmers' commodities remains chronically depressed. For example, cotton from the 2001 crop sold for around 30 cents a pound, just a third of its value two to three years ago.

A significant amount of land — an estimated 20 to 25 percent in some water-shy areas — has been placed in the federal Conservation Reserve Program, or CRP, under which it remains inactive except for cover crops planted to prevent wind erosion.

C.E. Williams, who heads the eight-county Panhandle Groundwater Conservation District office in White Deer, farmed in Carson County for 19 years. Because of the declining water table, parts of his homeplace reverted to dryland cropping long ago, moving from water-loving plants such as corn to dryland grain sorghums, wheat and sunflowers.

Farming communities suffer when the pumps go idle. Panhandle is a typical plains farming town, set in a deep-soil landscape flat enough to invite the plow. Williams says his hometown in the late 1970s had four farm implement dealerships. Now it has none. It had a strong rural bank. That closed five years ago. Three formerly independent grain elevators have consolidated into a single ownership.

Not all of the picture is negative. High costs have compelled farmers to seek increased efficiency. Though limited irrigation on the Texas plains began as early as 1911, it built momentum in the late 1940s and through the severe drought of the 1950s, peaking in the 1970s. Early flood irrigation allowed water to flow freely but wastefully down the furrows. As pumping costs and conservation awareness rose, curtailing waste became imperative. The first high-pressure sprinklers threw water high into the air, where much of it evaporated without reaching the ground. Since the 1980s the trend has been toward center pivot systems with low-hanging nozzles that expel water on or close to the ground. This reduces evaporation loss and can regulate the flow better. Even more efficient are drip systems, which apply water directly to the crop, though these can cost $700 to $800 per acre.

As one farmer remarked, "Paying for a drip system is like buying your farm all over again."

To help farmers apply just the right amount of water and no more, state and federal agencies have jointly instituted an information system using 12 High Plains weather stations to provide daily climatological reports on temperatures, solar radiation and relative humidity. These factors bear on plants' day-to-day water needs.

Leon New, Extension Service agricultural engineer in Amarillo, finds that the rate of decline in water levels has slowed over recent years as farmers have increased efficiency of use.

Nevertheless, "Each gallon of water taken is harder to get and more costly than the gallon before it," says Jim Conkwright, general manager of the High Plains Underground Water Conservation District No. 1, headquartered in Lubbock near the southern edge of the Ogallala. There, an estimated half of the original water is gone.

"We continue to mine the aquifer," Conkwright says.

"Mining" is a term used often by water specialists. In effect, it means viewing water as an expendable commodity like oil and gas. It also means that when the water is taken out, it is gone forever.

"If we mess up," Williams says, "we mess up for a long time."

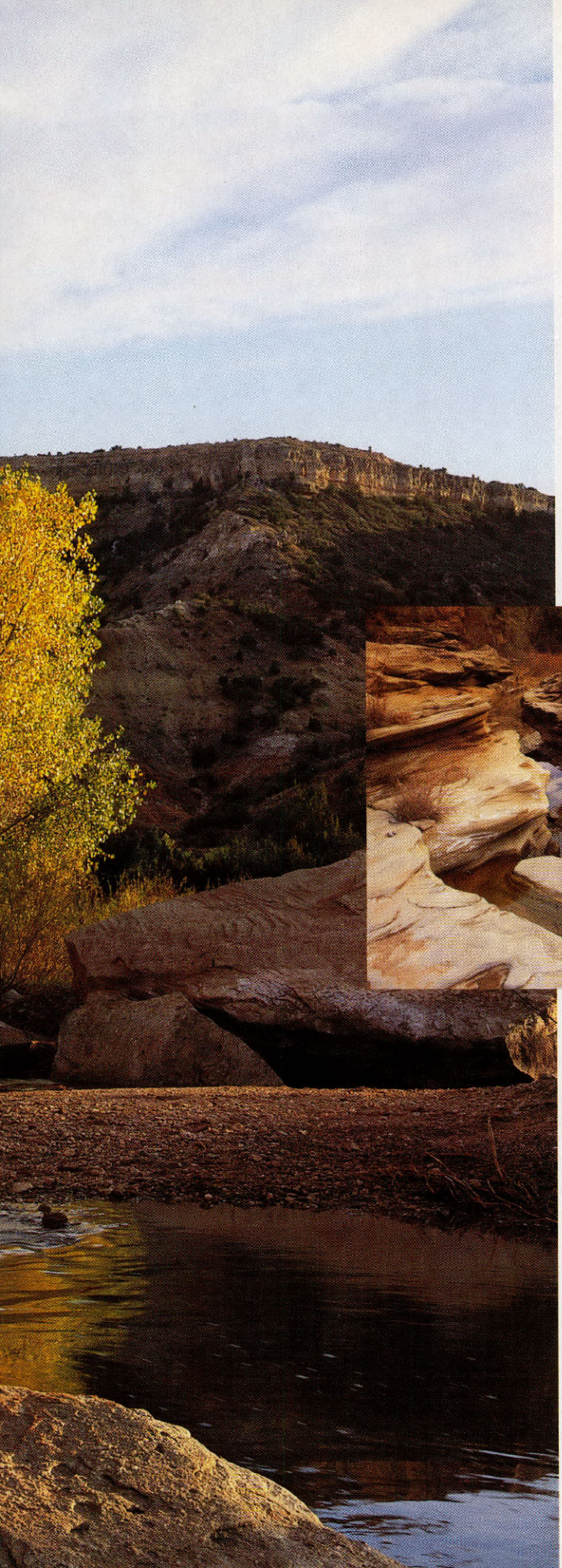
The more than 15,000 playa lakes scattered across the Texas plains are an important source of aquifer recharge. These natural depressions catch water from rainfall and snow. The playas are vital to wildlife, not only for water but for the many types of vegetation that grow up around their edges. Lubbock has 50 playa lakes within its city limits, to which thousands of Canada geese swarm each year. Up to 2 million ducks and uncountable numbers of geese depend upon the playas. Sandhill cranes are prominent winter residents, feeding around the lakes and from nearby grainfields. Game birds, shorebirds, waders, hawks and owls, as well as a variety of mammals find both shelter and sustenance in and from the playas. Pheasants and blue quail frequent the fields, picking up scattered grain.

Some ranchers, conscious of the financial as well as aesthetic value of wildlife, have provided such extra facilities as quail waterings. Even such a small thing as dragging a plow or grain drill across open rangeland encourages growth of weeds beneficial to bird life.

Ranching remains basic in the Panhandle economy. In general, it has suffered relatively little from the aquifer's decline,

{PLAYA LAKES AND IRRIGATION}

{THE RED RIVER AND QUITAQUE CREEK}



except in localized areas where water tables have sunk below the depth of wells serving windmills. Livestock's water needs are small in comparison to those of irrigated farming.

An exception is in the concentration of large numbers of cattle — and recently hogs — in commercial feedlot operations. So far, the Texas Cattle Feeders Association, headquartered in Amarillo, has noted no significant adverse impact from the aquifer's situation. The most visible effect has been in grain supplies. Much irrigated corn acreage on the southern plains has been replaced by irrigated or dryland grain sorghums. Feedlots import increasing amounts of corn from the Midwest to supplement diminishing local supplies.

Dr. John Sweeten, resident director of the Texas A&M Agricultural Research and Extension Center in Amarillo, says ongoing biotechnology is emphasizing water-efficient plant traits that will require less irrigation.

Minimum tillage, leaving crop residues on the ground, helps conserve moisture from rain and snow and reduces the need for supplemental watering.

Another method for increasing both ground and surface water is brush removal. Brush infests more than 50 million Texas acres, including much of the Panhandle. Texas A&M University studies indicate that the average mesquite tree uses about 300 gallons of water per year. In a model experiment on the small Rocky Creek watershed west of San Angelo, brush was removed from several ranches. A dormant stream soon returned to year-round flow.

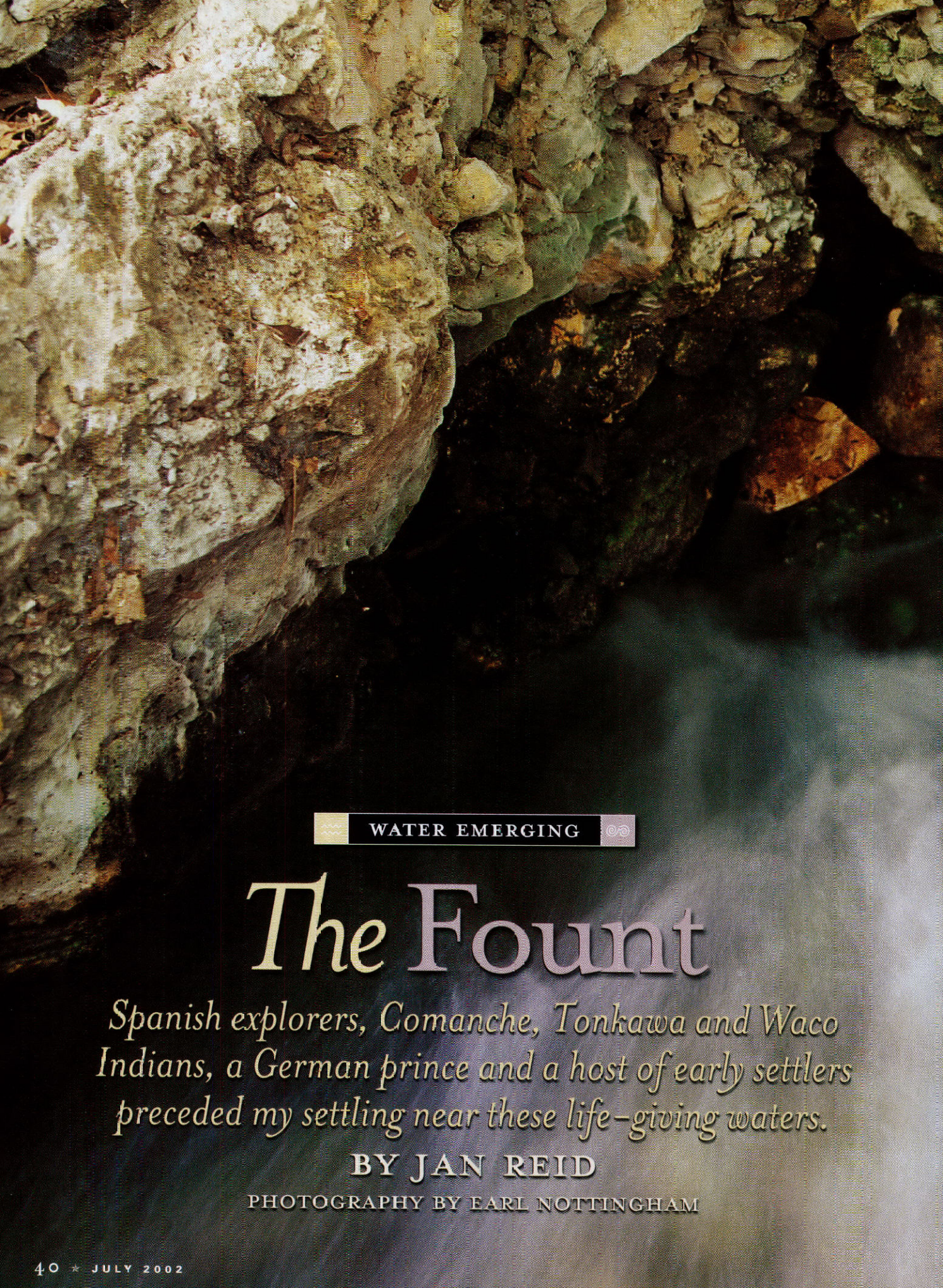
Costly brush removal faces both economic and political problems, however. Urban taxpayers tend to regard it as a benefit only to landowners and question why they should help pay for it, though it would also increase cities' water supplies.

Some of the earliest signs of man in this part of the continent have been found on the Texas plains. These first people, 10,000 or 12,000 years ago, almost certainly were drawn by the water and an abundance of game. Other people have come and gone through the ages.

Recently, I stood on the rim of Tule Canyon, a spectacular chasm 700 feet deep at the jagged eastern edge of the High Plains escarpment, near Quitaque. It is an extension of the Palo Duro. Indians long ago carved handholds on the yellow-red canyon wall so they could climb the sheer rock face. Just a few hundred yards to the north, the U.S. Cavalry once fought a pitched battle with hostiles. Far below me, near the chasm's boulder-strewn floor, clear Ogallala water bubbled out of the canyon wall to feed sparkling Tule Creek.

That visit gave me a look far back into the past. But it also afforded a disturbing vision of an all-too-likely future. The springs and the creek could dry up and die if the aquifer level continues to sink. Although this part of Tule Canyon is far from the highway and relatively unseen, we all instinctively would feel the loss. The creek, the canyon, the Ogallala itself, are part of our history, our heritage as a people.

If we exhaust it for today's transient gains, what heritage do we leave for our children and grandchildren?



WATER EMERGING

The Fount

Spanish explorers, Comanche, Tonkawa and Waco Indians, a German prince and a host of early settlers preceded my settling near these life-giving waters.

BY JAN REID

PHOTOGRAPHY BY EARL NOTTINGHAM

The most jubilant Comal Spring gushes from

the base of a limestone cliff in New Braunfels, at the juncture of the city-owned Panther Canyon Nature Trail and a heavily traveled street, California Boulevard. The Comal Springs and the short aquamarine river they form are tightly enclosed by urbanity, though most folks in New Braunfels still think of their community as a small town. A Landa Park sign warns you not to wade or dabble, but you can stand on a sidewalk about 20 feet from this source of Texas' largest springs.

On a chilly morning I pause there a long while, enjoying the birdsongs and burbling ruckus of the spring. Three mallards play in the current, paddling in tight circles, ducking their heads in the water, then giving them a vigorous shake. They behave like they wish they could swim back into the darkness of the aquifer, but the force of its ancient outrush holds them back.

Though remains of middens, flint-working sites, and rock shelters abound, scientists have not pinpointed exactly when people first gathered at these springs. In 1929, ditch diggers found eight indigenous skeletons buried nearby. A local avocational archaeologist proclaimed that they were at least 1,500 years old and that one woman had "absolutely no forehead" and was more than 6 feet tall. That's a fairly commanding prospect. Apart from being an oasis for humans, the springs provide critical habitat for animal species that are in danger of extinction. The Comal Springs are the locale's heart and soul.

The Edwards Aquifer replenishes itself by the simple expedient of holes in surface limestone. Rainwater pours through the cretaceous rock, then gravity pulls it west to east, then northeast. Springs abound in the Balcones Canyonlands because fissures in its geological fault let the pressured water out. Pollution of the aquifer and its springs is continually threatened by leaking septic and gasoline tanks and runoff of agricultural poisons and the foul gruel that coats urban concrete. But high coliform counts are less common in Comal Springs than in a famous relative, Barton Springs, which gets its water from limestone in Austin's urban sprawl. The Comal Springs' recharge zone extends far to the west — near Hondo, Sabinal, Uvalde, Brackettville. It's lightly populated ranching country.

But the Comal Springs' break in water quality is offset by heavy demand on its quantity. Between the springs and their recharge features are the city of San Antonio, which relies on the Edwards Aquifer for all its drinking water, and farmers who irrigate their fields by pumping from artesian wells. The system of springs flowing from the aquifer is often likened to a bucketful of holes. As the water in the bucket dips, the number of holes spouting rivulets falls off, too.

The Comal Springs emerge fairly high in the bedrock, at an elevation of 623 feet. They are known to have dried up just once, for 144 days in 1956. The ubiquitous Drought of Record lasted seven years and turned 90 percent of Texas into a disaster area. Glenn Longley, a Southwest Texas State University biologist and authority on the Edwards Aquifer, warns flatly: "If we let the Comal Springs dry up, we are down the road to an ecological disaster."

In the Trans-Pecos, the Comanche Springs were once a storied and glorious oasis, too. Heedless and selfish pumping by Texans left Fort Stockton with nothing but a grim hole in the ground today. You don't have to range that far to find the precedent for New Braunfels. Up Panther Canyon, a short distance from where I stand is a pile of rocks that once issued a vital Comal Spring. That spring dried up in the 1950s, and it's never come back.

Why should I care that the Comal Springs always flow? Let me begin with how I came to them. I grew up in North Texas, where all the recreational water in my life either was chlorinated or muddied shades of pink or brown. I zoomed down the rapid of a culvert of an irrigation ditch and learned to water ski in lakes where the bough of a partially submerged mesquite could strike like the horn of a rhino if you weren't careful. Then I finished college and got a reporting job in New Braunfels. I lived in a Spartan duplex on the edge of a neighborhood called the Estates. At the end of my first day there I went for a walk past small stylish homes then around the golf course and back around Landa Park. Gaping at the emerald water and the cliff rising above live oaks bearded with Spanish moss, I thought: This is the best place in Texas I've ever seen.

My chance residence in the Estates enabled me to swim in a

{SPRING RUN ON COMAL RIVER}

{AQUATIC VEGETATION IN THE COMAL}

pool restricted by a legal entity called the Comal Water Recreation District #1. I didn't feel guilty about my privilege; there are large public pools in Landa Park. I snorkeled for the first time and adjusted to the initial shock of jumping in that water, a constant 72 to 74 degrees. On winter days steam wisped off the water's surface. I jumped in once and surfaced laughing; now it felt like a lukewarm bath. Eventually I had to climb out, though, and I thought I was going to die of exposure when the cold air hit me and I raced shivering to my car. Best were the summer days when friends and I would take to the Comal River, where it flows out of the park, and drift downstream in inner tubes, young faces raised to the blazing sun.

All I knew then about the Comal Springs' ecology was the feast before my eyes. In that I was little different from others drawn there. Spanish and French explorers first wrote about it in journals four centuries ago; in 1691, one chronicler described a huge encampment of Indians around the springs — some, he said, came from as far away as present-day New Mexico and Parral, Chihuahua. In 1756 the Spaniards established a mission at the springs called La Señora de Guadalupe. Just two years later they were gone, chased off by ferocious Comanches.

Comal in Spanish means "basin," referring to the valley and hills, but for many years the 3.25-mile river was called the Little Guadalupe, and the springs Las Fontanas, "the fountains." The springs were a welcome stop for travelers on El Camino Real. Then in 1845, a German prince, Karl Solms, bought 525 acres around the springs for $1,111. That would be an astounding bargain in today's market, but the price in that economy and frontier is a measure of how cherished the springs were.

The Comal and San Marcos springs provide habitat for nine rare and threatened species.

The German immigrants landed at Indianola and learned that all the promised mule teamsters were off hauling freight in the Mexican War. They had to walk to the Balcones Escarpment, and dozens of them died from cholera and other ills. Trying to keep their spirits up, they danced at night to a clarinet played by an overworked gravedigger. Their arrival in the Comal basin in early May that year was a joyous occasion, but a schoolteacher named Herman Seele wrote: "In that night a Texas electrical rainstorm broke up a cannibalistic orgy by Tonkawa Indians ... at which they had feasted on boiled and fried flesh of one of their enemies, a warrior, of the Waco Indians. The next morning a number of Tonkawa squaws on their way from the feast, in grinning gesture told us how delicious the flesh tasted and hoped by eating of it their own offspring would be as brave as the Waco warrior had been."

