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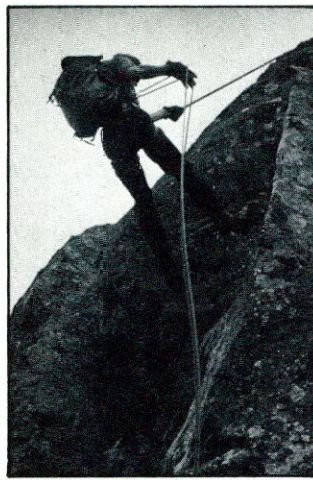
**TEXAS PARKS & WILDLIFE
magazine**

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

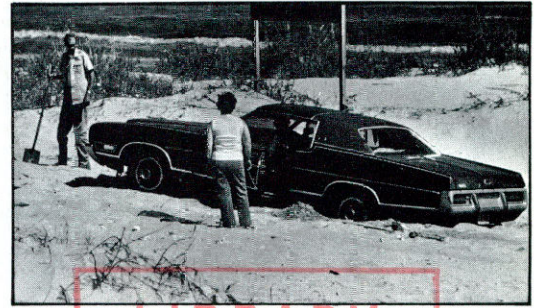
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TEXAS
PARKS & WILDLIFE

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Front Cover: The Texas antelope ground squirrel, characteristic of the desert regions of the Southwestern portion of the state, is a fidgety, nervous creature that can run with surprising speed. Photo by Jim Whitcomb.

Inside Front: Spinning such intricate webs as this is an almost daily toil for the group of spiders known as the orb weavers. Photo by Leroy Williamson.



Return of the Eastern Turkey

by Phil Evans, Wildlife Biologist
and Leroy Williamson, Information Officer, Tyler

Wild turkeys once roamed East Texas forests in plentiful numbers, but by the early 1900s a combination of factors had all but eliminated these magnificent game birds from their native ranges.

Land clearing and a general reduction in hardwood habitat decreased the eastern turkey's range and is primarily responsible for the birds' reduction in numbers. However, the responsibility for the near-total annihilation of turkeys in some areas of deep East Texas has to be placed squarely on the shoulders of illegal hunters.

Although the wild turkey disappeared from the land, it didn't disappear from the memory of man. Landowners who once had wild turkeys on their land wanted them back. Sportsmen, knowing that turkeys once existed in huntable populations in the eastern part of the state, wanted turkeys restored to huntable numbers again.



Wildlife biologists were sure that, given proper protection, turkeys could be reestablished over much of their traditional eastern range. But, there was a problem — broodstock. Although Texas had turkeys in other areas of the state, they were not the same variety native to East Texas. Rio Grande turkeys in Central, South and West Texas were plentiful. They could be trapped and moved to East Texas, but it was unknown whether these birds, accustomed to arid conditions, could survive the wetter climate in the eastern part of the state. Biologists thought it was worth a try, so Rio Grande turkeys were trapped and transferred to a variety of habitats in East Texas. For a while it looked as though these “easternized” Rio Grande turkeys were going to do well, but the wet, humid conditions were not appropriate for nesting and poult production. It soon became apparent that a successful reestablishment of turkey in East Texas would require broodstock of the true eastern turkey which was historic to that area.

Since there weren't enough eastern turkeys in

Biologists at the Management and Research Station at Tyler have raised and released more than 800 turkey since 1973. Artificial lighting, simulating extra hours of daylight, is being used to induce the birds to begin laying two months earlier than normal. Two varieties of turkey are being propagated — the true eastern and a hybrid Rio Grande/eastern cross.

Candling eggs after a period of incubation enables biologists to determine the percentage of fertility in the hatch. It also shows the embryo's stage of development. All infertile eggs with nondeveloping embryos can then be eliminated.



Texas to furnish broodstock, adult birds were obtained through cooperation with other states. To complement the program, an eastern turkey propagation program was undertaken in 1971 at the department's Management and Research Station at Tyler.

Since 1973, biologists at the station have raised and released more than 800 turkeys, and 1976 production is expected to surpass all previous years.

Actually, two varieties of turkeys are being propagated for release — the true eastern and a hybrid (Rio Grande x eastern). The hybrid birds are stocked in a transitional zone between East and Central Texas, where neither the pure eastern nor the Rio Grande species are able to thrive under present conditions. These "cross" turkeys are populating a vegetative transition zone between meridians 95° and 97°, which includes Blackland Prairie, Post Oak Savannah and Coastal Prairie. The true eastern turkeys are released east of the 95th meridian in the Pineywoods ecological area.

Criteria for the selection of turkey release sites are stringent. First, a minimum of 8,000 acres in one solid

block must be covered with a wildlife restoration license. These licenses represent an agreement between the landowners and the Parks and Wildlife Department prohibiting hunting of turkeys for a period of five breeding seasons, with an option for five additional seasons.

Biologists inspect proposed release sites to assure that the range is suitable turkey habitat. Good turkey habitat consists of a variety of hardwood and pine species, rather than pure stands of pine trees; some open areas of grass fields; and uplands and bottomlands that are rather open in understory vegetation with large trees that produce food and quality roosting sites.

Fields are necessary for young poults to obtain a large supply of insects, a food that makes up 90 percent of their diet for the first two weeks of life.

Stands of hardwood trees provide acorns for food and roosting areas. An understory of fruiting shrubs is seasonally important as turkeys physically develop for the breeding season.

Every effort is made at the Management and Re-



At 12 to 14 weeks of age, the pen-raised turkeys are released in groups of 10 gobblers and 20 hens at sites containing suitable turkey habitat. Prior to being released, some of the young birds are marked with colored wing tags, and all receive numbered leg bands.

leased turkeys, report that some of the birds have nested and many released two years previously still are alive.

To increase production, biologists utilized artificial lighting to induce turkeys to lay eggs earlier in the year than normal. By turning the lights on for a few extra hours of "daylight," beginning in December, the turkeys were deceived into thinking that the breeding season had come. They began laying eggs in February, two months earlier than normal. This early laying season also reduces the chances that higher summer temperatures will affect egg laying or hatchability. Additionally, a longer laying season is expected.

When the turkeys are 12 to 14 weeks of age, they are released in groups of 10 gobblers and 20 hens. Some are marked with colored wing tags; a few will have miniature radio transmitters strapped to their backs so their movements can be followed; and all wear numbered leg bands.

Feeding devices have been placed in some turkey release areas by landowners and sportsmen. Supplemental feed helps hold the turkeys in an area, carry them through stressful months of the year and provide locations for biologists to gather information about the released birds.

The turkey restoration program gains momentum as increasing numbers of birds are released each year. With cooperation from landowners and sportsmen, biologists are optimistic that turkeys raised at the Management and Research Station and released into the wild can help to restore the eastern turkey to its native range. **

search Station to keep the hatchery-raised turkeys isolated from human influences so that poults remain as wild as possible and do not become so identified with man that they recognize humans as their source of sustenance.

Observation studies made in other states where turkey propagation projects are underway point out the fact that pen-reared birds are inferior to wild, trapped birds. These studies also indicate that survival of pen-reared turkeys is limited because they lack "woods knowledge" and wariness towards man and predators. However it is hoped that restoration of the wild turkey in East Texas will be accomplished in part by using pen-reared birds.

