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TEXAS

PARKS & WILDLIFE

T4953



February 1986

HAVE YOU SEEN MY MARCH ISSUE OF TEXAS PARKS & WILDLIFE?

If you look forward to your issue of TEXAS PARKS & WILDLIFE magazine every month, you're sure to notice that there won't be a March issue. Because, we're getting ready for something fantastic.

Check your mailbox the second week in April for the big birthday issue of TEXAS PARKS & WILDLIFE. This 100-page special issue is our way of celebrating the Texas Sesquicentennial: 150 years of Texas' beauty recorded in breathtaking color, with sections on Texas' bountiful natural resources: her land, wildlife, waters and people.

We hope you'll remember when we don't show up in March that you haven't misplaced us. And the next time you see us will really be something special!



Contents

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TEXAS PARKS & WILDLIFE

February 1986, Vol. 14, No. 2

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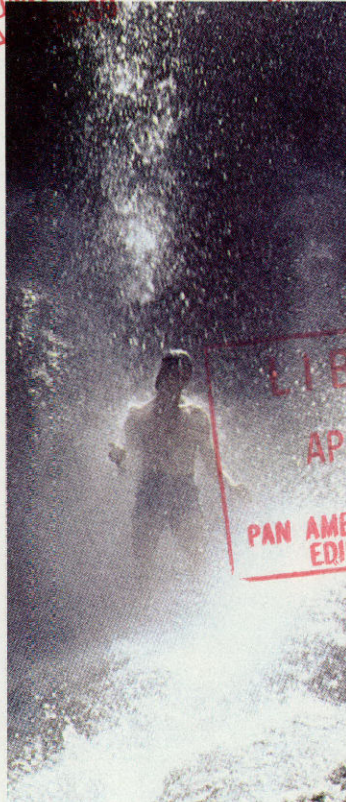
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Dedicated to the conservation and enjoyment
of Texas wildlife, parks, waters and all
outdoors.

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Page 34



Page 2



Page 14

Wildlife Images by <i>Belva McKann</i>	2
Texas wildlife artists help others enjoy the beauty of the outdoors.	
Young Naturalist: How Fish Swim by <i>Ilo Hiller</i>	14
A fish must overcome the effects of buoyancy in order to swim.	
Buried with the Past by <i>Jeff Towers</i>	20
The town of Springfield had a brief, colorful life in the early part of the 19th century.	
Cradle of Texas Liberty by <i>Mary-Love Bigony</i>	24
Stephen F. Austin State Historical Park commemorates the beginning of modern Texas history.	
Outdoor Roundup	32
News briefs compiled by the department's news service.	
Nature's Underground Storage Tanks by <i>George Oxford Miller</i>	34
Aquifers provide Texas' most valuable resource—water.	
Bass for the Future by <i>Jim Cox</i>	38
Insuring good bass fishing will require bold steps in fisheries research.	
Letters to the Editor	48

Covers

Front: A French angelfish moves effortlessly among offshore reefs. To learn how fish swim, turn to page 14. Photo by Stephan Myers. **Inside Front:** South Texas is the chief breeding place north of Mexico for the black-bellied tree duck. Photo by Steve Bentsen.



"Texas Heritage" by Ragan Gennusa



"The Flats" by John P. Cowan

wildlife images

by Belva McKann

Texas is home to a number of wildlife artists whose work reflects the value they each place on nature. Their inspiration is Texas wildlife in every conceivable habitat. The Big Thicket, Great Plains, Rio Grande Valley, Gulf Coast and mountains of the Big Bend all serve as studio and retreat for those creative individuals who reproduce the sights and feelings of the Texas outdoors and its wild inhabitants.

RAGAN GENNUSA

Ragan Gennusa, selected Texas State Artist for 1985 by the Texas Legislature, has dedicated himself to the pursuit of art. At his rock house on a deep creek in Dripping Springs, Gennusa uses water colors, oils and hide and feather "props" along with his own photos, to produce his award-winning works.

Since his boyhood in Port Arthur, Gennusa has loved both the sporting life and rendering his impressions of it through painting and drawing. He worked outdoors in the oil refineries of the Golden Triangle during the summers between semesters at the University of Texas, where he earned a degree in art and played split end for the Texas Longhorns. After graduation, Gennusa worked in printing, gaining knowledge of paper, ink and other details of art production.

Wild turkeys are among Gennusa's favorite subjects. For several years he has followed the progress of a turkey hen and her broods living on his home place. He also has carefully recorded the original longhorn steer, the rangy survivor that greeted Anglo explorers before the breed

was fattened up and improved. Gennusa's range of subjects recently expanded to include African species after he visited the dark continent and observed the other world of wildlife it presented to him.

Gennusa's recognition by the Texas Legislature comes during a career spent honing his talent painting things he knows and using it to benefit causes he believes in.

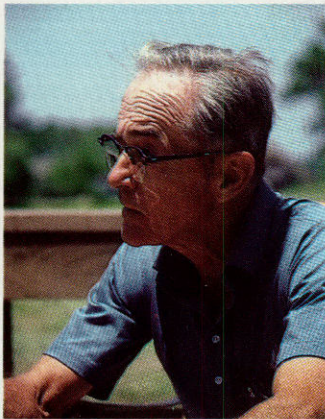
JOHN P. COWAN

John P. Cowan calls his craft sporting art. It focuses on the human figure engaged in the drama and excitement of the hunt. Cowan's works include the first Gulf Coast Conservation Association stamp and print, the first Texas Saltwater Fishing stamp and print and the 1985 Texas Waterfowl stamp and print. He has been honored by Ducks Unlimited and Trout Unlimited as Artist of the Year.

Cowan's paintings, which are rendered in the style of the English watercolorists, are "composites of generalities" designed to help viewers relate to the scene as though they had been there. His art reflects a lifelong love for the sporting experience that began when he was a young boy trapping rabbits and hunting small game around his Tennessee home. Cowan's artistic ability became apparent early, as did his love for the outdoors. His second grade drawings earned good marks at school and, thus encouraged, he went on to gain 20 years of experience in commercial art. Cowan's commitment to the conservation ethic, combined with his talent for producing scenes that are meaningful to the viewer, give his art an enduring appeal appreciated by Texas sportsmen.



Ragan Gennusa



John P. Cowan

CHARLES BECKENDORF

Two things inspire Charles Beckendorf: the diversity of his native Texas and pleasing other people with the works of art that result from his outdoor experiences. Born in Mathis in 1930, Beckendorf has made his career in the mainstream of art for more than 30 years. Commended by the Texas Legislature in 1984 for his popularization of the state through his paintings and drawings, he has been a lifelong fan of the critters and flora he grew up observing.

Beckendorf has drawn animals and birds since childhood. He worked on ranches and in oilfields as a young man, earned a degree in art from the University of Texas and began his career as a technical illustrator. He likes to portray the different species of native deer, as well as the great variety of waterfowl, especially ducks, that migrate through Texas each year.

The familiar Beckendorf style is an amalgam of influences picked up through the years, principally that of the French Impressionist school. The paintings and pencil drawings frequently are highlighted by artist's notes dealing with the habits, location and personal impressions made by the work's subject.

Besides gaining pleasure from showing people the beauty that is Texas, Beckendorf loves his work because it gets him outside. The Texas/Mexico border is one of his favorite spots, but many Beckendorfs picture rustic settings, such as old barns or windmills surrounded by quail.

From a gallery in Fredericksburg, the entire Beckendorf family works in the business of supplying visitors with the artist's interpretations of Texas scenery and wildlife in watercolor, pencil and acrylic.

GEORGE BOUTWELL

Born in East Hartford, Connecticut, George Boutwell came to Texas as a child. The sporting scenes, old dogs, farmhouses and native wildlife that populate his paintings demonstrate the completeness of his metamorphosis into a Texan.

From their restored Victorian house in Austin, Boutwell and his wife Martha devote much of their time and energy to wild-

life rescue and historic preservation. Boutwell worked for five years as art director for *Texas Highways* magazine, and during his tenure the magazine went from black and white to full-color. He also has years of advertising, design and illustration experience. Boutwell became a fine artist full time in 1973 and continues to provide lovers of Texana with nostalgic watercolors inspired by scenes he has observed all over the state.

Scissortails harrassing a hawk, mourning doves roosting among thorny mesquite branches, whitetails browsing beneath gigantic live oaks and songbirds drinking from a washtub are but a few of Boutwell's sympathetic interpretations of the habits of Texas' wild creatures.

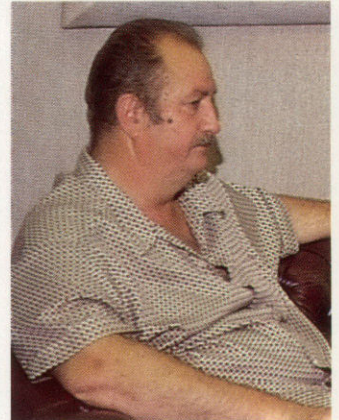
Boutwell watercolors complement some of the world's most distinguished private collections, among them Exxon U.S.A., the King Ranch, Johnny Cash, John Connally, Dolph Briscoe, the Agricultural Hall of Fame and Dr. Pepper.

CHARLES UMLAUF

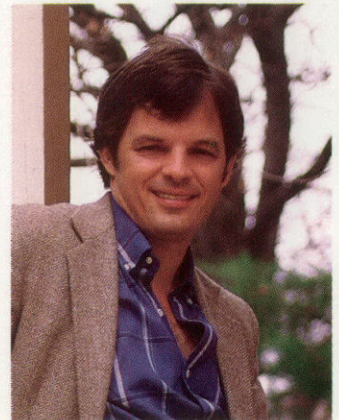
"He is a man who looks like a Texas rancher and who produces work from which grace and serenity emanate." So wrote Florentine art critic Luciano Meccheri of Charles Umlauf. Meccheri continued, "In his animals, in his portraits of people, Umlauf has the rare ability to capture the moment most expressive, making of it a living vibrant entity, a work of art." His work, reflecting Expressionist and Cubist influences, is filled with dynamism and vitality.

From a childhood beginning in South Haven, Michigan, through a distinguished academic career at the University of Texas at Austin lasting 40 years (1941-1981), Charles Umlauf has worked unceasingly to produce works that have garnered international acclaim. One of his many honors was his selection by the Houston Art League as 1985 Artist of the Year. Umlauf was identified by New York critic Peyton Boswell, Jr. as one of the leading sculptors of the West.

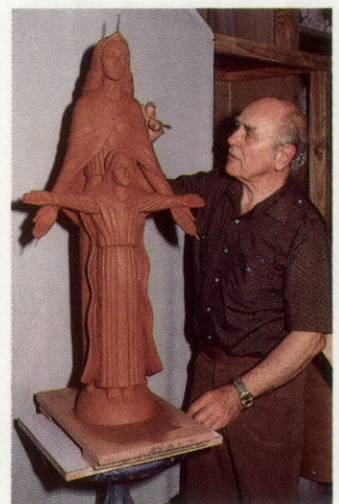
Umlauf is the exception in this group of artists in that he does not work exclusively with wildlife or western art. But Umlauf's



Charles Beckendorf



George Boutwell



Charles Umlauf



"West Texas Pronghorn" by Charles Beckendorf



"Snowbirds" by George Boutwell



"Otter" by Charles L. Mauf



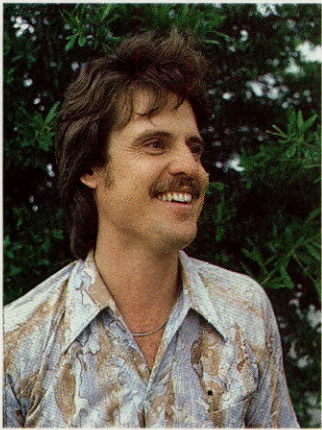
Greenwing Teal for 1986 Texas Waterfowl Stamp by Herb Booth



"Cooper's Hawk with Rufous-crowned Sparrow" by Roger Simmons



Herb Booth



Roger Simmons

animals capture the essence of the animal nature, a result of the rapport the artist has with them. Gibson A. Danes comments: "... When he enters the animal kingdom, he becomes a bit like a combination of Dr. Doolittle and a Ringling Brothers wild animal trainer. He loves them all, but he must capture their character, stance, gait, manner and expression on paper or snare them in clay, wood, stone or bronze. This joy in trapping the likeness of an anteater, bird, snake, boar, burro, horse, bull . . . or Longhorn steer is contagious. His lively fauna are in character . . . He is really a kind of an 'archangel' for the tame and the wild. He has been inspired by the birds and the beasts ever since he drew and studied them as a student at the Field Museum of Natural History."

