TEXAS PARKS & WILDLIFE

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TEXAS PARKS & WILDLIFE

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Covers

Front and Back: Dolan Creek in Val Verde County is one of 3,700 rivers and streams in Texas that provide 80,000 miles of diverse aquatic habitat. The Texas Parks and Wildlife Department's 20,000-acre Devil's River State Natural Area has one mile of Dolan Creek frontage on the park's eastern boundary. Preserving lands and streams such as Devil's River and Dolan Creek is the goal of the Texas Natural Heritage Program. Learn more about such efforts beginning on page 2. Photo by Bob Parvin. **Inside Front:** From early February to late June, herons go about the business of ensuring the survival of their kind. See story on page 32. Photo by Tom Rasor.

Vanishing TEXAS

Despite all the losses, Texas still has a natural heritage of nationally significant proportions.

Imagine you're on foot. It's a hot summer day and you're walking upstream along a river beneath the cool shade of a floodplain forest of ancient pecan, live oak, elm and sugarberry trees. A narrow strip of towering baldcypress lines the banks of the river. As you walk, each step falls on a soft, springy mat of roots, and your footsteps are silent. The only sound is that of the pure water tumbling through riffles, and it enhances your feeling of coolness and security.

You see a far off wisp of dust on the horizon and you're curious. You head away from the river, toward the crest of the floodplain to get a better look. As you top the hill you witness a familiar sight, yet one of singular majesty. Stretching before you are swell upon swell of grassy hills rolling toward the horizon. The wind playing on the grasses gives the dizzying illusion of a moving, living landscape. You spot the source of the dust that piqued your curiosity—a herd of bison has been spooked, perhaps by their ever-present adversaries, the plains wolf.

The pristine forests, vast prairies, bison, wolves, plains Indians and plentiful, pure water of this vision have vanished from Texas. Their fate is already certain, but not ours. We have the right to choose our own destiny as well as the destiny of our natural landscapes and the plants and animals that reside there.

As devastating as European settlement has been on natural Texas, some impressive enclaves of nature remain. You can still witness scenes where the landscape seems to consist of nothing but earth and sky—images that provoke feelings of immensity, emptiness and solitude. There is still something special about drifting across mile after mile of Laguna Madre grass flats on a fresh summer morning, or camping beneath the star-crowded and crystal-clear skies of the Big Bend. There are a few places where nature seems to swallow an individual in her immense scale and, for a moment, you can savor a taste of pristine Texas.

Grady Allen

The Attwater's greater prairie chicken, once abundant, now is an endangered species. Its plight is symbolic of other denizens of the prairie that have vanished. Texas still has some impressive enclaves of nature, such as Guadalupe Mountains National Park (left).

HERITAGE LOST

For more than 200 years, we have made strenuous efforts to tame our natural surroundings. In that time we have plowed under almost all of the 12.4 million acres of the Blackland Prairie; less than 100,000 acres, or one percent remains. Likewise, less than one percent of the land area of the Rio Grande delta has escaped the plow. Ironically, that surviving one percent is one of the primary attractions for tourists who pour thousands of dollars into the economy of the Rio Grande Valley each year.

The area of coastal es-

by Larry D. McKinney and David D. Diamond

tuarine habitat, which is essential to 30.5 million wintering waterfowl and to more than 90 percent of our commercially and recreationally important fish, totaled 940,000 acres in 1956. By 1980, only a little more than 600,000 acres remained. This represents a 35 percent loss in 21 years. Subsidence, dredging of navigation canals, filling of wetlands for urban development and erosion have all contributed to this loss.

Playas, or shallow, ephemeral lakes in the High Plains, serve as wintering areas for more than two million waterfowl. They cover about 296,000 acres, and one to three million acre-feet of water collect in them annually. About a third of playas have been modified by agriculture, including many of those covering 10 or more acres.

The rangelands within the Rolling Plains, Edwards Plateau and South Texas Plains, as well as the Trans-Pecos, have been almost universally overgrazed. As early as 1860, there were five million head of cattle on the South Texas Plains alone, as compared with 13 million head in all of Texas today. Although large areas were probably already overgrazed, the prevailing attitude among cattlemen at the time was that it was impossible to overstock the range. By 1885, the combined influence of overgrazing and drought was so severe that hundreds of thousands of cattle starved to death in Texas. One ranch near Fort Worth lost 15,000 of a 25,000 herd.

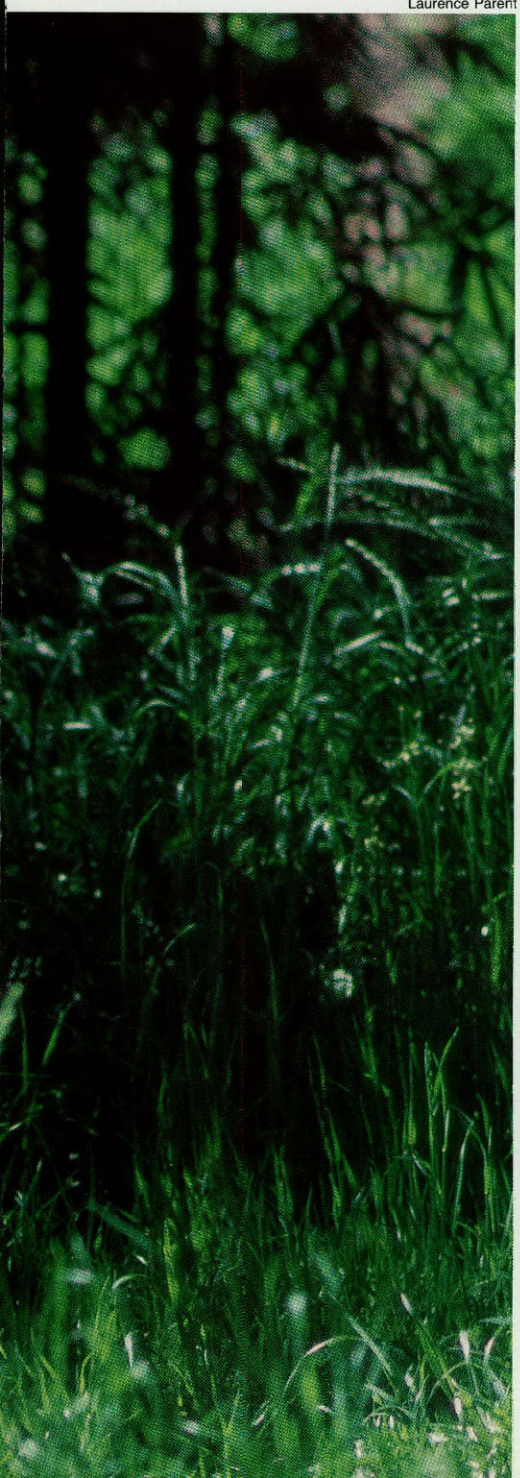
Today the most visible evidence of abusive grazing practices of the past is hundreds of thousands of acres of rangeland dominated by mesquite and juniper (cedar). Various mechanical and chemical range improvement

Glen Mills

Vanishing TEXAS

The Aplomado falcon (left) once inhabited the grasslands of the South Texas Plains and the southern Trans-Pecos. Fire suppression and brush invasion caused by overgrazing have eliminated wild populations from Texas.

Laurence Parent



practices have short term benefits for Texas ranchers, but in the long run they often exacerbate the brush problem. Thus, the damage done by overgrazing early in our state's history has left us with a brush problem that we have been unable to solve thus far.

Bottomland hardwood forests have been reduced from an original 16 million acres to six million acres. While six million acres may seem to be a substantial amount, it is important to note that this represents only three percent of the state's total land area and only seven percent of all woody vegetation.

The greatest losses have been due to reservoir construction and the harvesting of timber in East Texas. Only three percent of an estimated two million acres that remain there are in good condition by sivicultural standards. Proposed reservoir construction could reduce this remaining acreage by 17 percent. Additionally, reservoirs have impacts beyond those that are immediately visible because of the interruption of natural flooding, which can cause degradation of downstream bottomland communities.

All but a tiny fraction of the rich, moist, beech-magnolia forests of East Texas have been cut over; only one stand totaling less than 100 acres of virgin forest is known. Essentially, all of the diverse upland longleaf pine stands of southeast Texas have been cut over, and many have been converted to low-diversity slash or loblolly pine plantations.

Texas is also a state of rivers and streams—3,700 of them by one count

Jackie M. Poole

The last known wild population of the red wolf (left) was in the upper coastal prairie east of Houston. The species became extinct in the wild some 20 years ago. Red sage, salvia penstemonoides, *(above) went uncollected by botanists for 40 years but was rediscovered in 1987.*

—that provide 80,000 miles of diverse aquatic habitat. This far-reaching network binds our state from east to west, connecting all of our natural regions. With the exception of Caddo on the state's eastern border, pristine Texas had no significant natural lakes. Beaver dams, oxbows, resacas and playas provided some of this type habitat. But as the demand for flood protection and dependable water supply has grown, so has the construction of dams and reservoirs to meet those needs. Now every major river has one or more dams interrupting their flow. An additional 40 or more lakes may be necessary to meet future demands.

Reservoirs associated with these dams, such as Toledo Bend and Amistad, have greatly increased a once-limited habitat, but this increase has come at a price. As rivers have become more segmented because of dam construction, their flooding patterns and seasonal variation in flow have been altered, and in some cases reversed or even eliminated altogether. Consequently, their diversity has diminished. And because the scale of change is so large—spanning the state in many cases—we may not yet know the full consequences of our actions.

A cataloging of natural habitat losses due to cultivation, urbanization, overgrazing, water development and timber management practices is brought into focus by a chronicle of the inevitable loss in species diversity that has followed. The Carolina parakeet and ivory-billed woodpecker were common in the pristine forests of East Texas when Thomas Jefferson sent Peter Curtis on a survey of the Red River Valley in 1806, but they are now both extinct in North America.

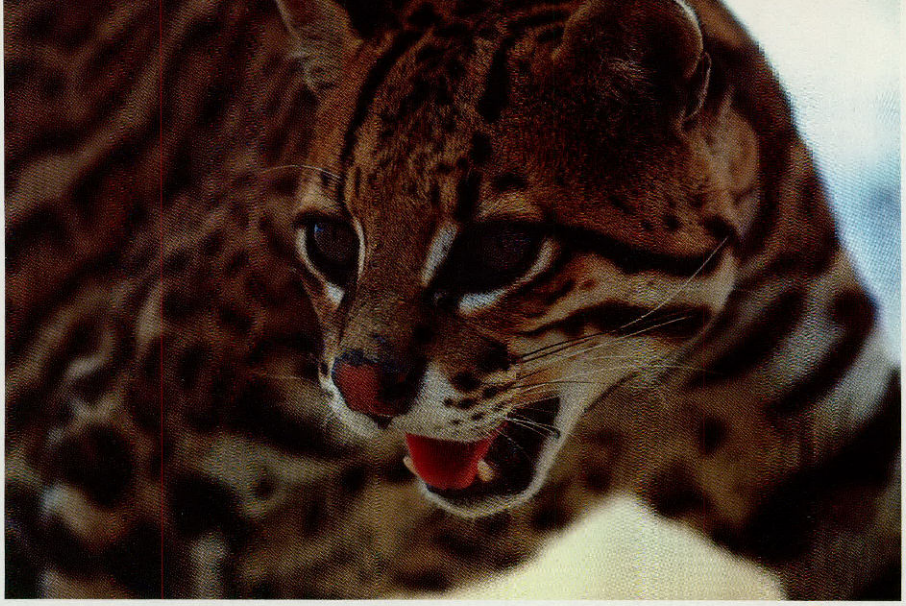
The jaguar has been eliminated from the South Texas Brush Country and a smaller spotted cat, the ocelot, is

Civilization exacts a high price, including loss of native habitats and biotic diversity. Clockwise from immediate right: barrier island grasslands are lost to urbanization; clean water for drinking and recreation becomes harder to find; subtropical woodlands of the Lower Rio Grande Valley are limited to isolated fragments within a sea of cropland; range improvement practices such as root-plowing exacerbate problems caused by overgrazing; less than one percent of the original tallgrass prairie has escaped the plow.

Bob Parvin

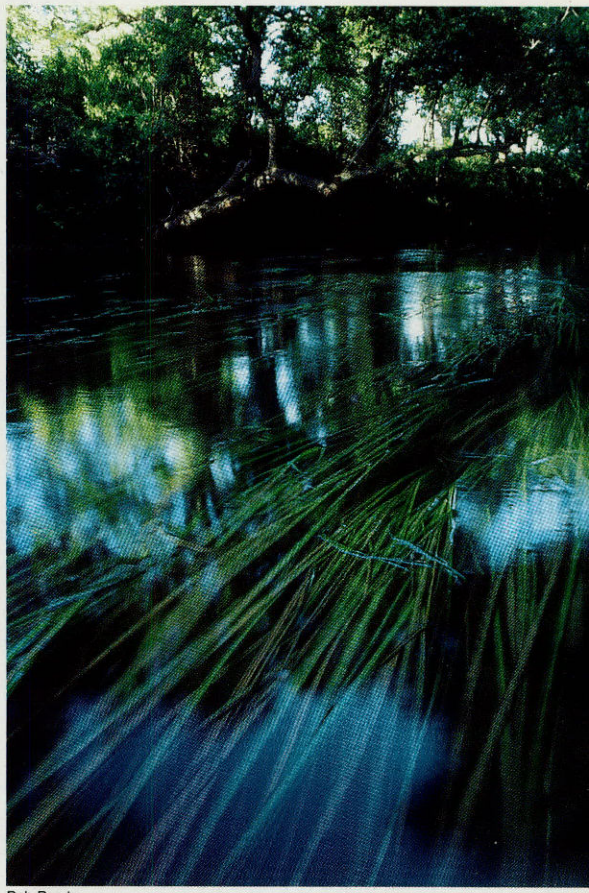
Jim Whitcomb

Bob Parvin



Vanishing TEXAS

It might be too late to save the ocelot (left). Its populations are low and its Rio Grande Valley habitat is fragmented. This Texas wild rice (below) is one of at least six rare species that live in the San Marcos River and the associated Edwards aquifer. Do we lack the will to save them?



Bob Parvin

Bob Parvin

Bob Parvin

limited to a population of an estimated 100 individuals in the Lower Rio Grande Valley. The red wolf, once common on the Coastal Prairie, now exists only in zoos and as a reintroduced population on a barrier island in North Carolina. Another Coastal Prairie inhabitant, the Attwater's greater prairie chicken, is holding on in scattered remnant populations. The black-footed ferret has been eliminated from the Panhandle, and now only a small, mostly captive population of fewer than 30 animals is thought to remain.

The list of vanished species could go on, but the list of species in danger of extinction is even more alarming.

The Texas Natural Heritage Program, within the Texas Parks and Wildlife Department's Resource Protection Division, tracks 50 species of animals and more than 250 species of plants with fewer than 20 known populations worldwide. The state list of threatened and endangered animals contains 126 species.

These lists include many species that once were common but have declined since European settlement. Examples, with associated reason for decline in parentheses, include the black-capped vireo (habitat loss due to grazing, browsing and fire suppression on the Edwards Plateau); the slender rush-pea (cultivation of the Lower Coastal Prairie); the Houston toad (urban development); the red-cockaded woodpecker (timber production activities in southeast Texas); and the Pecos River pupfish (hybridization with the introduced sheep's head minnow).

Extinction of species is sometimes a natural evolutionary process. But the construction of Amistad Dam, which caused the extinction of a small fish, the Amistad gambusia, could hardly be considered natural. Nor could the widespread destruction of grasslands by cultivation and overgrazing in West and South Texas, which caused the disappearance of the Aplomado falcon from the state. This type of wide-scale habitat destruction is uniquely caused by modern man, and is the primary

Laurence Parent

Laurence Parent

threat to most of our rare species.

HERITAGE SAVED?

Despite all of the losses, Texas still has a natural heritage of nationally significant proportions. But the future and conservation of this heritage remains uncertain. It is safe to say that our critical natural heritage has not been adequately preserved in any of the state's natural regions. Less than one percent of the total land area of nine of the 11 natural regions of Texas is contained within state or federal preserves (i.e. the State Park System, State Wildlife Management Areas, National Wildlife Refuges, National Parks), or private conservation areas. The exceptions are the Trans-Pecos region (five percent protected) and the Gulf Coast Prairies and Marshes region (2.7 percent protected).