The Germans who saw New Braunfels grow up around the Comal Springs included a number of distinguished frontier naturalists, among them a geologist and wildflower enthusiast named Ferdinand von Roemer. He witnessed the Indian-camp ceremony in which the Germans negotiated a truce with the Comanches. They were the only Texas settlers who made a lasting peace with that implacable tribe.

Scientists have documented about 280 major springs in Texas at the time of its settlement; about 60 of those have since dried up. The pioneer of that research was another geologist, Gunnar Brune, who worked for the U.S. Soil Conservation Service and the Texas Water Development Board. Brune's health and that of his wife prevented him from visiting every county and finishing his self-published 1981 magnum opus, *Springs of Texas* (reprinted this spring by Texas A&M University Press). Claims often are heard that the Comal Springs are the largest in the country. Not so, according to the master. Brune subscribed to a study that ranked them eighth in the nation. Still, by far, they are the most plenteous in Texas and the Southwest.

Brune was an impassioned but melancholy sort. "This writer believes," he said in his introduction, "that the human race is committing suicide, that man cannot control his destiny, and that within 500 years he will be extinct, carrying with him most other life forms on earth." Nothing seems to have disheartened him more than the loss of the Comanche Springs and many others in Texas. He wrote about overgrazing and ruinous oilfield brine, about a wasteful Lunatic Asylum Well in Austin that threw a geyser 35 feet in the air. Describing the desertification of Texas, he wrote about invasive mesquites that can root down 150 feet to reach an aquifer, about exotic salt cedar, or tamarisk, which infests streams from the Rio Grande to the Canadian, able to exist even on contaminated water. He wrote about irrigation well-pumpers "mining and using up groundwater, some of which should be left for their children and grandchildren. But no one cares ..."

Plenty of Texans cared, of course, especially in a dry spell. But any objections were stifled by an almost holy writ called the Rule of Capture. Nineteenth-century English and U.S. case law held that property owners had absolute right to water beneath their land. If capturing one's groundwater sucked neighbors dry, that was just too bad. By the end of the 20th century, the Rule of Capture held sway in just six states, including Texas. The firmament was shaken first here by the Drought of Record. A stretch of the Guadalupe River became a dry stream, then the Comal Springs dried up. Dependent on that flow were Seguin, Gonzales and Victoria, along with rice farms and chemical plants and rich ecosystems in the San Antonio Bay and Aransas National Wildlife Refuge. In droughts the Comal and San Marcos springs supply up to 80 percent of the fresh water flowing from the Guadalupe's mouth.

The loss of that water was made actionable by Richard Nixon's signature on the Endangered Species Act in 1972. The Comal and San Marcos springs provide known habitat for nine rare and threatened species. While knowledge of that was growing, San Antonio declined opportunities to supplement its artesian wells with water from lakes. In 1991 the Living Waters Ltd. Catfish Farm began to pump water every day at a rate that equaled one-fourth of San Antonio's consumption. The "catfish farmer" triggered howls of outrage and became a public metaphor for absurd abuse of the Rule of Capture.

Against that backdrop, the late Lucius D. Bunton III, federal district judge, presided in his Midland courtroom over a complex 1991 lawsuit that officially pitted the Sierra Club against U.S. Secretary of the Interior Bruce Babbitt. But it also featured a University of Texas–Austin zoology professor, downstream consumers of Guadalupe River water, the city of San Antonio, pump-well irrigators and municipal governments of New Braunfels and San Marcos, representing tourism industries that relied on water recreation and the springs. One can debate the merits of a federal law that makes

{SNORKELING THE COMAL}

top priority the survival of tiny fish and blind beetles and salamanders — and hosts of Texans fear and loathe the Endangered Species Act — but the issue was a hammer that echoed as loudly as the gavel in Bunton's hand. The judge effectively ruled that the use of the Edwards Aquifer must be limited when Comal Springs threatens to dry up and bring closer the extinction of its species. (The San Marcos Springs, which come out of the limestone 48 feet lower in elevation, are then imperiled.)

In Austin, the late Bob Bullock, lieutenant governor, growled repeatedly that the state had been jawing about and passing off the same water problems since he was a freshman legislator in 1957. Senate Bill 1 and subsequent state legislation signaled Bullock's top priority and hopes for his legacy as his retirement neared. Its features included the establishment of the Edwards Aquifer Authority. The Comal Springs' normal flow is approximately 300 cubic feet per second (cfs); its fragile species are considered jeopardized when the flow falls to 150 cfs. In September 2000, the Edwards Aquifer Authority actually imposed restrictions on use of sprinklers when that jeopardy level was reached.

Tom Arsuffi, an aquatic ecologist at Southwest Texas State University and expert witness for the Sierra Club in the suit before Bunton, remains hopeful. "If we can just cross our fingers and hang on five or 10 years," he says, "the Comal Springs might be all right. Conservation measures have been applied. San Antonio has gotten the point and started looking for other sources of drinking water. But the most significant part is that, in the Edwards Aquifer, the Rule of Capture no longer applies."

Stuart Henry, an Austin lawyer on the team who represented the plaintiffs in the 1991 lawsuit, does not celebrate yet. "In a real repeat of the Drought of Record, I'm not at all confident the trigger levels and management plans will successfully protect the species — in spite of federal law that says they have to." Alive and well before other federal judges is a countersuit by powerful San Antonio lawyers and clients who argue the Edwards Aquifer is an intrastate issue, so the Endangered Species Act has no legal bearing.

This year, *Men's Journal*, a magazine for outdoors enthusiasts, nominated New Braunfels as the sixth most agreeable place to live in the country. Access to water sports was the aspect of the quality of life that most set the town apart. New Braunfels owes its existence to Comal Springs. But even in years of good rain, their flow plummets through early July, when most irrigation is completed; they start to regain force, then sharply ebb again when dry, hot August increases the demands on San Antonio's artesian wells. Central Texans have endured fierce dry spells as recently as the 1990s, but none have approached the Drought of Record. The time it never rained, as Elmer Kelton phrased it in his fine novel about that period, ended with a characteristic slam-bang of Texas weather — a 1957 hurricane that ramped inland, assaulting thousands of people with catastrophic flash floods.

New Braunfels owes its existence to Comal Springs.

Yet those wild extremes of weather were no anomaly. What happens when it never rains again? Will Texans really have the conviction to keep the Comal's oasis waters flowing? Climatological patterns indicate that a repetition of that drought can be expected in Texas every 50 to 80 years. One day we'll have to answer those hard questions about will and water. It's just a matter of time.

TEXAS RIVERS

by John Graves

Photographs by Wyman Meinzer

In *Goodbye to a River*, John Graves defined what it means to know a river—as a real place, as a landscape of memory and imagination, and as "a piece of country, [that] hunted and fished and roamed over, felt and remembered, can be company enough." Readers who've taken that canoe trip down the Brazos with him have long wished to travel other rivers with John Graves. Those journeys now begin in *Texas Rivers*.

This book marries the work of two Texas legends. John Graves brings to *Texas Rivers* his ability to weave history, geography and culture into a vibrant portrait of a land and its people. Through photographs of rare beauty, Wyman Meinzer reveals the rivers as few will ever see them in person, distilling decades of experience in capturing light on film into a tour de force presentation of Texas landscapes.

In essays on the Canadian, Neches, Pecos, Llano, Clear Fork of the Brazos and Sabinal rivers, Graves captures the essence of what makes each river unique. While the Canadian is a river of the plains that runs through big ranch country, the Neches is a forested stream heavily impacted by human encroachment. The Llano and Sabinal remain largely unspoiled, though the forces of change ebb and flow about them. The Pecos shows ripples of its Old West heritage, while the Clear Fork of the Brazos flows through country still living in those times. Meinzer's photographs offer a stunning visual counterpoint to Graves' word portraits and, together, they show clearly that rivers have been central to the development of the unique character of Texas.

John Graves lives and writes in Glen Rose, Texas, in the Hard Scrabble country that has inspired so much of his work. A recipient of many honors for his writing (including a National Book Award nomination for Goodbye to a River*), he is a former president of the Texas Institute of Letters and a past holder of both Guggenheim and Rockefeller fellowships. Wyman Meinzer has published numerous books of photographs of Texas and has the distinction of having been named Texas State Photographer by the Texas Legislature. His work appears in magazines nationwide; he is a frequent contributor to* Texas Parks & Wildlife *and* Texas Highways.

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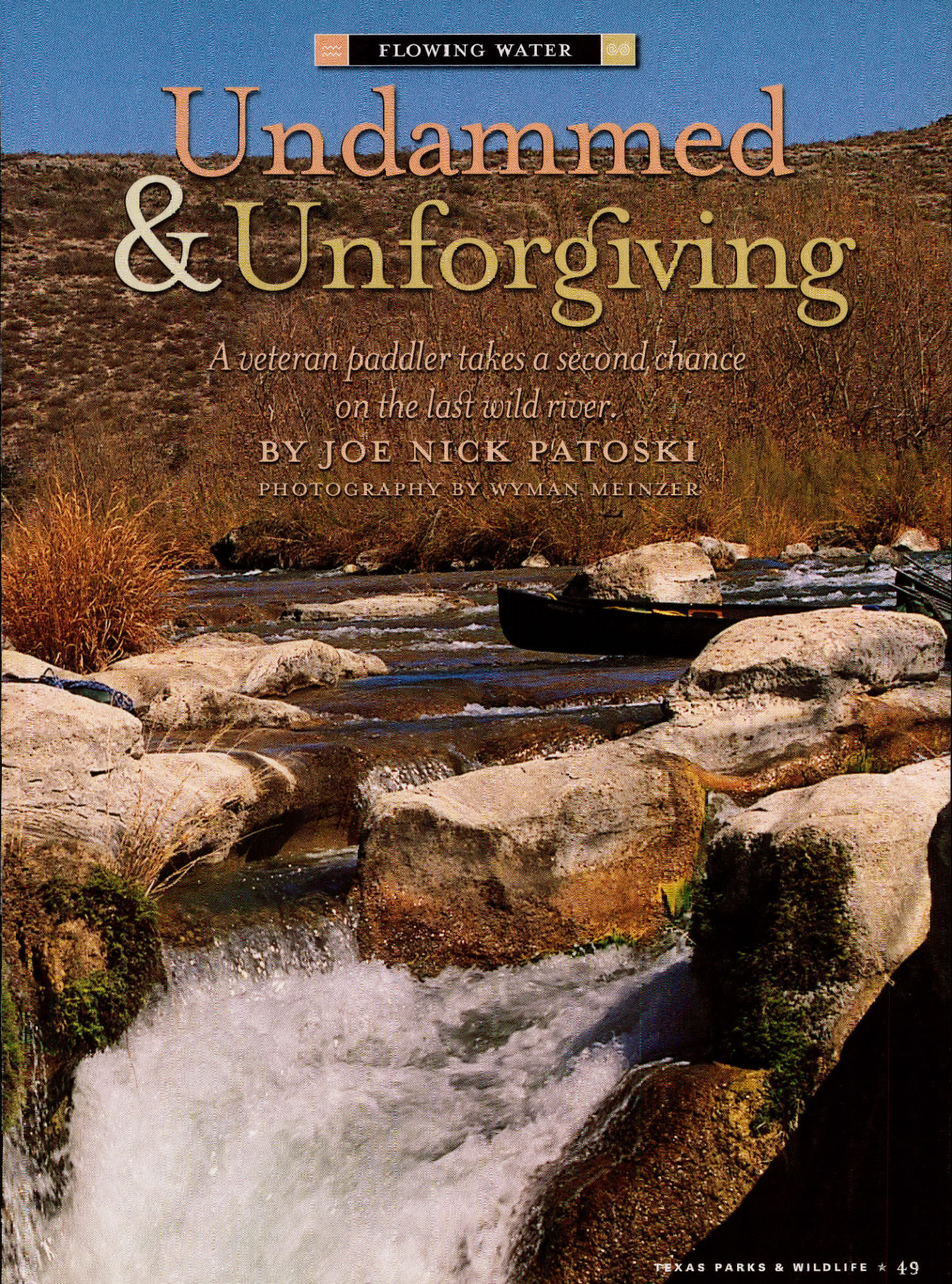
Undammed & Unforgiving

A veteran paddler takes a second chance on the last wild river.

BY JOE NICK PATOSKI

PHOTOGRAPHY BY WYMAN MEINZER



You know how songs get stuck in your head?

There's one written by the great Texas composer Billy Joe Shaver called "The Devil Made Me Do It the First Time" that wouldn't go away while I was on the Devils River. The diablo connection was probably how it burrowed into my brain in the first place, but the story line was the gnawing part. The singer blames all his troubles on Satan the first time around, but says "The second time I did it on my own."

Billy Joe had the river and me down cold.

My first time down the Devils was easy to explain. I'd only been hearing about it for the past 30 years. It was the great, lost Hill Country river, a spring-fed jewel on the western edge of the Edwards Plateau, running swift and fast through that vague badlands where Tamaulipan scrub — also known as South Texas brush country — fades into the Chihuahuan Desert, from somewhere between Ozona and Sonora down to just above Del Rio, where it dissolves into Lake Amistad. Its almost-Caribbean hue was striking, as pretty pale as a summer sky. The translucent water brimmed with smallmouth bass you could follow with your eyes, the clarity was so sharp.

The Devils lives up to its name. It is almost impossible to see, landlocked by sprawling ranches whose owners have been known to vigorously file trespassing charges and sometimes take even more extreme measures to discourage river use by outsiders. It is wild, empty country. Spotting wild turkeys is easier than spotting another human. Doing most of the floatable part of the river takes two days, requiring 15 miles of paddling on one stretch. There is no room for accidents. Rescues are out of the question. Once you get on, there is no turning back.

When I moved near the Blanco, a river that has become sacred in my life, the Devils always loomed. Half the time I'd talk to people about "my" river, the Devils came up, usually in the context of local river folks pointing out that the Blanco is the second-cleanest river in Texas.

"And what might be the cleanest?" I'd inevitably ask, never challenging the veracity of the claim.

The Devils.

My love of the Blanco, that "cleanest" superlative, and a developing obsession in paddling down rivers, beginning in an inflatable Sevylor and presently in a Yahoo sit-on-top kayak, led to the conclusion that if I really wanted to know what everyone was talking about, I'd have to get on the Devils.

That was easier said than done. Not only is the river in a very remote, lightly populated part of the state, the environment is particularly harsh, and the flow tenuous at best. It is reputed to be a homewrecker and heartbreaker that could tear lifelong friendships asunder. Too hot to run in the summer, and too cold to endure in the winter, it is best attempted in fall or spring. If one could get on the river at all, that is.

In a state where property owners have historically clashed with recreational river users, the Devils is arguably the most hostile. "You didn't just risk getting shot, you might be held under fire for six hours," one retired boater claimed, in relating what happened to him 20 years ago shortly after he put in at Baker's Crossing and got separated from his canoe. Even touching the bank can get one arrested for trespassing. Ranchers like to invoke the Spanish Land Grant version of property rights, which accords ownership of a river to include its bottom.

Until 1988, paddling was downright impossible if you couldn't do 25 miles in a single day. That's the year the Finegans sold the Dolan Creek Ranch to Texas Parks and Wildlife Department, which designated the land as a state natural area with virtually no park infrastructure. That made it possible to run the upper 15.5-mile part of Devils from Baker's Crossing — still a physically exhausting challenge — and legally pull out to sleep, then do 9.5 miles to the takeout, where fishing guide Gerald Bailey operates a shuttle service.

I managed to complete the run in two days, but only after hours of pulling my boat over shallow stretches, getting lost in jungles of river cane, running aground on the coarse, exceptionally abrasive limestone lurking just below the water's surface, and paddling into relentless headwinds that kicked up waves in my face. Heeding the retired boater's advice, on the few occasions I actually did touch a bank, it was of an island in the middle of the river. I felt a sense of satisfaction completing the journey, even while I was convinced I'd joined the silent majority whose first time on the Devils was their last. Maybe I'd run it again, I told myself, but only after an extended period of heavy rain, when the Pafford gauge was reading at least 500 cubic feet per second, twice the normal flow.

Less than six months later, I went back on my word. Somehow, my memory had erased all the nightmarish particulars of the first trip. I forgot sleeping for 12 hours straight at the end of the first day's paddle because I was too exhausted to do anything else.

{DOLAN FALLS AT DUSK}

{PICTOGRAPHS ALONG THE DEVILS RIVER}

That's the only excuse I can offer for returning to Baker's Crossing in early March to do it again. This time, the flow is the same, give or take 20 cfs, from the previous October. And if conditions aren't ideal, the one thing I recall from the first trip was, there is no such thing as an ideal day on the Devils. You work with what you get. At least overnight temperatures aren't dropping into the teens, as they had two days earlier. Even Mary Hughey is reassuring. "The Devils River and kayakers get along just fine," she tells me as she collects the camping fee from Joe Hauer and me at Baker's Crossing. Canoes might drag the whole 15 miles down to the state natural area. But not shallow-drafting kayaks.

Hughey is the matron at Baker's Crossing, the owner of the two-story mansion set by the banks of the tree-lined river and the surrounding campgrounds. A sweet lady who is training her 2-year-old grandson, Casey, for a career in the hospitality industry, she makes it plain to each and every boater camping out to be on the river by nine in the morning, or she'll make darn sure they will. She gets enough heat from landowners downstream for letting people on to the river in the first place, she says, and she doesn't need any more grief.

She also raises a warning flag. While talking about lack of rain, a common topic of conversation west of the 98th meridian, I mention the 10-year drought.

"Ten years?" she says. "It's more like a 30-year drought. The river hasn't really run since the '70s." She isn't kidding. Thirty years ago, the headwaters of the Devils were generally recognized as being near Juno, 10 miles up the highway. These days, it barely holds a flow at Baker's, though there is enough moving water to lull me to sleep the instant I climb into my sleeping bag.

We are on the river before eight the following morning, and reality rears its ugly head within 10 minutes, when the little riffle I ride disappears in a pool of gravel. Scrunch. I get up and pull; the first of more drags than I care to count. Somewhere in that first hour, I check the new seat I'd hooked onto my boat for back support and realize the zip pocket behind the seat is not watertight, but in fact self-baling. The topo maps I'd downloaded have turned to mush. I've left my river guidebooks in the car.

My first trip in October was with David Hollingsworth, who'd run the Devils before and brought along his GPS to pinpoint our location. This time, I am the experienced one, and now I have nothing — no map, no printed material, no help, since only a handful of people live along the river — nothing but my obviously defective memory. I calm down by reminding myself I've done this before. It is only two days. Heck, I could go without water for that long if I really had to. And we had plenty of water, trail mix and nutrition bars stuffed into our drybags. I decide doing it without any navigational aid would be liberating, with the understanding that mistakes would be unforgiven.

Hauer doesn't believe me when I tell him it will take the full day to get down to the state natural area. Like me on any first time on a river, he keeps thinking the takeout is just around the next bend.

"Patience," I counsel.