Many museums, churches, private homes and estates all over the world boast Umlauf works. Two bullfight drawings and a stoneware horse are owned by the Metropolitan Museum of Art in New York City. Among the numerous public and private commissions of Umlauf's work is a fountain, "Spirit of Flight" at Love Field in Dallas, executed in 1959. It is a bronze figure 17 feet high, mounted on a granite plinth, with eighteen bird forms in six groups of three radiating from the plinth and set in a circular pool of water which overflows into a larger pool. A bronze fountain sculpture of "Seagulls" for the Witte Museum in San Antonio was a gift to the city museum from Mayor McAllister and his family.

HERB BOOTH

Encouraged by his grandmother, Herb Booth had begun painting by the time he was in kindergarten. By the age of twelve, Booth was spending almost every weekend hunting and fishing. His love of nature and his love of art grew along with the boy and during high school, he became a member of a unique scouting organization in his home state of Colorado, the Koshare Indian Dancers. This group of scouts studied and collected Southwestern and Indian art on trips to New Mexico and Arizona. They bought art with money they had earned doing Indian dances throughout the United

States. The organization even built a museum to house the art with earnings from their performances. The Koshares' collection of western art is now valued at over \$1.5 million.

Booth does not like to consider himself a "self-taught" artist, but rather as one who was taught by every other artist whose work he has admired and studied, among them Remington, Russell and Bishop. In 1967, he donated a painting to Ducks Unlimited. This event was the turning point in his career, and Booth's work as a waterfowl artist virtually began.

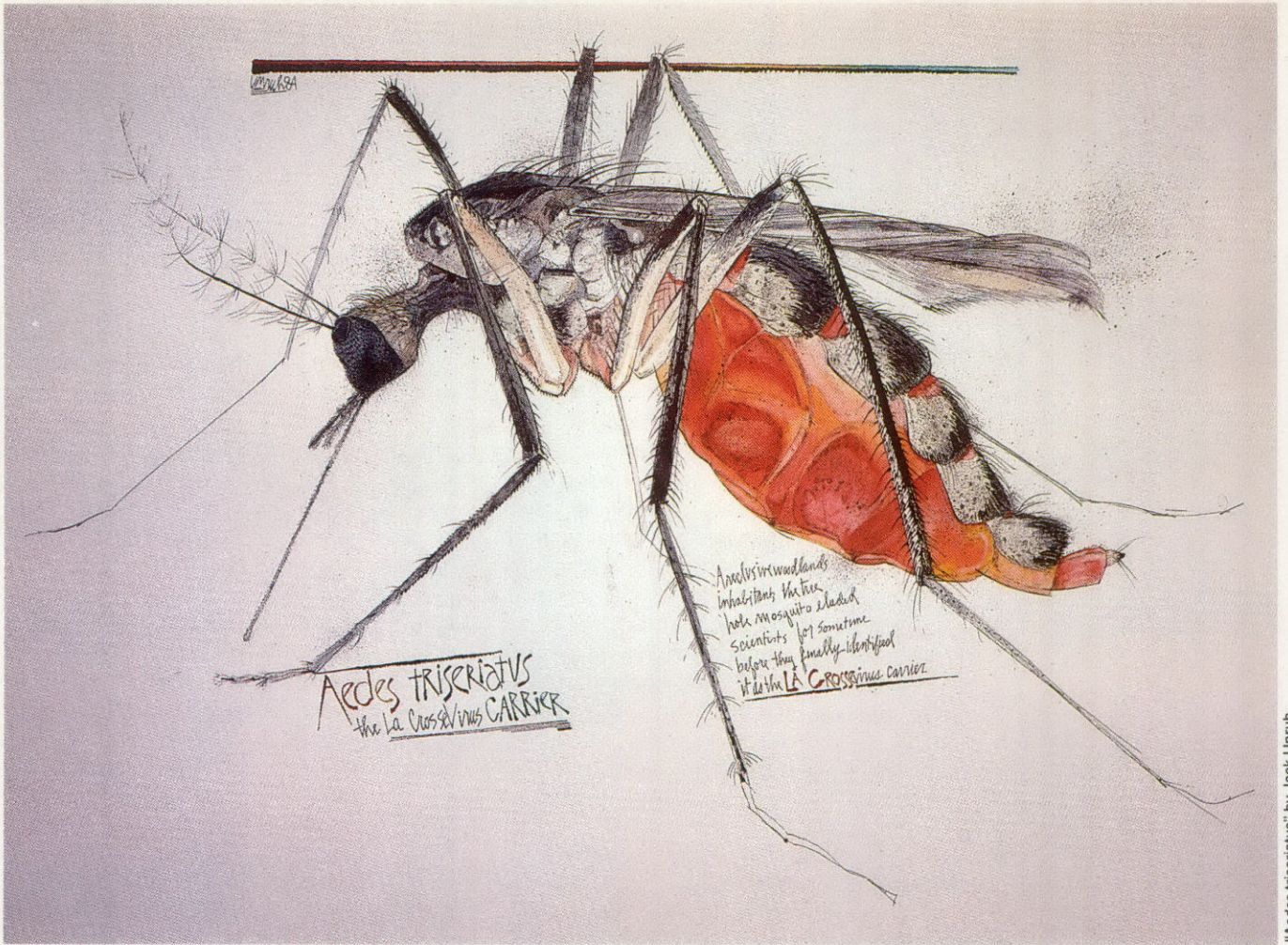
Booth has lived in Texas since 1970 because, in his words, "For a bird hunter and fisherman, living in South Texas is like going to heaven." His accomplishments include 1983 Ducks Unlimited Artist of the Year, 1985 Gulf Coast Conservation Association stamp and print and 1986 Texas Parks and Wildlife Waterfowl stamp and print. His work has appeared in *Sports Afield*, *Southern Outdoors*, *Texas Highways*, *Ducks Unlimited* and *Gulf Tide*.

ROGER SIMMONS

Roger Simmons' lifelike wildlife paintings are the result of a decision to forego the training he had begun in biology in order to pursue art. In the course of studying science at Texas A&I, it came to light that his lab drawings were works of art in their own right. Simmons' particular interest are birds, and every feather is rendered with faithful accuracy in his opaque watercolors.

In his pursuit of artistic realism, Simmons has been influenced by the styles of James Fenwick Lansdowne and Martin Glen Loates. For his work he studies animals in the wild and employs bird skins acquired from the Dallas Museum of Natural History and the Austin Natural Science Center. He is a serious student of ornithology and helped found the Bexar Audubon Society.

Simmons' avid interest in conservation has motivated the donation of wildlife paintings to such groups as Ducks Unlimited and the Travis Audubon Society. Simmons originals reside in private collections all over the world.



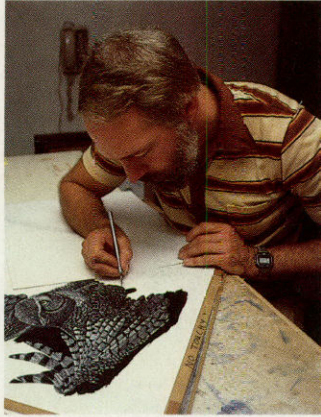
"Aedes triseriatus" by Jack Umruh



"Misty Rise" by Michael Allender



"Nesting Woodies" by Terry Burleson

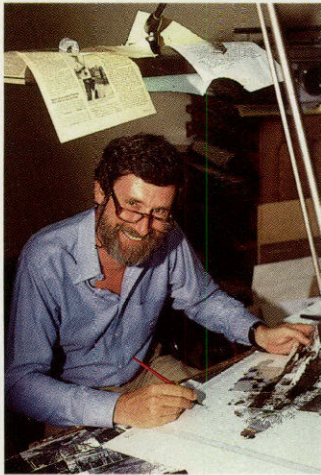


Michael Allender

MICHAEL ALLENDER

Michael Allender was born and reared in the Texas Panhandle, where he acquired a sensitive appreciation for the natural world. He earned a degree in wildlife ecology at Texas A&M, then went on to study ethology (animal behavior) at Utah State University. During this period, Allender worked as an illustrator for the Smithsonian Institution. In 1974, he turned to the sale of limited editions of his prints as the means of his livelihood, choosing the difficult and demanding medium of China-clay engravings (scratchboard) to create precise renderings of animals.

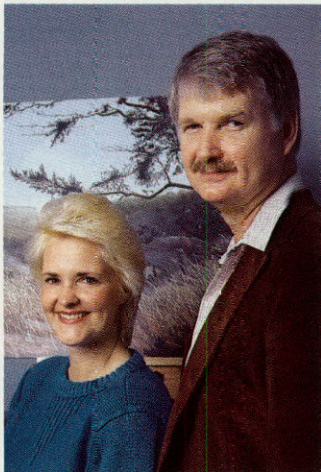
Allender has studied wildlife in their natural habitats throughout Texas and the rest of North America. When not working in his studio, he backpacks in wilderness areas, photographing and developing ideas for prints, magazine articles and books. His favorite subjects are canines and big cats. Allender also does expressive drawings of birds, which are infinitely more difficult than mammals because the pen strokes can look like hairs, rather than feathers. He sometimes spends 300 to 500 hours on a single likeness. His art hangs in Western galleries and in private collections throughout the country.



Jack Unruh

JACK UNRUH

Two popular forms of artistic expression in today's world are magazine illustration and commercial art. Instantly recognizable Jack Unruh illustrations, partially color-washed loose line drawings, have graced hundreds of national publications: *Sports Illustrated*, *Outdoor Life*, *National Geographic*, *Sports Afield*, *Science '84*, and *Smithsonian*. And Unruh's ethic about his art is that an illustration isn't valuable unless it's been in print somewhere. He believes in creating something meaningful and sharing it not with a special few, but with everybody. A drawing of a backpacking or hunting scene, a graphic magnification of a mosquito, a shorebird with a long bill that dominates a two-page magazine spread . . . all give a special feeling to the words of the stories they highlight.



Cindy and Terry Burleson

Unruh illustrations represent familiar scenes and creatures, easy on the eye and available for the cover price of a magazine. They have been featured in national exhibits, among them *Graphis*, the New York Society of Illustrators, Print Casebook of Annual Reports, the New York Art Directors Show and the United States Information Agency's "Advertising Art in America."

Unruh's home is Dallas, and he has been honored there as the Dallas Society of Visual Communications' Art Director of the Year and recipient of the Golden Egg Award which recognizes "top creative talent in the Dallas advertising community." Some of his commercial clients include American Airlines, Braniff Airlines, NBC, Twentieth Century Fox, Hyatt Hotels, the National Park Service, Time Inc., Exxon, IT&T and Trammel Crow.

CINDY AND TERRY BURLESON

Cindy and Terry Burleson both graduated with Fine Arts degrees from the University of Texas. The partnership thus begun has produced a prolific collection of remarkable wildlife art.

Cindy Burleson was nominated in the 1985 Texas Artist of the Year competition. Her bronze sculptures range from miniatures of wrens and jackrabbits to massive replicas of stampeding longhorn steers and studies of hunting dogs at the point, all of which reflect a strong knowledge of animals and great feeling for their beauty. Her work includes Texas wildlife in addition to other North American and African game.

Cindy Burleson's sculptures are included in collections in the United States and abroad. One of her large works is on display at the Spanish Embassy in Washington, D.C. She has been commissioned to create wildlife sculptures for the U.T. Law School conferences, commemorative belt buckles for a recent Governor's Conference, art for the Texas Relays, and the Austin Wild Basin Benefit Designer's Showcase Awards.

Terry Burleson's paintings and bronzes show special emphasis on game birds of the Southwest, especially turkeys, quail and various species of ducks found in Texas: mallards, greenwing teal, wood ducks,

pintails, red heads, hooded mergansers, golden eyes and canvasbacks. His paintings and sculptures decorate important collections throughout the country.

Terry and Cindy Burselson's work has been published in *Southwest Art* and *Print* magazines. The Texas Public Employees Association recently commissioned them to execute a large bronze to be placed on permanent display in the Texas Capitol Building to commemorate the 1986 Texas Sesquicentennial Celebration.

No discussion of wildlife art in Texas would be complete without telling the interesting story of one of the most collectible American folk art forms, the decoy. The word *decoy* was derived from two Dutch words—*ende*, meaning duck, and *kooi*, meaning cage. The European idea for attracting birds was to use live birds to lure them through net-covered channels on a pond or lake. Hence the American "decoy," a contraction of the Dutch expression for luring wild birds through artificial means.

The oldest known decoys in America were discovered in 1924 in Lovelock Cave, Nevada. They are woven reed ducks, made by American Indians around 1,000 A.D. and clearly identifiable as canvasbacks.

The white man learned the utilitarian value of decoy making in the late 1700s. The earliest American settlers' attempts at decoy making were simply mud heaps, duck-shaped rocks and stuffed birds, but the art of wooden decoy carving developed through the years in which bountiful game inhabited the continent.

The abundance of wildlife gave rise to the era of market hunting. Geese, ducks, shorebirds and even songbirds were gunned toward extinction to supply markets and restaurants with wildfowl.