We are left with the hard realization that our remaining natural heritage is limited in extent and not adequately conserved. Thus, it is reaching the limit in its ability to absorb abuse. We have almost no virgin Blackland Prairies left to plow and no pristine forests left to cut. Clean water can no longer be taken for granted anywhere in the state. More than a dozen animals that once were part of our natural heritage have vanished, and more than 300 plants and animals are known from fewer than 20 locations within the state. Texas can no longer withstand the full brunt of man's activities by virtue of her sheer size.

Fortunately, many of our state's leaders have realized that the opportunity for conserving our natural heritage is rapidly vanishing. They are committed to actions that will give future generations a legacy of more than just hard choices. Texas' future lies in growth and development that is balanced by preservation of a viable natural heritage and a sensitivity toward the environment. A number of changes have been instituted in recent years to help define this balance.

One such change was the establishment of the Resource Protection Division within the Texas Parks and Wildlife Department. Staff from this division annually reviews several thousand projects that could potentially impact our environment. The goal of this activity is to identify adverse impacts, to reduce impacts wherever possible, and to ensure that unavoidable impacts to fish and wildlife are mitigated.

One part of the Resource Protection Division is the Texas Natural Heritage Program, which has compiled a list of rare species and natural communities and has an ongoing program of cataloging their occurrences within Texas. This information is important in the environmental review of proposed projects. It is also valuable in helping to identify growing problems and in

Bob Parvin

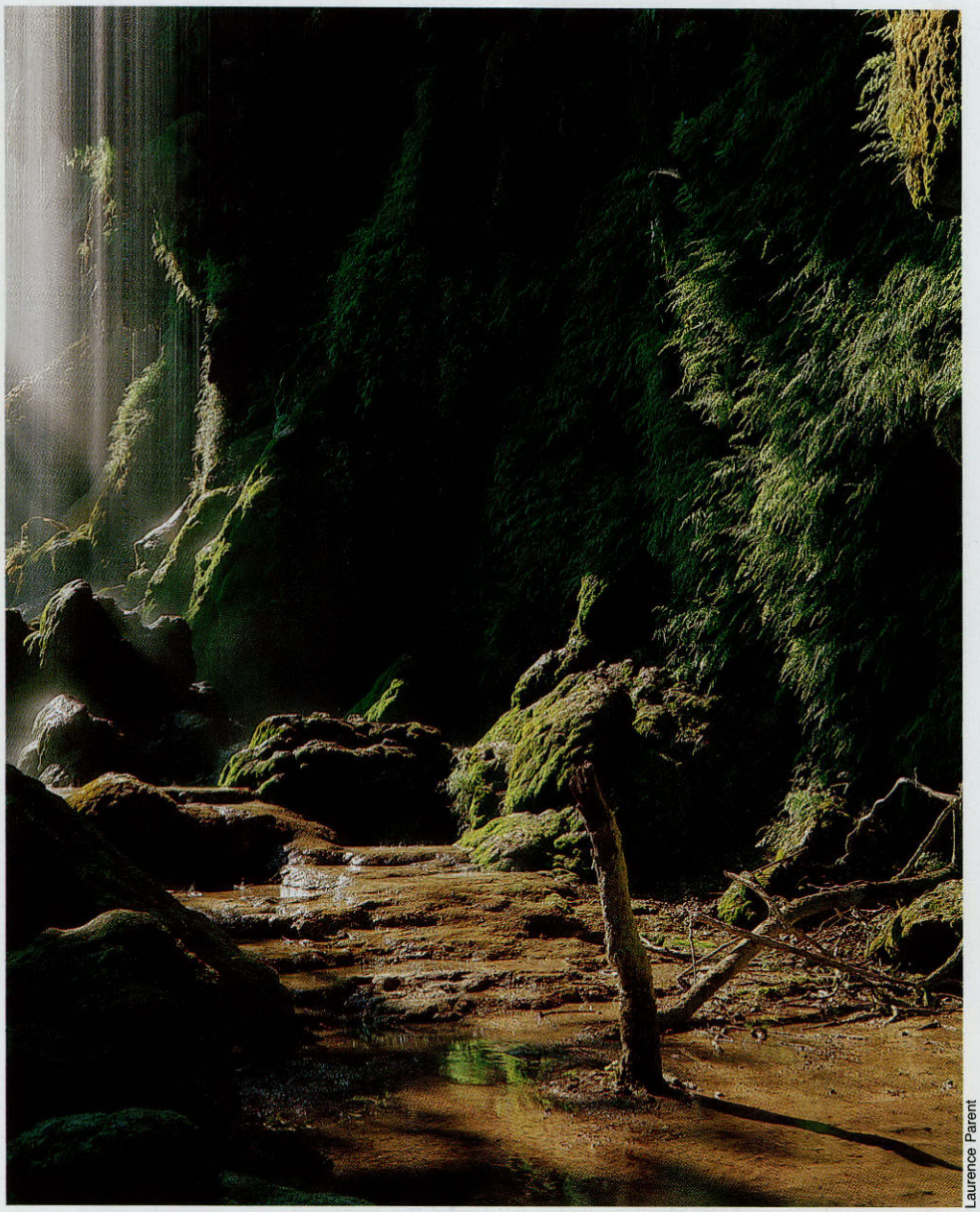
There are still places in Texas where the landscape consists of only earth and sky. Mountain peaks such as El Capitan in the Guadalupe Mountains (left) harbor a diversity of rare and endemic species. The Chisos Mountains in Big Bend National Park are home to the Chisos hedgehog cactus (above left). The Nature Conservancy's Clymer Prairie east of Dallas (above right) is part of the fewer than 500 unplowed acres of an original 12.4 million acres of Blackland Prairie.

setting conservation priorities.

The Texas Parks and Wildlife Commission has pledged to acquire an additional 1.2 million acres of land in order to protect natural areas and provide outdoor recreation opportunities. In addition, new policies adopted by the Texas General Land Office call for committing 20 percent of public lands under its control to environmental conservation, natural resource management and outdoor recreation. Both agencies have recently joined to initiate a system of coastal preserves to protect nesting shore birds, nursery areas, and unique habitats.

The United States Fish & Wildlife Service continues to acquire lands in the Lower Rio Grande Valley and along the Texas Gulf Coast to add to its National Wildlife Refuge system. Local governments such as Collin County (northeast of Dallas) and the City of Austin have instituted open space plans and ordinances to protect the environment. Conservation groups such as the Audubon Society and Sierra Club have long supported these and similar actions. The Nature Conservancy, founder of the Natural Heritage Programs that are now international as well as national in scope, actively pursues acquisition of unique natural areas.

Texas is a dynamic, developing state, and the future will bring change. This

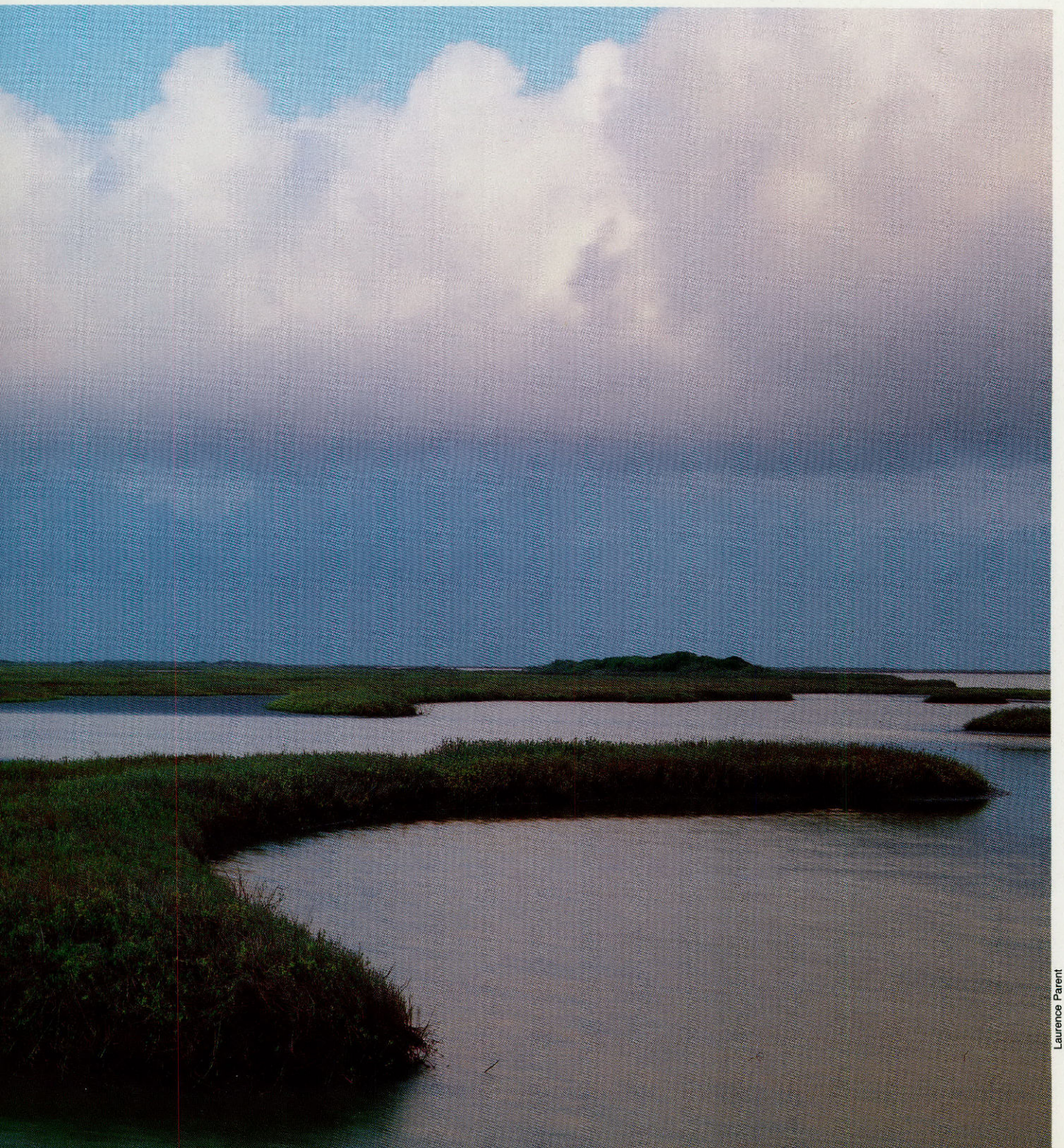


Laurence Parent

Gorman Falls in San Saba County (above) represents the springs that provide homes for a diversity of rare species. However, water sources also attract human settlers who threaten the very resources that brought them there. Coastal marshes and estuaries such as those at Matagorda Island (right) are biologically and economically important, but their integrity is threatened by reductions in freshwater inflow caused by reservoir construction, pollution and urban development.

universal change through time is part of nature itself, and we cannot avoid it. But we can, to some extent, determine its direction. Texans will strike some balance between economic development and conservation. The actions we take now will define the weight given to each side of the development/conservation equation. How many more reservoirs do we need?

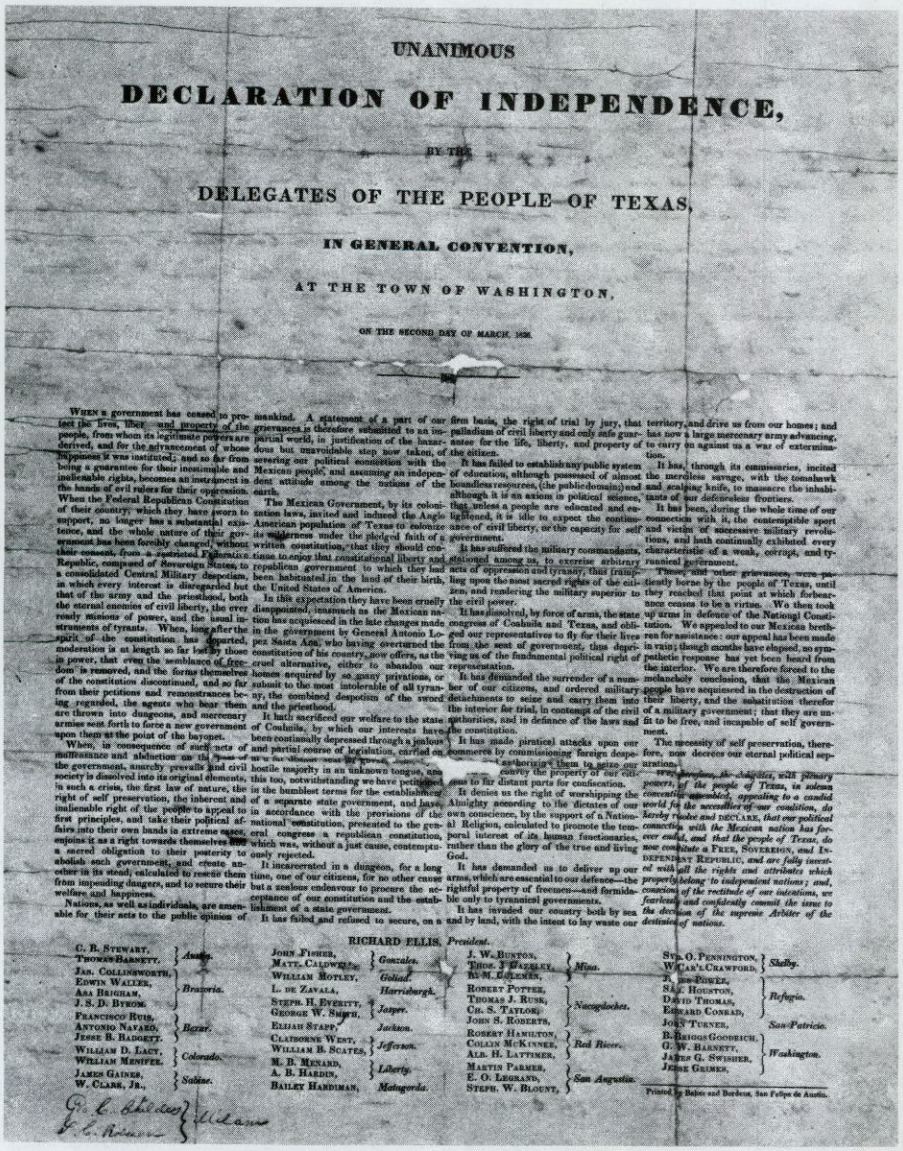
Must our remaining prairies and subtropical woodlands succumb to the plow if we are to achieve the "highest and best use" of the land? Are we willing to set aside acreage in order to ensure the survival of a rare plant, animal or natural community? These are but two of many questions that we must ask ourselves over the next several years, and the answers will have far reaching consequences. Our future is unfolding rapidly, and we must now determine the destiny of what remains of our vanishing Texas. **



Laurence Parent

Happy Birthday,

Article by Sue Moss, Photos by Leroy Williamson



UNANIMOUS

DECLARATION OF INDEPENDENCE,

BY THE

DELEGATES OF THE PEOPLE OF TEXAS,

IN GENERAL CONVENTION,

AT THE TOWN OF WASHINGTON,

ON THE SECOND DAY OF MARCH, 1836.

WHEN a government has ceased to protect the lives, liberty and property of the people, from whom its legitimate powers are derived, and for the advancement of whose happiness it was instituted, and so far from being a guarantee for their inestimable and inalienable rights, becomes an instrument in the hands of evil rulers for their oppression. When the Federal Republican Constitution of their country, which they have sworn to support, no longer has a substantial existence, and the whole nature of their government has been forcibly changed, without their consent, from a restricted Federative Republic, composed of Sovereign States, to a consolidated Central Military despotism, in which every interest is disregarded but that of the army and the priesthood, both the eternal enemies of civil liberty, the ever ready minions of power, and the usual instruments of tyrants. When, long after the spirit of the constitution has departed, moderation is at length so far lost by those in power, that even the semblance of freedom is removed, and the forms themselves of the constitution discontinued, and so far from their petitions and remonstrances being regarded, the agents who bear them are thrown into dungeons, and mercenary armies sent forth to force a new government upon them at the point of the bayonet.

When, in consequence of such acts of malfeasance and abduction on the part of the government, anarchy prevails and civil society is dissolved into its original elements, in such a crisis, the first law of nature, the right of self preservation, the inherent and inalienable right of the people to appeal to first principles, and take their political affairs into their own hands in extreme cases, enjoins it as a right towards themselves and a sacred obligation to their posterity to abolish such government, and create another in its stead, calculated to secure them from impending dangers, and to secure their welfare and happiness.