Department biologists are increasing their knowledge about the "hows" and "whys" of turkey propagation each year. During the initial year of the restoration project, no turkeys were produced. The next year, 11 birds were released. Production policies and procedures changed during the third year and 91 birds were raised and released. In 1975, production was up, and 750 birds were released. Biologists, checking on re-

Those Fighting Pickerel at Caddo

Article by Alan Allen
Photographs by Leroy Williamson

Pickerel hide among the cypress roots, lily pads and shoreline weeds, waiting to ambush any prey that comes within striking distance. Casting close to this type of cover can produce a nice stringer of pickerel as well as an occasional bass. More than 50 species of fish have been found in Caddo Lake, making it a year-round fishery.





Heaven, to a fisherman, might be a place where the fish strike as many as four times on a single cast. Not only would these voracious fish be ready to take a lure at almost any time, but they would also inhabit a peaceful lake studded with towering cypress trees heavy with Spanish moss.

If this is your idea of heaven, don't despair. You won't have to die to get to such a place; just visit Caddo Lake in northeast Texas. There you will find moss-laden bald cypress trees and a fish with the characteristics described above — the chain pickerel, *Esox niger*.

Admittedly, the chain pickerel, or jackfish, does not grow to monstrous proportions, but what it lacks in size, it more than makes up in fight. It will attack almost anything, and some have been found choked

to death from trying to swallow fish almost as large as themselves. Almost any lure a largemouth bass will accept can be used.

The state-record pickerel was caught on a floating-diving, minnowlike lure; but spinners, spoons, jigs, topwater plugs and other bass lures will also catch these fighters. Yellow is considered the best lure color. The current record holder, caught at Caddo Lake on March 27, 1976, weighed four pounds seven ounces, was 24½ inches long and had a girth of 11¾ inches. The previous record holder, taken from Caddo in 1971, weighed four pounds 6½ ounces.

Flyfishermen might try streamer flies, deerhair frogs or other floating artificials. A small spinner blade or two added to the streamer might make it even more attractive to

pickerel, as they seem to prefer the flashier lures.

During your first try for pickerel, you may be surprised to see one swirl at your lure two, three or even four times; or the fish may follow the lure almost to the boat before attempting to take it. Since anglers normally speed up their retrieve as the lure nears the boat, this faster action sometimes excites pickerel, provoking a strike. If pickerel do this repeatedly without being hooked, try a faster retrieve, keeping the rod tip near the water and working the lure all the way back to the tip.

When a pickerel rushes toward your lure, creating a wake that brings your heart into your throat, it may cause you to try to set the hook too soon. The fish may stop short and leave you sitting there choking,



Pliers come in handy to grasp the pickerel's lower lip to land it or to remove a hook from its toothy jaws. Pickerel can also be boated by carefully grabbing them behind the head, but watch out for the sharp gill covers.

or it may rush in and grab the lure. If you see a fish miss your lure or "boil" the water near it, make a few more casts to that same area. The next one might be successful.

Once you have hooked a pickerel and fought it to within reach, don't think it has given up. Look for a last-minute run. Also *don't try to "lip" one* as you would a bass, because the pickerel's teeth are formidable weapons, used to slash and kill prey, and they can slash fingers as well. If you don't have a landing net, either lift the fish into the boat with your line, or use a pair of pliers to grasp its lower lip. Pickerel can be landed by grabbing them behind the head, but do it carefully as the sharp gill covers can also cut your hand.

Due to their size, pickerel give their best fight and perform their wildest acrobatics on light tackle



such as flyrods and spinning gear. If you use light or ultra-light equipment, a leader of stout monofilament or wire will keep the teeth from cutting the line and you can use this leader to lift the fish into the boat.

Since pickerel prefer to ambush their prey rather than search for it, they hide among the cypress roots, or lie among logs, lily pads and shoreline weeds, darting out to catch any prey that happens to come within striking distance. This trait helps the angler and lets him know that each place that might hold a fish should be covered thoroughly with casts made close to the cover.

Few fishermen eat the pickerel they catch even though it makes good eating when fried, broiled or baked. There are rows of Y-shaped bones down the sides of the fish, but they are large and fairly easy to remove as the flesh is being eaten.

More than 50 species of fish have been found in Caddo, including black, yellow, white and spotted bass; black and white crappie; blue, channel and flathead catfish; sunfish; and the odd-looking spoonbill

cat or paddlefish. This abundance makes Caddo a year-round fishery; pickerel may be caught from September through April but many experienced anglers think they bite best during the winter months.

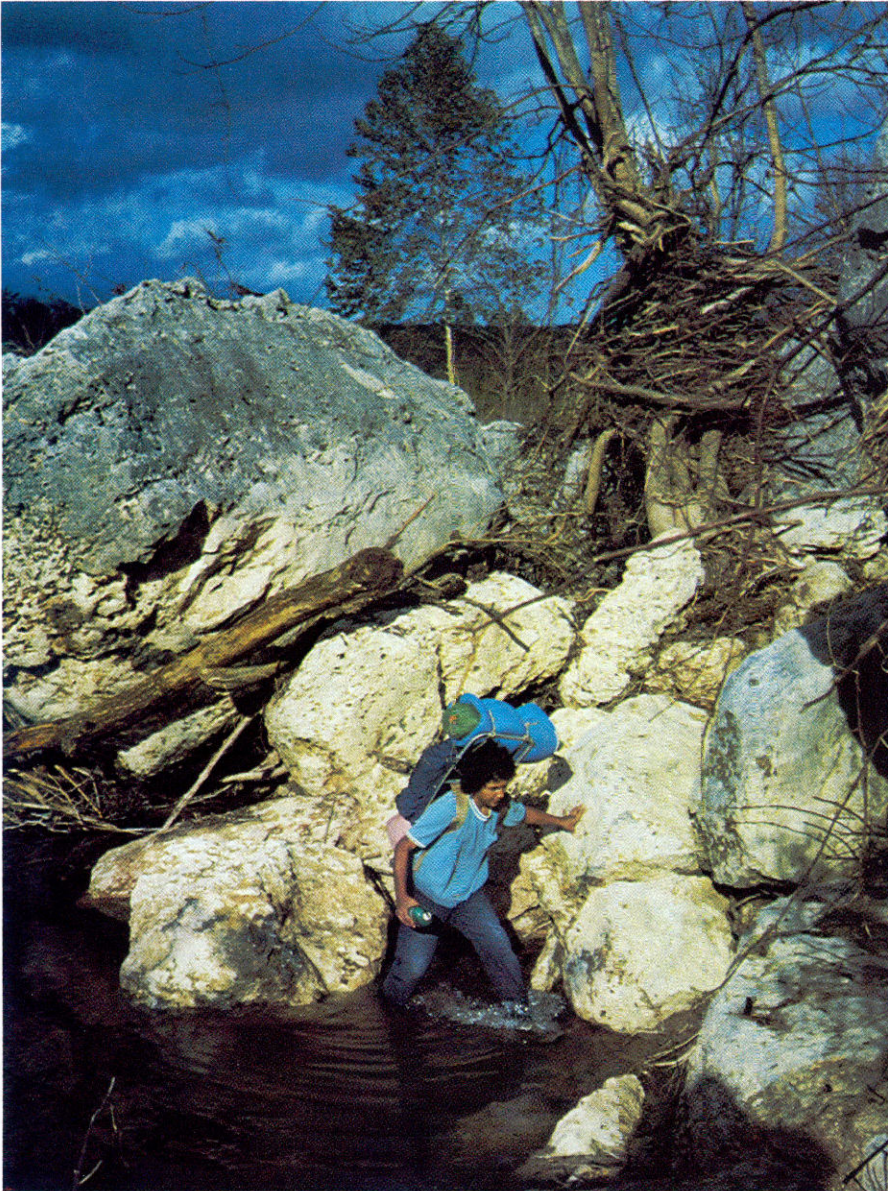
The lake is a maze of cypress, brush, lily pads and other growth. Gray (cat) squirrels, other wildlife and the many bird species distract visitors. While casting and admiring the scenery, anglers may fish for hours and seldom meet another human. If you are a newcomer to the lake, stay on the established boat roads that have been marked by the Texas Parks and Wildlife Department unless you are prepared to spend a night listening to screech owls and other nocturnal creatures. If possible, tell someone where you're going on the lake and when you expect to return.