The inexorable hunting pressure on American wildlife beginning in the 1840s wiped out the passenger pigeon and forced the passage of the 1917 Federal Migratory Bird Treaty Act, ended market hunting and diminished decoy making as a utilitarian form. Now the value of handmade wooden working decoys lies in their collectible worth, based on the identity of

the maker, the rarity of its type, age and condition.

A good bird is representative of the species it is meant to attract. It must be sturdy, buoyant, stable and self-righting with a durable, weatherproof finish. Weighted keels along the bottoms provide stability. Decoys called "confidence decoys" are models of nongame shorebirds placed in the water with the duck and goose decoys to lend a convincing appearance to the scene.

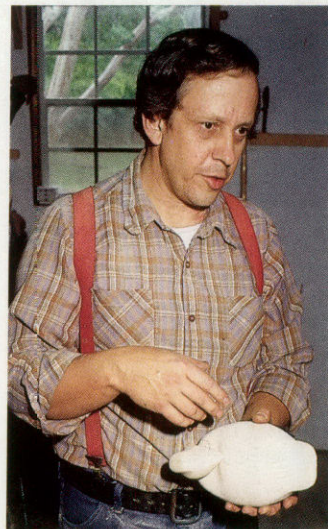
JOHN NELSON

There are possibly no more than half a dozen working decoy makers left in this country who make the craft their livelihood. In Texas, there is only one. He is John Nelson of Detroit in northeast Texas. A visit to Nelson's home is like stepping into a time when pride in handcrafted work was a way of life. He works 10 to 12 hours a day, six days a week making decoys that are recognized everywhere as the highest quality working birds. Nelson's wife Nancy weaves and spins, and their home is a peaceful place with every room filled with the products of their talented hands.

Nelson's method consists of hollowing out the duck's body in two parts which are then glued and nailed together. The wood he uses is sugar pine. The weighted keel is an oak board, bored out to receive molten lead which, when hardened, will weight the bird so it will "swim" steadily in the water. The keel is affixed with screws and glue, the head is attached and the bird is ready for priming and painting. Nelson's decoys can be seen at the Museum of American Folk Art in New York City.

RUDY LeCOMPTE

Another fine carver of decoys, 75-year-old Rudy LeCompte of Baytown, was born in Bourd, Louisiana, in 1910. He learned from his cousin how to get the cypress knees, the light durable part of the cypress root just above the water. This kind of wood never splits and floats like cork. LeCompte's ducks are low-swimming birds of the Gulf Coast style of modeling. His



John Nelson



Rudy LeCompte



"Hunting's Best Moments"
by Cindy Burleson



Duck decoys with white pelican and snow goose confidence decoys by John Nelson



Eastern bluebirds by Jerry Harp



Wood duck drake by Jerry Harp



Canvasback by Rudy LeCompte



Jerry Harp

method begins with roughing out the one-piece body of the bird with a hatchet. He then uses a three-inch plane to smooth out the wood. The keel is split bamboo filled with lead and secured to the duck with copper nails. The head is made with a tool much like a dentist's drill, but in the earlier days, this function was performed with a hatchet and a pocketknife. After the body and the head are made, they are attached and the eyes are added with a cork borer. A sealer is applied and the bird is painted with a mixture of flat and enamel paint, leaving a bright finish.

Lecompte started selling his decoys in Texas in the 1930s near Crystal Bay near Baytown. He began making greenwing and bluewing teal for the first time in 1972.

JERRY HARP

After the heyday of the working decoy, the transition from working birds to decorative carving was made by many decoy makers. The decorative birds are much more realistic, sometimes mimicking reality so expertly that the viewer expects the creature to flap its wings.

Twenty years ago, Jerry Harp quit his job to become a full-time professional carver. Now, according to *Outdoor Life*, he is one of the foremost bird sculptors in the nation. He has won numerous ribbons for his realistic sculpture at the Louisiana Wildfowl Carvers and Collectors Show in New Orleans and the World Champion Carving Competition in Salisbury, Maryland.

Harp's likenesses begin with observing the birds in their natural habitat. He has trained himself to be artistically observant of wildlife. Additional knowledge of coloring and feather patterns is obtained through study of actual bird skins.

On April 5 and 6, 1986, at the Sheraton LBJ in Dallas, the second annual Texas Wildfowl Art and Antique Festival will be held. Both antique and modern decoys will be shown, among them work by Red Meitzen of Houston, John Harris of McAllen, Ollie Townsend of Friendswood, Bryan Greer of Plano and Jack Lamb of Dallas. Details are available from Brian McGrath, president of the Texas Decoy Collectors Association at (214) 596-3293.

art imitates life and in Texas life and art present a particularly rich weave. The diversity of this state's resources and the beauty of her features are mirrored in the work of those who capture fleeting moments in nature. Just as surely as the Texans of thousands of years ago recorded Texas in their wildlife images on cave walls, our artists of today are the recordkeepers of a time and place made even bigger and more memorable for their presence. * *

Editor's Note: There's a lot of talent in the Texas wildlife artist community. We had time and space for interviews with only 13 of the many who earn their living as artists, some of whom have had their work published on the pages of this magazine. The work of these artists and others helps us enjoy the beauty of the state's wildlife and outdoors even more.

Texas State Artist Competition for 1985

A committee to select an official state artist is appointed each biennium by the Texas Legislature. This year's winning artist is Ragan Gennusa, chosen for best fulfilling the requirements of nominees: "exceptional ability in portraying the beauty of this state, some facet of its history, or the proud spirit of its people." Finalists in the competition, whose works were shown at the State Capitol and at the State Fair of Texas' Great Hall of the States were:

Cindy Burleson, Austin
 Charles Beckendorf,
 Fredericksburg
 James Eddleman, Lubbock
 Tony Eubanks, Grapevine
 G. Harvey, Houston
 B. J. Ritchie, San Marcos
 Randy Souders, Fort Worth
 Jesse Trevino, San Antonio
 Barvo Walker, Rhome
 Donald Yena, San Antonio
 Gene Zesch, Mason

HOW FISH SWIM

Article by Ilo Hiller and Photos by Stephan Myers

Since fish have been able to swim for half a billion years or so, it is no wonder they have mastered moving about in their watery world. As you watch them swim so effortlessly, have you ever wondered how they manage to stay suspended in the water—neither floating to the surface nor sinking to the bottom?

The secret to controlling their position in the water is being able to achieve a state of neutral buoyancy.

The dictionary defines buoyancy as: 1) the power of a fluid to exert an upward force on an object placed in it, or 2) the tendency of an object to float or rise when submerged in a fluid. This means that if an object is lighter than the fluid, it will float on the surface. Of course, if the object is heavier, it will sink to the bottom because of gravity. Neutral buoyancy is the condition where the object neither sinks nor floats but remains suspended.

When we think of buoyancy in relation to a fish, we must realize that if the fish is going to be able to move at will from the surface of the water to the bottom or up again it must overcome the effects of both buoyancy and

gravity, or achieve a state of neutral buoyancy. This means that regardless of how much it weighs, the fish must counteract the effects of buoyancy by being equal to the pressure or density of the water in which it swims.

More than half of the world's fish species solve this problem with a gas-filled bladder. Think of it as an oblong balloon, filled primarily with oxygen and nitrogen and buried deep inside the fish's body. This swim bladder must constantly regulate the amount of gas it contains so the fish will maintain neutral buoyancy as it moves through the various water depths.

Oxygen and nitrogen enter the fish's bloodstream through its gills, pass through blood vessels leading to the swim bladder and activate a gas regulating gland in one end of the bladder. This gland releases an acid that causes the blood to release its stored oxygen/nitrogen. The oxygen/nitrogen inflates the bladder and the fish becomes more buoyant (lighter).

Another gland located at the other end of the swim bladder removes the oxygen/nitrogen to decrease the fish's buoyancy. This gland, called the oval

Neon goby



Because they live in water fish must solve problems of locomotion that land animals do not have. Fortunately, most of the fish's weight is held up by the water and energy can be conserved for swimming. Fish use their fins to maneuver, steer, break or hold themselves motionless in one spot.

French angelfish



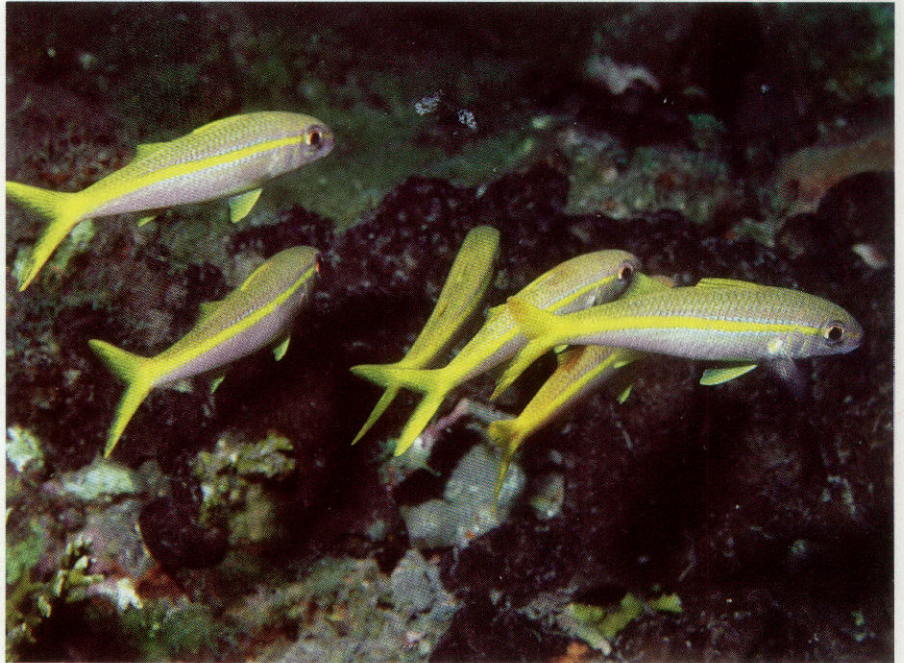
Young Naturalist

Yellow goatfish

body, contains many blood vessels that absorb air bladder gases. A muscular ring prevents this gland from coming into contact with the bladder when gases do not need to be removed.

Fish that swim in great depths where water pressures may equal 3½ tons per square inch must have more than simple gas diffusion system to keep their swim bladders from being compressed. These deep-water fish have a special network of blood vessels, called the rete mirabile. Rete (RET-e) means network and mirabile (ma-RAHB-a-le) means wonderful. This rete mirabile, located beside the gas gland, concentrates the oxygen/nitrogen until the pressure in the gland overcomes the bladder pressure and allows the bladder to remain inflated.

The swim bladder is an important part of swimming, but if you have watched many fish, you probably have noticed that all fish do not swim alike. Some rely heavily on back and forth movements of the tail or body while others rely primarily on fin movements.



Most fish swim by swinging the tail from side to side, while curving the rest of the body alternately to the left and to the right. If the tail fin is removed, the fish still can swim by using its body movements. Fish with more rigid bodies move the front portion very little, relying mainly on the tail for forward motion. Eels swim by alternately tightening muscles along their entire body, causing the body to bend in snakelike curves.

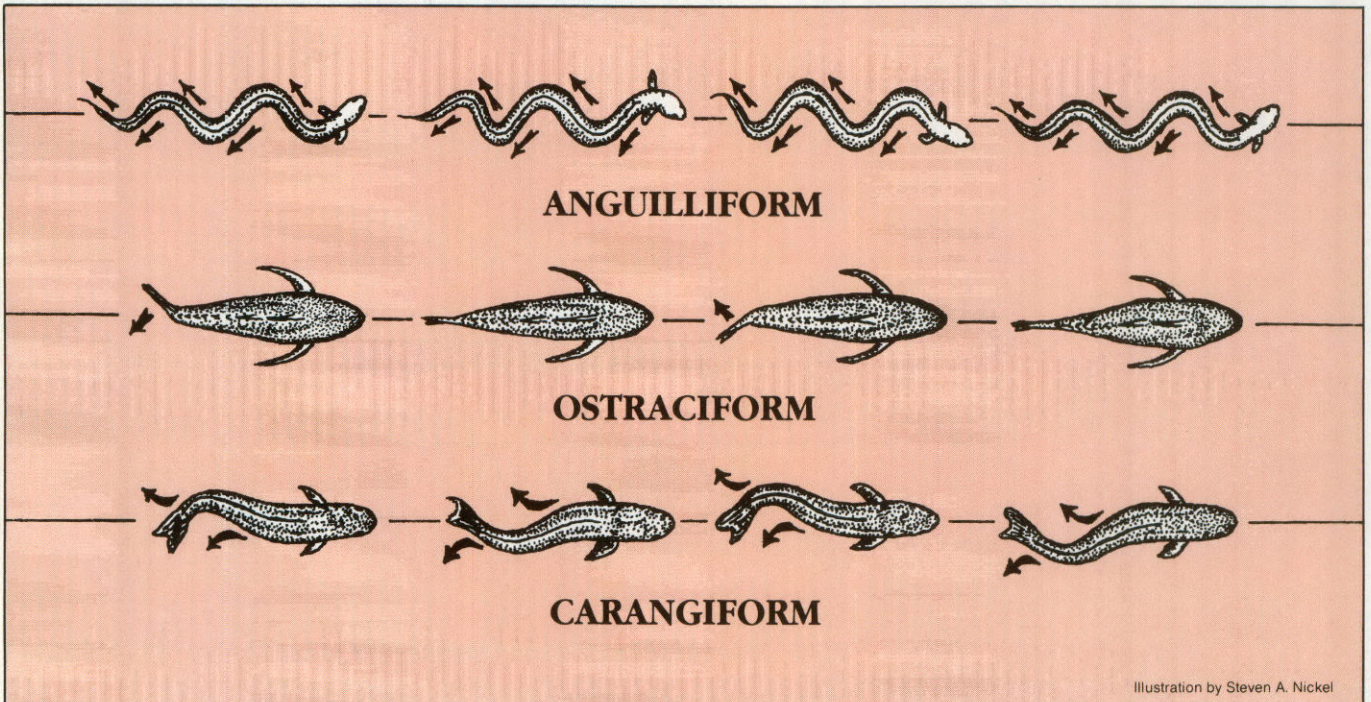


Illustration by Steven A. Nickel



Goldentail moray eel

Young Naturalist

Swimming methods can be divided into three major divisions based on the flexibility and use of the fish's tail—anguilliform, after the eel (*Anguillidae*), which is almost all tail; carangiform, after the jackfish (*Carangidae*), which has a strong, well-formed tail and tail fin; and ostraciform, after the trunkfish (*Ostracientidae*), which can only wag a flexible tail fin behind a blocky, inflexible body.