Nations, as well as individuals, are amenable for their acts to the public opinion of mankind. A statement of a part of our grievances is therefore submitted to an impartial world, in justification of the hazardous but unavoidable step now taken, of severing our political connection with the Mexican people, and assuming an independent attitude among the nations of the earth.

The Mexican Government, by its colonization laws, invited and induced the Anglo American population of Texas to colonize its wilderness under the pledged faith of a written constitution, that they should continue to enjoy that constitutional liberty and republican government to which they had been habituated in the land of their birth, the United States of America.

In this expectation they have been cruelly disappointed, inasmuch as the Mexican nation has acquiesced in the late changes made in the government by General Antonio Lopez Santa Ana, who having overturned the constitution of his country, now offers, as the cruel alternative, either to abandon our homes acquired by so many privations, or submit to the most intolerable of all tyranny, the combined despotism of the sword and the priesthood.

It hath sacrificed our welfare to the state authorities, and in defiance of the laws and of Coahuila, by which our interests have been continually depressed through a jealous and partial course of legislation, carried on by a hostile majority in an unknown tongue, and this too, notwithstanding we have petitioned in the humblest terms for the establishment of a separate state government, and have in accordance with the provisions of the national compact, presented to the general congress a republican constitution, which was, without a just cause, contemptously rejected.

It incarcerated in a dungeon, for a long time, one of our citizens, for no other cause but a zealous endeavour to procure the acceptance of our constitution and the establishment of a state government.

It has failed and refused to secure, on a firm basis, the right of trial by jury, that palladium of civil liberty and only safe guarantee for the life, liberty, and property of the citizen.

It has failed to establish any public system of education, although possessed of almost boundless resources, (the public domain) and although it is an axiom in political science, that unless a people are educated and enlightened, it is idle to expect the continuance of civil liberty, or the capacity for self government.

It has suffered the military commandants, stationed among us, to exercise arbitrary acts of oppression and tyranny, thus rendering the military superior to the civil power.

It has dissolved, by force of arms, the state congress of Coahuila and Texas, and obliged our representatives to fly for their lives from the seat of government, thus depriving us of the fundamental political right of representation.

It has demanded the surrender of a number of our citizens, and ordered military detachments to seize and carry them into the interior for trial, in contempt of the civil authorities, and in defiance of the laws and the constitution.

It has made piratical attacks upon our commerce by commissioning foreign desperadoes to authorize them to seize our property and convey it to far distant parts for confiscation.

It denies us the right of worshipping the Almighty according to the dictates of our own conscience, by the support of a National Religion, calculated to promote the temporal interest of its human functionaries, rather than the glory of the true and living God.

It has demanded us to deliver up our arms, which are essential to our defence—the rightful property of freemen—and formidable only to tyrannical governments.

It has invaded our country both by sea and by land, with the intent to lay waste our territory, and drive us from our homes; and has now a large mercenary army advancing, to carry on against us a war of extermination.

It has, through its commissaries, incited the merciless savage, with the tomahawk and scalping knife, to massacre the inhabitants of our defenceless frontiers.

It has been, during the whole time of our connection with it, the contemptible sport and victim of successive military revolutions, and hath continually exhibited every characteristic of a weak, corrupt, and tyrannical government.

These, and other grievances, were patiently borne by the people of Texas, until they reached that point at which forbearance ceases to be a virtue. We then took up arms in defence of the National Constitution. We appealed to our Mexican brethren for assistance: our appeal has been made in vain; though months have elapsed, no sympathetic response has yet been heard from the interior. We are therefore forced to the melancholy conclusion, that the Mexican people have acquiesced in the destruction of their liberty, and the substitution therefor of a military government; that they are unfit to be free, and incapable of self government.

The necessity of self preservation, therefore, now decrees our eternal political separation.

We, therefore, the delegates, with plenary powers, of the people of Texas, in solemn convention assembled, appealing to a candid world for the necessities of our condition, do hereby resolve and DECLARE, that our political connection with the Mexican nation has forever ended, and that the people of Texas, do now constitute a FREE, SOVEREIGN, and INDEPENDENT REPUBLIC, and are fully invested with all the rights and attributes which properly belong to independent nations; and, conscious of the rectitude of our intentions, we fearlessly and confidently commit the issue to the decision of the supreme Arbiter of the destinies of nations.

RICHARD ELLIS, *President.*

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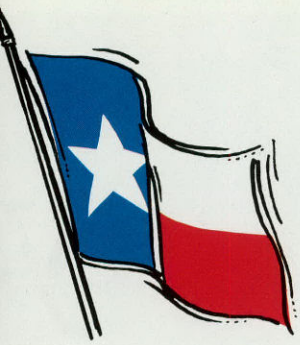
The Texas Declaration of Independence (above), similar to the American Declaration, was adopted on March 2, 1836, at Independence Hall. A replica of the hall (right) was built in 1970.



Texas

Independence Celebrations at Washington-on-the-Brazos

Located in the heart of Central Texas wildflower country, Washington-on-the-Brazos State Historical Park commemorates and preserves the birthplace of the Republic of Texas.

During March 1836, delegates from across Texas met at the infant town of Washington. With a late-winter norther blowing through an unfinished house, they adopted the Texas Declaration of Independence on March 2 and created the new republic. After writing the constitution that established Texas' government, the convention adjourned on March 17. Soon afterwards, the entire town of Washington fled as Santa Anna's army, fresh from victory at the Alamo, advanced toward the town.

Washington's residents returned following Santa Anna's defeat at San Jacinto on April 21. Over the next 25 years Washington prospered, serving as the capital of the Republic from 1842 to 1844 and growing into an important agricultural and commercial center during the 1850s. After the Civil War, Washington declined and most of the historic townsite became farmland.

In 1899 the schoolchildren of Brenham, led by School Superintendent E. T. Tarrant, raised funds for a monument at Old Washington to commemorate the signing of the Declaration of Independence. On April 21, 1900, the monument was unveiled. Located at the spot where Independence Hall had once stood, the 12-foot, gray granite shaft remains there today, next to a replica of Independence Hall built in 1970.

The Texas Legislature in 1915 authorized the purchase of 49 acres of the old town to preserve the historic spot. The size of the park has increased

more than threefold over the past 73 years. Since 1969 the Texas Parks and Wildlife Department, Blinn College in Brenham and the Washington-on-the-Brazos State Park Association have combined efforts to provide year-round recreational and educational services to more than 150,000 visitors annually.

The highlight of each year is the annual celebration of Texas Independence Day, held during the weekend closest to March 2. The park hosted many activities during the 1988 festivities, including a reenactment of the signing of the Declaration and a big-as-Texas birthday cake. The Houston Pops Orchestra, through the generosity of private and corporate sponsors, gave a full concert in the park, and played "Victory or Death," a piece written especially for the celebration. Square dancers and the Texas Army reenactment group provided entertainment and a look back to the earlier days. Beans and cornbread, cooked over an open fire, supplied a taste of the Republic.

Blinn College's Star of the Republic Museum opened a new exhibit, "As the Twig Is Bent." The exhibit, using historical artifacts from the museum's collections, told visitors about childhood in 19th century Texas. The exhibits and the film "Independence,"

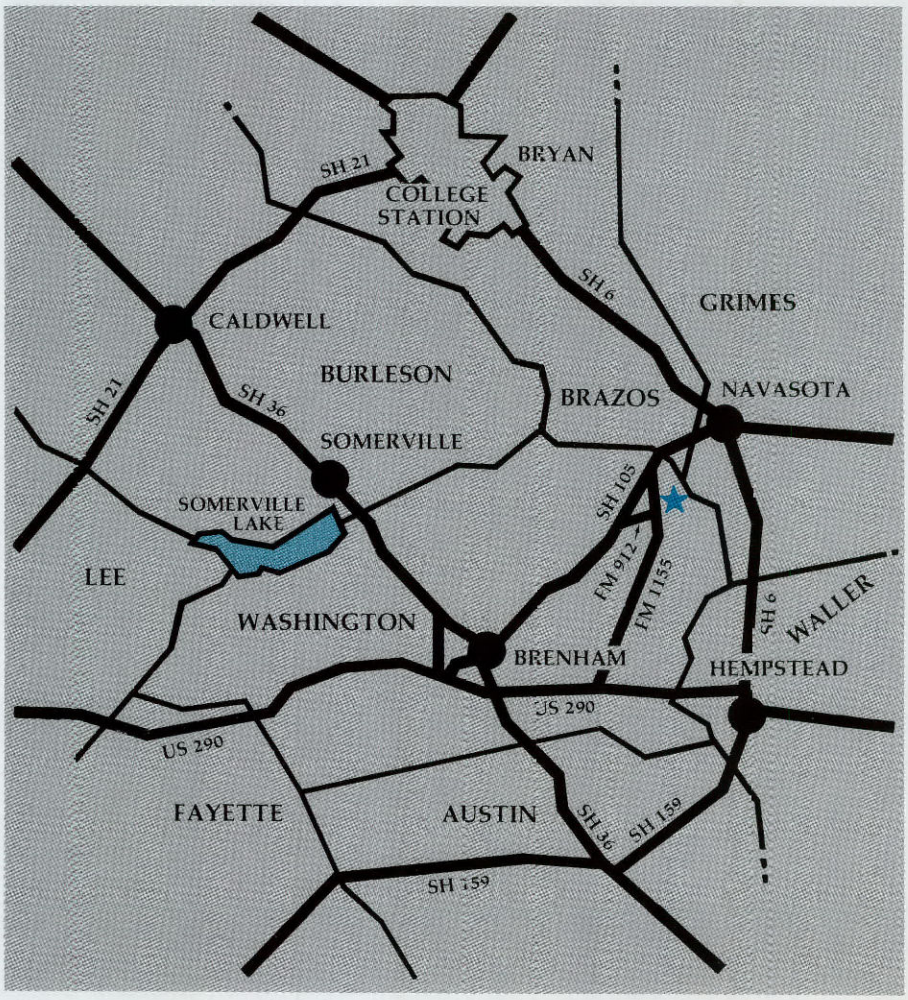
The home of Anson Jones, the last president of the Republic of Texas, is open for guided tours daily.

WASHINGTON-ON-THE-BRAZOS STATE HISTORICAL PARK

Location: Washington County, 14 miles northeast of Brenham on Texas 105 to FM 912, then five miles northeast to park entrance.

Hours and fees: Park is open seven days a week, 8 a.m. to sundown. Museums and exhibits are open 10 a.m. to 5 p.m. Tour of Anson Jones Home is $1 for adults and 50 cents for children 6–12.

For information: Call 409-878-2214 or write Box 305, Washington, Texas 77880.



located in the park's visitor center, are always popular during the celebration. "Independence," produced to commemorate the 150th anniversary of the Republic, takes its audience inside Independence Hall with the Convention of 1836 as Texas heroes and patriots such as Sam Houston and Jose Antonio Navarro declare Texas free from tyranny.

The 1989 Independence Day celebration will be held Saturday and Sunday, March 4 and 5. Many activities have been planned throughout the park, and the Star of the Republic Museum will open a new exhibit on medicine in early Texas. Traditional ceremonies will be held on Sunday, March 5, followed by a birthday cake commemorating the 153rd anniversary of the creation of the Republic of Texas. **

Independence Hall became a movie set for the making of the 1986 film "Inaependence" (above). The Houston Pops staged a concert in the park's amphitheater for the 1988 celebration.

Stephan Myers

CATTAILS

A Plant of Many Uses

by Delena Tull

Picture a hunter moving stealthily through a swamp, seeking food among the dense vegetation. He reaches down and grasps something beneath the muddy surface. Suddenly, with a yank of the arm, his catch is in hand. The catch is not a fish or a wounded waterfowl, but the long, slimy root of a cattail.

The seasonal harvest of the cattails, a ritual practiced for thousands of years by nomadic peoples worldwide, is rarely pursued by the not-so-nomadic members of modern society. Perhaps the ritual will be revived, however, as more people come to appreciate the many uses of the common cattail.

In winter, the roots of the cattail provide a floury starch. Remove the core of the long, spongy root and wash the starch out of the core by rubbing sections between your hands in a bowl of water. Sift out the fibers, leaving a slippery, white powder in the bottom of the bowl. The starch can be used alone or mixed with flour for baking pancakes or breads.

The early spring shoots, peeled and boiled, yield a delightful vegetable. Pull them up just as they begin to peek out of shallow water, because taller shoots become too bitter for eating. Nicknamed cossack asparagus, cattail shoots provided food for the cossacks of Russia.

George O. Miller

In late spring, you can prepare a meal of cattail-on-the-cob. After clipping the green flower spikes from the woody stalk, remove the paper sheath and boil the green spikes in water for five minutes. Spread with butter and nibble the tender vegetable off the stiff, inedible core. The yellow pollen on the mature flowers also is an excellent food, high in protein. Add it to bread doughs or sprinkle it on rice. Native Americans used the pollen as food and in religious ceremonies.

Even the seeds of cattails supply nutritious foods. The seeds cling to silky threads in large seedheads. Pull the fluff from the flower stalks and set it on fire to release the seeds. The parched seeds can be ground into a protein-rich flour. You may decide, however, that the fluff itself is too valuable to burn away.

George O. Miller

Cattails are common in freshwater marshes along the Gulf coast (left). Seeds of the plant, which cling to silky threads in large seedheads (above) can be ground into a protein-rich flour. A white-faced ibis (right) wades near a group of cattails in a coastal marsh.

Cattail seedheads provided an alternative to several imported products during World War II. The U.S. Navy used the buoyant, water-resistant floss as a substitute for kapok in life vests. The Germans manufactured compressed boards for sound and heat insulation and spun thread from the floss. And the Italians filled mattresses with it.

Cattail leaves supply an array of useful products. In New York, they provide the makings for rush-bottomed chairs. Mexican Kickapoo Indians cover their wigwams and weave mats for their floors with cattail leaves. More than 10,000 years ago, native Americans wove mats and sandals from the leaves. The lake dwellers on Lake Titicaca in Bolivia still weave their floating island homes from cattails and bullrushes. Threads from the leaves are woven into textiles, and the pulp can be used for papermaking.

On a summer evening, the call of a redwing blackbird echoes from the midst of the cattail marsh, which is a nesting ground for birds, frogs and damselflies. Cattails fill marshes along the Gulf Coast, line slow-moving streams in Central Texas and congregate below desert waterfalls in Big Bend National Park. Velvety seedheads sway in summer breezes, calling to mind a family of cats with stiffened tails lifted high in defiance of a bothersome dog.

Long considered a noxious weed, cattails clog waterways and become a problem in rice fields and among other wetland crops. In spite of these disadvantages, the plants have value as soil stabilizers and in lowering soil salinity. The same characteristics that have allowed them to become weeds (rapid growth and tolerance to a wide range of growing conditions) give cattails much potential as a cash crop. Research at Syracuse University attests to the agricultural value of this overlooked weedy plant.

Perhaps someday, cattail-on-the-cob will be available in the frozen food section of the grocery, and Americans will learn to appreciate why Euell Gibbons called the cattail "the supermarket of the swamp." **

George O. Miller

A group of black-bellied whistling ducks congregates around a stand of cattails at the San Antonio Botanical Center (above).

Stephan Myers

Young cattail flower heads can be collected for cattail-on-the-cob (left). Cattail leaves (below) are used for a variety of products, including rush-bottomed chairs, mats and textiles.

Stephan Myers

SLOT LIMITS

Insurance Policy for Quality Bass

Article by Tim W. Schlagenhaft and
Mark A. Webb, Photos by Ray Sasser

When Jim Kimbell of Pittsburg cast a crankbait in the wooded waters of Lake Monticello on a cool February day in 1980, he didn't suspect it was a historic act.

But when he hooked and boated a 14-pound, 1-1/2-ounce largemouth bass, Kimbell broke a 37-year-old state record and launched Texas into a new big bass era.

News of the record catch spread rapidly, and the 2,000-acre power plant reservoir near Mount Pleasant became one of Texas' best-known bass fisheries.

As the lake's popularity grew, fishing pressure became intense. Long lines formed at boat ramps and the crunch of fiberglass was heard as bass boats jostled for position along the lake's timbered creek channels.