As long as I maintain a steady stroke, I can savor the sweet bliss of floating through a genuine wilderness practically devoid of power lines, roads or human presence — save for the occasional hunting shack. In Texas, no less. The views are sublime: a flock of mallards skittering off the water, coots diving, a killdeer swooping just above the water line, hawks surfing thermals high above, a great blue heron lumbering out of the river cane. A bass spooks from under a shallow shelf, tail flopping above the surface, startled by my intrusion. On almost every cliff overlooking the water, I see caves and overhangs, the types that provided nomadic people over the previous 6,000 years with shelter and access to the other basic necessities of water and food nearby. There are more pictographs in the Devils, Pecos and Rio Grande watersheds than anywhere else on earth, save for the south of France.

My soundtrack is the steady splish-splish of every stroke, accompanied by distant squawks, chirps and screes, the occasional soft flutter of flapping wings, the intermittent whooshes of wind, and that Billy Joe Shaver song. It is a splendid river. More than once, I find myself on a tight rapid or in a gin-clear pool shaded by nearby groves of pecans and oaks, thinking I was back on the Blanco, more than 200 miles east. The cliffs, the outcroppings and the massive limestone the river cuts through brought Big Bend closer than it really is. Life is distilled to the sweet essence of river, land and sky. But I cannot get lost in the moment. After all, this is the Devils. You never know when the water will run out, or where the next crusty rock is crouching just under the surface, ready to snag an unwary boat. On some rocks, I recognize the distinctive blue streaks of my kayak, skid mark souvenirs from my first trip.

It is not difficult to focus on the dry, desiccated landscape and imagine something that during a much wetter period resembled the Hill Country. The first European to note the Devils' existence, the Spaniard Gaspar Castaño de Sosa, was not exactly impressed. He named it the Laxas, which translates as "feeble" or "slack." Explorers and travelers who followed him held it in higher regard, naming it the San Pedro, and often lingering longer than planned, since it was the last rest stop before striking out west across the desert. St. Pete struck Texas Ranger Jack Hays as an uninspired name for the river when he came upon it in the 1840s, before he moved on to California. He reckoned the Devils would be a more suitable title. A military camp had been established on the river after the Mexican War. Another Texas Ranger, Capt. Pat Dolan, arrived to clear the region of outlaws in 1870, early enough to have his name attached to the falls.

That made it safe for E.K. Fawcett who, along with a group of friends, left his mark inside a cave above Dolan Falls on July 24, 1883. As the Devils' first settler, Fawcett started grazing sheep by the falls, and others followed with goats and cattle. Eventually the grasses in the watershed were worn down to the nub, leaving rocks, prickly pear, cedar, mesquite and the occasional lechuguilla. The browsing down explained why I heard but a single calf on the trip. Not much is left for today's livestock to eat.

Gary Garrett, the Texas Parks and Wildlife Department biologist who has studied the Devils extensively, confirms that the river is relatively unpolluted and undammed — less than 2 percent of all American rivers remain free of such impoundments, and the upper part of the Devils is the only free-running river left in Texas — and one of the most pristine in the southwestern United States. But he also makes clear that, like every river in Texas, the Devils has been impacted plenty. Its flow has declined steadily. Chloride, phosphate, cadmium, lead and mercury have been found in concentrations high enough to be potentially dangerous for aquatic life and human health. The Rio Grande cutthroat trout, once native to the region, disappeared long ago. The smallmouth bass, which attracts fishermen from all over Texas, is an exotic introduced to the river and, with the cessation of the practice of stocking exotics in the Devils, the

(RUSHING WATER ON THE DEVILS)

smallmouths are just holding on, making the practice of catch-and-release on the river crucial to their survival. Garrett suspects the smallmouth and other exotics, including carp, black bullhead and blue tilapia, may be contributing to the threatened status of the native Devils River minnow.

But Garrett also gives me hope. "Stewardship is at a higher level here than on other Texas rivers, and property owners are utilizing TPWD resources to learn sound land and water management practices," he says. The big ranches are staying big, thanks to attorneys and doctors who want to keep it that way, buying big chunks of real estate. The Nature Conservancy bought 10,000 acres within the watershed, including Dolan Falls in 1991, and has brokered sales of another 35,000 acres with conservation easements, meaning the land will remain undeveloped forever.

I arrive at the state natural area 15 minutes ahead of Hauer. Usually it's the other way around. For all the exertion, we haven't averaged even two miles an hour. Back home we could do twice that distance in less time. But we aren't back home. We are on the Devils. And it has beaten us down bad. By the time Hauer crawls onto the rock shelf, he is declaring his fealty to the San Marcos River. Why come all this way to be brutalized? He is asleep before the sun goes down. I stay awake to watch the last light of day fade to dark while a couple of bats flutter erratically overhead. The last calls of a lonely mallard pierce the night. It is warm enough to sleep out without a tent, and cool enough to snuggle into a sleeping bag. I don't care whether the wind whips up or if it drizzles before dawn. I am too wasted.

The second day begins with a short, less-than-a-mile paddle from the state natural area to the juncture where Dolan Creek, the most abundant of 32 tributaries, meets the Devils. The meager flow builds into a churning and hissing torrent, climaxing at Dolan Falls. Water gushes through four chutes carved from solid rock, adorned with maidenhair fern. I'd seen a similar setting once before, at the Narrows on the Blanco. And like the Narrows, running one of those chutes likely would have terminal results. We scout and ponder, craning our necks, and decide to portage, following the metal arrows on the rocks on the left bank.

Dolan Creek's recharge makes the last nine miles a pleasure. Rapids carry the boats instead of stopping them. Picking a path through the reeds becomes a game of chance. Pick the right chute and get easy passage. Pick wrong, get out and drag. I even find a couple of spots where I can point my boat upstream and surf.

Although we've seen a scattering of trailers and cabins, one two-story structure high on a ridge above the eastern bank that looks like a hotel or a resort is the first real sign of civilization, other than all the posted No Trespassing signs. It is tobacco lawyer John Eddie Williams' Rio Vista Ranch, I later learn.

We find Gerald Bailey's place with no problem. His hillside home is marked by a canoe jutting into the air. Gerald is out guiding a fishing trip, his wife tells us, but Don Kelley will be over in a minute to drive us back. Don, one of the few other full-time residents of the Blue Sage subdivision, used to be a hunter and a fisherman when he first visited the Devils, but since he moved to a house overlooking the river from a high bluff, he says he's become a naturalist out of necessity. "You can't do much of anything if you live here, other than be a screwaround, because it's so remote and far away from everything," he says while he ties down our boats and loads us into his Suburban.

I happily pay Kelley $150 to shuttle us back to Baker's once I see what passes for roads on the Blue Sage subdivision and knowing the next takeout is another 20 miles downstream on a part of the river that is more like a dammed-up lake. It takes an hour to drive the 14 miles out to U.S. Highway 277, and almost another two hours back to either the natural area or Baker's.

We talk about wild turkeys. I've seen more on the Devils than anywhere in my life. We talk about how rocks seem to hold heat in this part of Texas longer than anywhere else, how untamed the river gets when it does flood, and how the same landowners with the hostile reputations are actually protecting the river and the caves and pictographs by discouraging tourists. I marvel how I hadn't seen a piece of trash anywhere on the entire trip.

We talk about rain, and how it almost never does in these parts.

Hauer figures he left at least $100 worth of his Perception's bottom on the caustic limestone in the river. His first time on the Devils may be his last. Me, once again I swear on a stack of Bibles that I won't do it again until there's been a really, really big dump in its watershed, which may not happen again in my lifetime.

Then again, that's what I said the last time around. Before Billy Joe Shaver started rumbling around in my head.

THE RIGHTS TO KNOW

QUESTIONS OFTEN ARISE about river access and the rights of river users. Because the laws are sometimes unclear, conflicts can occur between river users and landowners whose lands are adjacent to the river.

Early Spanish and Mexican law established that perennial streams were retained by the sovereign (governing body). Then in 1837, the Republic of Texas adopted the 30-foot rule. Under this law, the Republic claimed all streambeds with an average width of 30 feet from the mouth upstream. As long as the stream averages 30 feet wide from its mouth upstream, it is considered "navigable by law." Even if the river is dry, it is still considered navigable if it meets the 30-foot rule.

The issue is further complicated when landowners own the land under a stream. While most navigable streambeds are the property of the state, private landowners may own some streambeds in navigable streams. However, even when the streambed is privately owned, if the stream or river is "navigable by law," the public is granted rights by state legislation (Small Act) to conduct lawful activities in the stream, such as wading, canoeing, walking, camping, fishing and others.

Because streams meander and fluctuate with flow, the boundary between the navigable stream and private lands is often difficult to identify. In 1920, the U.S. Supreme Court defined this boundary as the "gradient boundary." While this boundary is difficult or almost impossible to identify without a licensed surveyor, it is a point on the bank that is halfway up the "lowest qualifying bank" and includes the entire low-flow bottom channel.

While major streams are navigable and are clearly reserved for public uses, conflicts often occur on smaller tributaries that are narrow and contain less flow. When boating on streams that may be private, it is important to check with local authorities to determine the status of the stream. Use of non-navigable streams is trespassing. A determination of whether a stream is navigable is the responsibility of the Texas General Land Office, which can be reached at (512) 463-5001.

Additional information on river laws can be found on Texas Parks and Wildlife Department Web site at <www.tpwd.state.tx.us/texaswater/rivers>.

— Bob Spain

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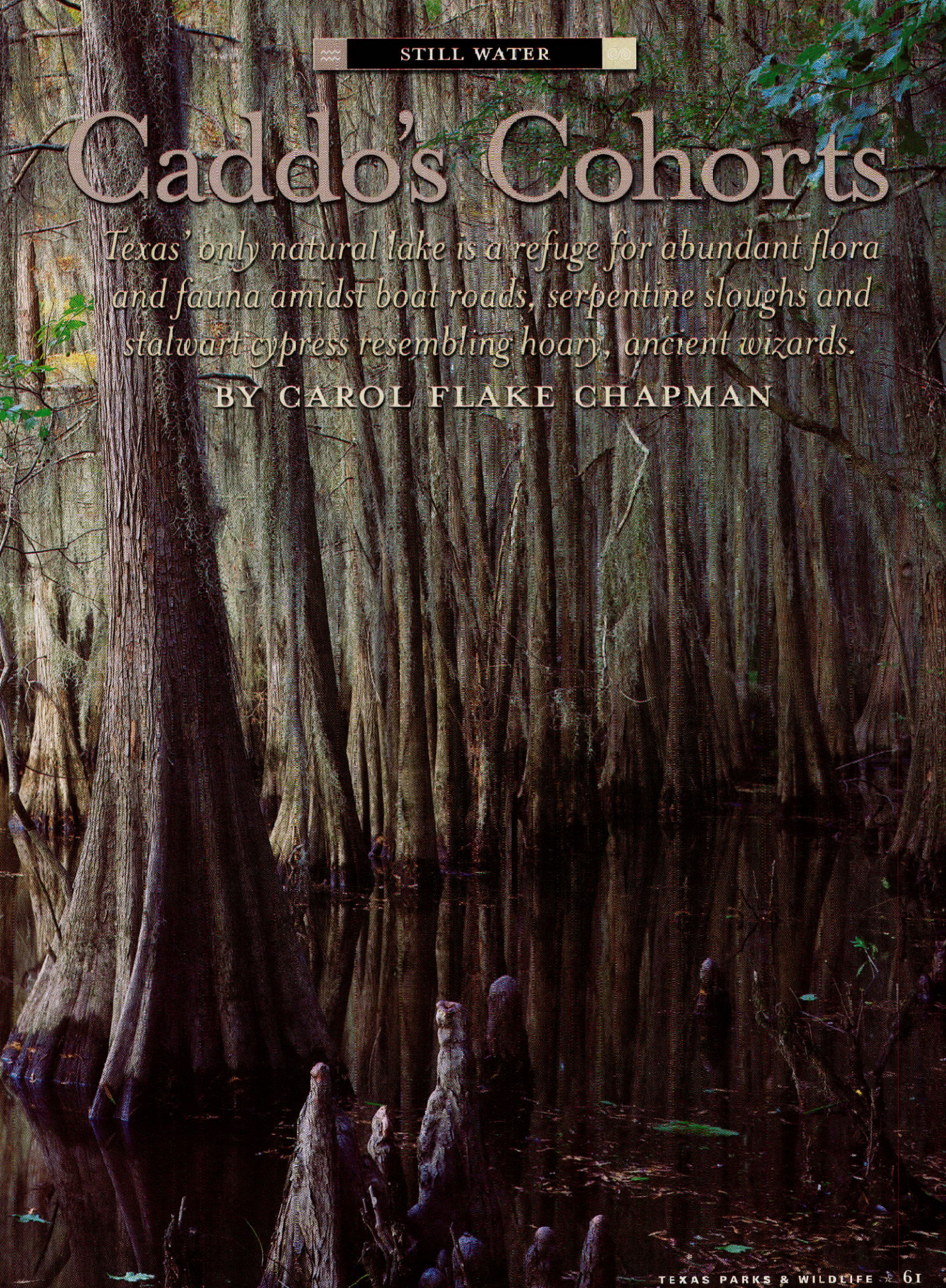
PHOTO © STEVE GUYNES

STILL WATER

Caddo's Cohorts

Texas' only natural lake is a refuge for abundant flora and fauna amidst boat roads, serpentine sloughs and stalwart cypress resembling hoary, ancient wizards.

BY CAROL FLAKE CHAPMAN



I first saw Caddo Lake at its barest and stillest,

deep in winter, when the mists were rising at dusk, and that spectral image of the lake has stayed with me like a recurring dream. In February, Caddo was a study in charcoal: a haunting vision of shimmering silver and gray and taupe. At first glimpse, the lake appeared to be trapped in suspended animation — its surface so motionless that a breath of wind ruffled up a small patch of water to resemble a moving school of tiny fish. Breaking the spell, a longnose gar rolled, and a great blue heron glided by like a relic from a lost world. It was enough to make me shiver. But then, my inadvertent baptism in its chilly waters might also have something to do with that lasting impression of Caddo.

Although it may inspire a chillbump or two at any time of the year, Caddo is a lake for all seasons, and I have yet to see all of its faces. "You've got to come back in April and again in November," I was told in February by Dave Lomax, owner and operator of Caddo Canoe Rentals and Boat Tours. Lomax has been guiding people around the lake for more than 30 years and renting out canoes at Caddo Lake State Park for 22 years. And even then, I realized, I would barely ripple the surface of this mysterious maze of cypress-laden bayous, sloughs, backwaters, ponds, channels and open waters hidden away in the Pineywoods. Caddo is the state's only naturally formed lake of consequence, and it's had a long headstart on the manmade reservoirs elsewhere in Texas in acquiring layer upon layer of history and biodiversity.

For countless centuries, it has been a lure for migrating birds. For the Caddo Indians, who built a complex culture here when the lake was little more than a seasonal swamp, as well as for the white settlers who later found escape here from their pasts in other places, it was a refuge. And Caddo is a refuge still, though the world around it sometimes appears to be impossible to escape.

Any lake in Texas is an occasion for celebration, since we've had to create so many reservoirs of our own, for a thirsty, growing population. During the last century, for the sake of flood control and more predictable water sources, engineers transformed ribbons of rivers into broad blue basins that were soon filled with fish and boats and swimmers. Even the youngest of our lakes have worked their way into the fabric of our lives, lending us the element to float away for a while from everyday duties and doldrums. But murky, dynamic Caddo, with its infinite variety, inspires the kind of devotion reserved for the world's ageless beauties.

The most flinty and practical of Caddo veterans acquire a lilt in their voices as they wax poetic about the growing riot of green that surrounds them in spring, from the carpets of spadderdock lilypads that spread over the water to the yellow-green buds bursting out on the bare boughs of the emergent baldcypresses and the overcup oaks on the banks and the burgeoning canopy of the surrounding woods. It's then that the bass move into the shallows, and then that so many migrating neotropical birds arrive for a sojourn on their way north, showing brilliant flickers and flashes of color as they wade and flutter along the lake's shimmering green-black surface.

Take Dave Lomax, for example. As we chug along on his pontoon boat past a swampy peninsula known as Hell's Half Acre, where spooky movies like "The Legend of Boggy Creek" have been filmed, he goes on about the way things will leaf out soon, turning the spiky boughs of this aquatic arbor into a lush green tunnel. And just when I'm ready to concede the superiority of Caddo in springtime, he pulls out some photos of his favorite spot on Caddo in late October or November. I can just picture it, on the way up Cypress Bayou, when the distant honking of the geese and ducks flying over is echoed by the scaups and grebes on the water that have decided to stay, and the fringe-like leaves of the cypresses take on a russet tone before they drop, in contrast to the colors on display among the oaks, dogwoods, chinquapins and hickories lining the surrounding banks and hills. "There's at least 38 different trees around Caddo," says Lomax, "and nearly every one of them turns a different color."

Winding through a labyrinth of boat roads, marked with numbered posts, we pass beaver lodges so big they could house some prehistoric-sized rodents. On a map, the big ink blot of Caddo

{CADDO LAKE STATE PARK}

PHOTO © LANCE VARNELL

PHOTO © CHARLES KRUVAND

{LILYPADS ON CADDO LAKE}

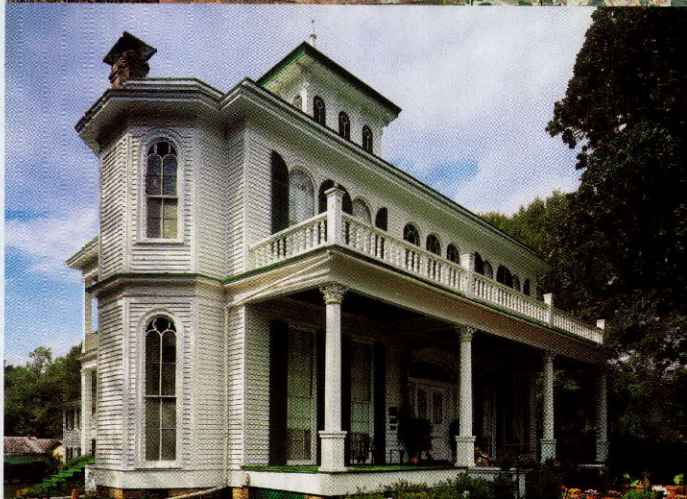
resembles a Chinese dragon sprawled across the state line, with its head aiming west and its tongue, Big Cypress Bayou, unfurling toward Jefferson. Its rump and tail extend east into Louisiana, with its tail curling toward Shreveport. Caddo, which covers 26,800 acres, is so convoluted that just going with the flow can easily lead you astray, even if you have one of Dave's maps pointing out the lake's better-known spots, like Whangdoodle Pass, Stumpy Slough and Old Folks Playground.

The next day I enlist Charlie Muller, the regulatory biologist for the region that includes Caddo, to help me get the lay of the land. A brewing storm keeps us off the water, and we drive in his truck to explore the scattered patchwork of land, swamp and water that makes up the roughly 7,000 acres of the Caddo Lake State Park/Wildlife Management Area (not to be confused with the neatly defined 500-or-so land-based acres of Caddo Lake State Park, which lies on the south side of Big Cypress Bayou). We travel from Goat Island, on the upper west reaches of the lake, to Potter's Point, almost on the Louisiana line, where Robert Potter, the "bad boy of the Texas Revolution," as he was known, was murdered by a neighbor.