There are a number of camps around the lake offering guide service, boat ramps and rental boats and motors. Until you become familiar with the lake you may find it helpful to hire a guide.

Caddo Lake State Park is located on Big Cypress Bayou (the main feeder stream) near the western or upper portion of the 32,700-acre lake. To get there, go 14 miles northeast of Marshall on Texas Hwy. 43 (which lies between Marshall and Texarkana), then travel east on FM 2198 for about one mile and the park will be on your left.

The state park has a boat ramp, trailer sites with water, electrical and sewage hookups, campsites, screened shelters and single-family cabins. There are hiking trails, picnic areas and a playground. The Park Visitor Center offers displays of Indian relics and information on area fishes, birds, wildlife and the history of the park and lake.

The park's beauty is attracting more and more visitors each year, and a new record for attendance will probably be set this year. If you plan to visit Caddo Lake State Park, you might want to make advance reservations for either the screened shelters or the cabins by writing: Park Superintendent, Caddo Lake State Park, Route 2, Box 15, Karnack, Texas 75661, or call AC/214-679-3351. **



Hiking in the north fork of the San Gabriel River or spelunking in Gorman's Cave near the edge of the Colorado River are not activities designed for those students who object to getting wet or muddy.



Austin Wilderness Institute teaches high school students **OUTDOOR SKILLS**

by M. Lauren Nagel

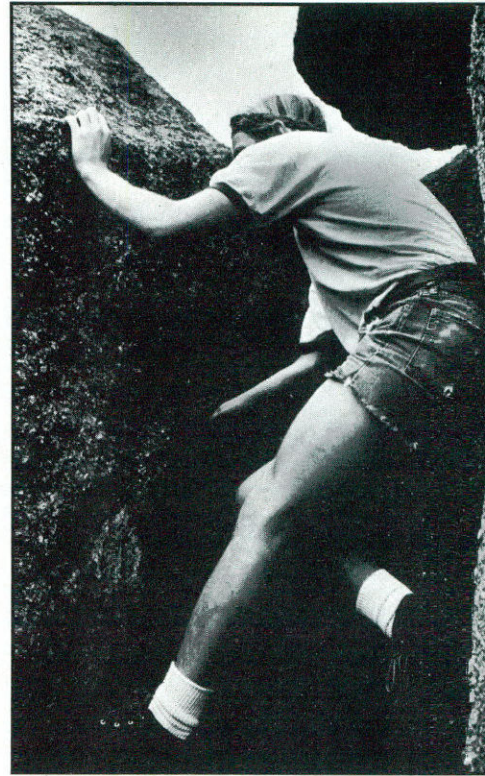
"We need to take our young people off the streets," has been a popular slogan for years, but to many, a slogan is all it is. However, one organization in Austin is doing just that. The youths not only are being taken off the streets, but out of the city and into the wilderness.

Austin Wilderness Institute (AWI) takes 80 high school students each semester on four weekend camping trips; instructing them in backpacking, rock climbing, canoeing and spelunking (cave exploring). The emphasis is on learning outdoor skills and developing a respect for nature.

Founded in 1973, AWI is a part of the Natural Science Center, which is funded by the Parks and Recreation Department in Austin, one of the few cities that pays for a wilderness program.

Most similar programs in other areas require participants to furnish their own gear, making the cost prohibitive for the low-income student who must buy

During the rock climbing expedition to Enchanted Rock, students learn how to use the chimney technique (extreme right) for climbing and the rappelling technique (right) for descending. Full packs, calf-deep water and walking sticks are all a part of the hiking adventure (below).



Photographs courtesy Austin Natural Science Center



The two-day canoeing expedition on the Colorado River is not all hard paddling. Students find many opportunities to pull into a shady bank area to relax, cool off with a refreshing swim and get to know each other better.

how to use the equipment necessary for each outdoor activity and to decide on food provisions. Food is not furnished by the AWI.

Outings, which begin early Saturday morning and end late Sunday afternoon, are limited to a 60-mile radius of Austin, but they include such activities as a canoe trip down the Colorado River; spelunking in Gorman's Cave, 30 miles outside Lampasas; rappelling off Turkey Peak, an 84-foot pinnacle of Enchanted Rock located near Fredericksburg and Johnson City; and backpacking along the San Gabriel River, an excursion that will have to be relocated when a dam floods the area.

Probably the favorite of the four trips is the one to Enchanted Rock. Imagine standing at the edge of an 84-foot pinnacle, pushing away and dropping, with nothing supporting you but ropes. That first step is the hardest and, although it sounds terrifying, the students always seem to enjoy the experience.

Spelunking, like rappelling, is a unique experience for the students. They quickly learn that cavers don't "walk around" and that a cave is no place for the person with claustrophobia. Since this particular cave is on the edge of the Colorado River, water washes in during heavy rains, leaving the cave floor quite muddy. The students end up crawling part of the time on their hands and knees or sliding along on their stomachs in the mud. After several hours in the total darkness of the cave, broken only by the students' flashlights, the explorers emerge covered with mud from the bottoms of their tennis shoes to the tops of their protective helmets.

These four basic trips are planned by the leaders; however, after completing them, the students are eligible for the "Alumni Club." This group goes on extended trips, such as backpacking in Colorado in the summer spending seven days on the trail, or a 10-day canoe and backpacking trip to Big Bend during the Christmas holiday. Alumni Club members plan their own trips with little help from the group leaders. They are limited only by their own ambitions.

Programs such as the ones sponsored by the AWI help young people learn new, outdoor-oriented activities that give them a chance to become personally involved with the environment.

Since people are basically selfish and will preserve that which they enjoy, by involving these students the urge to protect the outdoors for recreational purposes is implanted in their minds. They just may be the ones to save it for future generations. **

or rent a backpack, canoe or other outdoor gear. Because AWI owns more than \$30,000 worth of equipment, the cost borne by the student is minimal — \$15 for all four trips, with a part of this small fee being used to repair or replace worn-out equipment. Shuttle buses (available through the Parks and Recreation Department), 8 canoes with paddles, 6 four-man tents and dozens of backpacks of various sizes equipped with canteens and sierra cups have been accumulated by AWI over the past four years through budget allotments and donations.

Students learn about the program through their schools, and no screening process is used. The outings are offered on a first-come, first-served basis with any student being eligible.