Providing Texas fishermen the opportunity to catch quality-sized largemouth bass is a challenge for fishery biologists. Slot limits that protect valuable medium-sized bass from overharvest have proved to be highly effective in maintaining quality bass fisheries in some reservoirs.

Parks and Wildlife Department fishery biologists became concerned that this heavy fishing pressure could permanently damage the bass population. They took a bold step to preserve the fishery by recommending an experimental "slot" length limit and more restrictive bag limit of five largemouths per day. The slot limit, which went into effect September 1, 1981,

protected largemouths between 14 and 18 inches in length, while bass either longer or shorter could be retained by anglers up to the daily limit. This was done to improve bass size distribution and prevent overharvest.

Seven years have passed since the slot limit was initiated. During this time, other Texas lakes gained notoriety for producing trophy bass. The Florida-strain bass that propelled Monticello into the big-bass spotlight began to manifest themselves in many other Texas reservoirs. Lake Fork, located in adjacent Wood County, stole some of the limelight from Monticello, producing five of the 10 largest bass ever caught in Texas, including the current state record 17-pound, 10.7-ounce fish caught in November 1986.

Does this mean that Monticello is over the hill? Has the slot limit done any good?

As soon as the slot limit went into effect, plans were made to monitor bass populations as closely as possible to answer just such questions. One of the monitoring procedures is electroshocking, or using a boat equipped with electrical probes to temporarily

stun fish with an electrical charge so they can be counted and examined.

Electroshocking surveys conducted prior to establishment of the slot limit found that only 16 percent of the bass collected were longer than 14 inches. Although large bass were present, those greater than 18 inches long comprised only two percent of the sample. Two years after the slot limit was imposed, 54 percent of the spring sample were longer than 14 inches, and five percent were 18 inches or longer.

Size distribution, or average size, of bass continued to improve at Monticello. Electroshocking results from surveys during 1986, 1987 and 1988 combined showed that an average of 61 percent of the bass were over 14 inches long, and 11 percent were longer than 18 inches.

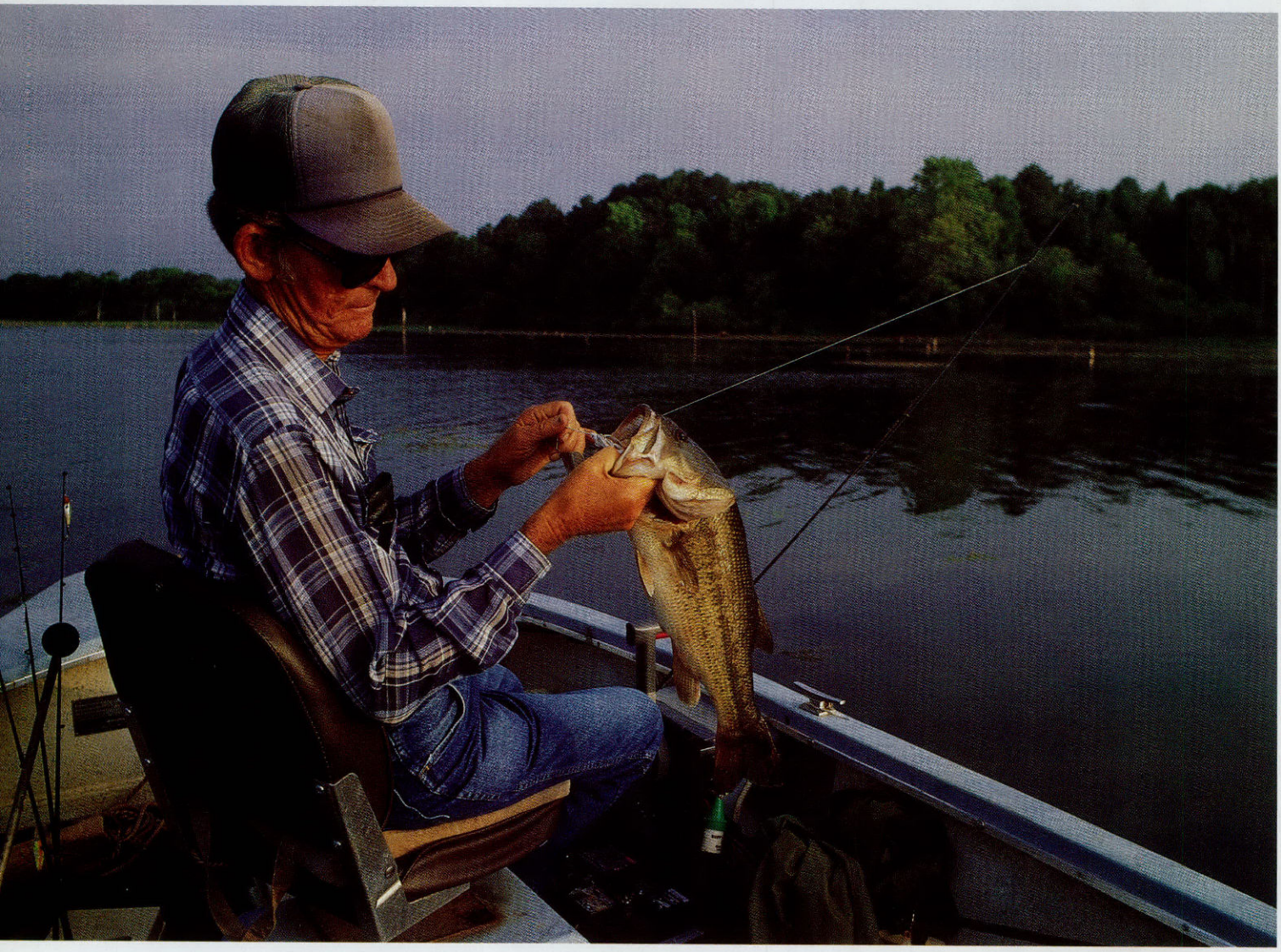
In addition to improving size distribution, the slot limit also has maintained overall bass abundance. The number of bass caught per hour of electrofishing has remained consistent before (55 bass per hour) and after (53 per hour) the slot limit was imposed.

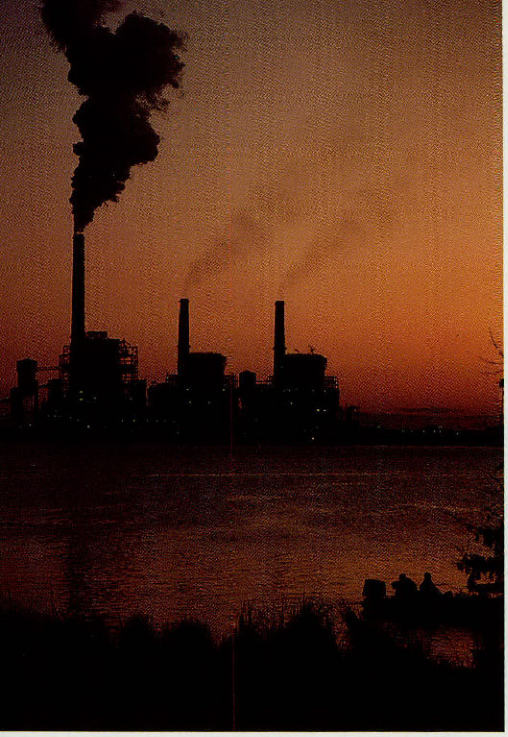
The fishery apparently has been maintained sufficiently to encourage continued heavy use of the reservoir. Creel survey (fisherman interview) data indicate heavy fishing pressure on the largemouth bass resource. In 1987, anglers spent 45.1 man-hours per acre on the lake, which is more than three times greater than the statewide average for all Texas lakes surveyed that year. Almost half, 45 percent, of the year-round fishing pressure occurred during winter (December through February).

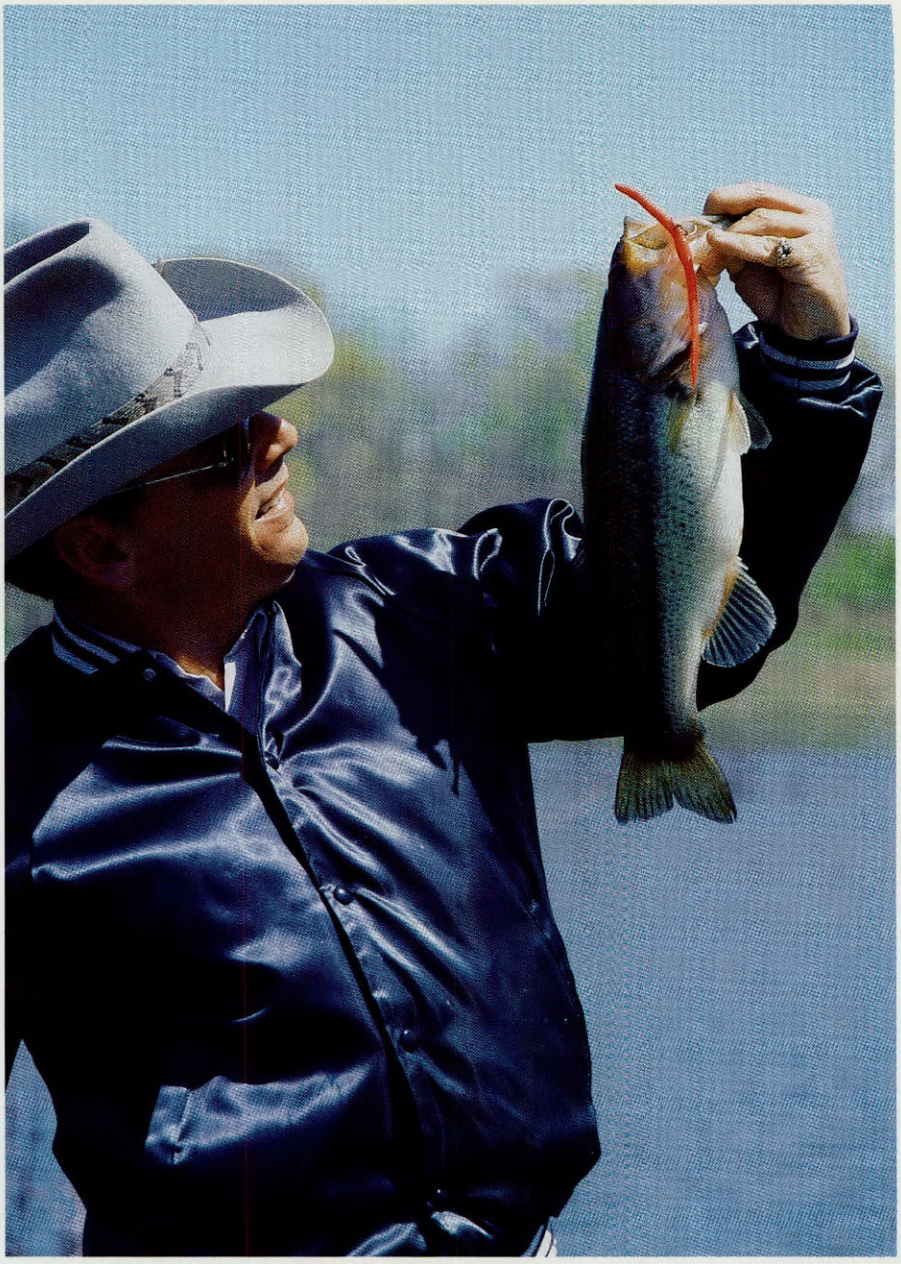
Lake Monticello fishermen continue to catch good numbers of quality-sized (14-inch-plus) bass. A total of 57 percent of all bass caught during 1987 were within the slot limit. The number retained by anglers during 1987 (1.7 bass per acre) was almost twice the statewide average of .9 per acre. During 1987, about 67 percent of Monticello bass harvested were greater than 18 inches long. The average weight was 3.7 pounds, almost twice the statewide average of two pounds.

Catch-and-release fishing, where anglers release both slot-sized and legal "keepers," is a growing sport at Monticello. During 1987, anglers released an average of 85 percent of all bass caught, including 67 percent of all legal-size bass caught. High catch-and-release rates combined with predominantly large bass being retained suggest that many Monticello anglers are seeking mainly trophy-sized fish.

Thus the slot limit appears to have played an important role in maintaining a balanced population of bass. But







veteran anglers have correctly observed that Monticello fish have not been among recent entries in the department's Top 50 Largemouth Bass List and Big Fish Awards program. Between 1979 and 1985, a total of 24 bass weighing more than eight pounds apiece was documented from Monticello. But since 1986, no Monticello fish have been listed in either program. While the lake has continued to maintain a stable fishery, it apparently is failing to produce many of the true trophy-sized bass in the 10- to 15-pound class. It certainly can produce such big bass, because during the period 1979–85 it yielded six bass larger than 12 pounds, including three over 14 pounds.

The answer to the relatively recent dropoff in trophy bass production, in the view of department biologists, is fishing pressure and the high harvest rate of the larger size classes of bass.

Creel surveys indicate, in fact, that most of the bass caught and retained at Monticello were longer than 18 inches. Approximately 64 percent of retained bass above the slot size were between 18 and 20 inches, weighing between 3-1/2 and 6 pounds. This heavy harvest of the 18- to 20-inch fish may be removing too many potential trophy bass before they have a chance to reach trophy size.

In an effort to increase catch rates of quality-sized fish and provide more trophy bass, the 14–18 slot was changed to a 14–21 slot, effective September 1, 1988. By protecting the larger 18- to 20-inch bass, anglers should catch more fish up to six pounds, with the potential for catching a true trophy bass greatly increased.

Overall, the slot limit has proved to be a very successful management tool at Lake Monticello. Anglers are willing to travel long distances, an average of 126 miles one way per angler, to sample the lake's bass fishing. These anglers have demonstrated a willingness to give the limit a chance, because creel data indicate only one percent of all fish harvested during winter and spring 1988 were illegal size.

The excellent structure of the bass population, combined with the increased catch rates and trophy potential offered by the new 14–21 slot limit, should pay off in improved fishing in the near future. **

Bass such as the one at left might qualify as a keeper where the 14-inch minimum length limit is in effect. But at Monticello (above) a slot limit permits anglers to keep only bass smaller than 15 inches or larger than 21 inches. This allows anglers to enjoy catch-and-release fishing for "slot" bass (above right) while increasing their odds for hooking a bona fide trophy largemouth.

On Armand

Nature center preserves a little piece of wilderness.

Nestled at the back door of the Johnson Space Center, within an hour's drive of the fourth largest city in the United States, is an area of unexpected natural beauty. In contrast with its high tech and metropolitan neighbors, Armand Bayou and its environs have frequently been called an "urban wilderness." Visitors are attracted by its recreational, educational and scientific treasures.

An 1,800-acre tract of land surrounds Armand Bayou, which was named for the late Armand Yramategui, a naturalist and director of the Burke-Baker Planetarium in Houston. The Armand Bayou Nature Center (ABNC) was founded on this site in 1977. Its employees and volunteers provide educational programs for the general public, and strive to preserve and enhance the area's natural and historical resources. The combination of prairie, forest and bayou offers a perfect classroom setting for young naturalists. For the historian, a turn-of-the-century farm and reconstructed Indian campsite recall the lifestyles of earlier inhabitants.

Formerly called Middle Bayou, Armand Bayou is part of the Trinity-San Jacinto Estuary. It was formed when Pleistocene ice sheets made their final advance about 30,000 years ago, causing sea level to drop as much as 400 feet. The Galveston shoreline moved 100 miles out into the Gulf of Mexico. On land, Armand Bayou was born out of the delta formed by the Brazos River. Along with other waterways along the Gulf Coastal Plain, Armand Bayou carved deep channels through the exposed sediment. As the ice melted, sea level rose and flooded the newly formed basins. Today, Armand Bayou begins as a small, freshwater stream in southeast Harris County and empties five miles south into Clear Lake, a saltwater lake fed by Galveston Bay.

As with other estuarine systems, Armand Bayou sustains an especially productive ecosystem for two reasons. First, tidal action from Clear Lake mixes fresh bayou water with salt water from Galveston Bay. Second, the bayou's basin is lower than sea level. Combined, these two factors make the bayou a nutrient trap for land wastes, soil runoff and shoreline vegetation.

Fish, crustaceans and aquatic plants are found in the bayou. A rich growth of algae gives the water its dull green color and provides the food base for higher forms of life which live in and near the water.