Forward motion in the anguilliform method of swimming results as the fish tightens alternate muscles, causing the body to bend from side to side. (Snakes use this same method to travel on land.) The fish's whole body is like a tail being wagged back and forth along its length. This continuous movement causes alternate pressures against the water and provides the thrust to move the fish forward.

The fastest, most efficient swimmers use the carangiform method. As they move their long tails from side to side,

forward motion is caused by the backward thrust of the tail against the water after a sideward sweep. The head is held stiff during the tail sweep to keep the fish straight, and the fins are used for steering and braking.

Since the bodies of fish using the ostraciform method of swimming are more rigid, the flexible caudal (tail) fin must move back and forth in a paddlelike motion to move the fish forward. Some species of these slower swimmers use their pectoral (side) fins in a paddling or rowing motion and reserve their tail-power for quick bursts of speed.

Since the shapes of fishes are so varied, these divisions may blend together in some species. However, others are distinctive enough to be easily classified.

On one thing we can rely, by whichever method a fish swims or maintains its position in the water, it is more efficient than man's. **

Queen angelfish



Creole fish







SPRINGFIELD BURIED WITH THE PAST

In the early part of the 19th century, the booming town of Springfield stood on land now occupied by Fort Parker State Recreation Area. The town had a brief, colorful life, but only a few traces of it remain within the state park.

Article by Jeff Towers and Illustrations
by Chris Morcl

Springfield became a townsite on January 6, 1838, when Moses Herrin donated 500 acres from his league grant for "the use and benefits of a town to be located at a large spring on the bank of the Navasota River." He stipulated that "any citizen improving and residing within the five hundred acres one year from and after February 1, 1838, should receive at least four lots not exceeding one acre, together with that proportion of ground necessary for public streets." A clause was included stating that "if damage and fear from our common enemies should cause said citizens as may settle on the town lots or land belonging to said town shall not prejudice their claims to such grounds as shall be assigned them according to the intent and meaning of the foregoing instrument unless such citizens shall not return within six months after such dangers are passed."

By the spring of 1838, 12 families had settled in the area, but they were forced out during the summer months by Indians. By 1844 the town was again inhabited by immigrants from Illinois and Tennessee, including survivors of the Fort Parker massacre. They named the town Springfield for the springs in the area and perhaps their own home town of Springfield, Illinois.

When Limestone County was formed in 1846, Springfield had 15 or more families. As the only town of any size, it was declared the county seat, and a United States Post Office was established the same year. In 1848, Springfield had approximately 120 residents



and was known as a fine place to live. A city government was organized that year by a legislative act incorporating the town.

In 1850, the town was growing rapidly. Businesses included five general mercantile stores, two hotels or taverns, two grocery stores, two blacksmith shops, one tailor shop, two schools and a Masonic Hall. In addition there were three carpenters, a gunsmith, a wagon maker, a surveyor, four physicians, four preachers and several freighters. Sometime during the Civil War Springfield had a college, but it did not last long. A newspaper also was started in the 1850s, but ended in 1860.

Several roads served Springfield, which may have contributed to its rapid growth. The Springfield road was the main route of travel from Houston

to North Texas, and an excellent road connected Springfield with Fairfield and Palestine. The first commissioners' court of McLennan ordered a road built from Waco to Springfield, and a stage line carried mail and passengers to Springfield and back.

During its time as county seat of Limestone County from 1846 to 1873, a series of at least four courthouses served Springfield. The first, built in 1846, was a wooden stockade with poles across the top and a brush covering. In 1847 or 1848, a wooden building of riven boards four feet long with wood shingles and a durable floor was built. This building was 30 feet by 20 feet and is often considered the first courthouse of Limestone County. In 1856 a fine brick courthouse was built. When the courthouse was destroyed by fire on June 19, 1873, the



county government was set up in a store. The building also was destroyed by fire later that year, on October 24. The county seat then was moved to Groesbeck, although there may have been at least one more courthouse building during Springfield's reign as county seat.

In the 1860s, the Houston and Texas Central Railroad made a preliminary survey of the county and mapped a tentative route of tracks to pass through Springfield. When a railroad right-of-way agent arrived to purchase the necessary land, many of the property owners were so enthusiastic about the prospect of having a railroad passing through the town, they donated the necessary right-of-way. Several influential men, realizing there would be no profit for them, convinced the landowners their land was very valuable.

Letters went out to railroad officials saying they would have to pay for the land which previously had been donated. The railroad then offered to pay a fair and reasonable amount for the land, but by that time landowners were asking exorbitant prices. They believed the tracks had to go through Springfield and the railroad would pay what they asked. Exasperated by the people of Springfield, in 1870 the railroad laid tracks three miles east of town, bypassing the county seat completely. This was the beginning of the end of Springfield, and people began moving to the newer towns of Mexia and Groesbeck. During reconstruction after the Civil War, Springfield was the scene of murder, race riots, martial law and political upheaval. Fire leveled much of the town, including the courthouse twice in 1873. The county seat was moved

to Groesbeck and Springfield began to fade from the map. Most of the buildings that weren't burned were moved out board by board.

The only thing left to remind us of Springfield are historical markers, the spring which still flows and the old town cemetery. There are no buildings or ruins of the town left; only the cemetery remains as a part of Ft. Parker State Recreational Area. It is an interesting place to visit. Although there were probably earlier unmarked graves, the earliest known marked grave is that of Dr. N. Brookins. The inscription reads "born in Eastern New York, January 21, 1819, died in Texas by Mexican violence, slain October 1854 for gold." Logan A. Stroud, the first settler in the county after the fall of Parker's Fort, is buried here in a family plot with his family and manservant Burr. Sanders Walker, a veteran of the Texas War of Independence, and Joseph Penn Lynch, a captain who served at the San Jacinto campaign, are buried here along with veterans of other wars.

There are many other graves in the cemetery. Some are marked and many others are not. There are probably a number of lost graves that have had their markers destroyed over the years by vandals.

Springfield was founded in the wilderness and rapidly grew into one of the crossroads of early Texas. Even more rapid was its downfall at the hands of greedy men. Now all that stands to remind us of what once was is an old cemetery, a metal marker, the spring for the town was named and the wind blowing through the trees where once a town stood. **



Leroy Williamson

Cradle of Texas Liberty



Leroy Williamson

by Mary-Love Bigony

Texas history and outdoor recreation come together at Stephen F. Austin State Historical Park in Austin County, and in this Sesquicentennial year, it is appropriate to pay a visit to the site that has become known as the "Cradle of Texas Liberty."

When the colonists answering Stephen F. Austin's call began arriving in Texas in the 1820s, they settled on the wooded, low-lying areas near the Brazos and Colorado Rivers. The "Old Three Hundred," as these 297 people are known, were the first Anglos to arrive in Texas under a contract



Leroy Williamson



Leroy Williamson

between Austin and the Mexican government. Columbus and Washington-on-the-Brazos were the first sites settled.

In 1824, Austin established a township near the ferry crossing on the Brazos River along the Old Atascocita Trail between the United States and Mexico. San Felipe de Austin, as the township was called, was Stephen F. Austin's headquarters as well as the capital of the American colonies in Texas. Until 1836, San Felipe was the social, political and economical hub of Texas. This was the site of an 1832 convention at which the colonists adopted resolutions urging settlement of land titles, seeking the right to use the English language in public business, the privilege of organizing a militia and separation of Texas from the State of Coahuila. A second convention was held at San Felipe when Santa Anna became President of Mexico in 1833, and similar resolutions were adopted. The Consultation of 1835 in San Felipe led to the Texas Declaration of Independence at Washington-on-the-Brazos, now also a historical park.

Texas' first Anglo newspaper, the *Texas Gazette*, was founded in San Felipe in 1829. The *Telegraph and*

Register began publication in 1835 as the official organ of the Texas Revolution. The first book published in Texas also was printed at San Felipe. The Texas postal system originated there, as did the Texas Rangers, which began with the township's Committees of Public Safety for protection against Indians. In 1836, President Sam Houston ordered San Felipe burned to prevent its falling into the hands of the advancing Mexican army.

Today, San Felipe is a quiet little town in Southeast Texas, much smaller than the original townsite. In 1940, the San Felipe Town Council deeded part of the original 22,000-acre grant to the State of Texas for park use. The 664 acres of forested land adjacent to the Brazos River provide a place for modern-day Texans to relax in a setting similar to the area colonized by those early settlers. The park includes a separate historical area that commemorates events marking the beginning of modern Texas history.

The park's historical area consists of 12 acres dominated by a statue of Stephen F. Austin, the Father of Texas (left). Purchased with Texas Centennial funds, the statue was unveiled on



Leroy Williamson



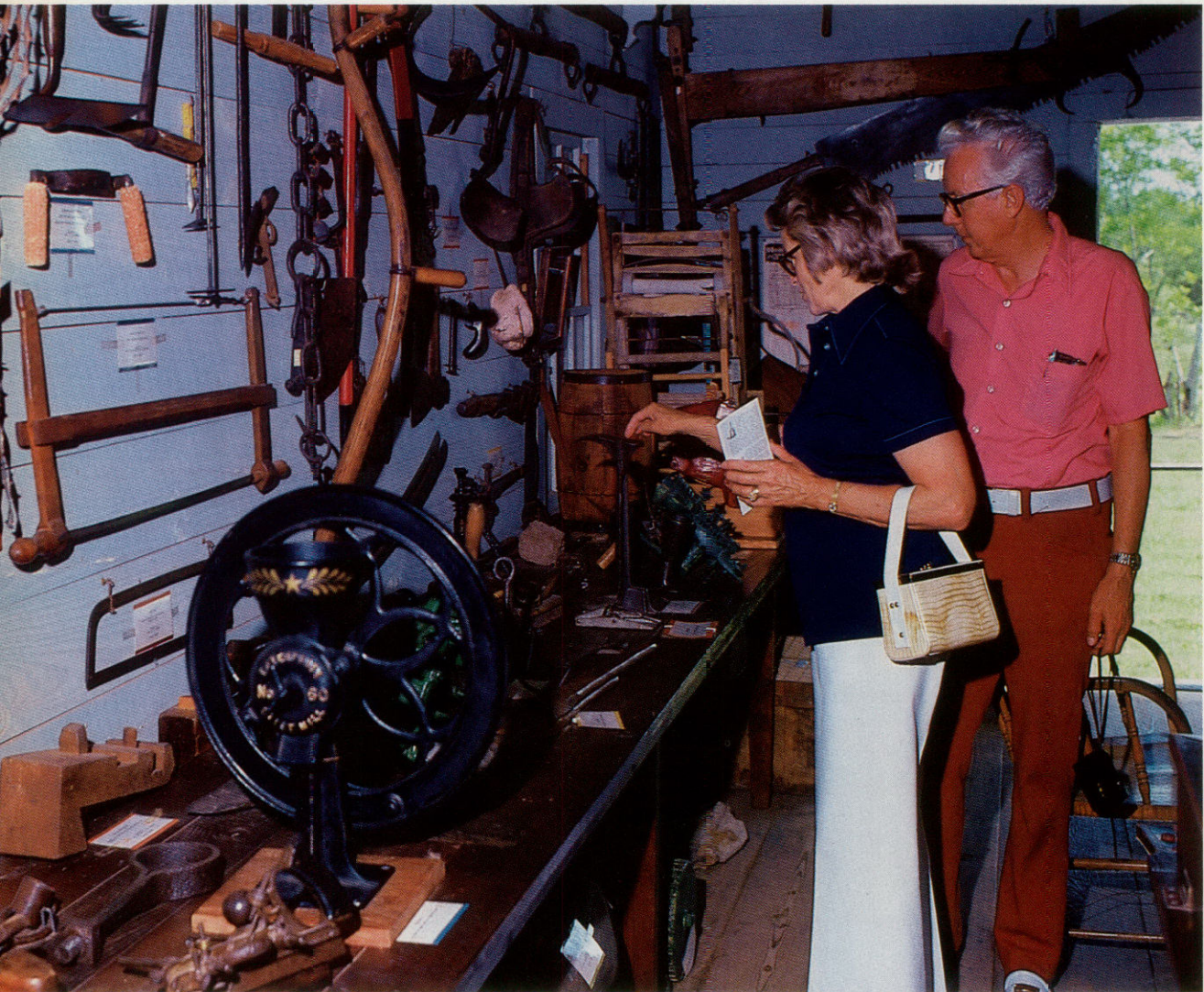
Leroy Williamson



Leroy Williamson



Leroy Williamson



Leroy Williamson

November 3, 1938. Elsewhere in the historical area are a public well dug with picks and shovels by the Austin colonists in 1824, a monument erected in 1928 by the school children of Austin County in honor of the Father of Texas and a marker at the site of the conventions of 1832 and 1833. Another monument serves as a memorial to John Bricker, the only Texan killed during a skirmish between Texans and Mexicans on April 7, 1836.