The 80 successful applicants are divided into four groups, each meeting in one of the various Austin recreation centers. Each group will have two leaders — one from the Natural Science Center and the other from the sponsoring recreation center — experienced in outdoor activities. Ideally, each group will contain 10 boys, 10 girls and a male and female leader, but it doesn't always work out that way.

Before the outings, the groups must meet to learn

OUTDOOR BOOKS

TOPWATER FISHING by Max Eggleston; Cordovan Corporation, 5314 Bingle Road, Houston, Tex. 77018, 1975; 94 pages, \$7.75 hardback and \$4.75 paperback.

Although it is more the personal history of a bass angler than instructions on how to catch bass, this book still can be thought-provoking to any fisherman.

There are tales of fish caught after a "pattern" was established (even though Eggleston doesn't call it a pattern), and the techniques used might be imitated or perhaps tempt an angler into doing some experimenting on his own.

Parts of the history of bass fishing in Texas, including such innovations as the introduction of monofilament, are recounted. "Knuckle buster" reels, silk lines and old lures like the Heddon Dowagaic, Al Foss' Shimmy Wigglers and Creek Chub Plunkers are a few of the items mentioned. It's not all history, though, since some modern lures are discussed.

As the title states, the book is about topwater fishing, mainly for bass. Eggleston tried worm fishing but quit it because, as he puts it, "I wanted to go out in a blaze of glory on top." If you sometimes use a topwater lure and also would like to do some light reading, you should enjoy this story. — Alan Allen

EASTERN TRIPS & TRAILS by Bill Thomas; Stackpole Books, Cameron and Kelker Streets, Harrisburg, Pa. 17105, 1975; 253 pages, \$4.95 paperback.

MID-AMERICA TRIPS AND TRAILS by Bill Thomas; Stackpole Books, Cameron and Kelker Streets, Harrisburg, Pa. 17105, 1975; 238 pages, \$4.95 paperback.

TOURGUIDE TO THE ROCKY MOUNTAIN WILDERNESS by Raymond Bridge; Stackpole Books, Cameron and Kelker Streets, Harrisburg, Pa. 17105, 1975; 160 pages, \$3.95 paperback.

Stackpole Books has recently released a series of wilderness tour guides for those of us anxious to be released from the commonplace. Whether the goal is hiking, backpacking, camping, canoeing or just sightseeing, the traveler who

first browses through these guides will command the most interesting and memorable experiences time allows.

Eastern Trips & Trails presents more than 60 points of interest in 16 states — from Maine to Florida. *Mid-America Trips and Trails* covers more than 50 unspoiled wilderness areas in 17 states, including Texas. *Tourguide to the Rocky Mountain Wilderness* leads to 18 specific areas in six states.

Each of these guides provides brief descriptive material, including what to see and do, flora and fauna of the area, the best routes for getting in and out of the area, the best roads for sightseers, where to hike and camp, backpacking opportunities and area maps. Addresses for obtaining further information are provided for each of the sites.

Other books not reviewed, but also in the series, include *Western Trips and Trails* by E.M. Sterling (1974, \$3.95 paperback), *Ghost Towns and Back Roads* by Donald Bower (1974, \$4.95 paperback) and *Discovering the Appalachians* by Thomas Connelly (1968, \$4.95 paperback). — Elaine Byrne

CHARLEY DICKEY'S DOVE HUNTING by Charley Dickey; Oxmoor House Inc., P.O. Box 2463, Birmingham, Ala. 35202, 1976; 112 pages, \$2.95 paperback.

This book gives an overall view of dove hunting in the United States, a big topic that cannot be covered in such a small book unless written in a general way. It is mainly about hunting mourning doves (the turtledove is a European relative), with a few comments on whitewings and bandtails. All three are migratory game birds and are covered by federal laws. At times, all three can be found in Texas.

The four most popular dove hunting methods are discussed: field hunting, covering the waterholes, intercepting flight lines to roost areas and jump shooting.

Dickey also relates some interesting facts about the mourning dove. It can fly 35 to 40 miles per hour and may reach 60 with a tailwind. There are normally two eggs laid at each nesting, and the nestlings are usually of the same sex.

They may double their weight in the first 24 hours of their lives.

In individual chapters, the author covers the life history of dove and their range, how to find a place to hunt, guns and shells, other equipment, dogs, selecting a shooting site and how to hit a dove. Chapters also cover the setting of hunting regulations, field care of the birds and recipes.

In the guns and shells section you'll learn how to determine the choke of your dove gun, regardless of what the manufacturer has stamped on the barrel.

Dickey writes well and humorously which makes for enjoyable reading. Throughout the book his admiration for the mourning dove is evident: "I bagged 12 dove with 13 shots, a feat I have since related to every hunter I could corner."

— Alan Allen

HOW TO CATCH SALT-WATER FISH by Bill Wisner; Doubleday & Company, Inc., 245 Park Avenue, New York, N.Y. 10017, 1973; 584 pages, \$8.95.

Although this book deals with the when, where and how for catching 23 popular fishes of the Atlantic Coast, there are chapters and tips that still should be of interest to Texas fishermen. Quite a few of the fish discussed, such as weakfish (speckled trout), flounder, sharks and kingfish, are sought in Texas, and Wisner's illustrated riggings could pay off in the Gulf.

The first few chapters cover choosing the proper size tackle for particular species. Lines, lures, hooks and accessories are also discussed. Most of the author's advice seems logical and well thought out, as though he has tried it and has confidence in it.

In the remaining chapters, Wisner discusses the 23 species and the best techniques, whether with lures or bait, to use in trolling, casting, surf fishing and other methods. He gives insights into the fishes' habits and range, and the best ways to find, hook, play and land each particular species.

Every technique, when appropriate, is thoroughly examined. Trolling, for example, is mentioned with each species that might be taken by trolling, along with the lures to use, speed to troll and where to try. Throughout the book, advice, preceded by the italicized word "Tips," is easily located.

The friendly, almost conversational style of this book is interesting and makes for easy reading, but the reader must keep in mind that the information is not devoted to Texas waters.—Alan Allen

PHOTO AND ART CREDITS

LONG SHOTS SHORT CASTS

Front Cover — Jim Whitcomb; Nikon F2, 1000mm F11 Nikkor; Kodachrome 25.

Inside Front — Leroy Williamson; Pentax SP500, 50mm Takumar; Kodachrome 64.

Page 2 — Williamson; Nikon F2, 35mm Nikkor; Kodachrome 64.

Page 3 — Williamson; Nikon F2, 70-210mm Vivitar Zoom; Kodachrome 64.

Page 4 (left) — Williamson; Nikon F2, 55mm Micro Nikkor; Kodachrome 64. — (right) Williamson; Nikon F2, 35mm Nikkor; from Kodachrome 64.

Page 5 — Williamson; Nikon F2, 55mm Micro Nikkor; from Kodachrome 64.

Pages 6-7 — Williamson; Nikon F-2, 70-210mm Vivitar Zoom; Kodachrome 64.

Page 8 (left) — Williamson; Nikon F2, 70-210mm Vivitar Zoom; from Kodachrome 64. — (right) — Williamson; Nikon F2, 55mm Micro Nikkor; from Kodachrome 64.

Pages 9-11 — Photographs courtesy Austin Natural Science Center; T.i.n.a.

Pages 14-15 — L. D. Nuckles; Nikon F2, 35mm Nikkor; Kodachrome 64.