Armand Bayou is a breeding ground for more than 22 commonly found fish and crustaceans. Among its inhabitants are the alligator gar, Gulf kingfish, spotted seatrout, black drum and southern flounder. It serves as a nursery for the white shrimp, grass shrimp, blue shrimp and the mud crab and blue crab. Maintaining the productivity of coastal estuaries is important to commercial fishermen since three quarters of the fish harvested in Galveston Bay and the Gulf of Mexico spend their early stages of life in

Bayou

Article by Barbara Dunn, Photos by Stephan Myers

these waters.

Motorized boating is not allowed on the bayou, making it a popular place for canoeing and kayaking. On any given day, one can find crabbers patiently stringing their lines from the wooden pier that extends from Bay Area Park.

The Gulf Coastal Plain is an area of poor water drainage and frequent flood/drought cycles. This has allowed an ecotonal environment to exist at Armand Bayou. An ecotone occurs where two biological communities meet; in this case, prairie and forest. Prairie lands cover 900 acres, or half of ABNC's area. This is but a tiny remainder of the estimated 750 million acres of original North American prairie.

The prairie soil is a dense, black clay called "gumbo," so named because crayfish use it to build their "chimneys," or living quarters. The clay shrinks during dry periods and swells shut during wet periods, incorporating humus and organic material into the cracks. Grasses with fibrous roots are best adapted to this soil.

In the 1700s and 1800s settlers moved into the region and used the prairie lands for pastures. After a while, overgrazing by livestock eliminated most of the natural prairie vegetation. Today, ABNC is attempting to restore the prairie to its highest, or "climax," condition. Its primary tool is controlled burning, which inhibits nonprairie plants and recycles nutrients from dead plant material back into the soil.

Waterlilly

Dayflower

Coneflowers

Prairie and forest communities meet at the nature center, bringing a variety of wildflowers to the area. In addition to the prairie and forest flowers are some aquatic plants found in the bayou.

Coral bean

Palmetto blooms

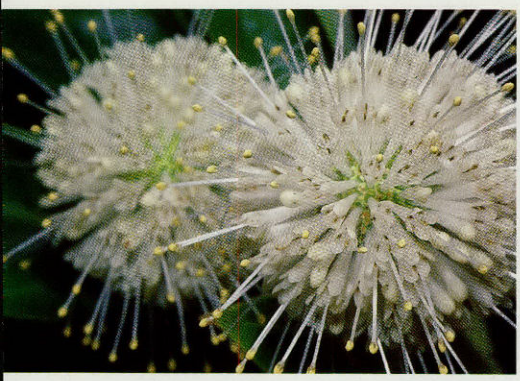
Prairie plants are uniquely adapted to the natural cleansing action of fire caused by lightning because their budding cells and food reserves are located underground. The grass family makes up 95 percent of the prairie's plant composition. Today, one may see climax species such as big and little bluestems, switch grass, Indian grass and Eastern gamma grass. During peak times in the growing season wildflowers also can be seen.

Between the prairie and the water lies a narrow belt of gallery forests. This soil is more hospitable to deep-rooted trees because water action has deposited coarser sand, thus allowing better drainage. There is no encroachment between the prairie and forest environments. Grasses cannot flourish in shaded areas and trees cannot survive in the dense prairie soil.

The dominant trees in the area are red oak, willow oak, water oak, post oak, winged elm, cedar elm, American elm, green ash and hackberry. Other species such as the hickories, basswood and American holly, which are less tolerant of the flood/drought cycles, grow in thin bands closer to the water.

The dead trees which stand in the bayou itself are evidence of a once larger forest. In the past, dredging and pumping for fresh water contributed to further subsidence of the bayou's basin, leaving these trees to die below the water line. This practice has been halted, and the barren limbs jutting skyward serve as a reminder that nature's coexistence with man is indeed fragile.

Foreign plant species have invaded the area, posing a threat to the present balance of the natural community. Jap-



Buttonbush

anese honeysuckle, privet, trifoliate orange and Chinese tallow have flourished. Some of the native species may not be able to compete and will disappear. In time, a new balance will be struck between the plant and animal life.

Walking along the forest trails and near the water, one will find palmetto and giant sagitarria. These plants require such specific conditions for growth that they are considered "indicator" species, meaning that their presence indicates the environment to which they are best adapted. In this case, both plants testify to the frequent flooding and poor drainage typical of the area.

The dominant understory plant is yaupon holly. Mosses and ferns are also prevalent. Spanish moss can be found perched on trees and plants. It is known as an epiphyte, since it draws its moisture from the air or the bark of host trees. In recent years, Spanish moss has dwindled because of increasing automobile pollution in the area.

Throughout the Armand Bayou forest area, lichens can be seen on fallen trees and other decaying plant matter. Some have a furry, golden appearance, looking like mushroom caps imbedded into their host. Lichens are actually composed of two species: an algae and a fungus. Through a process called "mutualism," the fungus surrounds the algae, providing life-

Among the classes offered at the center are sessions on Indian life. At left, a youngster learns to throw a spear with an atlatl. Palmetto and sagitarria grow at the edge of a small pond on the grounds of the nature center (right). On the previous page, a great egret stalks the shallow waters.

sustaining moisture. In return, the algae feeds the parasitic fungus.

An interesting yet unexplained feature of the area are mounds of sandy soil that rise one to three feet above the surrounding earth. These "pimple mounds" allow denser understory growth and are popular burrowing spots for animals such as the armadillo.

Armand Bayou supports a large wildlife population. As would be expected, insects are by far the most numerous. The more prevalent predatory insects are assassin bugs, dragonflies and wasps. Plant eaters such as grasshoppers, leaf-footed bugs and aphids also can be seen.

The wet environment of the bayou draws amphibian species such as frogs, toads and salamanders which require moisture to keep their skin soft and damp. Many breathe by the absorption of oxygen through their skin.

Numerous reptiles live in the area and visitors should keep an eye out for poisonous species. Representatives of the four types of poisonous snakes found in North America are found at Armand Bayou. They include the southern copperhead, western pygmy rattlesnake, western cottonmouth and Texas coral snake. Lizards, turtles and alligators also are regular inhabitants.

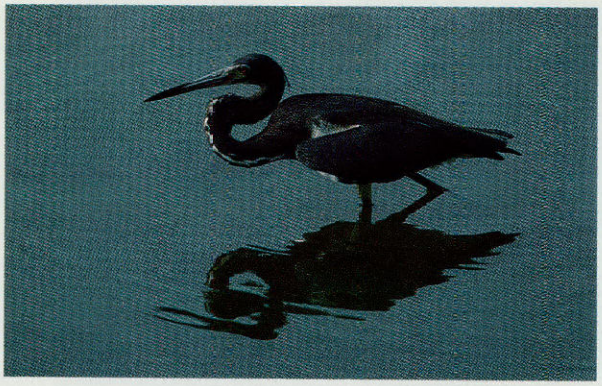
Birdwatchers need not look far to find a fascinating variety of birds along the trails. The area attracts more than 80 different birds for three reasons. First, the bayou is situated in the Central Flyway, thus providing a natural resting spot for migratory birds. Second, the prairie, wetland and woodland ecosystems offer a variety of habitats. Third, Texas generally has mild winter temperatures.

Some of the species which can be found year around are the great and snowy egret, herons, red-bellied woodpecker, mockingbird, starling and common yellow-throat. Spring, fall and winter bring migratory species

Swamp rabbit

Copperhead

White-tailed deer



Tricolored heron

Five-lined skink

Inside the nature center are a number of exhibits, including this one featuring tree leaves.

The bayou supports a large wildlife population. The wet environment attracts amphibians, and reptiles also are regular inhabitants. Birdwatchers need not look far to find a fascinating variety of birds, and mammals of all types thrive in the diversity of the area.

such as the northern harrier, belted kingfisher, tree and barn swallows, cedar waxwing, black and white warbler, yellow breasted chat and American goldfinch.

The diversity of the area also supports mammals of all types. Common herbivores are the marsh rabbit, white-tailed deer and fox squirrel. Omnivores are coyotes, raccoons opossums and armadillos. Bobcats and red foxes represent some of the carnivores present in the area. These animals are remnants of an environment which once supported the cougar, black bear and bison. Many of the animals come out only at night, when the heat of the day has dissipated.

For those who feel nervous walking through damp, bug-infested and snake-threatened trails, ABNC offers three other interesting subjects. The most notable is the Jimmy Martyn Farm. Jimmy Martyn's family settled in the

Canoeing and kayaking are popular on the bayou. Motorized boats are not allowed.

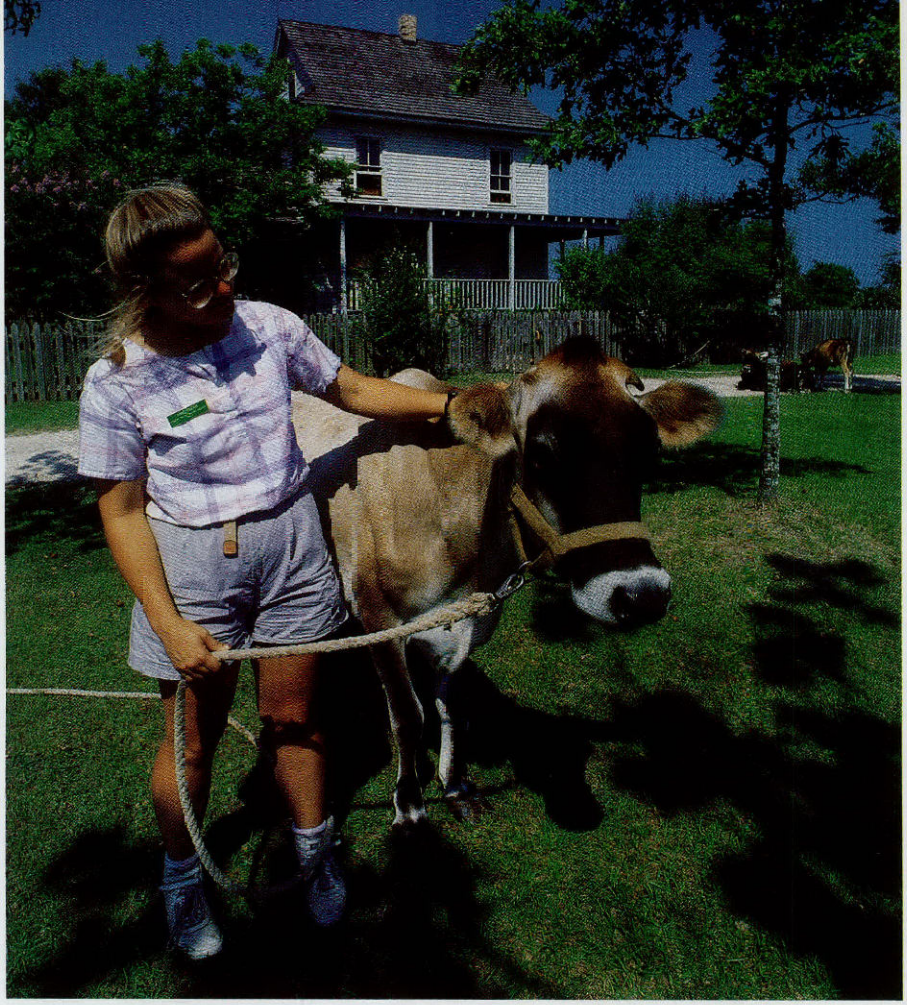
area in 1870. Until his death in 1964, Martyn staunchly maintained his respect and understanding of nature, ignoring 20th century progress. He rejected offers from developers and lived without electricity or running water.

Today the farm is maintained in its original condition, complete with hogs, goats, chickens and horses. Scythes, plows and other implements sit outside on display. The Martyn family's home is open to visitors and provides a sentimental look into the lives of 19th-century local residents.

Two other areas of interest are the Indian campsites and the greenhouse. ABNC is listed in the National Register of Historic Places as the "Armand Bayou Archaeological District." Six middens (prehistoric Indian garbage dumps) lie within its boundaries. The Karankawa and Orcoquiza tribes were seasonal residents in the area. Most of the sites on the upper Texas coast date to about 4,000 years ago. ABNC has reconstructed a typical Karankawa Indian camp and offers educational classes on Indian life.

The greenhouse was formerly an active retail nursery, but with the slowdown in the Texas economy, plants are now sold only in April and September. Horticulturists conduct botany classes and are involved in research and propagation of native plants.

ABNC is supported in part by corporate donations, government funds and the memberships of 3,000 supporters. An increasingly large staff of volunteers has enabled the center to maintain its educational and environmental goals.



A summer activities program offers instruction to children of all ages in subjects ranging from environmental history to ecology and marine biology. Demonstrations on landscaping, insects, wildlife rehabilitation, Indian life and farm skills are given on weekends. The 1988 program included overnight birdwatching trips to the Big Thicket and Anahuac, and a week's excursion to a tropical cloud forest in Tamaulipas, Mexico. An annual fall festival is held on the third weekend in October and features craft demonstrations, music and an "old-time" auction for homemade items. Horticultural interests will be emphasized in 1989 beginning with Arbor Day activities in January and a native plant sale in April. A birdwatching trip to Costa Rica is

ARMAND BAYOU NATURE CENTER

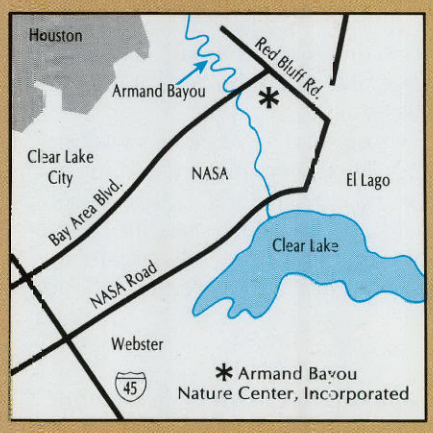
Armand Bayou Nature Center is located at 8600 Bay Area Blvd., between Interstate 45 and Red Bluff Road. It is minutes from Clear Lake City and within an hour's drive of Houston. The center is open from 9 a.m. to 5 p.m. seven days a week, except for major holidays.

Admission to the nature center is $2.50 for adults and $1 for children and senior citizens. Free admission is available for members, active volunteers and children under four years of age. Admission is free to all visitors on Mondays.

Annual membership fees range from $25 for a family to $100 for contributions. Members receive discounts on class fees.

Summer instruction costs for each member student range from $15 to $60 per class, depending on the topic and duration of the class. Nonmember costs range from $18 to $80

For more information, write to Armand Bayou Nature Center, P. O. Box 58828, Houston, Texas 77258, telephone 713-474-2551.



The Jimmy Martyn Farm (left) is part of the nature center. It is open to the public and provides a look into life in the 19th century. Prairie and forest meet at Armand Bayou (below), an area known as an ecotone.

tentatively planned for February.

The Armand Bayou Nature Center is preserving a vanishing part of our natural history. The benefits of such efforts reach beyond simply sustaining a healthy environment. They affect the commercial fishing industry and provide research data on the effects of man's progress on this unique blend of ecosystems. Foremost, visitors learn to respect and understand nature, thus ensuring its preservation for future generations. **

Classes at the nature center offer students an opportunity to collect specimens for identification and study, giving them hands-on experience in marine biology.

The Graceful Great Blue Heron

by Tom Rasor

Lying snug within a sleeping bag in the predawn darkness of a Northwest Texas morning, I listened to the sounds that flowed from the herons' nests. A cool northern breeze nipped at my tent, a relief from the warm, brisk winds that had ripped from the southeast the previous day.

As the March winds shifted and died, the birds of the heronry became more active. Through the darkness came a continual stream of vocalizations that made my hair stand on end. The long, wailing *raaak* and the sharp *clop* of snapping beaks were sounds that evoked a chilling sense of excitement. It was easy to ignore man's concept of time, and to visualize the spectacle as it must have occurred every spring for millions of years.

Herons' nests dotted drainage systems similar to ones in this area long before the larger mammals entered the scene. The ground beneath my tent was excavated for Indian ruins in the early 1900s, and stone tools are still scattered over the eroded red cliffs that jut above the lowland creeks. Brown-skinned aboriginal youths scampering over the hillsides for the last 10,000 years, spooking the herons from their nests in early spring, might be visions recorded in the genetic memories of the very birds I was observing. The scene I was about to witness as the eastern sky brightened with morning light was an ancient one.

Tom Rasor

Covered in long, sleek plumes, solitary male herons establish breeding territories in the spring.