The Stephen F. Austin Park Association built a replica of Austin's two-room cabin, which he called the only home he had of his own. Austin used one of the rooms for sleeping and cooking and the other for an office. The J.J. Josey General Store, built in 1847 and restored in 1962, operates as a museum and houses relics of the area's history (pages 28 and 29).

Other historical landmarks are within the town of San Felipe, although they are not part of the park. The San Felipe Church on the site of Constitution Plaza houses the oldest Sunday school organization in Texas. The Lambert House is one of the oldest structures in San Felipe and reflects the influence of Old South and Louisiana architecture. Town Hall, erected after the Texas Revolution in 1836, was used as a public school in earlier days. These and several other landmarks are in the vicinity of the park and are noteworthy aspects of Texas' early history. More



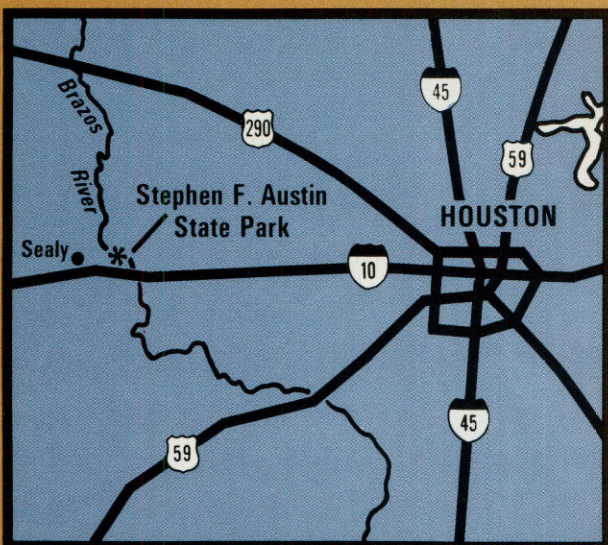
Leroy Williamson

information is available from the Stephen F. Austin Park Association in San Felipe.

Down the road from the historical area is the 652-acre recreational park. Just 48 miles west of Houston, the contrast between the wooded serenity of the park and the nearby sprawling city is dramatic. Large cottonwood, pecan, sycamore and elm trees—many of them decorated with hanging moss—

give the area a tranquil feeling and shade the picnic and camping areas. Deer, squirrels, raccoons, opossums and a variety of birds share the area with the human visitors, and in the fall and spring, huge flocks of migrating waterfowl pass overhead.

Near the entrance to the park is a replica of a dog trot cabin (page 27), popular throughout much of North America in the early part of the 19th



Stephen F. Austin State Historical Park

Location: Austin County, three miles east of Sealy on IH 10 to FM 1458, then north on FM 1458 for 2.5 miles to Park Road 38. West on Park Road 33 to park entrance. The historical area is on both sides of FM 1458 just north of its intersection with Park Road 38.

Facilities: Picnic sites, regular campsites, campsites with water and electricity, screened shelters, group dining hall, restrooms with showers, swimming pool, playgrounds, golf course, historical exhibits.

For reservations or information: Call 409-835-3613 or write Stephen F. Austin State Recreational Area, P.O. Box 125, San Felipe, 77473. Reservations are recommended for campsites, screened shelters and the group dining hall.



Leroy Williamson



Leroy Williamson

century. Dog trot cabins, with two rooms separated by a center breezeway, were part of this country's European heritage. The breezeways usually were oriented north and south to take advantage of prevailing breezes in the summer. One room served as a kitchen and the other as a bedroom, with extra bedrooms in a loft or attic. The cabins were built from materials available in the area. In this part of southeast Texas, settlers used red cedar, pine, cottonwood and oak. Chimneys were built with native stone or brick.

The park also features a large swimming pool (left), a real attraction for visitors during the summer. Two well-equipped playgrounds (right) and a basketball court also are available. An 18-hole golf course east of the park (right) attracts local citizens as well as park visitors. Check with the park about green fees and golf cart rentals.

Camping areas here are shaded and

relaxing. For campers without a tent or trailer, screened shelters (page 26) might be the answer. Electricity, water, tables and cooking grills are available at each. A large screened shelter with kitchen facilities is popular for family reunions and youth group outings. Check with the park for information about reserving the dining hall and the use fee.

Two hiking trails totaling 2½ miles head toward the Brazos River, which borders the park on its north and east sides. One trail takes hikers to an overlook on the river and the other goes to the river bank, where fishing is permitted. Tall cottonwoods and masses of large, tangled vines line the trails, and fallen leaves litter the ground. This is an excellent place to catch a glimpse of a deer or raccoon. If the ground near the river bank is muddy, try to figure out what animals made the tracks that can be seen there.

Because it's so close to Houston, Stephen F. Austin State Historical Park is crowded during the summer. But from now until Memorial Day and next fall and winter attendance at the park is relatively low, and the weather is pleasant most days. **



Glen Mills

Leroy Williamson



Outdoor Roundup

Best Lakes Picked For Popular Fish

One sure way to get a controversy started is to claim that old Lake Siwash is the best place to catch a lunker bass.

In the ever-changing world of fishing, yesterday's hotspot may be today's wallflower, and picking a "best" lake probably is more related to politics than science.

However, a number of people who should have first-hand knowledge of Texas reservoir fisheries recently were polled to find out where they would go to fish for nine popular species.

The respondents to this informal survey are Texas Parks and Wildlife Department field fishery biologists. Inland Fisheries Chief Ernest Simmons asked his staff for nominations from their regions. Here are the lakes they selected by species, in alphabetical order.

—Trophy largemouth bass: Calaveras, Fairfield, Fayette, Houston County, Fork, Monticello, Nacogdoches, Pinkston and Welsh. Add Braunig for the future.

—Most bass: Amistad, Fairfield, Fork, Nacogdoches and Travis.

—Striped bass: Amistad, Buchanan, Spence, Texoma, Toledo Bend and Whitney.

—Hybrid stripers: Braunig, Brownwood, Calaveras, Casa Blanca, Proctor, Pat Mayse, Ray Hubbard, Sam Rayburn and Somerville tail-race. Biologists said Cedar Creek, Palestine and Tawakoni also have been good.

—White bass: Buchanan, Cedar Creek, Falcon, Livingston, Sam Rayburn, Steinhagen, Spence, Tawakoni, Toledo Bend and Whitney.

—Channel catfish: Cedar Creek, Corpus Christi, Fairfield, Livingston, Monticello, Sam Rayburn, Tawakoni, Tradinghouse and Wright Patman.

—Blue catfish: Gibbons Creek, Livingston and Texana. (Texoma and Conroe for big blues).

—Flathead catfish: Buchanan, Corpus Christi, Kirby, Lake O' the Pines and Sam Rayburn

—Crappie: Cedar Creek, Graham, Granger, Houston, Lewisville, Limestone, Fork, Somerville (seasonal), Tawakoni and Toledo Bend.

—Sunfish: Athens, Boerne City, Hawkins, Fork, Quitman, Toledo Bend, Town (Austin) and Winnsboro.



Start Planning Now For Next Deer Season

The 1985-86 deer hunting season is over, but many hunters already are looking ahead to the next season.

For those planning vacations around hunting season opening, it is anticipated that the 1986-87 opener will be November 8. This is a result of the Parks and Wildlife Commission's decision to open the white-tailed deer season each year on the second Saturday in November. In prior years the season opened on the Saturday nearest November 15.

As in past years, the standard gun season will close on the first Sunday in January, meaning the 1986-87 season will end January 4, 1987.

Dates for the October deer archery season will be established by the commission this spring, as will dates for special early antlerless-only seasons in certain counties.

"Another thing hunters should start thinking about right away is where to hunt," said Horace Gore, white-tailed deer program leader. "The better lease areas are always booked up far in advance, so it's not too early to start shopping around."

There are several ways to find lease deals, including contacting Chambers of Commerce in cities where deer hunting is popular. "Also,

outdoor editors of many newspapers will publish lists of lease operators in early fall, especially those offering day hunts or weekend-type hunting packages," Gore said.

The department also offers hunts on wildlife management areas each fall on a drawing basis. Prospective hunters should contact the Parks and Wildlife Department's Austin headquarters beginning in August for application forms.

Project WILD

The six-hour Project WILD teacher workshops being conducted through the Texas Parks and Wildlife Department have been approved by the Texas Education Agency for advanced academic training credit. Teachers attending Project WILD workshops may apply six hours of credit toward the advanced academic training requirement of the career ladder, provided the workshop is approved in advance for the individual teacher by his or her school district.

Stephen F. Austin University in Nacogdoches and Texas A&M University in College Station will share the responsibilities of serving as the educational sponsors for Project WILD workshops statewide, and will issue the certificates for advanced academic credit.

State Parks Called Wintertime Recreation Bargain

Some of the best recreation bargains in Texas can be found in Texas' state parks during the winter and early spring.

Texas Parks and Wildlife Department officials say many outstanding facilities often overcrowded in summer may be vacant during cold-weather months. "Even the cabins which are booked solid during the summer often can be reserved on short notice during the winter," said Bill Scruggs, director of programs.

The cabins, are located in Bastrop, Possum Kingdom, Garner, Lake Brownwood, Daingerfield and Caddo Lake. Some of them were built by the Civilian Conservation Corps in the 1930s.

Other popular facilities include screened shelters, campsites, fishing piers, picnic areas and group facilities. The scenery and recreational opportunities available in state parks are as varied as the state's geography itself, and many are situated on streams or lakes.

To reserve overnight facilities, call the park you wish to visit. For a free brochure listing all the state parks and their facilities, call toll-free 1-800-792-1112.

Traveling Exhibit Highlights Work Of C.C.C.

The Civilian Conservation Corps, one of the main cogs in President Franklin Roosevelt's New Deal recovery plan in the 1930s, had a major and lasting effect on Texas' state park system.

The program put unemployed youths to work, and the fruits of their labor can be seen in 31 state parks where they constructed buildings, bridges, roads and variety of other facilities.

To commemorate this contribution, the Texas Parks and Wildlife Department will display a special exhibit at 23 sites during 1986-88.

The traveling exhibit opened at Governor Hogg Shrine State Historical Park in Wood County during January. The display will continue to Goose Island State Recreation Area in March, Palmetto State Park in April, Bastrop State Park in May and June, Cleburne State Recreation Area in July, Fort Parker State Recreation Area in August, Mother Neff State Park in September, Meridian (in a city facility) during September-October, and the Fort Worth Nature Center in November-December. For the exhibit's 1987-88 schedule, contact the department in Austin.

The CCC celebrated its 50th anniversary during 1985 with a national reunion. A national organization of alumni and many local

chapters have been organized for more than eight years.

Topics of the department's exhibit include the role of the CCC in development of state and national parks; CCC camp life; the influence of the CCC on its participants' later lives, and the legacy of cultural resources left by the CCC. It includes numerous old photographs.

State Park Annual Entrance/Use Fees Increase

Parks officials of the Texas Parks and Wildlife Department have announced that fees for annual entrance permits and certain user fees increased effective January 1, 1986.

The annual permit, which allows the purchaser entry to any state park in the system, was increased from \$15 to \$25; the restricted annual permit, which allows the holder an unlimited number of visits during a year to one park, was raised from \$8 to \$13.

Also increased were the annual group permit, from \$15 to \$25, and duplicate annual permit, \$2.50 to \$4.