It doesn't take long to see that Caddo is ruled by baldcypresses, which to me resemble ancient wizards, with their dangling beards and bangles of Spanish moss and their bulging buttressed trunks, which suggest the long skirts of a robe. The cypresses tend to be found in clusters with their "cohorts," as Muller calls them, of the same age. Cypresses can survive for centuries with their roots and lower trunks submerged in water, he explains, but they can't actually germinate in water — which means that when you see a cypress, it must have spent its first two years on dry land. The youngest cypress "cohorts," he says, are around 90 years old — when Caddo was last at a low level.

The lake was actually created some time before the early 1800s by a natural logjam on the Red River known as the Great Raft. With their roots eroded by rain and floods, thousands of trees slipped into the river, gradually building up a blockade so large and solid that horses could be ridden across it. It was said, though, that if you put your ear to the ground, you could still hear the current rushing beneath. The waters of the river backed up and flooded upstream from Louisiana, filling up the swampy basin of Caddo and submerging some Caddo Indian settlements. Indian legend had it that the lake was created by the angry stomping of the Great Spirit. And for a time, some historians theorized the lake had been created by the New Madrid Earthquake of 1811. But tests on the soil in recent times have been negative for evidence of seismic activity.

In fact, while Caddo may be a "natural" lake, humans have had a hand in its ups and downs — and still do. The uplifting of Caddo from swamp to navigable lake brought unexpected good fortune to the town of Jefferson, from which boats loaded with cargo from all across East Texas could steam through Caddo, across to the Red River, and then down the Mississippi all the way down to New Orleans. These were the years when the area around Caddo was known as the Badlands. Murders and feuds were rampant, and the few Caddo Indians who had survived the diseases and displacement brought by white settlers were removed to a reservation in Oklahoma. Although the Caddos had survived by forging alliances among individual tribes and by cooperative efforts in farming and hunting — the word Texas is derived from one of their words, *tejas,* meaning friends or allies — some of the settlers who replaced them obeyed a more primitive survivalist ethic. It was a time when strangers who met on the road used



PHOTOS © LAURENCE PARENT

{REMINDERS OF 19TH CENTURY JEFFERSON}

{BOAT ROADS AND CYPRESS SLOUGHS}

to ask each other, "What was your name before you came to Texas?" Things were so bad that a vigilante group known as the Regulators was warring with yet another group known as the Moderators, and Sam Houston tried to intervene, invoking the spirit of the Alamo to try to bring unity.

Eventually, the folks in Louisiana tired of the logjam and finally succeeded, after years of dynamiting, in breaking it up, leaving Jefferson and the other towns that had grown up around Caddo high and dry. Caddo reverted to swamp, and the state drained and sold much of the bottomland — making Caddo the only public lake in the state where much of the land below the surface is privately owned. Caddo even enjoyed a brief interlude as a pearl-hunter's mecca, when pearl-bearing freshwater mussels could be dug easily from its marshes by prospectors known as pearl hogs.

In 1911, an oil boom played a role in returning Caddo to its status as a lake. Wildcatters found it impossible to get heavy equipment into the boggy bottom of the Caddo basin, and engineers constructed a crude dam — essentially a spillway — at the eastern reaches of the Caddo basin in Louisiana, causing the lake to refill and allowing oil seekers to build platforms and float equipment to its desired destination. I was startled to learn that much of the early technology of underwater drilling came from Caddo — and that Howard Hughes, Sr., the founder of Hughes Tools, developed his fortune-making drill bit while working at Caddo.

Evidence of the oil boom remains, with a smattering of oil rigs on land on the Texas side and a few platforms on the water on the Louisiana side. Clearly, Caddo has managed to coexist with all manner of human activities, including a huge munitions plant that operated on its southeast shore until the Gulf War. The area, designated for a wildlife refuge, contains a number of contaminated Superfund sites currently being cleaned up by the Army. Those sites, however, have not been directly implicated in the high levels of mercury that have been discovered in some of the larger fish of Caddo, and no one knows for sure the source of the mercury.

Of course, Caddo has its protectors as well as its prospectors, and the people who live around the lake these days are quick to defend Caddo from any perceived threats. When a proposal was made in the 1990s to create a navigational channel for barge traffic through the sensitive upper reaches of the Cypress basin, local residents united in opposition.

Among the lake's strongest supporters is rock star Don Henley, of Eagles fame, who grew up in nearby Linden. Some of the best times of his life, says Henley, were spent on the lake as a child, fishing with his father. "Caddo was a magical, mystical place," he recalls. "We'd get up before dawn so we could be on the lake at sunup, when the mists would be rising." Caddo has played a strong role in his spiritual life, says Henley, as well as in his commitment to protecting the natural wonders of Texas and of the country. Caddo, he once said, was the place where he could "see and understand the divine hand of creation." Caddo, he says, is a "great teacher."

Henley is the key founder and sponsor of the Caddo Lake Institute, an organization devoted to studying and protecting the lake. Among the lake's best friends, too, are the scientists who've catalogued its resources, resulting in its designation by the international Ramsar Treaty as one of the 15 most significant wetlands in the world and its classification as a number-one quality resource habitat by the U.S. Fish and Wildlife Service. The scientists also have pointed out the vulnerability of the lake to environmental changes, including the construction of dams that have stopped the annual flooding that used to clear the lake of excessive vegetation. As early as 1993, when the Caddo Lake Coalition was founded, says Henley, it was apparent that the lake was under stress. "The lake looks just like it did when I was a kid," he says. "But once you get below the surface, you can see the problems." Caddo, he says, is a treasure for the entire state and "everyone who loves that lake needs to pitch in and help keep it healthy."

Just last December, residents made a passionate defense of the lake at a public meeting, in response to a proposal by the city of Marshall to sell some of its water rights to Caddo to a company building a power plant. A member of the Caddo Lake Chamber of Commerce pointed out the importance of Caddo as an economic asset, and another resident expressed concern that the lake wouldn't be there for her grandchildren. Already, says Mike Ryan, fisheries biologist for Texas Parks and Wildlife Department based in Marshall, the shallower upper reaches of the lake in the lower Cypress Basin have begun to experience anoxic conditions — that is, lack of oxygen in the water that can lead to fish kills. As a result, says Ryan, "any loss of water from the lake is cause for concern."

There can be consequences to messing with Caddo, I'm beginning to realize. On my last morning there, as I put out a rented canoe from a serene, sun-dappled point across from Goat Island, I start to get some strange feelings about the cypresses. They are cohorts, I think, not only in their common age but their common purpose. Like the people who know and love Caddo, and who will put up a fight for it, they are *tejas* — friends and allies of the lake. They remind me of the "ents" of J.R.R. Tolkien's *Lord of the Rings* — the tree guardians who can pull up roots and move when they get riled up. You really don't want to fool with an angry cypress, I think, any more than you want to tangle with a Caddo resident who thinks you might be out to do harm to the lake.

As I paddle, I'm trying hard not to bump into the ubiquitous bunches of cypress knees — the roots the trees send up above the water for air and stability. But the current is stronger than I expect, and my paddling skills are rusty. Three red-shouldered hawks keep circling me and screeching, and I can't help but disturb the quiet of the waters, scaring a sunning red-eared turtle into the water, spooking a belted kingfisher into flight, and provoking a swimming beaver, which slaps its tail on the water. Finally, as I near the bank, exhausted, I stand up in the canoe to try to push off from a particularly knobby knee that's blocking my path to the shore. With a lurch, I manage to tip the canoe and fall into the water. When I stand up, the murky water up to my waist, I probably resemble a Swamp Thang from a bad movie, with vegetation dripping from my head and arms. I can almost hear the cypresses rustling in hilarity.

Thrashing and glubbing, I hardly go under as gracefully as Amelia Jordan, who was lost to the lake in 1869 when the steamboat *Mittie Stephens* burned, and everyone jumped overboard. Her long, beautiful hair, I have read, floated on the water like silk before she disappeared. My gimme cap going down with my hair bunched beneath it hardly creates the same tragic effect, I'm sure. But then, perhaps my noisy immersion isn't for naught, since my quest, after all, is to get below the surface of this complicated lake. As I emerge sputtering from my unceremonious dunking, the ancient cohorts of the lake might approve. I have joined them, for the moment, with my wet feet submerged in Caddo and my head held high above the water.

PHOTOS © GRADY ALLEN

PHOTO © LANCE VARNELL

WATER INTO EARTH

God's Swamp

The watery labyrinths where earth, water and sky meld are a fecund haven for spiritual healing and wild creatures alike.

BY MICHAEL FURTMAN

PHOTO © LANCE VARNELL

{ANAHUAC NATIONAL WILDLIFE REFUGE}

And God said,

LET THE WATERS BRING FORTH ABUNDANTLY
THE MOVING CREATURE THAT HATH LIFE, AND FOWL THAT MAY FLY
ABOVE THE EARTH IN THE OPEN FIRMAMENT OF HEAVEN.

AND GOD CREATED GREAT WHALES, AND EVERY LIVING CREATURE THAT
MOVETH, WHICH THE WATERS BROUGHT FORTH ABUNDANTLY, AFTER THEIR KIND,
AND EVERY WINGED FOWL AFTER HIS KIND: AND GOD SAW THAT IT WAS GOOD.

AND THE EVENING AND THE MORNING WERE THE FIFTH DAY.

— Book of Genesis

The book of Genesis is wonderful reading, but you have to admit it skimps a bit on the details of creation. I have a feeling that, even for God, there must have been a lot more involved than what the Bible tells us. It is, after all, a book of inspiration, not natural history.

But if it did delve into detail, I'd like to think that there would be a whole section on wetlands, even though the good book mentions only waters, earth and firmament. Wetlands, of course, are none of these alone, yet they are all of these together.

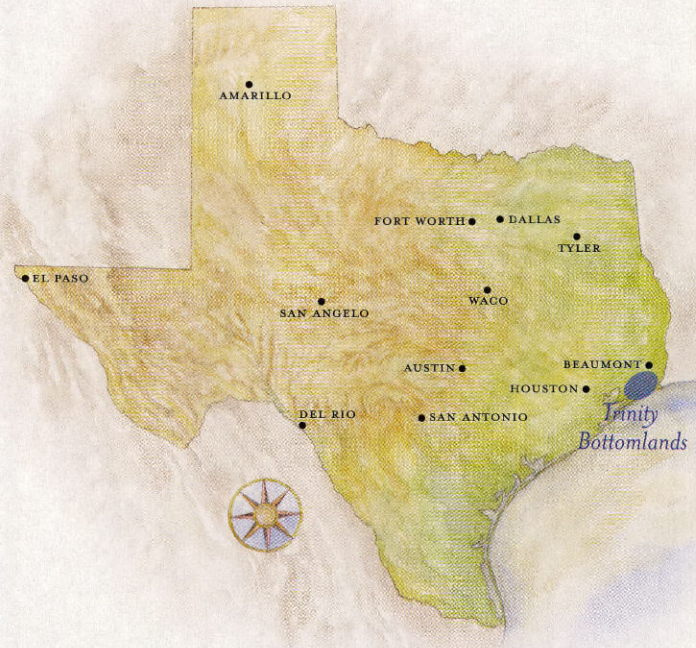
And so if God had asked a naturalist to flesh out this section, it might read much like this:

And God with infinite wisdom created the places where land and water meet, sprinkled the northern prairies with potholes of magnificent variety, so that to the waterfowl that flew above the earth the ponds glistened as jewels scattered in a sea of grass.

And God buttressed great rivers with stands of rushes, and in them birds of many kinds perched and in the dawn sang to His glory, and the rushes' roots drew up the waters and mixed it with sunlight and breathed it into the firmament, so that they were one with liquid and air. Against these marshes the great rivers fruitlessly spent their strength, for God placed the roots of these plants deep, and bound them to each other, and amongst these roots great fish wriggled to place in their protection the wealth that is their eggs, so they might bring forth abundantly more of their kind. And on mats of sedge birds nested.

Then, near where great rivers greet the sea, God created swamps of ceaseless mystery, with giant trees bulwarked against the flood, standing amid the waters. Around them swam great reptiles and fish, and in them lived multitudes of birds, and even the mire about the trees' roots burst forth with wiggling life, the beginning of the chain of food for all creatures.

And God saw that even against the might of the ocean there should be marshes and sloughs, and there He blessed the earth with places where waters of salt met sweet, and in them mingled fishes of both realms, meeting as if across a void, and there the waterfowl that are His voices of spring and autumn pause for food and rest after their long journeys that give glory to His scheme.



And God saw the wetlands, and they were good.

I've long thought that it is a pity that such language didn't make it into the good book. Because the importance of wetlands wasn't so clearly spelled out, somewhere along the line we decided we knew better. In our writings, wetlands were dismal; swamps were places of foulness and disease. In our actions, we sneered at the marshes, and in them dumped our waste, or we simply drained or filled them. We knifed through them with the Intracoastal Waterway, bleeding the fresh water from the coastal marshes, and flooded them with salt. Inland, we converted them to farmland, or buried them beneath manmade lakes. And the creatures that were there and were called upon to be abundant after their kind could no longer do so. And we looked upon it, and said it was good.

On that day, I became a believer in the marsh.

At least some of us thought so.

I learned that there was something wrong with society's view of wetlands the first time my father took me duck hunting.

On a dark morning, I hugged our big black Labrador as I sat in the bottom of the boat, as much for consolation as for

{GREAT EGRET IN COASTAL MARSH}

warmth. Dad's old boat, pushed by what was then considered a massively powerful six-horse Mercury outboard, knifed through the pre-dawn darkness. I shivered both from awe and cold. This was exciting, and a bit frightening, to be forging through the darkness with my father, my dog, in a mysterious place I'd never been.

I could hear, even over the putting of the engine, great flocks of ducks squawk into the air as we disturbed them. From under the hood of my parka, I watched the horizon glow blue-black, then purple. By the time we reached the point where we would hunt, the eastern sky bathed with pink the underbellies of flat, gray clouds scuttling across the sky. My father quickly and methodically tossed the old wooden decoys into the marsh. A muskrat, perhaps defending its territory, swam past to investigate, and the dog nearly flew from the boat in an effort to catch it. Only my father's powerful sheet-metal worker grip saved us from capsizing as he yelped the escaping dog into the boat.

That morning I first smelled methane gas ooze from the marsh, an odor I now associate with beauty and joy. I startled to attention as waves of shorebirds peented past us, the dog coiled hard under my restraining grip. I felt, as much as heard, the ducks as they sailed in; first the whistling of wind through their pinions, then the sound of tearing silk as they plummeted to our decoys, leather legs down.

On that day, I became a believer in the marsh, a convert to its catechism.

It was clear, even to this child, that the marsh was a place where life sprung forth. I couldn't voice it then, but I knew that swamps were not evil, dark things as society claimed. Though we were after ducks, we saw so many other species of wildlife that we soon began a naming game to see who could identify the most. Here, there were ducks. Here we saw beavers, heard bobcats yowl, and listened to loons. This could not be a bad place, I thought.

As good as the marsh was for wildlife, I knew it was good for people, too.

As good as it was for wildlife, I knew it was good for people, too, because I saw its impact on my father, saw his worry lines ease. This, believe me, was not a common thing. A hard-working, sometimes hard-drinking and frequently hard-brawling man saddled with five kids and all the responsibilities that brings, my father was not a man prone to smiling or poetic license. I always sensed, even in my earliest memories, a tenseness in him, and perhaps a wistfulness that life could, or should, have been different.

But when in the marsh, his tension evaporated. It was not the shooting that really brought him to these places. I know now that assuming the slow, sensual and ancient rhythms of the marsh sucks the tension from one as surely as its muck can suck a hip boot from your foot. And so we would sit side by side, and he would smile, and would share with me what he knew of the wonders of the marsh in as eloquent of language as I would ever hear him speak.

Perhaps the good Lord didn't make marshes so that parents and children could learn and love... but then, you never know.

It takes about two pounds of shrimp to make a good jambalaya. And an equal amount of mud. Not just any mud, but the mud of a coastal marsh, sediment carried by sweet water down through Texas' Pineywoods, nutrients filtered by acres of flooded cypress forests — trees with their skirts hiked like women wading. Flavored by starbursts of spider lilies, this sediment, this builder of life, is finally laid smooth like a damp blanket beneath a coastal bay's tossed waters.

Here in the mud is where jambalaya's most important ingredient grows — shrimp. Spawned beneath the swelling Gulf, embryonic shrimp are swept shoreward by coastal currents. Once inside the protection of the once-vast estuaries of the Texas coastal marshes, they become bottom dwellers, and if the rivers that feed these marshes are clean, if the bay bottoms are rich in nature's nutrients and not man's putrid chemicals, the shrimp flourish for several months. Once they grow to 3 to 5 inches, they scuttle back out to sea, and the whole marvelous cycle repeats itself, with some being eaten by fish and, fortunately, some ending up in jambalaya.

You might say a similar recipe is necessary for a good crawfish étouffee. As important as cayenne pepper is to this Cajun staple, free-flowing rivers and healthy wetlands are really the base.

In the 1960s, a good friend of mine would, with his brothers, mother and father, venture into the marsh. Like my dad and me on duck hunts, these outings near Old and Trinity rivers were as much about family as they were about gathering food. Rattling together in the old Chevy pickup, the group would trek through the marsh to open water where, with seines, they would gather nature's wealth. Washtubs full of crawfish were hauled back to the truck and then to home, where the real work of cleaning and boiling took place.

The crawfish runs of this area ended when the Trinity River was dammed to create Lake Livingston. No longer would water flood the marshes for weeks on end, in a cycle ages old. No longer would the marsh-building silt reach the estuaries. And so no wonder that the crawfish and shrimp and other creatures dependent on that cycle and its nutrients ceased to flourish. Now bureaucrats regulate rivers, when once only God did this job.

They cannot match His skill.

To the west an orange moon was setting. It sank slowly, as if reluctant to give up its reign of the night and, as it lowered, it burned a swath across the prairie pothole's waters, painted a path of liquid amber right to the transom of our duck boat. It felt as if we were being pushed by the moon. To our left, the broad, black North Dakota sky shimmered with the northern lights' eerie green glow, sheets of it rippling like the robes of acolytes scurrying to morning prayers.

I eased up on the throttle and pointed out to my duck hunting partner from Houston both the moon and the northern lights. I needn't have. He was already immersed in both, and simply shook his head at the glory of it all. Reluctant to hurry, we motored the rest of the way at half throttle, unwilling to give up the magic of this moment.

As glorious as that journey was, it was matched by the duck hunting, and when fat greenheads came to our decoys, we took turns in collecting our birds, the large slough's surface carved on each occasion by the wake of my swimming Labrador, only to close up unmarked as she returned.

By eight o'clock a farmer was at work. On a distant hillside I could see his big, green John Deere tractor going to and fro, tilling the soil, leaving it bare and ready for seed. As I watched him, I thought of a nearly identical machine also tilling prairie, but this was the coastal prairie near Texas' Anahuac National Wildlife Refuge.

Though these two farmers and the two prairies are far

PHOTO © LARRY DITTO


{RIO GRANDE LEOPARD FROG}

PHOTO © LAURENCE PARENT

{MORNING AT THE MARSH}

removed from each other, having seen one, you'd have a fair idea of the other. The prairie potholes of the north spawn the ducks; the wetlands on Texas' prairie give them winter respite. Both are, today, greatly diminished in number.