The great blue heron, *Ardea herodias*, is a long-necked, long-legged wading bird in the order Ciconiiformes, which includes all herons, storks, ibises, spoonbills and flamingoes. Within the order, the heron family, Ardeidae, consists of about 64 species of closely related birds, including the herons, egrets, and bitterns; 13 of the 14 North American species occur in Texas.

It may be difficult to distinguish some birds within this group, especially the white egrets, or even to locate and observe the secretive bitterns; but this is not the case for the great blue heron. It is the largest and most commonly seen heron in Texas and over most of the United States. The blue heron and its slightly smaller foreign look-alike, the gray heron, *Ardea cinerea*, make up a superspecies that is almost worldwide in distribution, absent only in the higher, ice-bearing latitudes

Records of the heron's presence in early human history are well documented. Possessing a strikingly elegant stature, this bird has been honored for centuries in the classical art forms of many countries, particularly ancient China, Japan and Egypt. Its graceful movements have been transferred into elegant lines that strike a harmonious chord in most viewers. The heron stands four feet high and has a wingspan of nearly seven feet. Its daggerlike bill, serpentine neck and long, slender legs exhibit precise movement that breathes life into drab, metallic-gray coloration.

Grace is inherent in the heron. Its sleek body and stiltlike legs are supported by long, slender toes that provide a stable support when the bird walks over varied terrain, from uneven rocky shorelines to soft muddy flats. The tracks of a mature bird can measure up to eight inches across. Such stability allows the bird to concentrate on its prime activity—capturing prey. The main tool for the job is its long bill. Although the heron sometimes spears larger fish by impaling them

Tom Rasor

The nest is built of small sticks and branches and lined with grasses to cushion the eggs (above). Inland herons often select tall mesquites and cottonwoods near bodies of water for their nests.

through the midsection, then flipping them into its mouth for swallowing, its usual mode of eating is grasping small fish in the serrations of the bill and ingesting them alive. An interesting adaptation of the heron's neck structure is an elongated sixth cervical vertebrae. This neck bone allows for special muscle attachment and mechanical advantage to increase the power of its lightning-quick strikes when grasping for its favorite food, fish.

One curious observer who approached an injured heron was surprised to find that the slender, yellowish, four-inch bill could penetrate a pine boat oar. In fact, piercing blows to the eyes of a menacing predator is a chief defense mechanism for the heron. Extreme caution must be used by people who come to the aid of a downed bird, for inexperience and improper handling techniques can be disastrous.

Many people enjoy watching the feeding habits of the blue heron. These birds usually can be seen stalking the shallows of practically every lake and river in Texas, feeding at any hour of the day or night. Dawn, dusk, and bright moonlit nights seem to be preferred dining times. The fluid silhouette of the heron against the amber waters of a broken shoreline at dusk is a scene too fine to be overlooked.

Although the heron's primary food is fish, it is omnivorous, eating a variety of foodstuffs. Along the shore, it devours frogs, snakes, salamanders, crayfish, snails and numerous insects and their larvae. Shrimp, crabs and various mollusks are taken along the Gulf. Herons frequently eat mice, rats, shrews and even pocket gophers. The birds occasionally are observed feeding in wheat and cotton fields, dining on an abundant supply of insects, reptiles and small mammals. More exotic foods include clapper rails, phalaropes, baby ducks and even small kittens scampering along the edge of a pond. This endless quest for a fulfilling meal often gets the bird into serious trouble; it can choke to death on a large morsel.

The heron's diet of fish is often unpopular with fishermen, who see the birds as a competitor for a limited number of gamefish. However, information about the feeding habits of the blue heron indicates the bird actually enhances natural fish production. By feeding on large numbers of animals that destroy fish eggs (such as carp, sunfish and dragonfly larvae), the egg predators are kept in check by the heron. This greatly offsets the small numbers of gamefish that are captured and eaten by the bird.

Although herons are beneficial to natural fish-producing areas, they may trouble fish hatchery operations. With concentrations of valuable gamefish to be exploited, the temptation for an easy meal of bass, catfish and trout is often too great for the bird to resist. Use of approved control measures by state fish hatcheries occasionally has been employed.

James Hendee, biologist at Texas' largest hatchery in Dundee, is not overly concerned by the predatory habits of the herons on his unit. The hatchery, located below Lake Diversion on the Wichita River near Wichita Falls, includes 91 large production ponds encompassing 78 surface acres of water. Although the number of herons feeding on the ponds varies, about 10 birds can be found scattered over the land at any one time. The birds are usually driven from the hatchery by normal activities—occasional yelling, shouting and horn honking are reserved for persistent birds. Nesting sites within a mile of the ponds are discouraged. The birds are sensitive to human disturbance at this time, so it is easy to make them move on to a location away from the hatchery.

Most of the blue heron's year is spent in the solitary search for food. From late June through late January, attention is focused on the individual's survival. Feeding territories are established by the presence of a bird in an area, and are seldom challenged. Although older adults may have a prefered nook in which to gather a meal, most feeding site selection appears to be on a first-come, first-served basis. Occasionally this rule is overlooked by young herons. Approaching too close to feeding adult birds will provoke

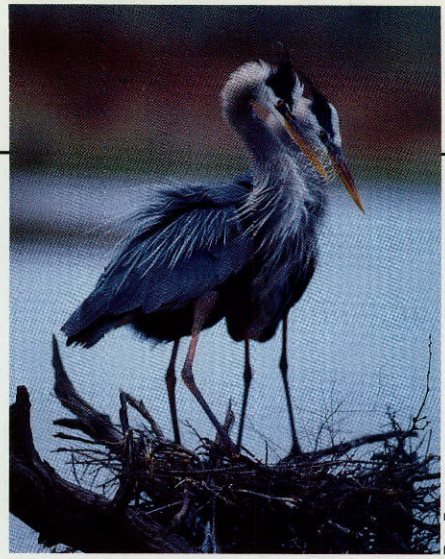
small territorial skirmishes. The dominant bird usually sends the intruder squawking and flapping into the air to find his own area and reflect on his *faux pas*.

From early February through late June, the herons elevate themselves above their mundane, isolated existence and go about the business of ensuring the survival of their kind. The reproductive stage of their lives is pomp and splendor. They are bedecked—head, neck and back—in long and sleek plumes. The slate-gray colors brighten to a definite blue, with patches of deep chestnut and black on wings and legs. The bill approaches a fluorescent orange, the most obvious indicator of the breeding season.

The heron's mating pageantry was aptly described by John James Audubon: "The males walk about with an air of dignity, bidding defiance to their rivals, and females croak to the males to pay their addresses to them." The males appear to initiate the breeding sequence by congregating in an area near a nesting site, usually in the vicinity of last year's nests. Mutual respect is more evident than establishing dominance. Some authority is chartered to the more mature birds, being enforced mostly by vocal and postural cues; serious combat is rare.

Within weeks, the mature males choose the best of the old nests. A definite breeding territory is then established and the immediate area around the nest will be firmly defended. The male will begin weaving new sticks into the nest, making repairs to impress a female. Mate selection may occur earlier, but usually this is the time the females circle overhead and choose the male and nest that best suits their fancy.

With the prime males presenting the better sites and the dominant females receiving first pick, strong genetic pair bonds are formed, ensuring survival of the characteristics that give the species their strengths. The superior pairs make up the core of a heronry, with the less experienced birds nesting on the perimeter. The nest consists of small sticks and branches that form a platform which is lined with finer grasses and brush to cushion the eggs. First year nests are small and flimsy, providing minimal support; older nests may reach four feet across and weigh more than 50 pounds. Nest building activity is continuous throughout the nesting period. Juveniles will take branches from the adults and reinforce the nest just days before fledging.



Tom Rasor

After the male herons have selected nests and made repairs to them, the females circle overhead and choose the male and nest that suits their fancy. Juvenile herons learn to grasp the parent bird's bill and shake it, stimulating the adult to deposit fresh fish into the bottom of the nest (below).

The number of nests within the colony varies considerably, from fewer than five to more than 100, depending on the availability of suitable habitat. In general, coastal heronries contain more nests, include other heron species and remain in the same location for a longer time; inland heronries are widely scattered, often abandoned and contain fewer nests.

In northern Texas, heronries are usually located in the tallest trees within a mile of prime feeding areas. Availability of nesting materials is a key factor in site selection. Inland birds often select tall mesquites and cottonwoods along creeks near open bodies of water. However, many herons build nests a few feet above water level in the remains of mesquites that are killed when stock ponds are flooded.

Wyman P. Meinzer

John Peslak

This young great blue heron has learned the fishing skill characteristic of the species.

Three to five blue-green eggs are laid in early March and incubated by both parents for 28 days. Squalling young often appear by April 1, but times may vary from year to year. Most young of the heronry hatch at about the same time, but replacement clutches (new eggs laid after the first ones were destroyed) cause herons of all ages to be present.

Both adults tend to the downy young, alternating food-gathering trips and leaving one parent to protect the young from intruding predators. A common predator at this stage is the turkey vulture, which will try to drive the adult heron from the nest to get at the young. The first few weeks are critical for the survival of the youngsters. Any disturbance that causes the adults to fly from the nest leaves the helpless young at the mercy of nature. Undue disturbance by man also can be disastrous to the heronry.

An unfortunate incident occurred at a heronry I had been observing. A road construction crew set up a temporary water pumping station within 100 yards of nests built on a stock tank near the road repair site. When the machinery moved in, the birds moved out, abandoning their eggs at this critical stage of development. Even without human disturbance, infant mortality is usually more than 40 percent.

The surviving young grow rapidly, with both parents alternately bringing food to the nest. The incoming adult will land on a branch near the nest, alight on the nest and scan the area for unseen dangers. The young clamor *cuk-cuk-cuk* in a frenzy of anticipation. Partially digested regurgitant is placed directly into the mouths of the hatchlings. As the young gain strength in the following weeks, they grasp the adult by the bill and shake vigorously. This stimulates the adult to deposit fresh fish from its specially adapted esophagus into the bottom of the nest for the juveniles. Although the youngsters struggle for the available food, competition among the offspring is not as great in this species as it is in other heron species. Often, one juvenile heron feeds alone, while the others wait their turn for the next returning parent.

About 60 days after hatching, the adult-sized young prepare to leave the nests. Preflight activities include much wing flapping and preening of flight feathers. Finally, nest hopping and branch jumping lead to short flights around the heronry. Within a week, most fledglings leave for feeding areas, sometimes following parents to observe fish-catching techniques. Learning is by trial-and-error with most attempts failing to capture prey.

Observing the awkward efforts of the heron at this stage is amusing. However, it marks the beginning of the most critical period of their juvenile lives. Fewer than 20 percent of the heron hatchlings make it through the first year of life. If a hatchling survives the first year, its chance of surviving the second year is about 70 percent. By the time they are several years old, their survival skills are honed to a fine edge.

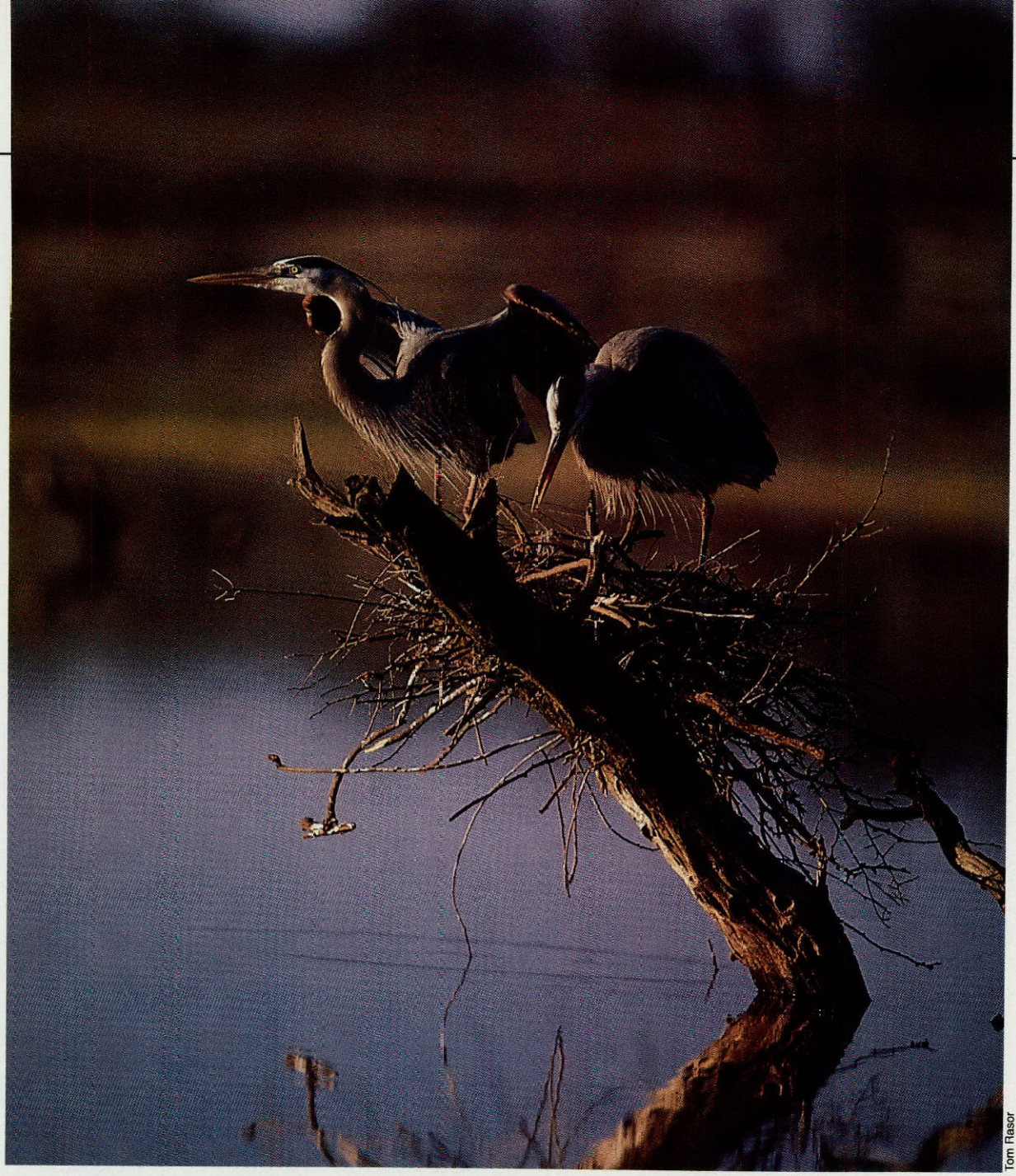
As their confidence grows, the juveniles gradually disperse to feeding areas away from parental tutors and become more solitary. As autumn ends and colder weather arrives, an optional migration to coastal areas begins for inland herons. The number of blue herons in northern Texas is reduced during the colder months, but many are seen bracing against the icy winds of January. Migration is more a matter of food availability than cold temperatures. The solitary search for food continues until the days gradually lengthen, signaling the return to the breeding areas in late February.

By constructing a blind before the birds arrived at a spring nesting site, I was able to observe blue herons from within 50 feet of their nests during peak mating activity. The pair bonding vivacity is a wildlife spectacle etched into my memory. The many visual and auditory signals that were sent in intimate communication were astounding. I have no doubt that definite messages were shared.

The female gives a distinct *arre-*

John Peslak

Preflight activities of the juvenile heron include much wing flapping and preening of flight feathers.



Tom Rasor

Pairs and juveniles disperse as winter approaches, but by late February the herons begin the return to the breeding area. Males gather nesting material, and the transfer of this material from male to female is a sure sign of mate selection.

ar-ar to signal the male to venture forth in search of nesting materials, and greet him with high-pitched clamor upon his return. The transfer of the gathered material (usually small sticks of mesquite) from male to female, is a sure sign of mate selection. Soon, the delicate feminine form, with beak thrust skyward and head plumes flowing gracefully, produces an utterance that has been described as "howling," for lack of poetic vision to give it justice. This signals readiness for a brief aerial mating encounter that precedes egg laying by a few days. So begin the many specialized activities learned through countless ages of experiences to insure the survival of the species.

The next time you sight this lonesome bird feeding along a Texas shoreline and it cries *kraak* as it departs in protest of your arrival upon the scene, think about the qualities that have brought it admiration from generations of people who have seen beauty in so simple a show. **

Outdoor Roundup

by Jim Cox

State Park System Posts Record Visitation Year

More people visited state parks during the 1987–88 fiscal year than ever before, parks officials said.