The standard park entry fee of \$2 per vehicle and other facility use fees such as those for campsites and group facilities will remain unchanged. Holders of a Parklands Passport, available to persons 65 years of age and older and qualifying disabled veterans, are exempt from the entrance fee.



Second Nongame Print, Stamp Available This Month

The Texas Parks and Wildlife Department's Nongame Stamp and Print program will feature its second edition with artwork by noted wildlife artist John P. (Jack) Cowan.

Revenues from the stamps and prints will be dedicated to the department's nongame and endangered species programs.

Officials said the \$5 stamps are now available from department offices and some hunting license outlets. The prints, priced at \$125 for the regular edition and \$250 for the medallion editions, are available through art dealers or from Collectors Covey, 15 Highland Park Village, Dallas, Texas 75205, 214-521-7880.

The artwork depicts a pair of endangered Attwater's prairie chickens. The inaugural edition of the Nongame Stamp and Print featured a pair of whooping cranes.

Cowan's award-winning work has been featured in a number of national magazines and wildlife print programs, including the 1985 Texas Waterfowl Stamp and Print and 1985 Saltwater Fishing Stamp.

In addition to revenue from sales of the stamps, the department will receive \$37 for each print sold.

Officials said the nongame stamp and print program is patterned after the State Waterfowl Stamp and White-winged dove stamp, in that all revenues will be used for programs to

benefit the resource. Unlike the other stamps which are required in order to hunt waterfowl or whitewings, the nongame stamp is offered as a voluntary means to enjoy excellent artwork while enriching the department's nongame and endangered species programs.

Dwarf Sperm Whale Found On Beach

The body of a dwarf sperm whale washed ashore on the Matagorda Peninsula near Port O'Connor is being examined in efforts to find the cause of death.

Biologist Steve Marwitz of the Texas Parks and Wildlife Department said the whale, about 4½ feet long, was discovered by Don Williams of Port Lavaca on November 3. The whale died as rescue efforts started, Marwitz said.

Marwitz said while little is known of total populations of dwarf sperm whales, the appearance of one on a Texas beach is considered rare.

The whale was sent to Dr. Raymond J. Tarpley at Texas A&M University, who said initial examinations revealed no apparent cause of death.

Marwitz said all dolphins, porpoises and whales are protected by state and federal law. Persons observing stranded marine mammals, or interested in assisting with the Texas Marine Mammal Stranding Network, should contact Dr. Tarpley at the Department of Veterinary Anatomy, Texas A&M University, College Station, Texas 77843, 409-845-4344.



AQUIFERS

nature's underground storage tanks

Article and Photos by George Oxford Miller

Few of us realize to what extent the environment and climate that existed millions of years ago still influences our everyday lives. Ancient oceans that once covered Texas determine where we live, our livelihood and even our favorite forms of recreation. Over millions of years, thousands of feet of sediments settled to the ocean floor and gradually became compacted into rock. Certain strata of rock, now buried hundreds of feet below the surface, contain a mineral that has made Texas a rich state and an economic leader in the nation. That mineral, Texas' most valuable resource, is water.

An ample supply of water enables Texas to be a national leader in agriculture, industry and population. Texas is third in the nation in agricul-

tural production, yet only the eastern third of the state receives enough rain to sustain extensive farming. The most fertile farm land in the state must supplement rainfall with irrigation. Because of dependable ground water, cotton, grain sorghum, wheat and soybeans, which normally require 24 to 30 inches of rain annually, can be grown in areas receiving only 16 to 24 inches of rain. Texas grows one-fifth of the nation's cotton, one-fourth of the grain sorghum and significant amounts of wheat and other grains.

Texas ranks third in population in the nation. Large cities, extensive agriculture and industry all require massive amounts of water. Texas has 184 major reservoirs to supply this valuable resource, but surface water supplies only about 30 percent of the state's needs; the other 60 to 70 percent comes from ground water. More than 50 percent of the state is underlain by seven major and 16 minor aquifers.

An aquifer is a strata of porous rock beneath the surface that, like a sponge, is saturated with water. Rain water that does not flow into streams and rivers percolates through the ground and is stored in the porous rocks. Layers of limestone, sandstone, sand and gravel hold vast amounts of water across the state. Texas aquifers vary from less than a hundred feet deep to more than a thousand. The major springs in the state occur where faulting has uplifted a water-bearing strata and exposed it to the surface.

Indians and early pioneers recognized the necessity of a dependable water source and established the first

Windmills brought ranching to the arid West.





A large percentage of the water used for spray irrigation evaporates (above).

settlements near rivers and springs. Dr. Joel Shiner of Southern Methodist University has unearthed 12,000-year-old Clovis points at the headwaters of the San Marcos springs. The abundance of artifacts indicates that the springs could be one of the oldest continually occupied sites in North America.

The Spanish established San Antonio around the San Pedro and San Antonio Springs, and dug channels to supply water to their missions and irrigate their fields. The frontier Army forts that protected settlers from the Indians usually were located on springs. Fort Stockton, Big Spring, Bracketville, Uvalde, San Antonio, New Braunfels, San Marcos, Round Rock, Georgetown and Salado are some of the cities that owe their existence to spring water flowing from hidden aquifers.

Except for springs and shallow wells, the precious ground water remained out of reach until the invention of the self-regulating windmill. By the late 19th century, windmills had become the landmark of arid West Texas. Today, windmills still sing in the wind and suck precious water from beneath the surface for thirsty cattle, sheep and goats.

After World War II, irrigation pumps tapped the hidden ground waters, and the state blossomed with agriculture. While a windmill could keep a stock tank full, an irrigation pump could

Spring-fed Gorman Falls (left) plummets into the Colorado River near Lampasas.

flood a hundred acres. In the High Plains alone, farm acreage rose from 250,000 to six million acres irrigated by more than 70,000 pumps. The Panhandle became one of the most productive farming areas in the nation. The Winter Garden area southwest of San Antonio and the subtropical Rio Grande Valley also depend on ground water for irrigation. The water stored in the earth is like money in a bank vault, but the account is being overdrawn. Every year Texas draws twice as much water from aquifers than is replenished by rain.

During the 1970s, the State Department of Water Resources monitored the water levels in the major aquifers, and in 1980 prepared 10-year maps showing changes in the depth of the ground water. Every aquifer showed a decline. Artesian wells, which are under pressure and flow naturally, typically dropped 10 feet per year. The water table, the depth a well must be drilled to penetrate saturated rock, dropped four feet per year. The flow of major springs decreased significantly, and many are expected to suffer the fate of Comanche Springs at Fort Stockton, which dried up 30 years ago.

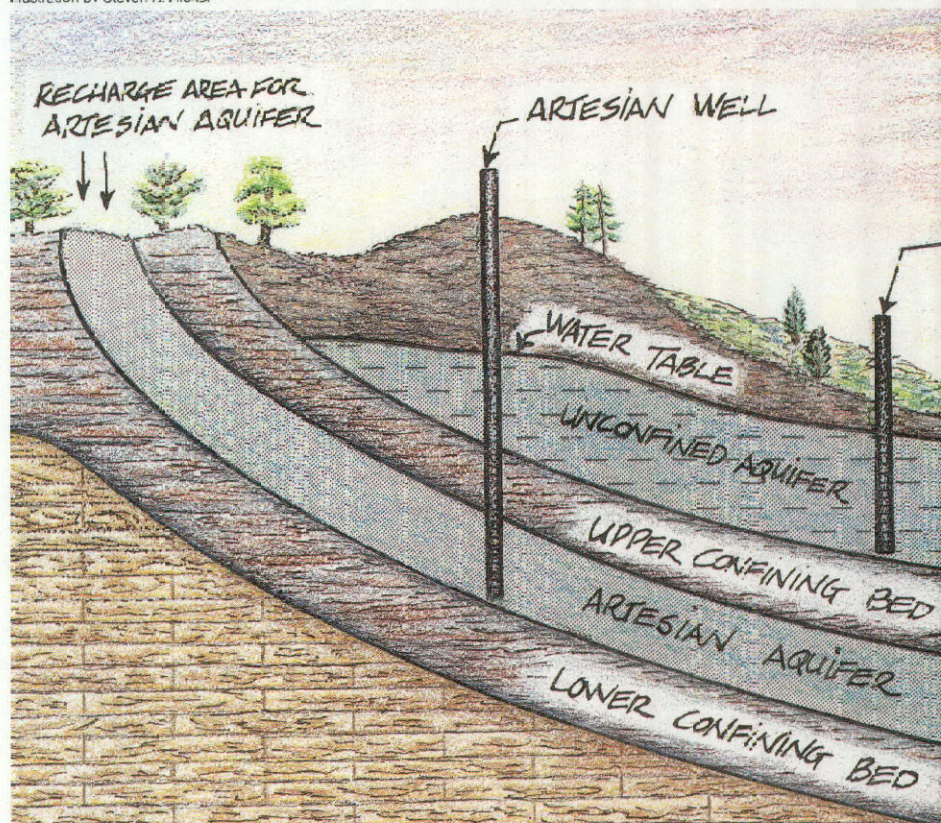
As the water table recedes, the amount of particulate matter in the water increases until it is not an economical source for drinking water. The City of Round Rock north of Austin recently was forced to switch from Edwards Aquifer ground water to surface water from lakes. The water table in the Carrizo-Wilcox Aquifer southwest of San Antonio has dropped 400 feet in the last 50 years. Deeper wells cost more to drill and maintain, primary considerations for cost-conscious farmers who depend on irrigation.

Farmers in the High Plains draw water from the Ogallala Aquifer, the largest in the world by volume, which extends north through eight states into South Dakota. High Plains agriculture uses two-thirds of the state's ground water. Rain naturally recharges many of the state's aquifers, but not the Ogallala. Its fossil water was stored millions of years ago when climatic conditions were vastly different. Recharge today is insignificant. At the present rate of consumption, half of the available water will be used within

More than 40 springs flow into the creek at Krause Springs in Spicewood (above).



Illustration by Steven A. Nickel





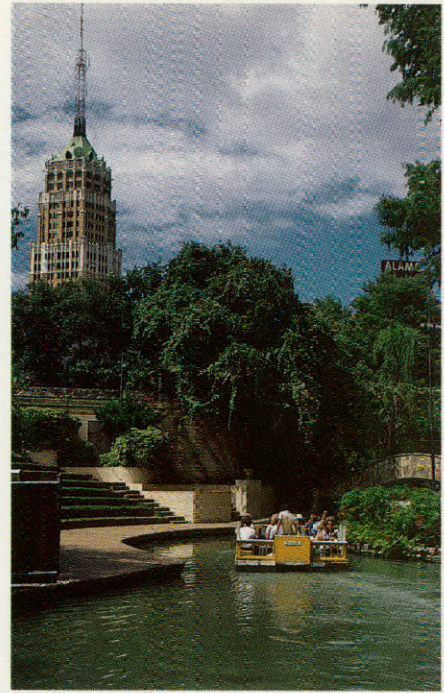
50 years, decreasing the irrigable farmland by half.

Unlike arid West Texas, the rainfall in Central and East Texas can recharge the aquifers, if they are not depleted by pumping. The Gulf Coast Aquifer, the second largest in the state, parallels the crescent shaped coast and supplies water to coastal municipalities, industry and agriculture. Overpumping of the aquifer near large cities creates serious problems. So much water has been pumped around Houston that the ground has subsided as much as eight feet in areas. San Jacinto Monument has sunk 12 inches, and about 150 acres of the state park have been inundated. The waves of Galveston Bay now lap at the doors of one subdivision in Baytown.

If the water level is lowered too much in the Gulf Coast Aquifer, intrusion of pollutants and salt water and compaction of the porous strata can ruin the aquifer forever. The Harris-Galveston Counties Subsidence District now regulates ground water use and limits pumpage in areas of serious depletion.

The fractured limestone in the Hill Country of Central Texas makes the Edwards Aquifer one of the most rapidly recharging aquifers in the state. Until 1980, recharge exceeded discharge. The rapid growth of both San Antonio, which uses well water, and the Austin-San Antonio growth corridor increased use beyond what naturally flows into the aquifer. The base flow for creeks and rivers in the Guadalupe River basin comes from springs fed by the aquifer. Comal Springs in New Braunfels and San Marcos Springs show significant decreases in flow as demand for ground water increases. According to the Edwards Aquifer Research and Data Center, the continuing depletion of water stored in the aquifer will cause these springs, the largest in Texas, to become intermittent and cease altogether by 2020.

Pollution poses a serious threat to the Edwards Aquifer. The limestone is so porous that surface water percolates rapidly into the aquifer without being filtered by the soil. Development over the recharge zone can result in urban pollutants, sewage discharge and industrial waste penetrating the aquifer. During extremely dry years when spring flow is too little to dilute the pollutants, swimming is unsafe in the



San Antonio's River Walk (above) parallels the spring-fed San Antonio River.

large spring-fed swimming pools in New Braunfels and Austin and in the San Marcos River.