Pages 16-18 — Seafood Marketing Files; T.i.n.a.

Page 20 — Neal Cook; Nikon F, 55mm Micro Nikkor; Kodachrome 25.

Page 21 — Bill Reaves; Nikon F with motordrive, 400mm Leitz Telyt; from Kodachrome II.

Page 22 — Whitcomb; Nikkormat, 55mm Micro Nikkor; Kodachrome 25.

Page 23 — Williamson; Pentax SP500, 25mm; Kodachrome 25.

Pages 22-23 — Reaves; Nikon F with motordrive, 80-200mm Nikkor Zoom; Kodachrome 25.

Pages 24-25 — Photograph courtesy Texas Coastal & Marine Council; from 16mm film.

Page 26 (top & bottom) — Sammy Gold; photographs courtesy Texas Coastal & Marine Council.

Inside Back — Henry Compton; Colored ink, pencil and gouache on illustration board.

Back Cover — Whitcomb; Nikkormat, 400mm Leitz Telyt; Kodachrome X.

compiled by Neal Cook

Bison Demise: In 1866 Dr. William T. Hornaday, a naturalist, toured the United States to count the America bison (buffalo). He found only 541 animals left of all the millions which once roamed the prairies. His American Bison Society later helped restore the animal to a safe population level.

Clean Anchor: One way to offend the friend who asked you to go fishing in his boat and assigned you as "anchor man" is to pull the anchor, covered with mud and plants, and dump the whole mess in the bottom of the boat. Swish the anchor around and clean it off before bringing it aboard. Don't bang it against the side of the boat, as that also makes the boat owner unhappy.

Alien Invasion: On Laysan Island, a tiny island only two miles long at the western end of the Hawaiian chain, lives the Laysan duck. Discovered in the 1890s, this species had a small population of only about 100 birds. In 1903 disaster struck when rabbits were introduced to the island; around the same time, feather hunters moved in to kill the birds. By the end of the year only about 24 birds remained. Some six years later the ducks were given protection by the United States Government, but feather hunters had returned during that period and only six birds remained in 1911. With added protection the birds' population began to grow to a healthy level, but then the rabbits showed what a problem they could be. The rabbits ate almost all of the vegetation on the island which the birds needed for protection and food. In 1926 the rabbits were exterminated from the island, but recovery for birds and vegetation was slow until the 1950s when the population jumped from slightly more than two dozen to as many as 600 birds in a seven-year period. Man almost exterminated this creature, and then man helped it recover.

Fly-fishing Bird: A report from Florida tells of a green heron that deposited a small feather on the water's surface, waited until a small swarm of minnows came to investigate it and then speared his meal.

Learn the Laws: Game and fish laws vary throughout the state, and the outdoorsman who doesn't want his vacation spoiled by a citation and fine should make sure he reads the regulations for the area in which he is hunting or fishing. The "Guide to Texas Hunting and Sport Fishing Regulations 1975-1976" is available free from all places that sell hunting and fishing licenses, state parks and various offices of the Parks and Wildlife Department. The guide contains information about legal means and methods of hunting, which licenses are required, how to legally take bait fish and game fish in both fresh and salt water, which animals are protected, trotline regulations and many other laws which every outdoorsman should know. Also, each county is listed with seasons, bag limits and fishing regulations.

First Refuge: In 1903 President Theodore Roosevelt established the first federal wildlife refuge at Pelican Island, Florida, to shield nesting grounds of brown pelicans. Today there are more than 375 federal refuges covering about 32,000,000 acres and protecting almost every kind of wildlife.

Dead twigs and limbs litter the ground as workmen prune the Texas Champion Live Oak that grows in Goose Island State Recreation Area. Careful, controlled feeding is also a part of the specialized maintenance given to the tree.



Photographs by L. D. Nuckles

Face-lift for Champion Live Oak



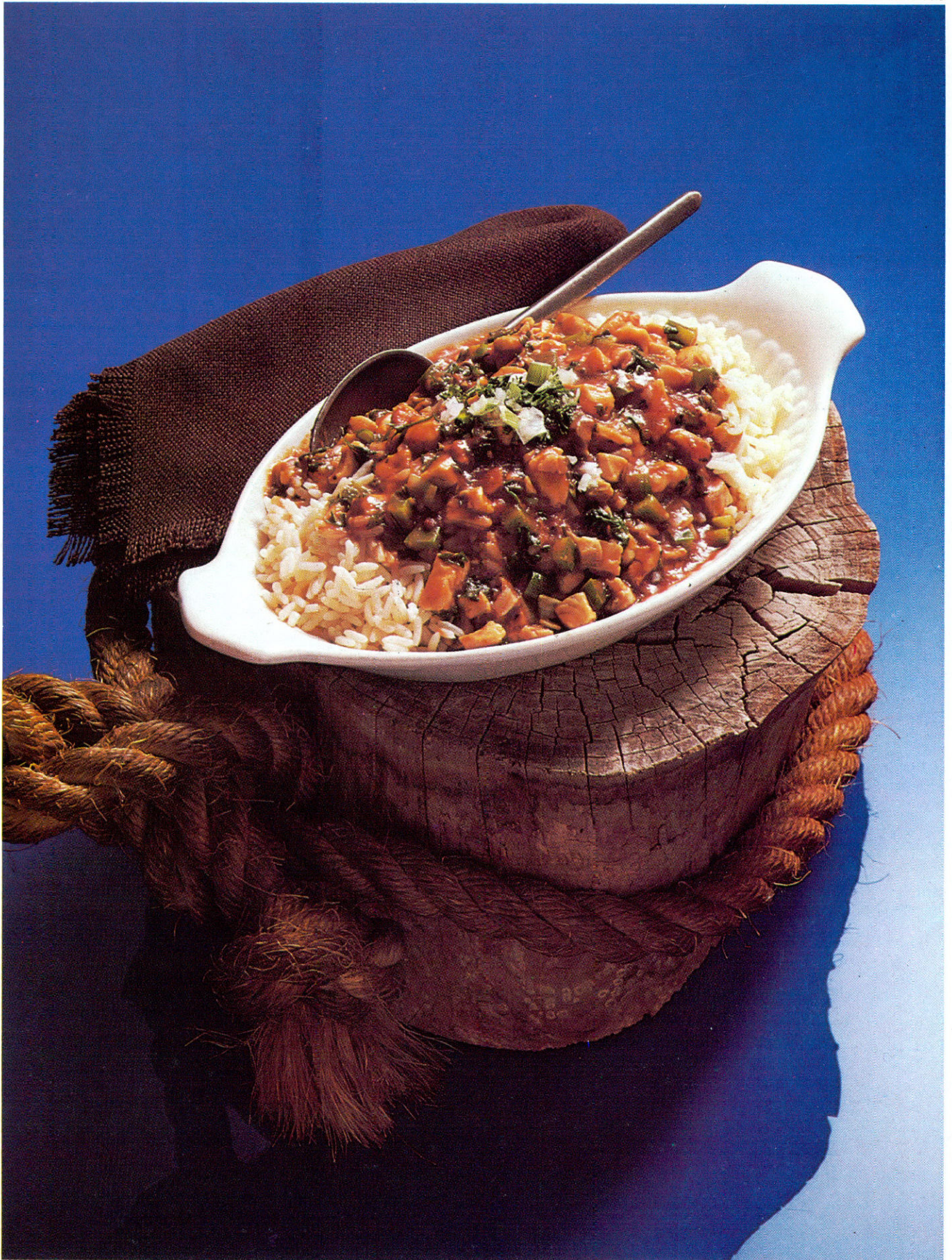
by L. D. Nuckles,
Information Officer, Rockport

Sometimes the “Big Tree,” a giant live oak growing in Goose Island State Recreation Area, needs a little specialized maintenance. There’s nothing really wrong with the old giant; it’s just sometimes necessary to remove dead limbs, prune other limbs to guide the direction of their growth and administer careful, controlled feeding.