A record 20,960,284 visitors were counted during the 12-month period ending August 31, according to Wilson E. Dolman, director of the Texas Parks and Wildlife Department's Parks Division.

Dolman said the total visitation figure represents a recovery from 1986–87 when visitation fell to approximately 19.5 million. The previous high was 20.5 million in 1985–86.

Overnight visitation also increased by 8.2 percent, climbing to more than 2.2 million.

Dolman said the increased visitation could be attributed to several possible factors, including a gradual improvement in the Texas economy, opening of several new parks during the past two years, increased popularity of coastal area parks, fish stocking, generally good weather and increased public awareness of available facilities.

"Also, a recent trend has been that people nowadays tend to make more frequent but shorter recreational trips," Dolman said. "This probably caused more people to visit state parks rather than traveling longer distances out of state."

Recently opened park facilities include Fanthorp Inn and Lake Bob Sandlin, both during 1987, and Colorado Bend and Martin Creek Lake in 1988.

As in the past, the number-one attraction in terms of day visitation was the San Jacinto Battleground State Historic Park and Battleship *Texas* at Houston, with more than 1.7 million visitors.

The popularity of coastal parks was reflected in attendance figures at Mustang Island State Park near Port Aransas, which had the second-highest visitation at more than 1.4 million. Other popular coastal parks that experienced increased visitation over last year are Galveston Island, 507,337 visitors, and Goose Island with 465,387.

Several new inland parks contributed to increases in park visitation figures, Dolman pointed out. One of these is Choke Canyon near Three Rivers, where the Calliham and South Shore units hosted more than 500,000 visitors during fiscal year 1988.

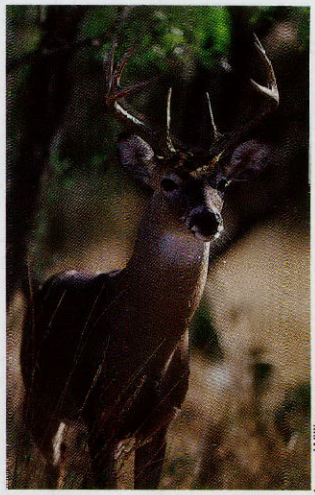
Another fairly new state park that has proven popular is Brazos Bend southwest of Houston, visited by almost 385,000 during the year. Other leading inland parks include Lake Corpus Christi, 612,000 visitors; LBJ, 523,000; Martin Dies, Jr., 493,000; Kerrville, 451,000; Palo Duro Canyon, 416,000; Huntsville, 412,000; and Garner, 363,000.

For full information on facilities available in the state parks, request the state parks brochure by writing the TPWD, 4200 Smith School Road, Austin, Texas 78744, or by calling toll-free 1-800-792-1112.

Popularity of coastal parks such as Mustang Island (right) contributed to the state park system's record visitation.

Dallas Safari Club Sets Convention, Exposition

The Dallas Safari Club, a nonprofit organization that supports several Texas Parks and Wildlife Department projects as well as conservation endeavors worldwide, will host its annual convention and hunting exposition February 9–12, 1989, at the Hyatt Regency DFW Hotel at Dallas-Fort Worth International Airport.



Leroy Williamson

"Year of the Deer" will be the theme of the Dallas Safari Club's annual convention and exposition February 9–12.

Officials said net proceeds from the convention and exposition will used by the Dallas Ecological Foundation to "help protect, conserve and manage wildlife resources in the United States and abroad, through a broad base of conservation, education and wildlife projects."

The 1989 convention theme is "The Year of the Deer," recognizing the mainstream hunters who seek these popular big game animals each year. The convention program will feature a series of awards and dinners and nightly entertainment. Auctions will be held for trophy hunting trips, jewelry, art, paintings and specialty items.

The exposition will feature the largest collection of trophy deer mounts ever assembled, in addition to more than 200 exhibitors from North America and 27 foreign countries.

For the interested hunting public, ticket donations of $8 per person for adults and $2 for children provide admission for each day of the exposition. A portion of the net proceeds will go directly to support the Dallas Museum of Natural History and the Dallas Zoo. For the dedicated enthusiast, tickets are available for three full days of convention and exposition activities. For convention and ticket information call the Dallas Safari Club at 214-630-1453. For hotel reservations call 214-453-8400.

Texas Wild Turkey Federation Donates Funds

The Texas Wild Turkey Federation has announced it will donate $10,000 to the Texas Parks and Wildlife Department to use in the agency's eastern turkey restoration program in East Texas.

The department was notified of

Leroy Williamson


Leroy Williamson

Reenactment groups will wear 1870s-style military uniforms during a February 18–19 program at Fort McKavett State Historic Site.

the gift in a letter from Paul H. Hanser, president of the federation. Hanser said the money can be used to cover transportation costs for turkeys trapped in other states and brought to Texas.

The Texas Wild Turkey Federation is an affiliate of the National Wild Turkey Federation. The Texas chapter already has made significant contributions to the eastern turkey program, according to Don Wilson, turkey program leader for the department. "They donated $25,000 in 1987, which was used to obtain turkeys for stocking," he said. In the past, the federation has donated nets to trap turkeys, trailers to transport them and a scanner to monitor birds fitted with radio transmitters.

With the support of the Texas and National Wild Turkey Federations and donations from forest products industries participating in the Type II public hunting lands program, the department was able to import a record 398 eastern turkeys during the 1987–88 winter trapping season.

New Program Recognizes Lake, Bay Fish Records

The Texas Parks and Wildlife Department has expanded its state fish record program to include the biggest fish caught from individual water bodies such as public lakes, rivers and coastal bays.

To facilitate certification of record fish, the department has created a single Fish Record Application. Officials said this single form can be used by an angler to apply for either a state record, water body record, big fish award or the Lunker Catch and Release program.

Dr. Gary Matlock, fisheries division director, said the various award programs recognize outstanding catches while providing the department important data on the state's fisheries. "I think there is a tremendous amount of interest among fishermen about the fish caught in their local lakes," he said, "and the records give them a good idea about the size of fish they can expect to catch."

Fish record application forms may be obtained from department offices across the state, or by calling toll-free 1-800-792-1112.

Rules for getting a water body record are less stringent than for a state record. However, Matlock said certain information is necessary, including the angler's name, address, telephone number, species of fish, weight, length as defined in the fishing regulations, date and location of catch and gear used. The fish must be weighed on a scale certified by the Texas Department of Agriculture, and the scale number must be included. The application must be signed by a weighmaster and two disinterested witnesses.

Qualifying fish must be equal to or greater than the existing record for the water body in question. Species include 18 of the more popular sport fish, and additional species may be included by the Fish Records Committee as fish are submitted.

Reenactment Event Planned at Ft. McKavett Park

Ft. McKavett State Historic Site, an 1870s era frontier fort, will come to life on February 18–19 with the sound of bugles, cannon shot and the jingling of cavalry riding gear as a historical reenactment program is presented.

Ft. McKavett is located in Menard County, 23 miles west of Menard on FM 864. Admission to the park is free for the program.

Texas Parks and Wildlife Department officials said reenactment groups from San Antonio, Victoria, Amarillo, San Angelo and Seguin are expected to participate.

The groups have participated in numerous movies, and their costumes and other gear are representative of the 1870s. One day in the life of a Texas fort will be highlighted, including reveille, meal calls with authentic period foods, infantry and cavalry drills, artillery drills and a civilian buffalo hunters' camp.

Officials said the two-day event will feature the Crossroads of Texas Living History Association, consisting of both infantry and artillery. The Ft. Concho 16th Infantry will bring mules and a wagon. Groups expected to participate include reenactors of the 4th U.S. Memorial Cavalry of San Antonio, the First Texas Light Artillery of Seguin and "Dixon's Skinners" from Amarillo.

The reenactors will be setting up camp in tents near the parade ground on Friday, February 17. Reveille on Saturday morning will start the living history program, which will continue until 1 p.m. Sunday.

COMPILED BY THE PARKS AND WILDLIFE DEPARTMENT'S NEWS SERVICE

Booklet on Mourning Doves Offered by TPWD

Sportsmen, landowners and others interested in learning more about Texas' most popular gamebird can obtain a new booklet entitled "Mourning Doves In Texas," from the Texas Parks and Wildlife Department.

The free booklet was written by Ronnie R. George, dove program leader for the department. It is written in nontechnical language for the layman, and deals with various aspects of mourning dove life history, habitat needs and management suggestions.

To obtain the booklet, write the Literature Section, TPWD, 4200 Smith School Road, Austin, Texas 78744.

Three Saltwater Fish Records Certified by TPWD

The state fish records committee of the Texas Parks and Wildlife Department has certified three new saltwater state fish records, including a 38-pound, 14.2-ounce blackfin tuna.

The tuna, caught by John Alvarez Jr. of Port Mansfield on June 23, erases a record set in 1968 when a 36-pounder was caught off Port Isabel.

Alvarez' fish was taken near Port Mansfield on 30-pound-test line, also earning the angler a world record for that line class from the International Game Fish Association.

A 178-pound spinner shark caught by Bobby Espinoza of Poteet on June 12 near Port Aransas is a new record. It was five pounds heavier than the previous record caught in 1986, also off Port Aransas. Espinoza's shark was seven feet, one inch long.

Also certified was a 10-pound, 7.3-ounce smooth puffer caught by Kenneth G. Fraser on May 25 in the Gulf of Mexico off South Padre Island. The fish bested a five-pound, four-ounce puffer caught in 1986 as the state record.

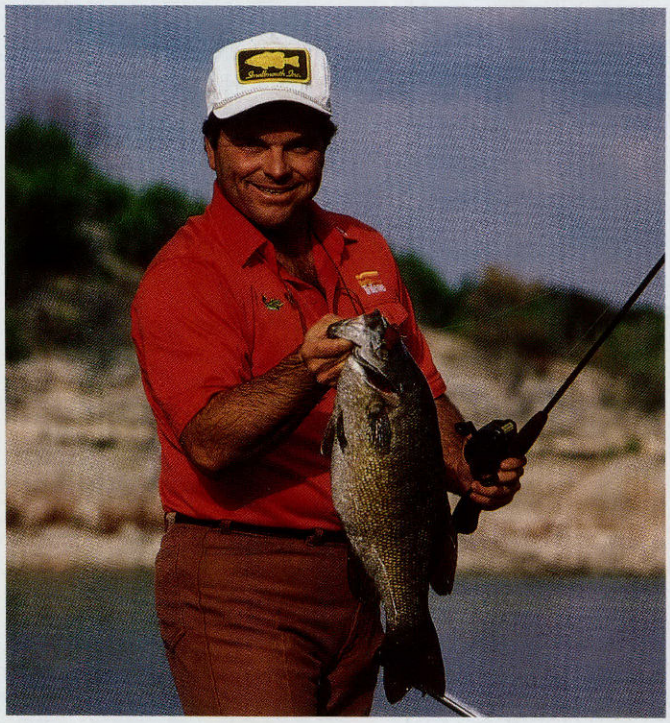
Whitney Smallmouth Is Apparent State Record

A seven-pound, 11-ounce smallmouth bass caught by fishing guide Ron Gardner at Lake Whitney on November 18 apparently will set a new state record.

Gardner kept the big fish alive, which allowed the Texas Parks and Wildlife Department to take it to the Tyler State Fish Hatchery where it remains in an indoor raceway.

Certification has not been completed, but Gardner's fish should eclipse the current smallmouth state record of six pounds, eight ounces. That fish also came from Lake Whitney in Central Texas, caught a year ago by Floyd Teat of Waco.

Gardner's fish will be kept at the Tyler hatchery, home of the department's "Operation Share A Lone Star Lunker" program, until spring when the big female will be spawned. Offspring from this unusually big fish will be reared to fingerling size and stocked in public waters.



Ray Sasser

Lake Whitney fishing guide Ron Gardner shows off the seven-pound, 11-ounce smallmouth bass that is expected to be the new state record.

Oyster Management Plan Designed to Help Resource

The Texas Oyster Fishery Management Plan recently adopted by the Texas Parks and Wildlife Commission resulted from the combined efforts of industry officials, conservation groups and Parks and Wildlife Department biologists.

Dr. Jerry Clark, director of the department's Coastal Fisheries Branch, said the plan was mandated by legislation passed by the 69th Texas Legislature in 1985. The bill required the department to adopt a management plan and accompanying economic impact analysis. "Adoption of this plan carries out the legislative mandate to manage the oyster resources of Texas in a manner that will prevent depletion while achieving optimum yield on a continuing basis," said Clark.

During the past three years, biologists gathered and analyzed extensive data on the oyster fishery, Clark said, and during 1986 the department invited all identifiable commercial fishing organizations to meet with the department staff to discuss the plan.

Clark said seven public hearings also were held along the Texas coast during summer 1986 to obtain public comments. Notice of each hearing was sent to all commercial fishermen and seafood dealers (approximately 10,000 individual invitations were sent for each of the seven hearings) and to newspapers and electronic news media. Also notified were coastal county judges and representatives, environmental organizations, commercial and recreational organizations, marine agents and others interested in the shrimp and oyster industry.

An advisory committee made up of individuals interested in the Texas oyster resource will be created to work with the department staff in formulating future rules and regulations.

"The department and advisory committee will work closely to carry out the Oyster Fishery Management Plan to assure the future well-being of this precious natural resource," Clark said.

Study Casts New Light on Spike Buck Question

An ongoing study of mule deer bucks in the Trans-Pecos region of Texas suggests that a high incidence of spike bucks in the yearling age class is normal, and that spikes should not necessarily be considered inferior deer.

Bill Russ of Sanderson, a Texas Parks and Wildlife Department biologist, is in charge of the investigation aimed at determining if mule deer spike bucks are inferior to bucks that have forked antlers during their first year of life. Spike bucks have single antlers with no prongs or forks.

Russ wrote in a report that a majority of buck mule deer yearlings are spikes during their first year. This percentage tends to increase during dry years when range conditions are poor.

"The same is true for white-tailed deer spikes," said Horace Gore, white-tailed deer program leader. "Studies on the Kerr Wildlife Management Area have shown that the percentage of spikes taken by hunters may triple or quadruple following lengthy drought."

A total of 324 mule deer were trapped for the West Texas study during the three years from 1986 through 1988, including 102 fawns and yearlings. The animals were marked with ear tags and freeze brands for subsequent identification, and then released at the trap site.

"Of the 39 known-age yearling bucks we marked, 34 have been sighted or retrapped," said Russ. "A total of 28, or 82 percent, of these bucks were spikes."

On the other hand, 12 of the 18 known-age 2.5-year-old bucks were documented, and only one was a spike. A 3.5-year-old eight-pointer was a spike when trapped as a yearling, Russ said.

"There has been a great deal of misinformation and misinterpretation of information concerning spike bucks," said Bob West, wildlife regional director in San Angelo. "The 'kill all spikes' attitude is now being applied to desert mule deer. The department has never recommended culling spike mule deer."

West believes deer management is a complex situation with virtually no easy answers. "Poor range conditions almost always produce low quality animals with smaller antlers," he said. "Spike bucks have become scapegoats, animals to be blamed for mismanagement of Texas' deer herds. The taking of spikes has never been shown to improve deer quality unless the total herd is managed."

West said the mule deer study is not yet complete, but so far the data indicate that the incidence of spike bucks in mule deer populations reflects weather conditions, and that spike fawns and yearlings have a chance to develop into good-quality, fork-antlered bucks later if range conditions allow.

"Shooting spike bucks is no cure-all for lack of quality," said Gore. "Trophy bucks, whether mule or whitetail, require two

things: age and nutrition. If these two requirements are met, everything else naturally falls into place."

Illegal Shocking Devices Hurting Flathead Catfish

The increasing use of electronic shocking devices by poachers is causing headaches for state game wardens and threatening flathead catfish populations in Texas rivers.

Texas Parks and Wildlife Department officials said the compact electronic devices are cheap to construct and easy to conceal. "We're finding increasing evidence that shocking devices are being used, and we are stepping up our efforts to stop the activity," said Maj. David Palmer, director of field operations for the TPWD's Law Enforcement Division.

Palmer said electroshocking is especially effective on flathead (yellow or Opelousas) catfish that are often found in shallow, slow-moving rivers.