As we sat in the North Dakota marsh, watching flocks of bluebills, redheads, canvasbacks and mallards, it occurred to us that these same birds would soon enough find their way to Texas, pressed by a northern winter that sweeps down like wolves on their prey.

Down the long rivers, over a broad continent, they gradually wend their way south, some to the playa lakes region of Texas' own north, but more still to flooded bottomlands in the east. Diving ducks will forgo even these and, at the blinding lights of Houston, turn to the coastal marshes, fresh or salt, there to spend the winter restoring themselves for the migration back north.

Though most ducklings are not born in Texas, they get here as soon as they can.

They have no choice.

They are as bound to Texas as they are to the wetlands of their birth. At the bottom of the migratory funnel, Texas holds as its responsibility the health of much of the continent's waterfowl population.

Despite the good work of many Texans to honor that responsibility, it is one that sometimes has been failed.

My father's marsh, like many others, is gone now. Today, his ashes lie beneath a mound behind the marsh where I hunt, a marsh whose future is threatened by development. He watches me, I feel, and I'm sure that if he has made any connections in the afterlife my marsh now has a powerful advocate.

But what of the others? It is a fair question to ask. Though the destruction of wetlands has slowed, it has not ceased. In just the past 50 years, as much as 400,000 acres of Texas coastal wetlands have vanished; much that remains is sorely compromised by saltwater intrusion from shipping canals, or starved of fresh water and needed silt by upstream dams. Dams and reservoirs on Texas rivers also have either buried or stopped the necessary seasonal flooding of more than a half-million acres of bottomland hardwood forests.

To be sure, the needs of people are legitimate, and it would be foolish to think that we could have preserved all the wetlands as we developed our farms and met the needs of cities. Still, it is also legitimate to question any further loss.

Whether one believes, as my father did, that the world was created by God to honor His great plan, or instead that the complexity of nature is the result of aeons of evolutionary refinement dependent upon sometimes fragile connections, it is clear that wetlands rank high in either scheme.

Ask the millions of the continent's ducks that depend upon Texas marshes to complete their life cycle whether wetlands should be saved or restored. Ask the godwits and rails, the ibis and the egrets. Ask the colorful spring procession of orioles, tanagers and myriad warblers strung through bayous like God's own Christmas lights. Ask the child of a duck hunter, or the family that gathered crawfish.

Science can tell us of a wetland's worth. But it is the soul that yields the truer measure.

The Bible tells us that God looked down upon the results of his creation efforts — including wetlands — and pronounced that it was good.

My father believed it so. I'm his son. I believe, too.

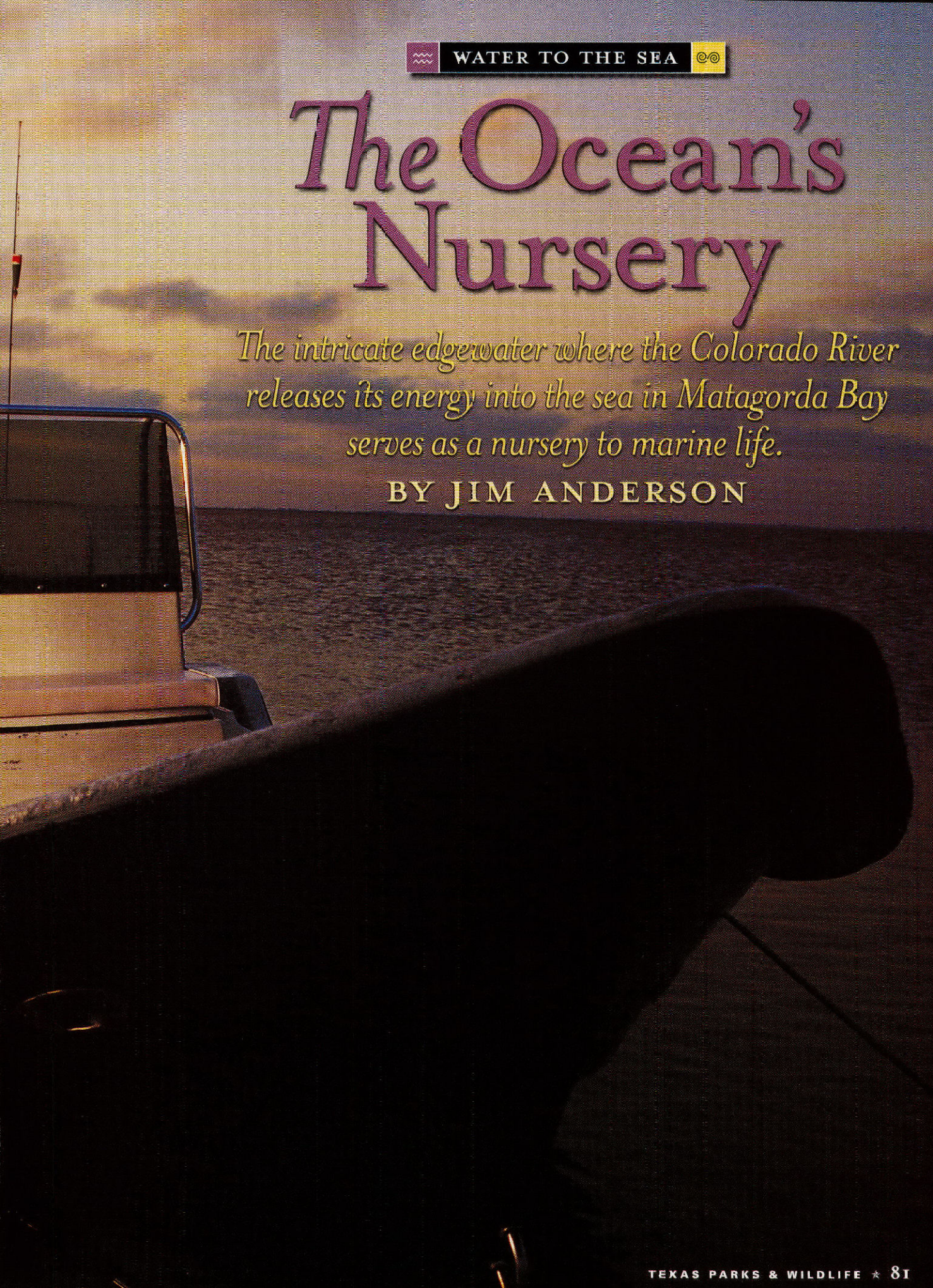
What I'm still struggling with is how so many of us have had the nerve to tell Him otherwise.

PHOTO © WYATT MCSPADDEN

The Ocean's Nursery

The intricate edgewater where the Colorado River releases its energy into the sea in Matagorda Bay serves as a nursery to marine life.

BY JIM ANDERSON



Louis Martino is the third generation of his

family to live near and love Matagorda Bay. He grew up in the 1950s, a time of wooden skiffs and rope-start outboards, a time when commercial fishing was rare and catch limits unheard of, a time when a boy could make big adventures out of a free summer day and a cheap fishing rod. From age 6 he tagged along with his father or one of his three uncles, learning the secrets of the bay. In the years since, even with a full-time career, he has worn out several outboard motors pursuing an ongoing romance.

"One day I sat down and estimated the amount of time I've spent fishing," he says. "It's scary. But I try not to think about it too long."

Like many of us who fish, he subscribes to the bumper sticker philosophy that time spent fishing is not deducted from our allotted time on earth. Well, it's a handy excuse, anyway. Besides, there's always another secret spot to discover.

"I know this shallow cove where the water is usually crystal clear and the bottom is pure white sand and there's just the right amount of seagrass," he says. "I call it the 'aquarium' because of all the different kinds of life you can see there — flounder, specks, redfish, stingrays, crabs, turtles — just like looking into an aquarium."

Nearby boatbuilder V.T. Tran is another descendant of bay fishermen who grew up during the same time as Martino. But Tran's boyhood waters are at the edge of the South China Sea, where the Mekong River Delta splays out from the mainland of Vietnam. Like many of his fellow Vietnamese immigrants who came to America after the war, Tran saw a comforting familiarity along the Texas Gulf Coast.

"This water is like where I grew up — lots of shrimp and fish. I always loved the water, loved to fish and build boats.... People ask me why I work so hard, but every time we finish a new boat, I stand back and look, and it makes me feel good. If you have work you like, it's not really like work."

The proof is impressive. His "TranSport" custom bay boats are in big demand, and he has just moved his family into a beautiful new two-story home.

At approximately 350 square miles, Matagorda is the second largest of Texas' seven major bay systems. (Galveston Bay is the largest; the others are Sabine Lake, San Antonio Bay, Aransas/Copano Bay, Corpus Christi/Nueces Bay and Upper and Lower Laguna Madre.) So far, fate has been kind to the area by sending "progress" elsewhere, leaving it as one of the last surviving condo-free zones along the Gulf Coast. The surrounding plains are rural and agricultural, bayside towns are quiet and uncrowded and the fishing, shrimping, crabbing and oyster gathering are excellent. But don't tell anybody.

Calling itself "The Shrimp Capital of Texas," Palacios is home port to more than 400 shrimp trawlers, big beamy offshore boats with powerful diesel engines and twin steel outriggers for dragging a pair of nets off each side. These vessels are equipped with freezer storage and stay at sea for up to 30 days, fishing around the clock. The Gulf of Mexico produces more than 40 percent of the total U.S. seafood harvest, and commercial boats based around Matagorda Bay bring in a major portion of the bounty, generating about $63 million annually. And the booming sportfishing industry on the bay generates $115 million annually. Matagorda Bay, with its estuaries nourished by fresh water from the Colorado River, is a mother dynamo of sea life production.

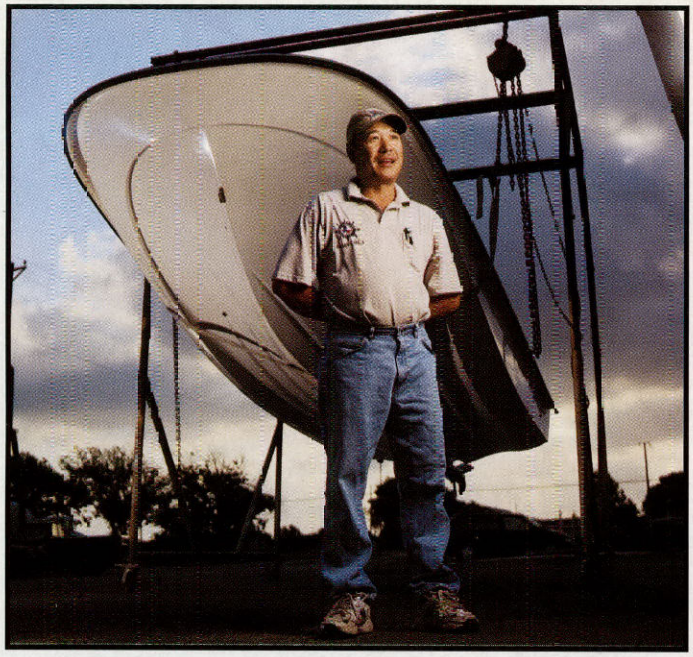
AN ESTUARY PRIMER

Much of the Texas coastline is not exactly postcard pretty. Flat, brushy plains feather off to mucky marshes of coarse grass and muddy tidal pools. But there on the boggy brown fringe, where the border between land and water blurs, is precisely where the true beauty lies. These uniquely rich ecosystems are called estuaries.

The phenomenon begins with the most basic of natural facts: rivers run to the sea. Along the way, the current picks up decaying organic matter and minerals from the soils of its watershed. As the rivers flush into the bays, this matter nourishes plants and microorganisms, which feed other tiny organisms, which feed bigger organisms, and so on up the food chain to the primary organisms humans depend on.

Equally critical, the fresh water dilutes the ocean's salt content, creating a zone of mild brackish water essential to the reproduction and/or early-stage development of hundreds of species of fish and shellfish. During one life phase or another, 97 percent of the marine creatures in the Gulf depend on

PHOTOS © WYATT MCSPADDEN




{BOATBUILDER V.T. TRAN}

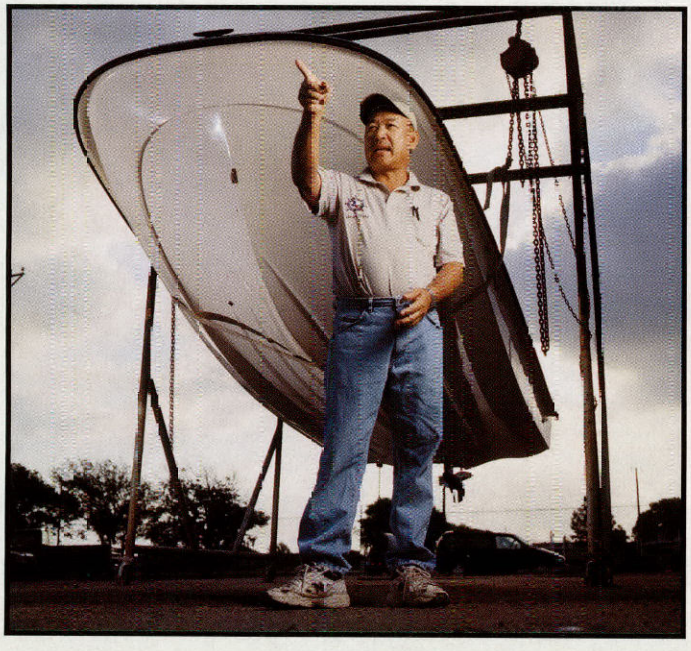
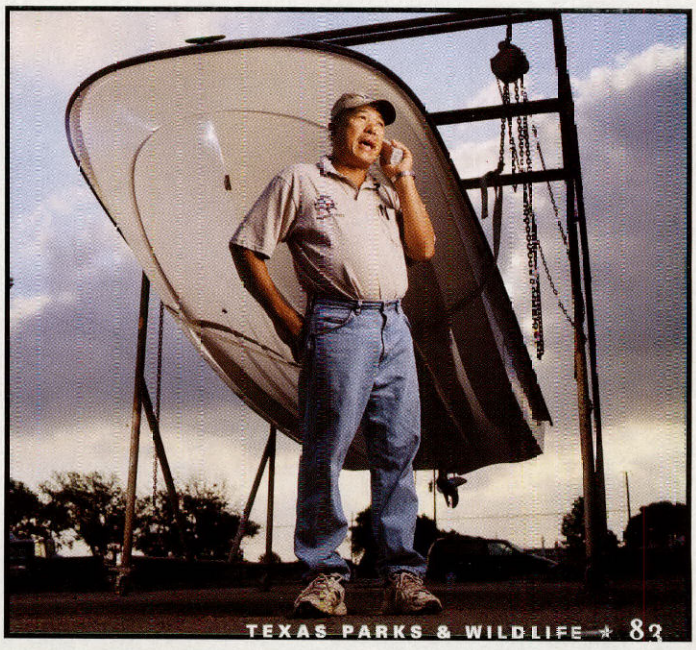



PHOTO © WYMAN MEINZER

{COASTAL ESTUARY}

healthy estuaries. If the freshwater inflow of an estuary declines, the productivity and diversity decline. It's a simple case of cause and effect.

This intricate edgewater maze of pools and bogs, grass beds and sloughs also gives juvenile marine creatures shelter from predators until they can grow large enough to get a running start on life. It's a complex ecosystem that produces a vast abundance, not to mention providing habitat for more than 250 species of birds, some of them rare or endangered.

The keystone of the habitat is no mystery: it's fresh water. "We need every drop we can get," says Jim Dailey, recently retired Texas Parks and Wildlife Department biologist and staunch defender of the bay for 30 years. "The upper Colorado drainage isn't particularly nutrient-rich, and the Highland Lakes trap whatever there is at that point, so the nutrients picked up between Austin and the bay are vital... plus the fresh water itself. We need every bit of it."

Today there are eight dams on the Colorado, but the first dam wasn't manmade. Observers in the early 1800s noted an immense clot of driftwood that choked the mouth of the river and backed water for miles inland. No doubt the swamp was good for snakes and alligators, but Colorado inflow to the bay was restricted and diffused. Attempts to remove the obstruction began in the 1820s. Stephen F. Austin and his first colonists took a whack at it, but soon gave up and moved farther upriver to clear some farmland. (Ironically, their cuttings washed downstream and added to the raft.) The logjam continued to grow and defeated several subsequent schemes to clear it. In 1851, the pile was seven miles long. In 1853, a side channel was dredged around it, but in a few years flotsam plugged it again. By 1928 the jam was 40 miles long, and another channel was dredged around it. Finally, in 1929, a great flood busted through and blew centuries of accumulated silt and debris into Matagorda Bay, building a new delta, which soon grew into a land bridge reaching to Matagorda Island.

Some of the fresh inflow dispersed laterally into the bisected bay and some into the Gulf, but in 1934 an ill-advised channeling directed all the flow straight into the Gulf. Not until 1991 was the mistake fully corrected with the opening of a new channel that finally restored ample freshwater inflow to the bay. In addition, the Lower Colorado River Authority is now required to deliver water downstream to protect both the river and Matagorda Bay. In little more than a decade, the ecosystem has responded amazingly well, and a biological renaissance seems underway.

TPWD biologist Bill Balboa, based at the Palacios Field Station, has worked in some of the state's other bay systems, but Matagorda is his favorite. He sees the positive effects of inflow on the ecosystem. "It's a healthy, diverse system now. Inflow is essential for the production of white shrimp, blue crabs and oysters. The menhaden are thriving (a key forage fish), shellfish surveys are up, new wetlands have formed.... Now that the habitat is getting pretty well balanced, I hate to imagine what might happen if we lost any inflow."

It's not an unfounded worry. Some 150 miles upstream, papers are rustling, deals have been made, maneuvers are in motion.

A SEVEN-YEAR COUNTDOWN

On Feb. 27, the countdown clock on the future of Matagorda Bay began ticking. That day, in ceremonies in Austin, an agreement was signed between the Lower Colorado River Authority (LCRA) and the San Antonio Water System (SAWS) that could dramatically transform the lower Colorado

PHOTO © LANCE VARNELL

{CRABS AMID MARSH GRASSES}

{SHRIMP BOAT AND STRINGER OF FISH}

PHOTOS © DAVID J. SAMS

watershed. LCRA is an agency created by the Texas Legislature in 1934 to control floods along the Colorado River, to provide electric power and water for municipal and agricultural needs for a defined area, and to be responsible for the water quality of the Colorado River basin, including Matagorda County and Matagorda Bay.

Seeking to produce water for sale to the city of San Antonio, as well as water to solve the shortage predicted for agriculture in the lower Colorado River basin, the agreement allows seven years for research to determine whether the project is technically feasible and environmentally and economically sound. If the studies indicate otherwise, the project will not be implemented and LCRA will cover half the research costs. If the deal is ultimately approved, SAWS would pay all the research and infrastructure building costs.

"The project will not go forward unless the board in office at that time [LCRA board] finds that it benefits the lower Colorado River basin," said LCRA board chair Gale Lincke.

Interesting word choice. It will be instructive to watch how the word "benefits" becomes defined, and who does the defining.

Only a few decades ago, the word "Texas" meant wide-open spaces and uncrowded towns. That time is long gone. Year after year, the state absorbs tens of thousands of newcomers, and experts say the current population figure could double by 2050. San Antonio is already in the top 10 most populous cities in the United States, and its growth continues. The additional people will need water, and conservation is a tough concept to sell in Texas. People want long showers and green lawns, and policymakers are reluctant to deny them.