For about 2,000 years this giant of its kind has stood on Lamar Peninsula near the mouth of St. Charles Bay. Hurricanes, droughts and floods have come and gone, but the “Big Tree” has withstood them all. Slow, steady growth over the centuries has produced this specimen that is the Champion Live Oak in Texas, and Co-Champion of the United States.

Every few years the old tree needs care which requires specialized equipment for accomplishment. Companies that specialize in tree care are contacted and asked to bid on the job. Only those with a reputation for the highest standard of ethics and performance are contacted, because a tree of this age and stature is irreplaceable and repairs to it must be done with accuracy and precision.

Given a little professional care from time to time, this rugged old veteran may stand for another thousand years. Certainly, this ancient representative of our historic past deserves our attention, and the Parks and Wildlife Department is trying to see that the care is there when needed. **



Let Seafood Solve Your Mealtime Problems

by Joan Pearsall

Juggling menus isn't easy when you consider all the requirements — tastiness, variety, economy and, above all, good nutrition. Nowadays, there are also the extra problems of inflation, diet watching and rushed schedules.

Every one of these challenges can be met by the many varieties of seafood, but seafood is a solution many people don't turn to often enough.

Food from the sea can trim you and your bills for food, utilities and health care. It can help give you energy instead of costing you large amounts in its preparation.

From a health standpoint, it is low in calories and sodium, and 60 to 80 percent of its fat is polyunsaturated. It is high in protein, B-complex vitamins and minerals such as calcium, iron, phosphorus and iodine. Fish also is easy on the digestion, since it has less muscle fiber than the flesh of other animals, allowing the human stomach to react to and assimilate the protein more quickly.

Slow cookers and microwave ovens are a great help to the busy careerist, but they are not needed for fish. Cooking time is minimal. In fact, cooking too long or at too high a heat only dries and toughens the meat. This is because seafood has little connective tissue, another reason it is easy to digest.

Besides the economy of fuel-saving, there is practically no waste. There are no chunks of fat or big bones, and there is less fat to cook out. Fillets are a form that is 100 percent edible.

Fishery products can be prepared in every way — baked, fried, poached, sauteed, grilled, smoked, tossed in a salad or blended into a casserole or soup. They fit into any meal, at any time.

There's also a wide range of natural flavors in the various forms of seafood, and these adapt readily to an endless variety of dishes to appeal to just about any taste.

We have selected a few recipes to demonstrate this versatility.

One of the most recent fish to be turned into seafood for Americans is shark. The impact of a current movie might deter some people but, wherever shark has been introduced commercially, it has had enthusiastic response from those who have tasted it. This might end in a situation where man and shark start eyeing each other warily as to which will make the first move.

The shark species that have been brought to the table so far in this country include sandbar, blacktip, bonnethead and smoothnose. One advantage of shark is its firm texture, which makes it ideal in any concoction that might need to be reheated without falling apart, as in soups and gumbos. Another point in its favor is the fact that it has no bones.

The following recipe would make an exotic party entree.

SHARK TERIAKI KABOBS

2 pounds shark, cut into one-inch cubes

1 can (16 oz.) pineapple chunks

¼ cup reserved pineapple juice

½ cup soy sauce

¼ cup sherry (optional)

2 tablespoons brown sugar

1 teaspoon ground ginger

1 teaspoon dry mustard

1 clove garlic, crushed

1 green pepper, cut into one-inch cubes

3 cups cooked rice (optional)

cherry tomatoes, mushrooms, onions, etc., for kabobs, as desired

Bamboo or metal skewers

Combine pineapple juice, soy sauce, sherry, brown sugar, ginger, mustard and garlic to make a marinade. Pour marinade over fish. Cover and refrigerate for at

least one hour. Drain fish and reserve marinade to baste. Thread kabobs, alternating fish, fruit and vegetables. Broil four to five minutes on each side or cook over hot coals. Serve as main dish with rice, or alone as an hors d'oeuvre. Two pounds of fish make 18 to 20 hors d'oeuvres or six servings.

Shark also can be used successfully in almost any fish recipes in which you would substitute other species, such as drum, mullet and croaker, and you'll be pleasantly surprised.

SAVORY BAKED DRUMFISH

2 pounds black drum or other fresh fillets

2 teaspoons lemon juice

Dash pepper

6 slices bacon

1 medium onion, thinly sliced

½ cup soft bread crumbs

2 tablespoons chopped parsley

Place fillets in a single layer in a greased baking dish. Sprinkle with lemon juice and pepper. Fry bacon until crisp, remove from fat and crumble. Cook onion rings in bacon fat until tender, then arrange evenly over fillets. Combine bacon, bread crumbs and parsley. Sprinkle mixture over fillets and onion rings. Bake at 350 degrees for 25 to 30 minutes or until fillets flake easily when tested with a fork. Makes four to six servings.

SUNSHINE FILLETS

2 pounds fresh fish fillets

3 tablespoons oil or melted fat

2 tablespoons concentrated orange juice

Orange slices for garnish

2 teaspoons grated orange rind

1 teaspoon salt

Dash pepper

Dash nutmeg

Parsley for garnish

Cut fillets into serving-size portions. Place portions in a well-greased baking dish. Combine remaining ingredients and pour over fish. Bake in a moderate oven, 350 degrees, for 25 to 30 minutes or until fish flakes easily when tested with a fork. Garnish with orange slices and parsley. Makes four to six servings.



Appetizing, low-cost, seafood favorites, such as stuffed blue crabs, will add variety to your summer menus. To get double pleasure from this tasty crustacean, try catching your own on your next beach outing. It's a sport the whole family can enjoy.

SEAFOOD SALAD SANDWICH

- 1 pound fresh fish fillets, or cooked leftover fish
- 1 quart water
- 1 tablespoon salt
- 3 hard-boiled eggs, chopped
- ¾ cup Spanish olives, chopped
- ½ cup finely chopped celery
- ⅓ cup mayonnaise or salad dressing
- 1 tablespoon horseradish
- Dash pepper

Place fillets, if using fresh fish, in a pan of salted, boiling water. Cover and return to a boil. Reduce heat and simmer for 10 minutes, or until fish flakes easily when tested with a fork. Drain fillets and remove skin. Flake fish and combine thoroughly with eggs, olives, mayonnaise, horseradish and pepper. Add salt to taste and chill. Use mixture as a sandwich spread or serve on lettuce leaves as a salad. Makes approximately six sandwiches.

Shellfish become a feast in a myriad ways. You could eat them all day, starting with a shrimp-and-egg breakfast recipe.