The Texas Water Commission predicts that within the next 20 to 30 years Houston, Dallas, Fort Worth, El Paso, Corpus Christi and San Antonio will face critical water shortages. Lack of water will limit growth throughout major areas of the state. But the crunch is already here. During the summer of 1984, 70 cities in the state enforced mandatory water rationing.

The state government has turned its full attention to insuring that we greet the new century with ample supplies of water to meet our needs. A state-wide water plan, funds for water development and improved water quality, revision of water rights laws and creation of local water districts all address the problem of present and future water shortages. Conservation by cities, farmers, industry and in homes plays an integral part of any water management plan.

Water has been a determining factor in forming this state and continues to influence its people, its economy and its future. The real challenge as Texas enters its sesquicentennial year is to change the pattern of overconsumption of this most valuable resource. Can we enter the new century living in balance with our water supply and insure a prosperous future? **



Aquifers lie beneath the ground and are saturated with water, like a sponge. Rain water that does not flow into streams and rivers percolates through the ground and is stored in porous rocks.

Unconfined aquifers yield water by drainage near wells, lowering the water level and causing the water to flow freely toward the well. Confined or artesian aquifers lie beneath an impermeable layer, and yield water by compression of the aquifer, expansion of the water, drainage of adjacent unconfined zones and leakage through confining layers. A region supplying water is known as a recharge zone.

Compare a largemouth bass caught from a Texas farm pond and one from a river in Florida and the two fish will look virtually identical. In fact, even professional fishery biologists cannot reliably identify a bass' origin by its exterior appearance.

This similarity once led scientists to believe largemouths were the same fish regardless of where they came from. Trophy-sized bass from Florida got that way because of warm waters and plenty of year-round food, they thought.

This theory developed a crack in 1949 when ichthyologists discovered that largemouths from Florida were a separate strain from the northern largemouth found in Texas and most of the continental United States. Proof of this claim appeared dramatically during

BASS FOR THE FUTURE

by Jim Cox

the 1950s, when bass from Florida were stocked in California lakes where no bass had existed before.

These imported fish stunned the fishing world by growing past the 15-pound mark with some regularity. The current eight-pound line class record largemouth documented by the International Game Fish Association is a 21-pound, three-ounce bass caught from a California lake in 1980. The all-tackle world record largemouth bass, caught in 1932, weighed 22 pounds, four ounces. It came from a lake in Georgia, but bass in that region subsequently were found to be dominated by the "Florida" strain.

By the 1970s, Florida-strain bass were being stocked in many reservoirs in the southern U.S. Although they are less tolerant of low temperatures than northern bass, the Florida fish proved superior to the northern strain in al-

most all other categories. Both the "pure" Florida bass and the northern/Florida hybrid grow faster and generally attain larger maximum sizes than the northern, and they are better than northern bass in several, more subtle ways, including the efficient use of shallow water habitat and sunfish-dominated forage situations.

In Texas, introductions of the Florida strain has been almost as dramatic as the California experience. The state record has ballooned to 15 pounds, eight ounces, and the list of the 20 largest bass includes only fish 13 pounds or heavier. Many of these large bass were "intergrades," or hybrid crosses between Florida and northern fish.

After more than a decade of successful Florida bass stockings, it might have appeared that little else could be done to genetically improve bass stocks in Texas waters. But in 1985, the department was able to obtain some fish which may ultimately turn a new page in bass genetics studies—the Cuba largemouth.

It should be noted at the outset that no largemouth bass fishery in Texas or elsewhere will ever reach its potential if overharvested. Stocking programs and genetic manipulations will prove useless if most of the fish are removed before solid populations of mature bass are able to develop in a reservoir. Specialized length and bag limits on certain reservoirs are being used to prevent this problem, and more will be utilized as fishing pressure unavoidably grows. "Bass management in Texas has two main thrusts," points out Bill Rutledge, the department's hatcheries chief. "Improvement of hatchery stocks is one, and harvest control is the other."

More will be said about limits later, and the philosophy behind special limits can be reviewed in the May 1985 *Parks & Wildlife* magazine.

The appearance of Cuba-born bass in Texas was the result of an unusual series of events. Due to obvious political situations, bass fishing in Cuba has been only partially and sporadically open to this country's fishermen, and until 1985 no live bass from Cuba had ever been exported for study.

One of the relatively few American anglers who have fished Cuba's famous bass lakes is Joe Bob Wells, a Levelland farmer. Wells was able to untangle





Bill Reaves



Glen Mills



Glen Mills

Producing largemouth bass fingerlings for stocking in the state's reservoirs requires a blend of technology and personal care. Hatchery rearing ponds must be conditioned with fertilizers (left) and inoculated with zooplankton to provide food for the bass fry. A brood bass (right) is removed from a tank trailer for release into a pond with other brooders in preparation for spawning. During 1985, the hatcheries produced 2.1 million fingerlings.

bureaucratic backlashes to the point that permission was given by the Cuban government for Wells and Dan Snow of Houston to catch some bass from Lake Hanabanilla and bring them back to Texas.

The first four fish were flown to Houston via Mexico City in February 1985. They were taken to the Tyler Fish Hatchery. A second group of six fish arrived in Dallas two weeks later, and they also were transported to Tyler.

The fish were so aggressive they had to be isolated in separate tanks to prevent possible injury. Dr. Bill Harvey, hatchery and genetics program leader, said the fishes' aggressive behavior was the type seen in other bass when individuals are confined in a small area. "However, it seems these fish were even more aggressive than one would expect," said Harvey.

After a few weeks in tanks, and after spring weather moderated, the fish were paired off and placed in hatchery ponds. They spawned, producing about 20,000 fingerlings, according to Harvey. "A portion of the fish are being used in genetics investigations," Harvey said. "We will allow the remainder to

stay in the ponds, so we can watch their growth rate and other characteristics."

Early returns from the temperature tolerance tests are good news, Harvey said, as the fish may be even more tolerant to cold water than the Florida strain. Several Cuba bass at the department's Heart O' the Hills Fishery Research Station at Ingram survived in chilled tanks for several days. The temperature was just above 32 degrees Fahrenheit. Biologist Bob Howells said a group of Florida bass tested alongside the Cuba fish suffered high mortality. "We don't have all the data completed yet, but overall this tells me that Cuba bass could survive in any Texas reservoir that has any depth to it at all," said Howells.

Just how do the Cuba fish differ from Florida-strain bass? "The first fish we tested exhibited some unique genetic characteristics," Harvey said. "Others we examined later appeared to vary less from the Florida strain."

Wells said information he gained in Cuba indicates the first largemouth bass in that country were brought from Florida by employees of the famous King Ranch in South Texas during the 1920s. If this is true, Harvey theorizes

that the isolated populations of Florida-strain bass had ample time—more than 60 years—to develop as a separate strain or subspecies. Harvey believes that if the department had a mechanism to examine the Cuba bass' entire genetic makeup, the fish would prove to be unique. "So far we simply have not had enough fish or enough time to make a definitive judgment," he said.

This may be possible in the future, since the department has reached an agreement with the Cuban Academy of Sciences to obtain 30 additional bass. Again, Joe Bob Wells is expected to play a key role.

Wells, an avid bass fisherman, said his personal efforts in the Cuba bass saga simply spring from a desire to help the sport's future in Texas. "I was fortunate enough when I was a kid to have good places to go fishing," said Wells. "I was just afraid that my grandkids might not have good bass fishing if we don't do something to preserve it now."

While enthusiastic about the prospect of Cuba bass improving the future of bass fishing in public waters, Wells stresses that only through conserva-



Glen Mills



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During spawning and when the fry are in their critical early stages of growth, workers make daily checks of zooplankton (left) and water quality to assure that the fry have optimum conditions for growing to the 1½ inch length needed for stocking. When the fingerlings are ready, ponds are drained (right) and the fingerlings are collected.

tion, i.e., stricter limits, will good fisheries be maintained in the future. "I enjoy eating fish and I have no objection to keeping bass for the table occasionally, but I think Texas fishermen are going to have to accept the fact that they'll have to throw some bass back in the lake to have consistently good fishing," he said.

Wells downplays the difficulties he encountered transporting live bass from Cuba to Texas, saying he received almost universal support from Cubans. "We had to make a long bus trip from Hanabanilla to Havana with the fish, and when we arrived I discovered our source of oxygen was gone," Wells said, explaining that the bass spend the entire trip in plastic bags filled with water and inflated with oxygen. "I figured I had to do something fast, so I went to a hospital emergency room and talked the doctors into letting me have some oxygen."

The visit created quite a stir, he said. "I'll bet just about everyone in Havana knew about those fish by the next week," he laughed.

Oxygen supplies weren't the only hazard to fish transporting. Wells said a Cuban customs agent lifted a bag of

fish out of the ice chest used to ship them. The bag broke and a wild scene of fish flopping about on the slick airport floor ensued. Unfortunately, the fish could not be saved.

A more serious incident threatened more than just fish as on a flight from Havana to Cancun. "We were just a few minutes out of Havana when we heard an explosion," Wells said. "Then the plane's engines appeared to shut off and we went into a vertical dive straight toward the sea."

After plummeting thousands of feet, the pilot restarted the engines and pulled the craft from its dive. The explosion was caused by a tire exploding inside the landing gear housing, Wells explained. The plane turned back to Havana, laboring against wing flaps which somehow were stuck in the down position after the explosion.

Miraculously, the landing gear were still operable and the landing was smooth. "I really didn't want to ever get on another airplane," Wells said, "but we had no choice but to get on another one that same day to get back."

The department has secured enough Cuba fish for experimentation, but hatchery chief Rutledge warns that it

may be two to three years before the Cuba strain enters the state's public waters. "We are going to take a conservative tack in our investigations," Rutledge noted. "When the time comes, though, we will be certain that the fish will have no negative effects on any other fish."

Rutledge said one of the first steps will be creating a hybrid cross between the Cuba fish and a strain of northern bass from a small private lake near Mexico. "These native fish have two features that should make them ideal," said Rutledge. "They have a genetic makeup different from all other native bass we have tested, which means we will be able to identify the hybrids by genetic marking, even years after releases. The other oddity about the fish is that they have an unusually good potential for large sizes."

Rutledge points out that regardless of which genetic combination proves best, the department will continue to place heavy emphasis on improvement of black bass fishing in Texas. "We found out a long time ago that stocking more native bass into a lake which already has an established population is a waste of time and money," he

noted. "However, we also have seen that introducing the Florida gene can improve fishing. This is most dramatic in new reservoirs, but it also has benefited older ones that already have native bass."

The hatchery branch hopes to produce as many hybrid bass as possible for stocking in selected lakes, since these fish have the fast growth rates and hybrid vigor that can revive a fishery in a short time.

In the long term, breakthroughs in the field of genetics may open the door to even more dramatic changes. Cloning and production of sterile fish are concepts which if successful may make possible the stocking of large numbers of fast-growing individuals. Fish produced from eggs rendered sterile would utilize the energy normally expended in production of sexual products, re-routing it into body growth. "These genetic manipulations sound fairly radical, but they have been used in other fields, especially agriculture, for many years," Rutledge said.

Until some of these new concepts are developed, largemouth bass will remain one of the most expensive fish

to produce in hatcheries. "Bass require a great deal of pond space, and brood fish have to be maintained year around along with the forage fish on which they live," Rutledge continued. "Then every couple of years we have to replace the brood fish to keep production high."

Producing bass in the hatchery is technically more difficult than one might expect. Dr. Jaime Geiger, assistant chief/hatcheries, said an exacting regimen of pond preparation is necessary to assure that bass fry have nourishment. "We have been able to make great strides in bass culture because of this intensive monitoring of water quality and food production," said Geiger.

The actual spawning procedure involves placing pairs of brood fish in outdoor ponds during early March. The male bass fans out a shallow depression on the gravel bottom of the pond and then escorts the female to the nest. She deposits her eggs and the male fertilizes them. The male guards the nest until the fry hatch in 10 to 14 days. The fry, which are sustained by their yolk sacs after being hatched,

start feeding on micro-organisms after three to five days. When the fry reach one-half inch, the ponds are drained and the fry moved to pre-fertilized rearing ponds. About 21 days later, the fish have grown to stocking size of approximately 1¼ inches, according to Bill Bowling, hatchery biologist at the Jasper Fish Hatchery.

During 1985, the hatchery system produced 2.1 million fingerlings, of which 850,000 were Florida/northern hybrids. The remainder were bass with origins in Cuba, Florida and California. The Cuba fish obtained during 1985 will be subjected to extensive research before any decision is made on stocking them in public waters.