An example of the problem occurred recently on the Sabine River in East Texas. Game warden William B. Decker was on routine patrol in Panola County when he saw two partially concealed vehicles with boat trailers near the river. Decker waited, and soon four men returned in two flat-bottom boats.

The investigation revealed three electronic shocking devices and 98 catfish. A total of 93 of the fish were flatheads, Decker said, with the remainder being blues and channels.

The four suspects entered guilty pleas before a justice of the peace for taking fish with illegal means. Each man was assessed a fine of $500 plus court costs of $30.50 on each charge, for a total of $10,610 plus possible further civil restitution fees.

Two suspects in a West Texas case were arrested after being caught on the Colorado River with 26 flathead catfish, which was 16 fish over the possession limit for that species.

The two were assessed fines totaling $3,743 on charges of exceeding the daily bag limit of flathead catfish and one of the men also had no fishing license.

The difficulty of detecting the use of shocking devices makes it even more important for fishermen and others on the water to report suspected shocking activity. Such incidents can be reported to the department's toll-free Operation Game Thief number, 1-800-792-GAME, 24 hours a day. If the information provided leads to arrest and conviction of a game or fish law violator, the caller becomes eligible for a cash reward. Callers may remain anonymous.

Glen Mills

Are mule deer spike bucks inferior animals, or do they have the potential to develop into trophy bucks eventually?

Texas Alligator Harvest Sets Record in 1988

Hunters harvested a record 1,644 alligators during the September 1988 season, according to the Texas Parks and Wildlife Department.

The season was authorized for portions of 15 counties in East, Southeast and South Texas.

Bruce Thompson, alligator program director, said the harvest was 248 gators higher than the previous year. "The total represents continued successful implementation of our statewide alligator management plan," Thompson said. The plan provides for sustained yield harvest of about 2,000 gators annually, given current understanding of Texas alligator populations.

Thompson said 1,746 tags were issued to landowners for distribution to hunters. The harvest total represents 94 percent utilization of tags.

The alligator management plan calls for biological surveys to be conducted each summer prior to the hunting season to determine proper harvest levels. The harvest increased from 437 gators in 1984, the first legal Texas season in recent times, to 747 in 1985, 952 in 1986, 1,396 in 1987, and the 1988 record level.

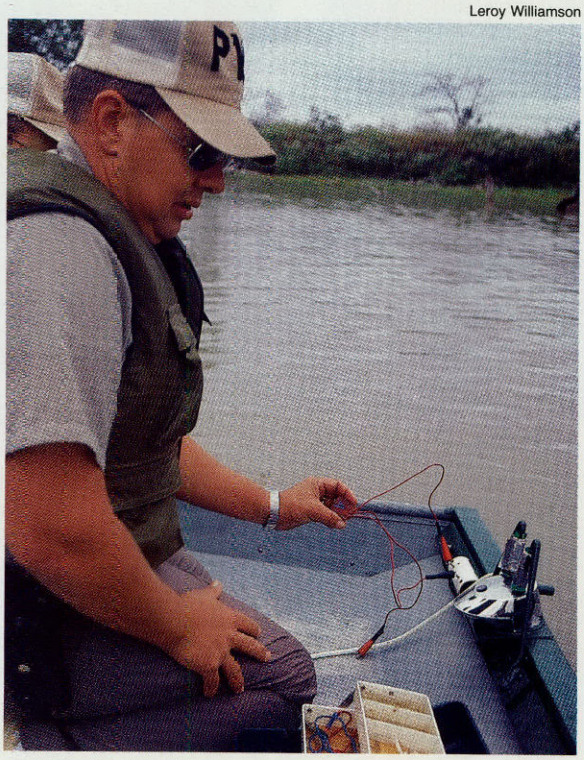
The plan is maintaining large alligators in Texas wetlands, as shown by two 13-foot, five-inch animals taken during the 1988 season. The proud hunters are Terry Bordelon, who hunted in the Trinity River drainage in Chambers County, and L. Vance Stanton, hunting at Eagle Lake in Colorado County. The Eagle Lake gator weighed 850 pounds and is the largest gator verified to date in the Texas harvest, according to biologist Royce Jurries of Columbus.

Based on a eight-foot average length of gators taken and an average value of $45 per foot of length, the 1988 harvest had an estimated worth of $592,000 to Texas gator hunters and landowners. Lease and guide fees are added values to landowners and local Texas economies.

Significant amounts of gator meat also were processed in approved facilities for sale and restaurant use. "All facets of the controlled alligator harvest are now a million-dollar industry in Texas," said Thompson, "and that improves the value of wildlife in the eyes of Texans."

Lee Ann Johnson, alligator species leader with the department in Port Arthur, said the recovery of alligators in Texas has been a great success, and their populations again are an important resource in many Texas wetlands and to wetland landowners.

Leroy Williamson



Electronic shocking devices such as these that were confiscated from a poacher are taking a toll on catfish.

March in . . .

TEXAS PARKS & WILDLIFE

For years, biologists have worked to restore the eastern wild turkey to its native East Texas range. After many disappointing efforts, the eastern turkey restoration project is finally making progress, and we'll explain how and why in the March issue. We'll also visit the gardens, ponds and trails of Harris County's Mercer Arboretum and Botanic Garden. Also in March are stories on flycatchers, and a close-up look at spring wildflowers.

by Ilo Hiller
Photos by Stephan Myers

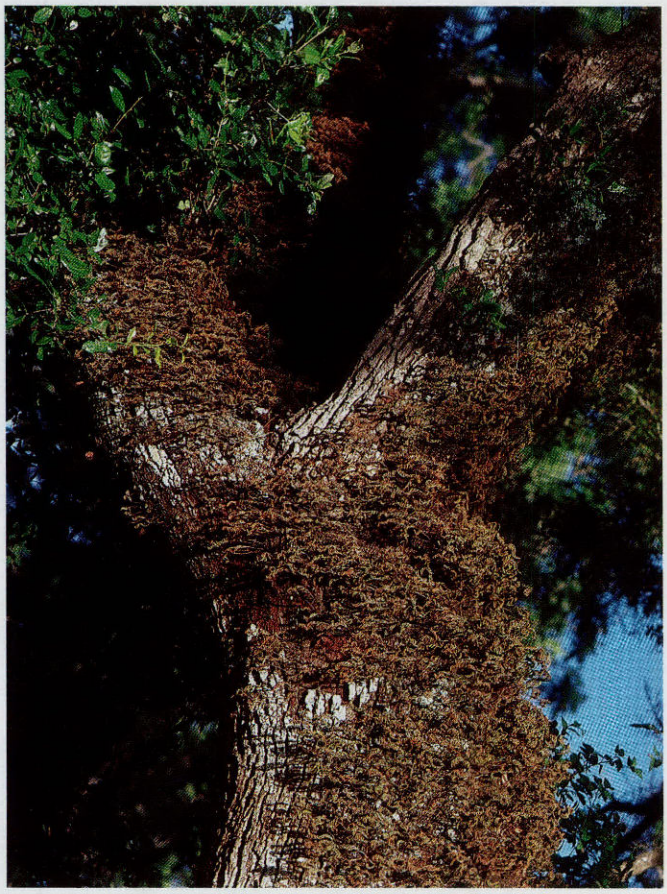
Resurrection Fern

Ferns appeared on the earth millions of years before there were any flowering plants, and scientists believe they were the primary vegetation of that time. Some grew as tall as trees and were a major part of the ancient forests. When these prehistoric ferns decayed, they helped to create the great coal deposits we now use for fuel.

Today, flowering plant species far outnumber the ferns. In fact, there are fewer than 10,000 species of ferns in the world and only 300 varieties in the United States. Some are so small they look like moss, while others are as large as trees. Some of them can grow in cold climates, even north of the Arctic Circle or on mountains at elevations of more than 15,000 feet. However, the greatest number are found in the tropics where heat and moisture still encourage their remarkable growth. Tropical tree ferns may grow to a height of 50 feet and have fronds (leaves) that are 20 feet long.

Most ferns grow in the soil, but some are aquatic and a few fall into the air plant category. (Air plants receive their nutrients from moisture and airborne particles of decayed matter.) The smaller ferns of our cooler lands seem to grow best in moist, shady areas with other vegetation.

One type of fern that has adapted to our Texas climate is the resurrection



Resurrection fern fronds (above) have a leathery textured surface and are divided into round-tipped leaflets. These leaflets extend from the center stem of the frond, but they are not paired directly across from each other. In dry weather, the fern appears to be dead (right); however, it can live in this dry, shriveled condition for weeks, waiting for rain to revive it.

fern, *Polypodium polypodioides*. Polypodi means "many feet" and refers to this small evergreen fern's tiny rootlets.

The common name, resurrection fern, is appropriate because this plant, which curls up and looks dead in dry weather, becomes lush and green shortly after it receives moisture. It can live for weeks in a dry, shriveled condition waiting to be revived. This adaptation makes it possible for this fern, which needs moisture, to survive when there is none.

The resurrection fern prefers shade or semi-shade and often is found growing on trees in swamps or along streams where the humidity is higher than on the drier hillsides. Its fronds grow from a slender, cordlike, woody

The lighter colored bumplike structures along the surface edges of the leaflets show the locations of the fruit dots that form on the underside. Look in the upper right-hand corner (left) to see some of these exposed brownish-red fruit dots. After a rain, the dry, shriveled resurrection fern is transformed into a lush green plant.

rootstock that creeps horizontally along the tops of old tree branches, especially the live oaks in the southeastern part of the state. It also grows ivylike on stumps and logs, rock ledges, boulders, old buildings and along mossy river banks.

It is common in the Timberbelt region of the state and in the eastern half of the Coastal Prairies. It is scattered more sparsely in the Blackland Prairie region. The resurrection fern's range extends northwest to Parker County, southwest to Atascosa County in the Rio Grande Plains, and it is found in Uvalde County on the Edwards Plateau.

The fronds of the resurrection fern are about eight inches long and have a leathery texture. These fronds are divided into leaflets that have narrow, rounded tips and often wavy edges. The leaflets extend from the center stem of the frond, but they are not paired directly across from each other. The upper surface of the frond is dark green. The under surface is a lighter gray green and it is covered with tiny, pointed, tear-drop shaped, gray scales. These scales, with their dark reddish brown centers, are like little water reservoirs. They swell up as they absorb water, and they hold the water next to the leaflets so it can be absorbed by the fern.

Ferns do not grow from seeds. They grow from spores that are so tiny they cannot be seen with the naked eye. According to folklore, witches used these spores in their potions to make themselves invisible.

Thousands of the microscopic spores are enclosed in a spore case, which is a little round capsule covered with a single layer of transparent skin. Many of these spore cases, each one growing on a little stalk, are clustered together on the underside of the frond leaflets in arrangements or clusters known as fruit dots. The fruit dots appear in rows along the edges of the leaflets, and all leaflets on a fertile frond will have these fruit dots. Spores for the resurrection fern are produced from May to November.

When the spores are ready to be released, a jointed ring that surrounds the spore case snaps open at the four o'clock position. This powerful snap catapults the spores into the air. They are easily carried by the wind and when they fall on warm, moist ground, they can germinate and begin to grow. Only a few will survive.

These tiny spores do not produce a fern plant like the one they came from. Instead they grow into flat, heart-shaped plants about the size of a thumbnail. These plants are so small that few people ever see them. Later these small, heart-shaped plants produce sex cells and go through a reproductive cycle that produces the fern plants. This type of reproduction is what botanists call alternation of generations. In other words, fern plants do not look like their parents; instead they look like their grandparents. **

A closeup of the leaflet underside (top right) shows the fruit dots where the reproduction spores form. Also visible are the scales that serve as reservoirs, absorbing water and holding it next to the leaflets so it can be absorbed by the fern. The dry frond (center right) is revived by moisture (below). New fern plants (bottom right) appear in alternate generations. They are produced by tiny, heart-shaped plants that grow from the spores. Fern plants look like their grandparents.

Letters

Gafftopsail Catfish

Where have all the gafftopsail catfish gone?

Galveston Bay, between Red Bluff and Seabrook, was full of big gafftops in the 1950s, and there were so many little ones that they were pests.

In recent years, we haven't caught a single gafftop, large or small. Your "1986–87 Texas Saltwater Fishing Guide" failed to even mention them.

Are gafftops hiding out some place, or are they dying off?

Daniel E. Johnson
Hayward, California

■ It probably could be said that gafftops are much like several other bay/surf species of the Texas coast, in that they are not as numerous as they were during the 1940s and 1950s.

However, Lynn Benefield, chief of our fishery station at Seabrook, said creel and net surveys during the past decade have not indicated any shortage of gafftops. He said gafftops are somewhat migratory, and may be concentrated in one area and absent in another.

Fishing pressure has increased dramatically in the bays, and perhaps more anglers are going after catfish because of more restrictive limits and the difficulty of catching the more popular game fish such as red drum.

There should be plenty of gafftops, however, for your next trip to Texas.

Praying Before Eating

In July 1988, I noticed a praying mantis on our hummingbird feeder. Thinking it might frighten the birds, I removed the insect and placed it on a branch of the tree on which the bird feeder was hanging.

The next morning, I saw that the praying mantis had returned and in its claws was a dead hummingbird. The powerful insect apparently had grabbed and killed the bird and was calmly eating the breast meat.

We were wondering if any of your readers ever witnessed this. I was under the impression that praying mantis ate only other insects.

We enjoy *Texas Parks & Wildlife* very much. As new residents of Texas, we find the magazine to be very informative.

George D. Schultz
Bandera

Panhandle Texans

My husband and I really enjoy *Texas Parks & Wildlife*. Being native West Texans, we appreciate it that you do not ignore the Panhandle and West Texas as many "Texas" magazines do.

Some Texans don't realize that there is a wonderful expanse of land and people north and west of Dallas/Ft. Worth.

Teresa E. Cavitt
Granbury

White-winged Doves

I have wondered why the Texas Parks and Wildlife Department or some other appropriate agency has never tried to introduce the white-winged dove into other parts of Texas.

It seems like the mesquite and huisache brush bordering the coastal highway from Corpus Christi to the Colorado River convergence with the bay would provide good habitat for whitewings.

Parts of this area have more oak than mesquite, but I believe the birds would adapt. The grain farmers, however, might disapprove of this. What is TPWD's opinion?

E. Bauer
Victoria

■ The white-winged dove is a tropical, migratory species that reaches the northern extent of its vast Central and South American breeding range in the southwestern United States.

Although whitewings have been reported by reliable observers in North Texas (there are even band returns from Arkansas), the areas surrounding Galveston, Austin and El Paso currently mark the northern extent of the breeding range in Texas.

During the 1970s, the Texas Parks and Wildlife Department trapped, transported, overwintered and released more than 700 juvenile white-winged doves at the Chaparral Wildlife Management Area near Artesia Wells in south-central Texas. The number of whitewings currently at the Chaparral WMA, however, is not significantly greater than before the stocking.

Efforts to stock migratory birds often are unsuccessful because the birds simply travel to more suitable habitat when released.

Ron George
White-winged Dove Program Leader
Wildlife Division, TPWD

Henderson Attractions

First, let us commend you for publishing the article in the October issue on Martin Creek Lake State Park. However, we were disappointed that the story did not give more detail to the attractions and historical points of interest that we at the Rusk County Chamber of Commerce have worked so hard to develop.

Without the support of the Rusk County Chamber of Commerce, Rusk County Commissioners Court, State Representative Jim McWilliams and this entire county, this particular state park would not be in operation today.

Again, we thank you for your coverage of Martin Creek Lake State Park. We hope that in the future you will work more closely with us in developing stories that affect Henderson and Rusk County.

Jim Robertson
Harold Sadler
Henderson

■ For information about attractions and historical points of interest in Henderson, contact the Rusk County Chamber of Commerce, 201 North Main, Henderson, Texas 75652, telephone 214-657-5528.

Bargain Publication

Texas Parks & Wildlife is my favorite magazine and I would like to give gift subscriptions to other people besides my son, but we are on a limited income.

Although we have dropped many magazines, including *National Wildlife,* I'm hanging on to *Texas Parks & Wildlife* because we get so much enjoyment and information out of it!

Ora Stengler
Pinehurst

INSIDE BACK COVER

As February leaves its last freeze over the state, round-headed katydids such as this one begin appearing on weeds, bushes and trees, even prickly pears. Usually green in color and more than one inch in length, round-headed katydids sing songs consisting of high-pitched lisps or ticks. Photo by Leroy Williamson.