PEPPERED SHRIMP AND EGG

- ½ pound raw Gulf shrimp, peeled and cleaned
- 3 slices bacon
- ½ cup onion, chopped
- ¾ cup green pepper
- ½ teaspoon salt
- ¼ teaspoon cayenne pepper
- 6 eggs, beaten
- ¼ cup half-and-half cream
- ½ teaspoon Worcestershire sauce

Place thawed shrimp in boiling, salted water for three to five minutes, then drain. Fry bacon until crisp, then drain and crumble. Saute onion and green pepper in bacon fat until tender. Add seasonings and shrimp and heat. Combine eggs, cream, Worcestershire sauce and bacon. Add to shrimp mixture and cook until eggs are firm, stirring occasionally. Makes four to six servings.

SEAFOOD CREOLE

- 1 pound fresh fish fillets
- ⅓ cup vegetable oil or melted fat
- ¼ cup flour
- 1 cup hot water
- ½ cup green onions including tops, chopped
- ¼ cup green pepper, chopped
- ½ cup parsley, chopped
- 4 cloves garlic, finely chopped
- 1½ teaspoons salt
- Dash cayenne pepper
- ½ teaspoon thyme
- 2 whole bay leaves
- 1 lemon slice
- 1 can (8 ounces) tomato sauce
- Cooked rice

Cut fillets into small cubes. Prepare roux by heating oil in large skillet and blending in flour over medium heat, stirring constantly until brown. Add water gradually and cook until thick and smooth, stirring constantly. Add remaining ingredients except rice. Cover and simmer for 20 minutes. Remove bay leaves and serve over cooked rice. Makes four to six servings.

SMOKED FISH

Start fire in a hooded outdoor cooker, using fewer briquets than usual to maintain a low cooking temperature. Place a handful of hickory chips in water and allow to soak. Dissolve one cup salt in one gallon of water. Marinate fish in brine according to table. Spread coals in cooker and add wet hickory chips. Grease grill well. Place fish on grill and baste with vegetable oil. Close hood and smoke according to table. Baste fish occasionally during smoking.

Size and shape	Amount to serve six	How long to marinate in brine	Cooking temperatures	Cooking time
Fillets or steaks — ½-inch thick	2 lbs.	30 mins.	150-175 200 250	1 hr. 30 mins. 45 mins. 30 mins.
Fillets or steaks — one-inch thick	2 lbs.	45 mins.	150-175 200 250	1 hr. 45 mins. 30 to 45 mins. 30 mins.
Whole dressed fish — 1½ to 2½ pounds	3 to 4 lbs.	30-45 mins.	150-175 200 250	2 hrs. 1 hr. 15 mins. 45 to 50 mins.

SHRIMP HURRY CURRY

1½ pounds small, raw Gulf shrimp, peeled and cleaned
2 tablespoons butter or margarine
1 can (10½ ounces) condensed cream of shrimp soup
1 can (10½ ounces) condensed cream of mushroom soup
¾ cup sour cream
1½ teaspoons curry powder
2 tablespoons parsley, chopped
Rice, toast points, or patty shells
Saute shrimp in butter for three to five minutes over low heat, stirring frequently. Add soups and stir until thoroughly blended. Stir in sour cream, curry powder and parsley. Continue stirring until mixture is piping hot, then serve immediately on fluffy rice, toast points or in patty shells. Serves four to six.

BLUE CRAB STUFFING

1 pound blue crab meat
1½ cups cracker crumbs
¾ cup celery, finely chopped
¾ cup onion, finely chopped
1 tablespoon green pepper, finely chopped
½ cup butter or margarine, melted
¼ cup milk
½ teaspoon salt
1 teaspoon dry mustard
Dash cayenne pepper
2 tablespoons parsley, finely chopped
Combine all ingredients thoroughly in a large mixing bowl. Stuff mixture into shells, place in casserole dish, and bake at 350 degrees for 30 minutes. Makes enough stuffing for six crab shells.

CRAB AU GRATIN

1 pound fresh blue crab meat, lump grade
3 tablespoons butter or margarine
3 tablespoons flour
¼ teaspoon paprika
½ teaspoon salt
⅛ teaspoon pepper
1½ cups thin cream
1 cup Cheddar cheese, grated
1 tablespoon Worcestershire sauce
⅓ cup bread crumbs
Remove any remaining shell or cartilage from crab meat. Melt butter in skillet and stir in flour, paprika, salt and pepper. Continue to stir until smooth. Gradually add cream

and cook slowly until thickened. Add cheese and Worcestershire sauce, and stir until cheese is melted. Add crab meat. Place mixture in a greased baking dish or in individual bake-and-serve dishes and cover with crumbs. Bake at 400 degrees for approximately 20 minutes. Makes four to six servings.

GOLDEN FRIED OYSTERS

1 pint fresh oysters
2 eggs, beaten
2 tablespoons milk
1 teaspoon seasoned salt, or table salt
⅛ teaspoon pepper
1 cup fine cracker crumbs
Drain oysters. Combine eggs, milk and seasonings. Dip oysters in egg mixture and roll them in cracker crumbs. Repeat process to form double breading. **Deep Fat Fried:** Fry in oil, hot but not smoking (375 degrees) until golden brown. Total frying time is two to three minutes. Drain on absorbent paper. **Pan Fried:** Fry in ¼ inch of oil, hot but not smoking, until bottom side is golden brown, then turn and fry other side until golden brown. Drain on absorbent paper. Makes four servings.

SEAFOOD BISQUE

½ pound raw Gulf shrimp, peeled and cleaned
½ pint oysters, fresh
½ pound blue crab meat, fresh
2 tablespoons green pepper, minced
3 tablespoons green onion, including tops, minced
3 tablespoons celery, minced
½ cup butter or margarine, melted
1 can (10½ ounces) condensed cream of shrimp soup
1 can (13 ounces) evaporated milk
½ cup milk
½ teaspoon salt
⅛ teaspoon pepper
½ teaspoon Italian seasoning
2 tablespoons dry sherry (optional)
Cut shrimp and oysters into ¼-inch pieces. Remove any remaining shell or cartilage from crab meat. Cook green pepper, onion and celery in butter until tender, but not brown. Add shrimp, oysters and crab meat. Cook over low heat until shrimp turn pink and oysters curl at

the edges. Add remaining ingredients and heat to a near boil. Serve immediately. Makes four to six servings.

Seafood is enhanced by various well-known accompaniments, so included here are a couple of traditional ones with a flair.

FISHERMAN'S TARTAR SAUCE

1 cup mayonnaise
2 tablespoons kosher dill pickle, finely chopped
2 tablespoons onion, finely chopped
2 tablespoons olives, finely chopped
1 teaspoon lemon juice
Dash pepper
¼ cup sour cream (optional)
Combine all ingredients well and chill. Makes two cups of sauce.

JALAPENO HUSH PUPPIES

1½ cup sifted flour
2½ teaspoons baking powder
1½ teaspoons salt
½ teaspoon pepper
⅓ cup onion, finely chopped
1 cup milk
1 egg, beaten
3 tablespoons vegetable oil
¼ cup jalapeno peppers, finely chopped (optional)
Combine dry ingredients. Add remaining ingredients and stir until blended. Using a fork, drop heaping portions of the mixture into hot, deep fat (350 degrees). Fry each hush puppy approximately three minutes, or until golden brown. Turn once during cooking. Drain on absorbent paper. Makes approximately 30 hush puppies. **

NATIONAL HUNTING & FISHING DAY

September
25, 1976



Neal Cook

Sand, Sea and Safety

by Stanley W. Taft, Park Superintendent, Sea Rim State Park

Enjoying a beach is easy whether you go for its feeling of mystery, to beachcomb or for relaxation. But like all outdoor experiences, there are things to keep in mind to insure a safe, comfortable visit.