Thus the production of bass for stocking has become more sophisticated, just as modern bass fishermen have become more sophisticated and efficient during the past decade or two. Providing a continuing supply of good bass fishing will require bold steps in both the research and development phase, to produce the best possible fish, and in the field of special length and bag limits, to prevent overharvest. * *



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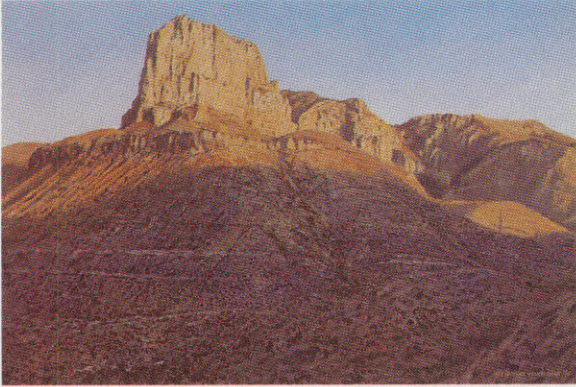
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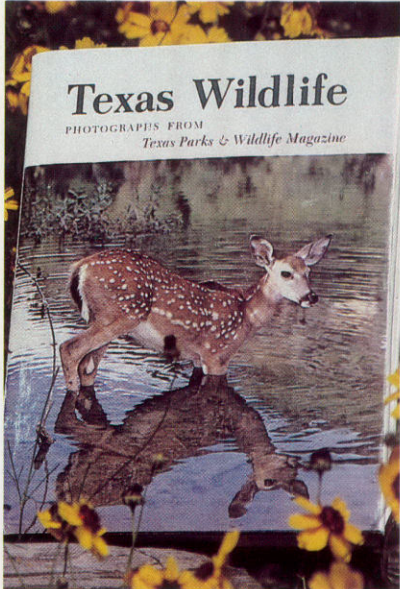


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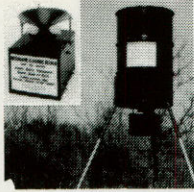
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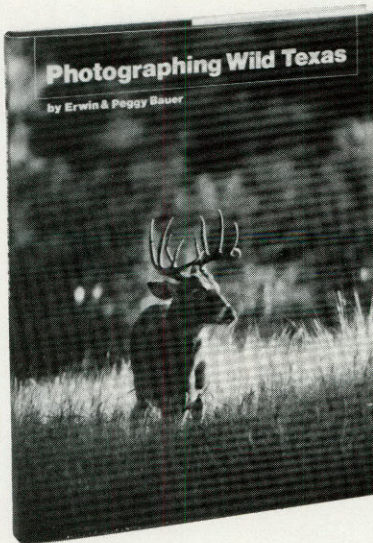
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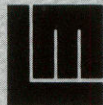
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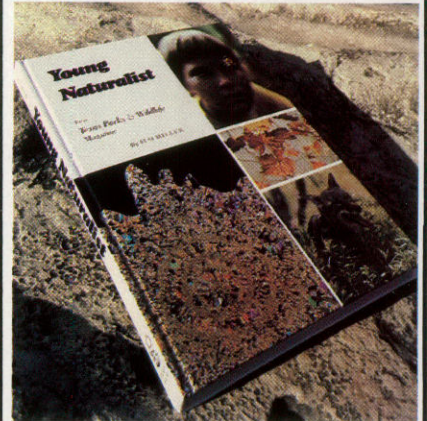


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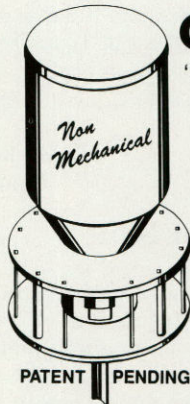
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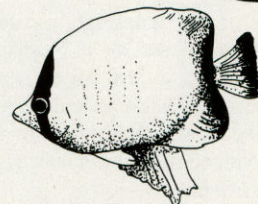
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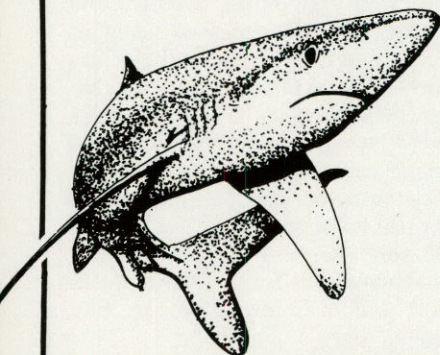
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Letters

Nothing But Praise

Please accept my sincere congratulations on publishing a really enjoyable, informative magazine. The photography is splendid. The text is readable—down to earth but done in a professional manner.

I have been fortunate enough to camp in several of your state parks and can offer nothing but praise. A visit to Caprock Canyons State Park is an especially warm and vivid memory—spectacular scenery, outstanding facilities and a staff of remarkably competent, knowledgeable, friendly folks.

Tom Dewberry
Lakeland, Florida

Arkansas Roadrunners

Of particular interest in the September issue was the article on the roadrunner. I noted the reference about the range of this bird. In the past, at least, the roadrunner has been found in northern Arkansas. It may not be a permanent resident at all times, but I have read reports of this bird across the northern tier of counties in Arkansas.

Four or five years ago, a rural mail carrier reported seeing a roadrunner on a country road a few miles northwest of Corning. About the same time, I definitely witnessed one striding down a gravel, brush-fringed road about seven miles south-east of Corning.

Bryan J. McCallen
Corning, Arkansas

■ Although the roadrunner has become a symbol of southwestern deserts, it is not restricted to such areas. It requires bare ground with scattered trees and bushes where it can walk about freely. As stated in the article, the roadrunner's large range extends from central California to central Mexico and east into Arkansas and Louisiana.

Prairie Ringneck

In the November issue, you identified a "pretty little snake" for Mr. Chapman as being a regal ringneck, *Diadophis punctatus regalis*. I believe this is in error. According to the Peterson Field Guide Series book, "A Field Guide to Reptiles and Amphibians," the regal ringneck does not usually have a ring on the neck. Also, the known range falls just south of Lubbock and well to the west. I believe the correct

identification would be a prairie ringneck, *D. punctatus arnyi*. The range and description fit better.

I remember seeing one of these snakes in the biology department of Texas Tech while I was a student there back in the 1950s. As Mr. Chapman said, it is a "pretty little snake."

J.D. Meekma
Lamesa

October Issue

In my judgment, your October issue is one of the best you've produced.

Ilo Hiller's feature on monarch butterflies was timely because the creatures were drifting through at that time of year. If she omitted a single known fact I did not discover it, and it was well-written in the Hiller style.

David Baxter's "Colors of Fall" also was outstanding. The purple thistle on page 26 is a superb picture; however I have always identified it as an eryngo, *Eryngium leavenworthii*, a carrot rather than a thistle.

Mary-Love Bigony had an appropriate item—"Posted." I would like to share a considerate practice of a rockhound friend of mine, John Taylor of Denison. He always gets permission to enter, and he also carries a number of fence staples in his pocket. Rather than carelessly climbing fences and tearing them down, if he finds a staple out of a fence he always replaces it from his pocket supply. Landowners praise him for his thoughtfulness.

Paul O. Cardwell
Bonham

Lamar Peninsula History

Thank you for the article on Goose Island State Park in the December issue, as well as past articles about the Lamar Peninsula, Matagorda Island and the Rockport area.

The part about Sam Colt in the Goose Island article was correct, but the land bought was one-fourth interest in 14,000 acres including Lamar and Goose Island, with the exception of certain townsite properties and Captain Byrne's saltworks on St. Charles Bay.

One of the exceptions was Lamar townsite Outlot #8, which was bought by Archibald Mirae (my great-great-grandfather), the second settler of Lamar from James Byrne in 1839 or 1849.

I still own a part of Outlot #8.

McRae W. Hill
Austin

Freeze-dry Techniques

Having read "From the Water to the Wall" in the November issue, I would like to make a few comments on the freeze-dry process.

First of all, it is true that extreme cold is used in the process. However, it is vacuum pressure (extracting the air from the chamber where the specimens are located) which actually extracts the moisture.

Here in Duluth, Minnesota, roughly half the fish we handle are trout and salmon species, which are oilier than any large-mouth bass. We use freeze-drying exclusively on all our fish. After the meat and tissue are removed from the skin, a body is carved out of polyurethane foam. The skin of the fish is put through three chemical baths to preserve and protect it. The skin is then mounted on the body and the fins are positioned as desired.

At this point the fish is placed into a chest freezer and frozen into the desired position. After about two days it is placed in the freeze-dry machine. The fish is weighed once a week to document moisture loss, and when it has weighed the same for two weeks all moisture is gone and all oils are stabilized.

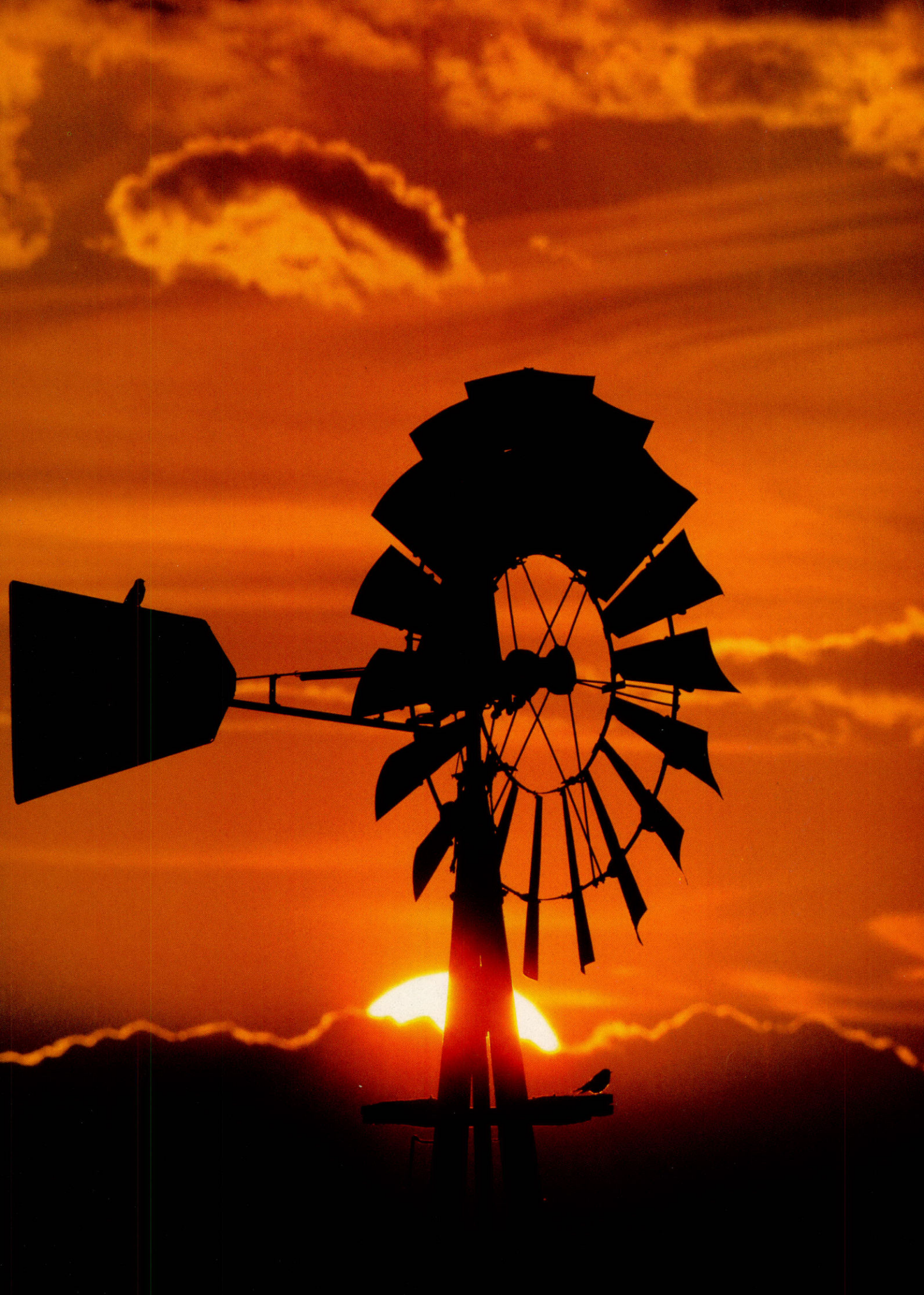
It is true that the initial cost of a freeze-dry machine is high, but why should the customers worry about the costs if we can turn out the best mounts available at a competitive price?

Randy Bowe
Duluth, Minnesota

BACK COVERS

Inside: Windmills have become the symbol of arid West Texas, bringing water out of the ground for that region's livestock industry. An ample supply of water has made Texas a leader in agriculture, industry and population, but surface water supplies only about 30 percent of the state's needs. The rest must come from underground aquifers, but every year Texas draws twice as much water from aquifers than is replenished by rain. (See story on page 34.) Photo by Wyman P. Meinzer.

Outside: Winter maintains its chilly hold on Central Texas as dawn breaks over Onion Creek. Photo by Paul Montgomery.





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111

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