The LCRA/SAWS water project agreement calls for developing an additional 330,000 acre-feet (one acre square, one foot deep per year) of water in the lower Colorado River basin, half of which would be piped to San Antonio. Groundwater would be developed for agricultural uses in the Colorado River basin when river flows are low. Only surface water would be exported out of the river basin. The engineering methods to accumulate this much surface water would require several new reservoirs to be built. (However, no new dams on the main channel of the Colorado itself are proposed.) Pumps would pull water from the river into off-channel storage reservoirs during high-flow periods. The agreement requires all water needs, including environmental, in the basin and under contract for San Antonio, to be met even during a repeat of the worst drought conditions on record.

Proponents of the plan say the lower Colorado region and Matagorda Bay would get even more water than it currently does (presuming normal or wet years outnumber droughts). A skeptic might wonder if, once the system is in place and serving the big paying customer of San Antonio, allotment formulas might be rewritten.

There is some humor to be found in the terms of the agreement. It states that at the end of the 80-year contract period, the water export would cease, and the lower Colorado River region would suddenly have 75 percent more water than it had before the project. As if San Antonio will then say, "Thanks, it's been a swell 80 years," close the tap and send several million residents packing off to North Dakota or maybe Venus.

REMEMBERING THE OTHER COLORADO RIVER

It's an odd coincidence — two rivers of the same name, both dammed at several points, both heavily tapped for irrigation and development, and both terminating at bay deltas. Hopefully, the parallels end there. The other Colorado River — the one that flows through the Grand Canyon and creates Lake Powell, Lake Mead and seven other reservoirs — no longer runs into the Gulf of California as it did for aeons. The lower 100 miles of the other Colorado are fast becoming dry riverbed, and its former coastal estuary is parched to a crisp. As an example of what can happen in 80 years, it was just that long ago that the young Aldo Leopold, who would become a renowned naturalist and writer, canoed through what was then one of North America's most lush and diverse estuary ecosystems. As he paddled, lost in the profusion, he saw what he described as "a maze of green... verdant walls of willow... a hundred green lagoons..."

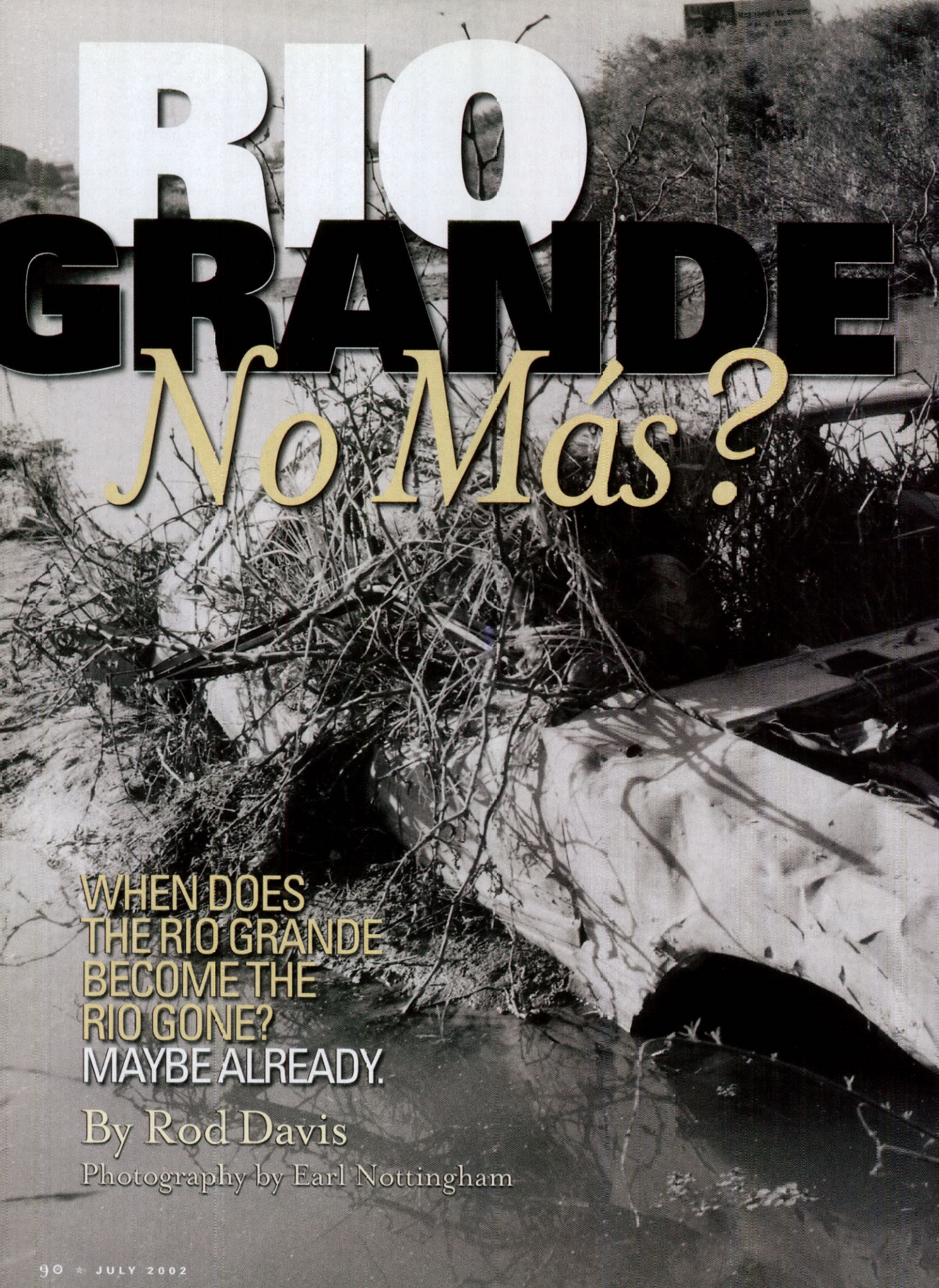
Those 3,000 square miles of teeming habitat are now cracked mud flats and salt cedar thickets. Because estuaries are literally at the end of the line, that's often where they fall on a list of water priorities. The upstream dependents of the western Colorado — San Diego, Phoenix, Las Vegas, the vast irrigated farms and orchards of the Imperial Valley, the hydroelectric turbines of Hoover and Glen Canyon dams — are not likely to return any water. Water demand doesn't decline, it only increases.

Certainly, the two Colorados are different. Much of the western one runs through desert country, especially in the lower reaches. Our Colorado gathers in a headland that's somewhat better watered, and below the last dam at Austin it flows through a landscape that receives up to 40 inches of rainfall annually. But examples of overtaxed rivers can be found here in our own state: for one of the first times in history, last year the Rio Grande petered out well short of the Gulf, and the coastal estuary it once fed has dried up. Less dramatic but worth considering is the Navidad River. In the late 1970s, the U.S. Bureau of Land Reclamation dammed the Navidad, creating Lake Texana not far above Lavaca Bay, which is just around the corner from Matagorda Bay. Despite requirements to deliver fresh water to Lavaca Bay, fishermen say catches have since declined in those waters.

UNTIL THE NEXT SHOE DROPS

Rainfall is our primary freshwater source, and Texas weather is prone to extremes, often whipsawing us from drought to flood to drought. Drafting water policy for the state is a maddening task. Haskel Simon, Matagorda County resident, former rice farmer and member of the Matagorda County Water Council, is a well-informed citizen-activist who thoughtfully weighs the issues. "It's a complex subject, and the various viewpoints overlap in interesting ways," he says. "For instance, environmentalists are generally against irrigation, but down here, even the Audubon Society and the Sierra Club recognize that rice fields — I call them 'constructed wetlands' — are a boon for migratory birds. It'll be tough to put a value on the Colorado water. There's a lot we don't know yet, but we do know that if we lose the water, lots of people's livelihoods will go with it."

At the end of a bright winter day, a low sun turns the brown tidal pools to gold. Hawks wheel and dip in the yellowing sky. In a distant patch of marsh, a dozen roseate spoonbills, all cherry and pink and creamy white, probe the mud for slimy delicacies. Farther on, there's a gathering of slate blues, iridescent blue-greens and snowy whites — 30 or more various egrets and herons stalking fish in the shallows. Near the mouth of the river, people cast their fishing lines. A man reels in a thrashing silvery fish and puts it on a stringer. Children run and squeal. All seems well here as the late sun hangs above the horizon. For the time being.

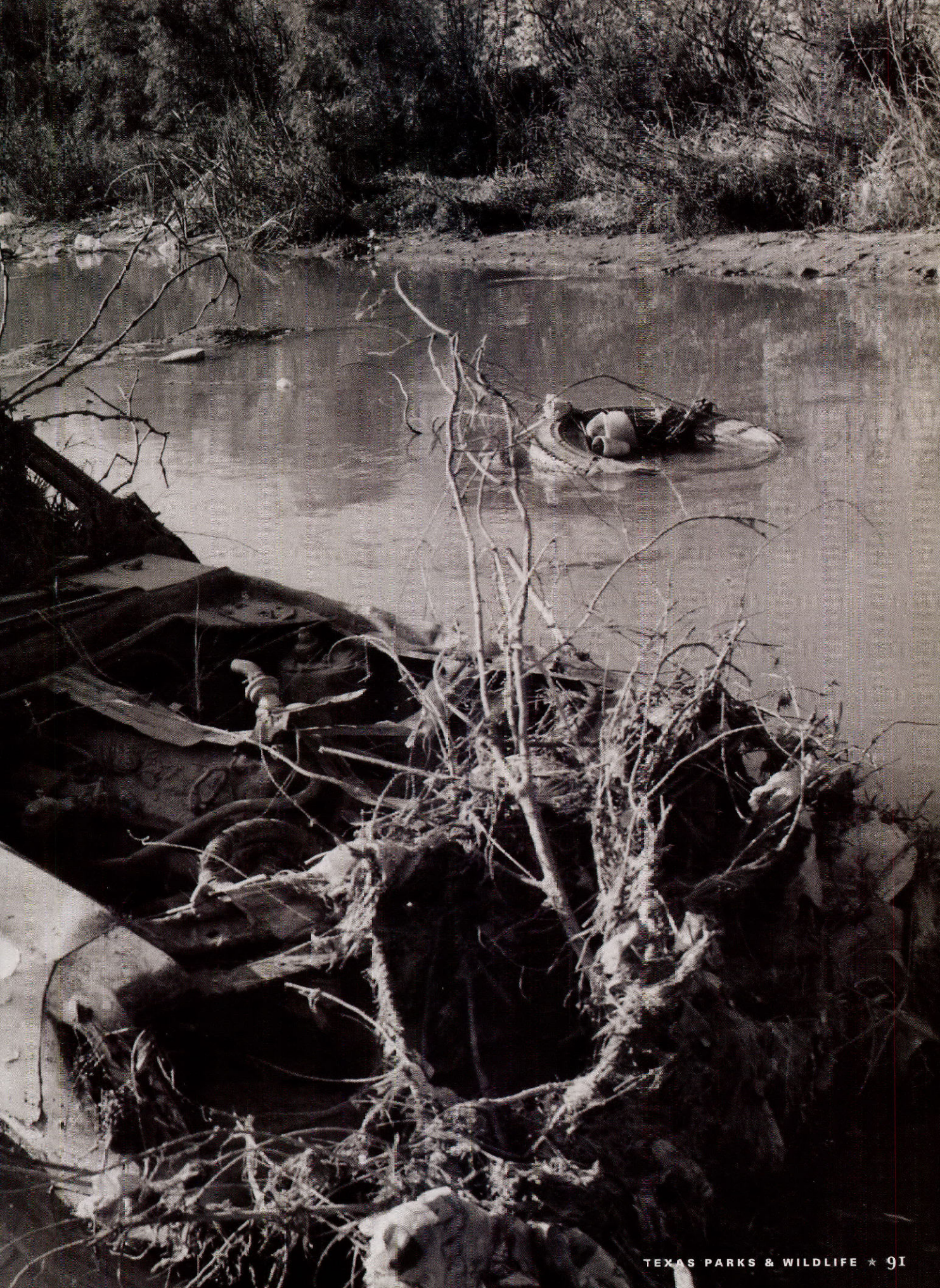


RIO GRANDE *No Más?*

WHEN DOES THE RIO GRANDE BECOME THE RIO GONE? MAYBE ALREADY.

By Rod Davis

Photography by Earl Nottingham



RIO GRANDE *No Más?*

It enters Texas from high in the San Juan Mountains

of Colorado, and finishes at the Gulf of Mexico, becoming the third-longest river system in the United States. By way of welcome, we trap it in concrete culverts at El Paso to avoid fighting over its boundary with Ciudad Juárez. We put up razor-wire fences to say who can cross it. For the remainder of its 1,254 miles, the effective border between Texas and Mexico, we literally suck the life out of it so aggressively that by the time it reaches its mouth at Boca Chica, it is a trickle of toxic, brackish slush. If that. For five months in 2001, and now again, this river, whose history rivals or exceeds that of the great Mississippi-Missouri system, has been strangled in its own ultra-saline estuary. It falls short of its own mouth.

I saw it last summer.

On the U.S. side, at Boca Chica, I parked my SUV and walked across a dry, windswept sandbar to the edge of Mexico. A Confederate port once was there, scoured away long ago by a hurricane. In years past, I had waded into turbulent waters here, churned up by gulf currents hitting the river's final punch leaving the continent. A punch that allowed the river to wash away sandbars constantly being formed by the tides, so the waterways could meet as they had for thousands of years.

But on that day last summer, what was left of the Rio Grande was more than 100 yards inland — a tepid pool ringed by dead fish, old tires, cast-off shoes, plastic water jugs. Certainly there are worse tragedies to see in this life, but one that you could do without is seeing the most famous river in the Southwest dead at your feet.

BRAVE, GRAND

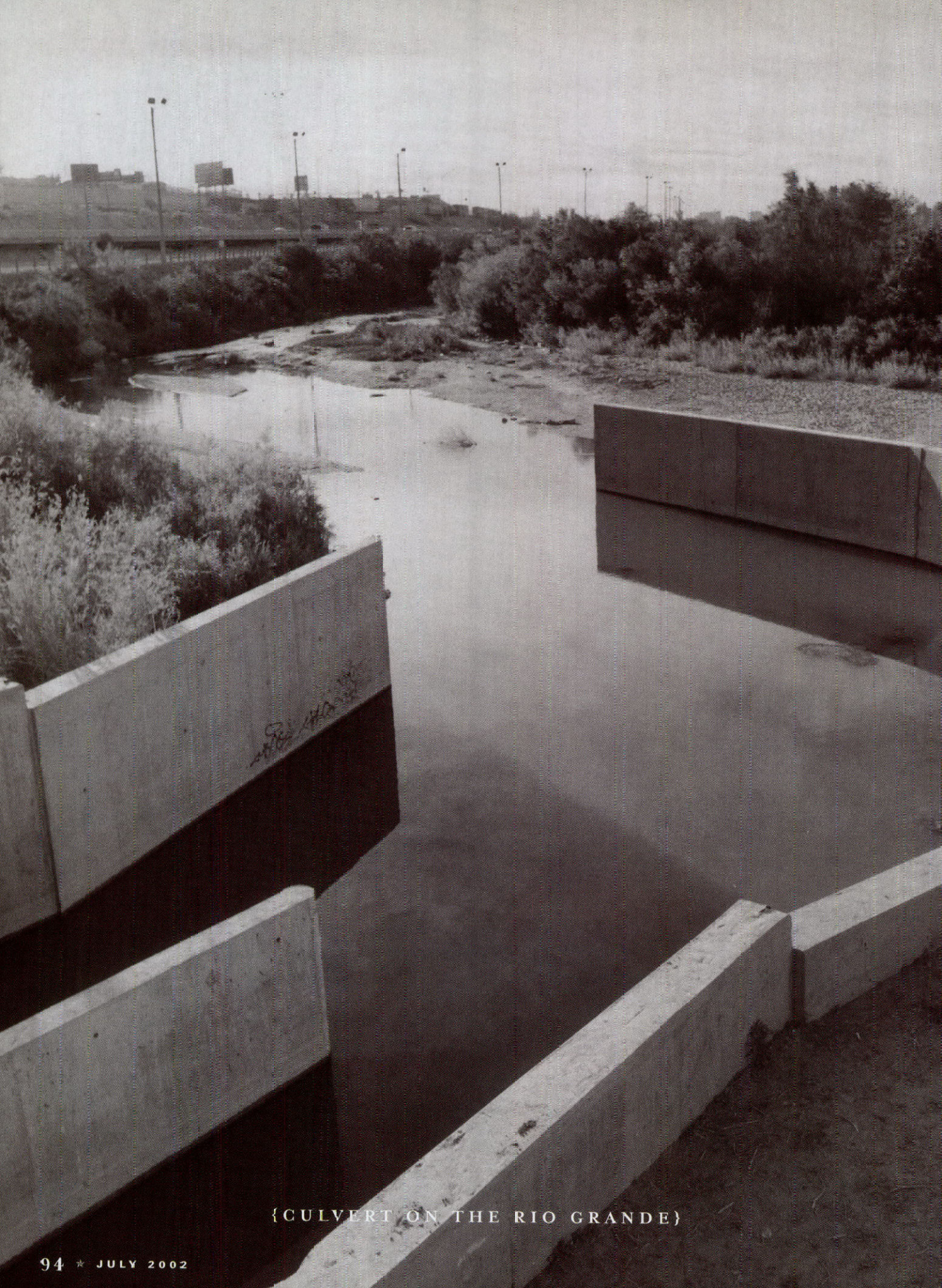
Always the river has been used for commerce, for transportation, for irrigation, for washing, for drinking and as a sewer. In the 16th century, it defined the route of Spanish exploration, as for centuries before that it defined the location of the pueblos of northern New Mexico. Its waters carry the genes of conquest, defeat, valor and treachery. Today it sustains the lives of about 13 million people across three U.S. states and five in Mexico. Yet the Rio Grande itself is not being sustained.

Paul Horgan famously styled it "Great River" in his lyrical, two-volume 1954 study, *Great River: The Rio Grande in North American History*, perhaps the best book ever written about this or any other river. He roll calls the names by which it has been known — Rio Bravo, Rio de las Palmas, P'osoge, Tiguex River, Rio Turbio, Rio Bravo del Norte and more, all testament to its ability to assume the guise of those who have need of it. In 1997, President Clinton selected the Rio Grande as one of 14 American Heritage Rivers. In Larry McMurtry's *All My Friends Are Going to Be Strangers*, the river, near Roma, provided the means for Danny Deck to drown his novel. Today, the river is so depleted from irrigation, salt cedar and municipal and industrial draws you'd be hard-pressed to get a postcard damp.

As such, the river has earned another name: endangered. Over the last decade, it has placed six times on lists of severely troubled waterways compiled by the environmental watchdog group American Rivers. The Rio Grande was among the top 10 endangered in 1993, 1994 and 2000 and was ranked in the next tier, the "threatened" list, in 1992, 1995 and 1996. So poor is the river's quality that it reaches out to what surrounds it. This year's inclusion of Big Bend National Park among the top 10 endangered national parks, as ranked by the National Parks Conservation Association, was based on the degradation of the Rio Grande, as well as air pollution.

The causes of the river's difficulties stem partly from nature, in the form of drought, but in the main have human causes. Basically, that's population growth. Texas' head count is predicted to climb to 37 million by 2050. The Lower Rio Grande Valley, from Hidalgo through Cameron counties, will more than double in population in that same period, to 3 million from the current 1.2 million. It was about 400,000

{THE BORDER AT EL PASO}



{CULVERT ON THE RIO GRANDE}

IN THE LOWER RIO GRANDE VALLEY, 85 TO 89 PERCENT OF THE WATER THAT IS TAKEN FROM THE RIO GRANDE IS USED FOR IRRIGATION.

in the 1950s. And that's just on the U.S. side. Mexico is growing just as fast, and it is folly to consider the demands on the river as though it realized its banks were borders.

In the Lower Rio Grande Valley 85 to 89 percent of the water taken from the river is used for irrigation, often for water-slurping crops and for corn and cotton fields kept alive by the ditches and pipelines that are as familiar landscape features along the border as the dirt trails and sensor towers of the INS. Although projections say irrigation use will lessen in the next 50 years, that's because cities will be expanding, taking in more agricultural areas.

"Farmland is disappearing at an alarming rate in the basin, largely for subdivisions," says Bess Metcalf, U.S. co-director of the Rio Grande/Rio Bravo Basin Coalition. "Population growth along with the increasing competition for the river as a resource, is the overriding issue," she says, "and how that reality complicates efforts to restore the river to some semblance of ecological health. Urbanization is also playing a role

{ONION FARMING NEAR THE RIO GRANDE}

{SALT CEDAR AND WATER HYACINTH}

in the disappearance of the habitat."

But irrigation is the life's blood of border economies. Without it there would be no labor-intensive melon, onion or lettuce fields that provide jobs, low-paying as they are, to *campesinos*. Without water from the river, the cultures that have evolved around the migrant enclaves in places like San Juan del Valle, home of the United Farm Worker regional headquarters on César Chávez Avenue, will vanish. Nor would there be the farms that have sustained both Latino and Anglo families along the border for many decades.

There wouldn't be cities, either, those booming areas in the semiarid Southwest that often seem to forget that water doesn't grow on trees. In El Paso, which takes about 40 percent of its municipal water from the river there are already plans to purchase "water ranches" to obtain groundwater access to supplement the growth of the urban sprawl. In Laredo, where 100 percent of the water comes from the river — the case for most cities below the Amistad and Falcon dams — the time is coming when water shortages are a certainty. The time may also be coming when the final fate of the river will come down to battles over providing drinking water to the cities or irrigation to the cash crops in the fields.

Farmers, cities and water ranches that specialize in selling water rights up and downstream, state to state, take away precious acre-feet all along the 1,900-mile run. For a river famously prone to flow fluctuations and periodic low patches or flooding even without human "management," the additional draw-offs are, not to overdo the analogy, vampirish. As for fish, waterfowl and other riverine fauna and flora, they have no water rights — and no chance.

THE FINAL FATE OF THE RIVER MAY COME DOWN TO BATTLES OVER PROVIDING DRINKING WATER TO THE CITIES OR IRRIGATION TO THE CASH CROPS IN THE FIELDS.

COMPOUND FRACTURES

It's not just what is being taken out, but what is being put in. Recent studies show very high amounts of arsenic, mercury, copper, selenium and antimony sediment from current or long-closed mines. You'd have to be crazy, or very poor, or unable to read the warning signs on the U.S. side, to eat any fish from the river and yet it continues to be fished. Yet even then the available species are threatened all the way to the Laguna Madre at the coast, where loss of adequate fresh water from the Rio Grande means the once-rich estuaries have lost their balance with the sea water and are lethally saline.

The river water also is being leached away by "exotic' or nonnative species, principally salt cedar, scraggly sponges of trees that are especially hard on the western end of the river, where the water tends to run lower. Other species, such as hydrilla, which grows from the bottom, and water hyacinths, which mass at the top, clog the flow and must be removed periodically. These invaders have gotten so thick in the lower valley riverbed that giant machines to cut them down have on occasion become trapped overnight as the masses of vegetation shift around in the slow current. The machines themselves then must be cut free. And when the vegetation is cut down, moving their bulk downstream requires up to a 30 percent increase in the prevailing flow — from where does that extra water come?

Compounding those impediments is silt runoff from agri-

culture. Compounding that is a drought going strong into its second decade. Reservoirs all along the route are at critically low levels because of the drought, and this year there was very low snowpack at the Colorado headwaters. Elephant Butte Reservoir in New Mexico was expected to drop to 25 percent volume this summer, and it is hardly unique along the river's basin. Added to that is increased demand for water in times of drought and high heat — a vicious cycle that bludgeons all hopes of raising the water levels in any kind of natural way.

The failure of the river at its mouth is the precise locus at which all these factors gather with geometric amplification in one catastrophic *fait accompli.*

THE RIVER HAS MADE THE VALLEY A KINGDOM IN ITS OWN WAY, THE VIRTUAL FUSION OF TEXAS AND MEXICO FOR HUNDREDS OF MILES AND FAMOUSLY DIFFICULT FOR ITS RESIDENTS TO TRULY LEAVE.

NOT EVEN IN NAME

And consider this. Although the Rio Grande/Rio Bravo Basin Coalition sponsors an annual Dia del Rio (Oct. 19 this year), the group, like others, has had to give up on a cherished notion: that it is in fact a "whole" river. "It is managed in fragments, and segmented by dams," says Metcalf. "It is not the wild and untamed river it used to be."

The first half essentially stops at El Paso, already badly depleted and now canalized. After Fort Quitman it's virtual-

{THE U.S./MEXICAN BORDER AT BOCA CHICA}

{A BAPTISM AND GUERRERO VIEJO}

CERTAINLY THERE ARE WORSE TRAGEDIES TO SEE IN THIS LIFE, BUT ONE THAT YOU COULD DO WITHOUT IS SEEING THE MOST FAMOUS RIVER IN THE SOUTHWEST DEAD AT YOUR FEET.

ly a ghost river for 250 miles until it receives new life from the Rio Conchos just above Ojinaga/Presidio. It gets another shot west of Del Rio when the Pecos and Devils rivers feed in, and another from the Rio San Juan just before Brownsville, where there are currently plans to build a weir.

Yet the tributaries themselves are troubled, especially the Conchos coming down from the Sierra Madre Occidental. It now supplies less than 40 percent of the flow below Presidio, down from its historical input of about two-thirds. In June 2001 the Rio Grande reached a historic low flow in the Big Bend of just 25 cubic feet per second, lower even than during the drought of the 1950s. The flow at its mouth, now, is zero.

"It's hardly even a river anymore," says Larry McKinney, senior director for aquatic resources for Texas Parks and Wildlife Department. "It's more a managed irrigation ditch. It's actually become three or four rivers."

McKinney, who says he "can't stand" to visit the dried-up mouth of the Rio Grande at Boca Chica, thinks identity itself is in question. "Slowly but steadily, it is losing most of the criteria that define a river — that it has to have water in it, and that it reaches its end at its mouth." Heroic efforts at conservation, efficiency and cooperation with Mexico could help, he says, but not without some sea changes in public awareness.

"We've got to have a broad-based watershed approach, which we don't have now," says Jim Earhart, executive director of the Rio Grande International Study Center in Laredo. He added that the urgency of water problems near Laredo and Nuevo Laredo, where the river is particularly foul and growth is going full tilt, has created "more recognition of the problem than there was. People don't joke about it anymore,' he says.

Virtually all groups, public or private, studying the river share grim assessments. "The situation is extremely dire,' says Karen Chapman, assistant director of the Austin-based Texas Center for Policy Studies. "The system has been so altered we're never going to get it back the way it was before. The real question is how do we manage the river — Texas Colorado, New Mexico and Mexico. It's both an ecologically viable system and a system that supplies water to people. It's divvied up so many times, and there are so many inefficiencies. Management is lost in a quagmire of agreements.

"But we shouldn't give up on it yet," she adds. "There's a rising groundswell of support to think of the river as a nature system and not just a water conveyance system."

Then there are the neighbors. The bordering states to the river are constantly fighting Texas, and each other, over who owns what rights. It gets vicious. The U.S. and Mexican governments are at odds over Mexico's debt of 1.4 million acre-feet of water, mostly from the state of Chihuahua, based on a formula worked out in a 1944 treaty, one of several, including the 1906 Rio Grande Treaty, which govern the water's allocation between the United States and Mexico. In a time in which Mexico itself is suffering from the same kind of drought as Texas, there is a sadness to this dispute, for whichever party prevails, certainly the other will suffer. This is the nature of the crisis.

The agencies that try to make this work also carry a tone of 11th-hour desperation. Keeping track of them is difficult: the International Boundary and Water Commission, Texas Natural Resource Conservation Commission, Texas Water Development Board, U.S. Fish and Wildlife Service, Texas Parks and Wildlife Department, Texas Railroad Commission, Texas Department of Agriculture, the EPA and sundry others, not to mention cities, counties and water districts along the way. There are also the agencies of other states and of Mexico and its border states.

What is considered one of the best current policy documents in Texas, the master plan from the Rio Grande Regional Water Planning Group, says major efforts must be addressed in at least five areas: getting more water from the river, conserving it better, using it more efficiently in irrigation, finding new sources of it, and knowing that competition for river water from multiple users will only grow more intense. Looked at another way, this is a plan for a very limited and troubled future.

Going, Going...

Can it have come to this? How can the Rio Grande be gone? It has linked the cultures of two countries in a way that exists nowhere else for either of them. History was played out all along the river. Two major battles were joined near the mouth: Palo Alto, the first serious engagement of the Mexican-American War in 1846; and in 1865, Palmito Hill, the last battle of the Civil War. At the opposite end of the state, Pancho Villa's 1916 raid crossed at El Paso, and myriad personal and family histories have begun and ended at the river's divide. The river that made the river kingdoms of New Mexico has made the Valley a kingdom in its own way, the virtual fusion of Texas and Mexico for hundreds of miles and famously difficult for its residents to truly leave.

Even the most controversial parts of the river, such as the dams, have left impacts. Falcon Lake flooded the colonial-era Mexican city of Guerrero Viejo, and then receded from it, an eerie resurrection unique to the continent. At Los Ebanos, west of fast-growing McAllen-Reynosa, you can still cross the river on its last hand-drawn ferry, get off, have a beer and go back. Almost anywhere you can find a *chalupero* to row you across.

The rio is magnificent and brave and grand even in its disappearance as it runs through the salt cedar-choked basin west of Presidio and cuts through the Chisos Mountains. Amid the steep, surreal canyons of the Big Bend, known to generations of Texans, Mexicans and Indians, the river has cut a simple, stone aesthetic almost beyond words. I have rafted that river. Today, my raft would run aground.

"Better just to want rivers," Danny Deck said, after putting his face into the Rio Grande to cool it. Better, still, not to have forsaken them.

RIO GRANDE *No Más?*

{DRIED UP MOUTH AT BOCA CHICA}

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TELEVISION

LOOK FOR THESE STORIES IN THE COMING WEEKS:

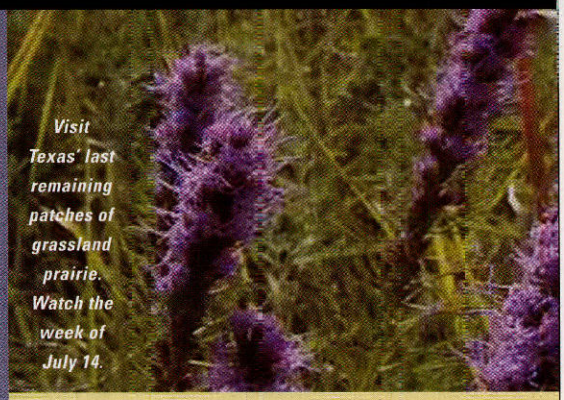
June 30 – July 7:
East Texas game wardens; helping kids survive in the wilderness; combating the illegal bird trade; Parrie Haynes Ranch, an outdoor camp for kids.

July 7 – 14:
Development and conservation on the Katy Prairie; seashells by the seashore; learning to paddle with disabilities; drought and the Rio Grande.

July 14 – 21:
Preserving the prairies; helping raptors survive and thrive; life and work on a commercial fishing boat; volunteers at Palo Duro Canyon State Park.

July 21 – 28:
Pursuing polluters of Texas waterways; rafting the Rio Grande; beneficial snakes; snow geese eating themselves out of house and home.

July 28 – Aug. 4:
Spiders; Vietnamese adapt to the coastal way of life; Texas game wardens; public hunting on private lands.



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CORPUS CHRISTI: KEDT, Ch. 16 / Sun. 11 a.m. / Thurs. 1 p.m.

EL PASO: KCOS, Ch. 13 / Sat. 5 p.m. (rotates with other programs; check listings)

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Also serving Abilene, Denton, Longview, Marshall, San Angelo, Texarkana, Tyler, Wichita Falls, Sherman

HARLINGEN: KMBH, Ch. 60 / Thurs. 8:30 p.m.
Also serving McAllen, Mission, Brownsville

HOUSTON: KUHT, Ch. 8 / Sun. 5 p.m. / Fri. 1 p.m.
Also serving Beaumont/Port Arthur, Galveston, Texas City, Victoria

KILLEEN: KNCT, Ch. 46 / Sun. 5 p.m.
Also serving Temple

LUBBOCK: KTXT, Ch. 5 / Sat. 6:30 p.m.

ODESSA–MIDLAND: KOCV, Ch. 36 / Sat. 5 p.m.

PORTALES, N.M.: KENW, Ch. 3 / Sun. 2 p.m.
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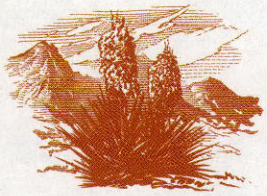
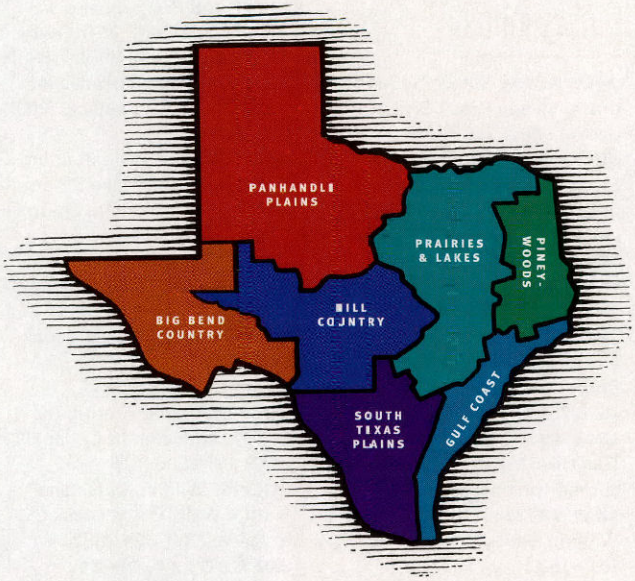
GETAWAYS

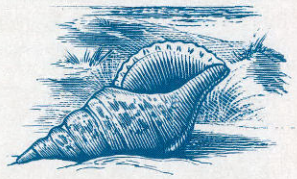
FROM BIG BEND TO THE BIG THICKET AND THE RED TO THE RIO GRANDE



BIG BEND COUNTRY

JULY: Bouldering Tours, every Wednesday through Sunday, by advance request only, Hueco Tanks SHS, El Paso, (915) 849-6684.
JULY: White Shaman Tour, every Saturday, Seminole Canyon SP & HS, Comstock, (888) 525-9907.
JULY: Desert Garden Tours, by reservation only, Barton Warnock Environmental Education Center, Terlingua, (915) 424-3327.
JULY: Fate Bell Cave Dwelling Tour, every Wednesday through Sunday, Seminole Canyon SP & HS, Comstock, (915) 292-4464.
JULY: Summer Amphitheater Programs, call for dates, Davis Mountains SP, Fort Davis, (915) 426-3337.
JULY: Hiking Tours, every Wednesday through Sunday, by advance request only, Hueco Tanks SHS, El Paso, (915) 849-6684.
JULY: Pictograph Tours, every Saturday and Sunday, Hueco Tanks SHS, El Paso, (915) 849-6684.
JULY 1-31: Equestrian Trail, Black Gap WMA, Alpine, (915) 376-2216.
JULY 1-31: Fishing on the Rio Grande, Black Gap WMA, Alpine, (915) 376-2216.
JULY 4: Adobe Workshop, Fort Leaton SHS, Presidio, (915) 229-3416 or (915) 229-3613.
JULY 5, 20: Trip to Madrid Falls, Big Bend Ranch SP, Presidio, (915) 229-3416.
JULY 6-7, 20-21: Guided Tours, Franklin Mountains SP, El Paso, (915) 566-6441.
JULY 13: Stories of Spirits, Magoffin Home SHS, El Paso, (915) 533-5147.
JULY 21: Bird Identification Tours, Hueco Tanks SHS, El Paso, (915) 849-6684.



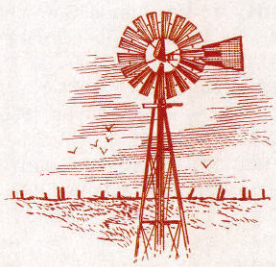


GULF COAST

JULY: Plantation House, Barn and Grounds tours, Wednesdays through Sundays, Varner-Hogg Plantation SHS, West Columbia, (979) 345-4656.
JULY: Hatchery Tours, every Monday through Saturday, Coastal Conservation Association/Central Power and Light Marine Development Center SFH, Corpus Christi, (361) 939-7784.
JULY 4: July 4th Fun Day, Lake Texana SP, Edna, (361) 782-5718.
JULY 6: Miss Ima's Birthday Celebration, Varner-Hogg Plantation SHS, West Columbia, (979) 345-4656.
JULY 12-14: Hunt-arama Hunting Show, Beaumont, (713) 461-9163.
JULY 13, 27: Beachcombing and Shelling Tour, Matagorda Island SP & WMA, Port O'Connor, (361) 983-2215.
JULY 19: Story Time, Sea Center Texas, Lake Jackson, (979) 292-0100.
JULY 20: Nighttime Wildlife Tour, Matagorda Island SP & WMA, Port O'Connor, (361) 983-2215.
JULY 28: History Tour, Matagorda Island SP & WMA, Port O'Connor, (361) 983-2215.

HILL COUNTRY

JULY: Group Tours, by reservation only, Longhorn Cavern SP, Burnet, (877) 441-2283 or (512) 756-4680.
JULY: Go Fishing with a Ranger, every Saturday, Inks Lake SP, Burnet, (512) 793-2223.
JULY: Hiking Trail, daily, Longhorn Cavern SP, Burnet, (877) 441-2283 or (512) 756-4680.
JULY: Wild Cave Tour, every Thursday through Saturday, by reservation only, Longhorn Cavern SP, Burnet, (877) 441-2283 or (512) 756-4680.
JULY: Wild Cave Tour, by reservation only, Kickapoo Cavern SP, Brackettville, (830) 563-2342.
JULY: Sinkhole Bat Flight Tour, call for dates, Devil's Sinkhole SNA, Brackettville, (830) 683-2287.
JULY: Gorman Falls Tour, every Saturday and Sunday, weather permitting, Colorado Bend SP, Bend, (915) 628-3240.
JULY: Walking Wild Cave Tour, every Saturday and Sunday, weather permitting, Colorado Bend SP, Bend, (915) 628-3240.
JULY: Birdwatching, daily except when park closed for hunting, Pedernales Falls SP, Johnson City, (830) 868-7304.
JULY 3, 4, 11, 18, 25: Devil's Waterhole Canoe Tour, Inks Lake SP, Burnet, (512) 793-2223.
JULY 4-7: Operation Patriotism, Admiral Nimitz SHS-National Museum of the Pacific War, Fredericksburg, (830) 997-4379.
JULY 6: Crawling Wild Cave Tour, Colorado Bend SP, Bend, (915) 628-3240.
JULY 6-7: Island Assault 1944 Living History Program, Admiral Nimitz SHS-National Museum of the Pacific War, Fredericksburg, (830) 997-4379.
JULY 6, 13, 20, 27: Stumpy Hollow Nature Hike, Inks Lake SP, Burnet, (512) 793-2223.
JULY 12: Range and Wildlife Seminar, Kerr WMA, Hunt, (830) 238-4483.
JULY 27: X Bar Dinner Show, X Bar Ranch, Eldorado, (888) 853-2688.



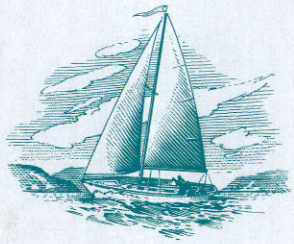
PANHANDLE PLAINS

JULY: "Texas" Outdoor Musical Drama, every Thursday through Tuesday, Palo Duro Canyon SP, Canyon, (806) 655-2181.

JULY 2, 9, 16, 23, 30: River Walk, Palo Duro Canyon SP, Canyon, (806) 488-2227 Ext. 49.
JULY 3: Wildflower Safari, Palo Duro Canyon SP, Canyon, (806) 488-2227 Ext. 49.
JULY 4, 11, 18, 25: Family Nature Hike, Palo Duro Canyon SP, Canyon, (806) 488-2227 Ext. 49.
JULY 5, 12, 19, 26: Palo Duro Pioneers, Palo Duro Canyon SP, Canyon, (806) 488-2227 Ext. 49.
JULY 6: Sun Fun and Star Walk, Copper Breaks SP, Quanah, (940) 839-4331.
JULY 6: Petroglyph Tour, San Angelo SP, San Angelo, (915) 949-4757.
JULY 6: Outdoor Photography, Palo Duro Canyon SP, Canyon, (806) 488-2227 Ext. 49.
JULY 6: Trailway Adventure, Caprock Canyons SP & Trailway, Quitaque, (806) 455-1492.
JULY 6: History Hike, Palo Duro Canyon SP, Canyon, (806) 488-2227 Ext. 49.
JULY 10, 27: Canyon Heritage, Palo Duro Canyon SP, Canyon, (806) 488-2227 Ext. 49.
JULY 13: Family Nature Hike, Caprock Canyons SP & Trailway, Quitaque, (806) 455-1492.
JULY 13: Stargazing Party, Fort Griffin SP & HS, Albany, (915) 762-3592.
JULY 13: Wild and Edible Plants, Caprock Canyons SP & Trailway, Quitaque, (806) 455-1492.
JULY 13: Nature Challenge, Palo Duro Canyon SP, Canyon, (806) 488-2227 Ext. 49.
JULY 13, 27: Campfire Tails, Abilene SP, Tuscola, (915) 572-3204.
JULY 17: Night Noises, Palo Duro Canyon SP, Canyon, (806) 488-2227 Ext. 49.
JULY 20: Archeology Program, Palo Duro Canyon SP, Canyon, (806) 488-2227 Ext. 49.
JULY 20-31: Annual Summer Art Exhibition, Copper Breaks SP, Quanah, (940) 839-4331.
JULY 24: Bat Mania, Palo Duro Canyon SP, Canyon, (806) 488-2227 Ext. 49.
JULY 27: Texas State Bison Herd, Caprock Canyons SP & Trailway, Quitaque, (806) 455-1492.
JULY 27: Prehistoric Permian Tracks Tour, San Angelo SP, San Angelo, (915) 949-4757.
JULY 31: Canyon Critters, Palo Duro Canyon SP, Canyon, (806) 488-2227 Ext. 49.

PINEYWOODS

JULY 5, 19: Nature Slide Program, Village Creek SP, Lumberton, (409) 755-7322.
JULY 6, 20: Steam Engine Shop Tours, Texas State Railroad SP, Rusk, (800) 442-8951 or (903) 683-2561 outside Texas.
JULY 7, 14, 28: Walk on the Wild Side, Martin Dies, Jr. SP, Jasper, (409) 384-5231.
JULY 13: Miss Ima Hogg's Birthday Party, Governor Hogg Shrine SHS, Quitman, (903) 763-2701.
JULY 13, 27: Guided Nature Trail Hike, Village Creek SP, Lumberton, (409) 755-7322.
JULY 19-21: Hunt-arama Hunting Show, Lufkin, (713) 461-9163.
JULY 20: Floating the Forks, Martin Dies, Jr. SP, Jasper, (409) 384-5231.
JULY 31: Old Settler's Reunion, Governor Hogg Shrine SHS, Quitman, (903) 763-2701.



PRAIRIES & LAKES

JULY: Weekends at the Farm, every Saturday and Sunday, Washington-on-the-Brazos SHS, Washington, (936) 878-2461 Ext. 245.
JULY: Historic and Scenic Tour, available by reservation only to groups of 10 or more, Monument Hill & Kreische Brewery SHS, LaGrange, (979) 968-5658.
JULY: Kreische Brewery Tours, every Saturday and Sunday, weather permitting, Monument Hill & Kreische Brewery SHS, La Grange, (979) 968-5658.
JULY: Evenings at the Amphitheater, every Saturday, Stephen F. Austin SP, San Felipe, (979) 885-3613.
JULY 4: H-E-B Fireworks on the Brazos, Washington-on-the-Brazos SHS, Washington, (936) 878-2461 Ext. 245.
JULY 5, 27: Campfire Sing-a-Long, Cedar Hill SP, Cedar Hill, (972) 291-5940.
JULY 6: Star Party, Lake Whitney SP, Whitney, (254) 694-3793.
JULY 6: Cowboy Campfire-Music and Poetry, Lake Mineral Wells SP & Trailway, Mineral Wells, (940) 327-8950.
JULY 6: Armadillo Odyssey, Purtis Creek SP, Eustace, (903) 425-2332.
JULY 6: Sandcastle Building Contest, Cooper Lake SP/South Sulphur Unit, Sulphur Springs, (903) 395-3100.
JULY 6: Reptiles of Cedar Hill, Cedar Hill SP, Cedar Hill, (972) 291-5940.
JULY 6: Nature Walk, Cedar Hill SP, Cedar Hill, (972) 291-5940.
JULY 6: Poking Around the Pond, Cedar Hill SP, Cedar Hill, (972) 291-6505.
JULY 6: Wildlife Detectives Nature Walk, Purtis Creek SP, Eustace, (903) 425-2332.
JULY 6-7, 14, 20-21, 27-28: Inn Tours, Fanthorp Inn SHS, Anderson, (936) 873-2633.
JULY 7, 14: Kreische House Tours, Monument Hill & Kreische Brewery SHS, La Grange, (979) 968-5658.
JULY 9-12, 16-19: Camp Fish, Texas Freshwater Fisheries Center, Athens, (903) 676-BASS.
JULY 13: Take a Ride on the Water Cycle, Cedar Hill SP, Cedar Hill, (972) 291-5940.
JULY 13: Outdoor Skills 1-Fire Building, Purtis Creek SP, Eustace, (903) 425-2332.
JULY 13: Venomous Snakes, Cooper Lake SP/Doctors Creek Unit, Cooper, (903) 395-3100.
JULY 13: Snakes Alive!, Purtis Creek SP, Eustace, (903) 425-2332.
JULY 13: Stagecoach Days, Fanthorp Inn SHS, Anderson, (936) 873-2633.
JULY 13: Kids' Wilderness Survival, Lake Mineral Wells SP & Trailway, Mineral Wells, (940) 328-1171.
JULY 13-14: Taste of Summer, Sebastopol House SHS, Seguin, (830) 379-4833.
JULY 20: Night Sounds, Lake Mineral Wells SP & Trailway, Mineral Wells, (940) 327-8950.
JULY 20: Animal Tracking, Cedar Hill SP, Cedar Hill, (972) 291-5940.
JULY 20: Bug Safari, Cooper Lake SP/South Sulphur Unit, Sulphur Springs, (903) 395-3100.
JULY 20: Talala Trail Walk, Cedar Hill SP, Cedar Hill, (972) 291-6505.
JULY 27: Penn Farm Tour, Cedar Hill SP, Cedar Hill, (972) 291-5940.
JULY 27: History of the Cooper Lake Area, Cooper Lake SP/Doctors Creek Unit, Cooper, (903) 395-3100.

SOUTH TEXAS PLAINS

JULY 20: Reptile and Amphibian Field Study Techniques, Government Canyon SNA, San Antonio, (210) 688-9603.

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SHS	State Historical Site
SNA	State Natural Area
WMA	Wildlife Management Area
SFH	State Fish Hatchery

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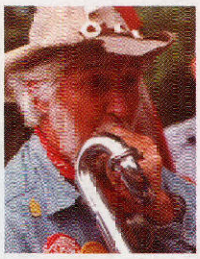

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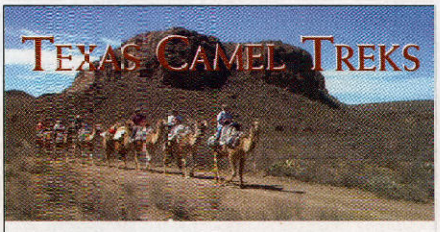

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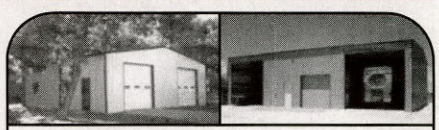

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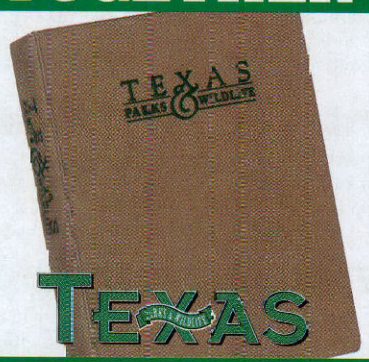

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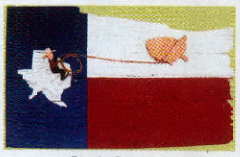
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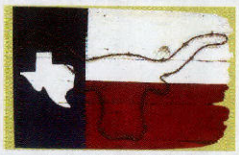
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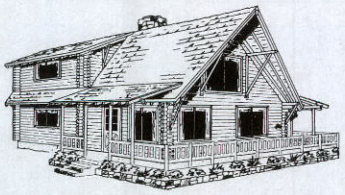

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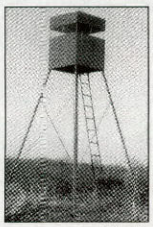

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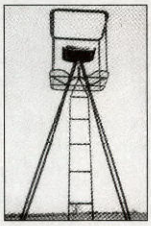

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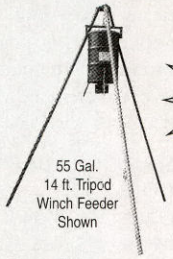

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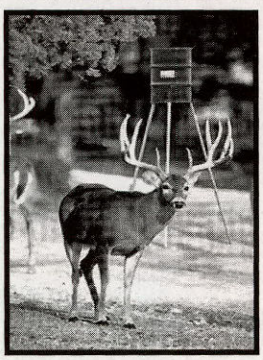

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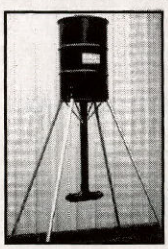

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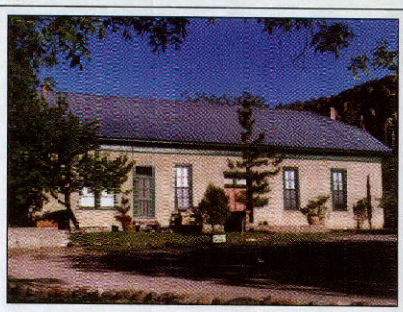

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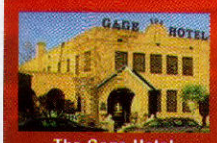

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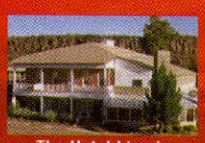

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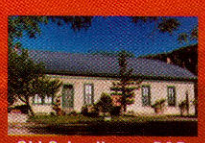

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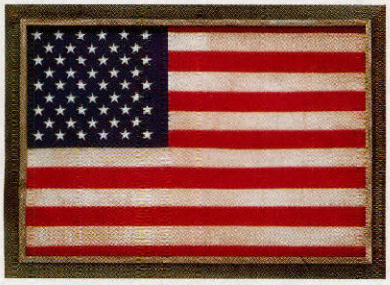
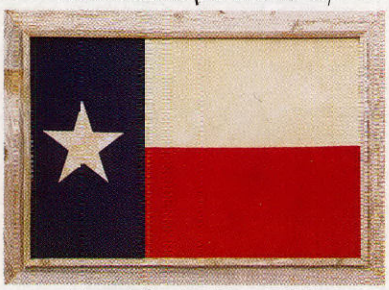
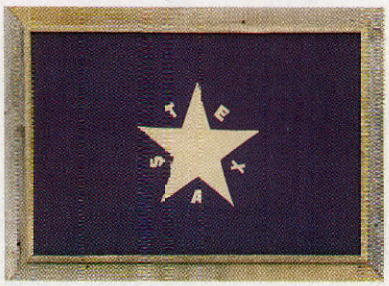


United States (28″H x 40″W)

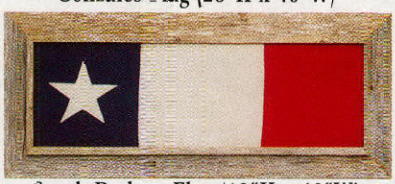


Texas Flag (28″H x 40″W)



First Republic of Texas Flag (28″H x 40″W)

Gonzales Flag (28″H x 40″W)



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American Rivers
<americanrivers.org>
River issues, river campaigns, river groups and even river trips.

Edwards Aquifer Research and Data Center
<eardc.swt.edu>
Providing data to enhance the understanding and use of this very fragile resource.

Living Waters Project
<texaswatermatters.org>
Information on water planning, conservation, the environment and economic impact.

National Weather Service Southern Region Headquarters
<srh.noaa.gov>
Weather data for the southern U.S.

Texas Alliance of Groundwater Districts
<texasgroundwater.org/>
Maps of the major and minor aquifers.

Texas Drought Preparedness Council
<www.txwin.net/DPC/Index.htm>
The latest information on drought in Texas.

Texas General Land Office Wetnet
<glo.state.tx.us/wetnet>
Wetland-related information including wetland species and wetland publications.

Texas Natural Resource Conservation Commission
<tnrcc.state.tx.us>
Locate information about surface water rights.

Texas Parks and Wildlife Department
<tpwd.state.tx.us/texaswater>
Texas water information, environmental flows, unique stream segments, recreation and more, plus links to federal and state water information, and all Texas River Authorities.

Texas Water Development Board
<twdb.state.tx.us/>
Access the 2002 Texas State Water Plan.

Texas Water Foundation
<texaswater.org>
Texas water facts, regional water plans, children's pages, conservation, water law, drought and history.

Texas Water Resources Institute's Texas Waternet
<twri.tamu.edu>
Technical news, well-researched feature articles and a newsletter, "New Waves."

U.S. Environmental Protection Agency Office of Water
<epa.gov/ow>
Groundwater and drinking water; water science; wastewater management; wetlands, oceans and watersheds and the American Indian Environmental Office.

U.S. Geological Survey
<txwww.cr.usgs.gov>
Maps, data, water science for schools and fun features for children such as "Mad Scientist" and a puzzle, 'A Tapestry of Time and Terrain."

Water Smart
<watersmart.org/>
Water conservation tips and information.

Water Wise Council of Texas
<waterwisetexas.org/>
Being water wise benefits your landscape, environment and community.

Year of Clean Water 2002
<yearofcleanwater.org>
October 18, 2002 will be the 30th anniversary of the Clean Water Act. This site offers Year of Clean Water events, the history of the Clean Water Act and proclamations and educational tools such as publications, videos, posters and bookmarks.

WATER AUTHORITIES

Angelina/Neches River Authority <anra.org>
Brazos River Authority <brazos.org>
Edwards Aquifer Authority <edwardsaquifer.org>
Guadalupe Blanco River Authority <gbra.org>
Lower Colorado River Authority <lcra.org>
Lower Neches River Authority <lnva.dst.tx.us>
Nueces River Authority <nueces-ra.tamucc.edu>
Red River Authority <rra.dst.tx.us>
Sabine River Authority <sra.dst.tx.us>
Sulphur River Basin Authority <sulphurr.org>
Trinity River Authority <trinityra.org
Upper Guadalupe River Authority <ugra.org>

PARTINGSHOT

END OF THE ROAD Farm Road 2031 is one of only two roads in Matagorda County that reach the Gulf of Mexico. Houston photographer Lance Varnell shot this photo where the washed-out road disappears into the Gulf on this isolated stretch of beach near the town of Matagorda, population 710.

© LANCE VARNELL

DESERT FLOWER Earl Nottingham, Texas Parks and Wildlife Department photographer, was exploring the dried-up riverbed of the Rio Grande in Big Bend National Park when he found this limoncillo sprouting through a crack in the dried mud.

PLAINS WATER Thousands of shallow playa lakes are scattered across the Texas plains, next page, providing a water source for wildlife and recharge for the Ogallala Aquifer. Photographer Wyman Meinzer watched the sun come up over these playa lakes not far from his home in Benjamin.

© WYMAN MEINZER

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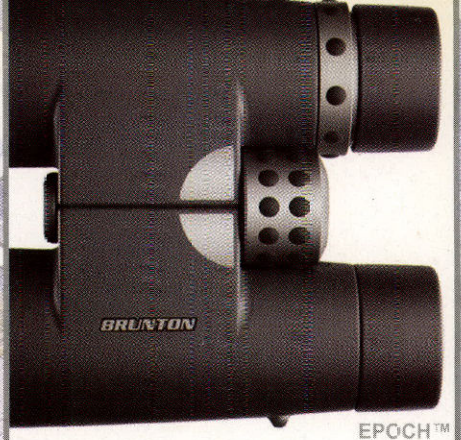

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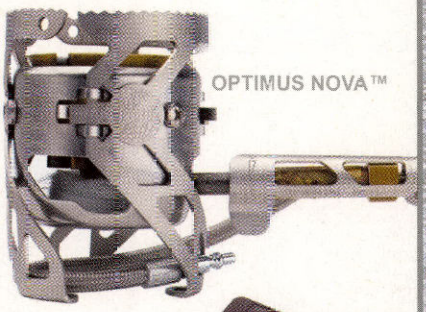

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