During low tide, don't drive your car too close to the water and get stuck. Follow other car tracks if they are visible, and watch out for silt or mud washed upon the beach. If you have doubts about the firmness of an area, probe it with a stick or rod, as a thin covering of sand sometimes hides a layer of mud. If you are not careful, you may get stuck and help, in the form of a costly wrecker service, may be miles away.

Even when the beach is firm, don't drive along the water's edge and allow the surf to splash onto your car. Salt water is extremely corrosive to metal, and if not washed off with fresh water, it can cause rust within hours. After you've been on the beach, it is always a good idea to rinse your car thoroughly. Don't forget to flush the underparts of the vehicle as well.

Many beaches have a 20- to 25-mile-per-hour speed limit, but this speed is much too fast for heavily used areas where children might come darting out of a crowd to recover a rolling beach ball. Watch your speed and keep in mind that, to the little ones, a beach is a giant playground where they can, and do, run free.

If you take your own children to the beach, know where they are at all times and be aware that there is potential danger both on the beach and in the surf. Never allow children who cannot swim to be in the water without an adult swimmer. The agony of watching a family look for a child last seen in the surf makes a lasting impression.

Moderate to strong winds blowing at a sharp angle to the shoreline can create rip currents or "rip tides." These are strong surface currents which flow from the beach to open water. Even good swimmers sometimes have been unable to cope with rip currents when caught unaware, so watch for them.

If you are a nonswimmer, be especially wary of wading very far offshore. A misstep into a trough may plunge you into water over your head, and it may take all your faculties to survive.

Be cautious about exposing yourself to the sun at the beach until your body has become acclimated. Use plenty of suntan oil or sun screen, and don't be

ashamed to put on a long-sleeved shirt or protective clothing for the first few outings.

Whenever you leave your car, lock it. Hang the key around your neck to keep from locking it inside, or hide an extra key somewhere on the car.

Your campfire, or one left by others, should be smothered or drowned after use, even on the beach. Wind-blown sparks have caused more than one grass fire, and hot coals are a hazard to bare feet. Although open beaches appear to be excellent places for fireworks, the danger of one starting a fire is the reason they are banned on all state park beaches, as well as in all state parks.

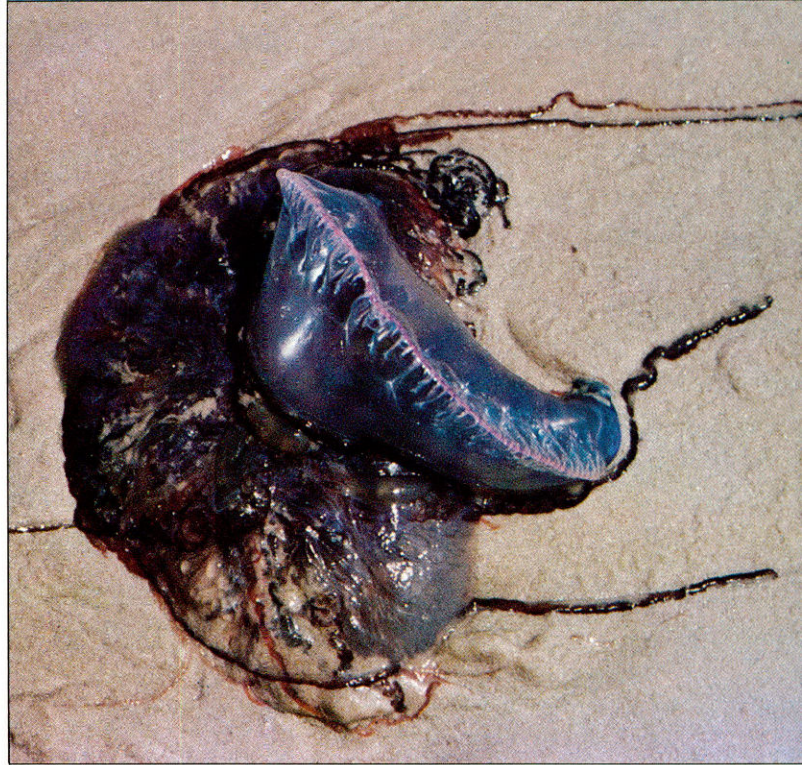
Wear protective shoes or sandals to protect your feet. Hot coals, broken glass and sea creatures, such as the hardhead catfish with its sharp, poisonous spines and the man-o-war with its stinging tentacles, can produce painful wounds. Some beaches have

Children love the beach and are fascinated by the shells and surf, but they should never be allowed to play in the water alone. A small child's feet can easily be swept out from under it by an incoming wave, and a tragic drowning result.



Bill Reaves

Jim Whitcomb

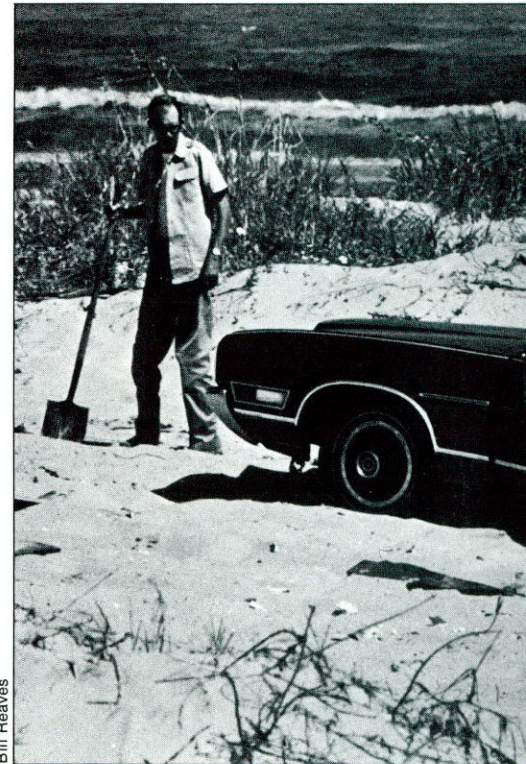


laws that prohibit glass containers and, when enforced, these regulations prevent many cut feet each season. Whether it is a law or not on the beach you visit, it is a good idea to leave glass containers at home.

Recreational vehicles such as dirt bikes, minibikes, dune buggies and jeeps can be a lot of fun at the beach, but please don't drive on the sand dunes near the beach or allow your children to do so. These sand dunes, which provide protection from storm tides, are very fragile and are held together only by the roots of the vegetation covering them. If this vegetation is destroyed by off-road vehicles or fire, the dunes become vulnerable to severe wind and water erosion.

Off-road vehicles may also be prohibited on some beaches, so check the city or county ordinances or, in the case of a state park beach, check with park personnel before roaring off down the beach.

This summer, if trends continue, the coastal beaches of Texas will be visited by more people than ever before. The coast is a beautiful, enjoyable area, and like other recreational spots, it should be appreciated and protected by those who go there. Don't litter it or abuse it and it should provide you with hours or days of safe, enjoyable recreation. **

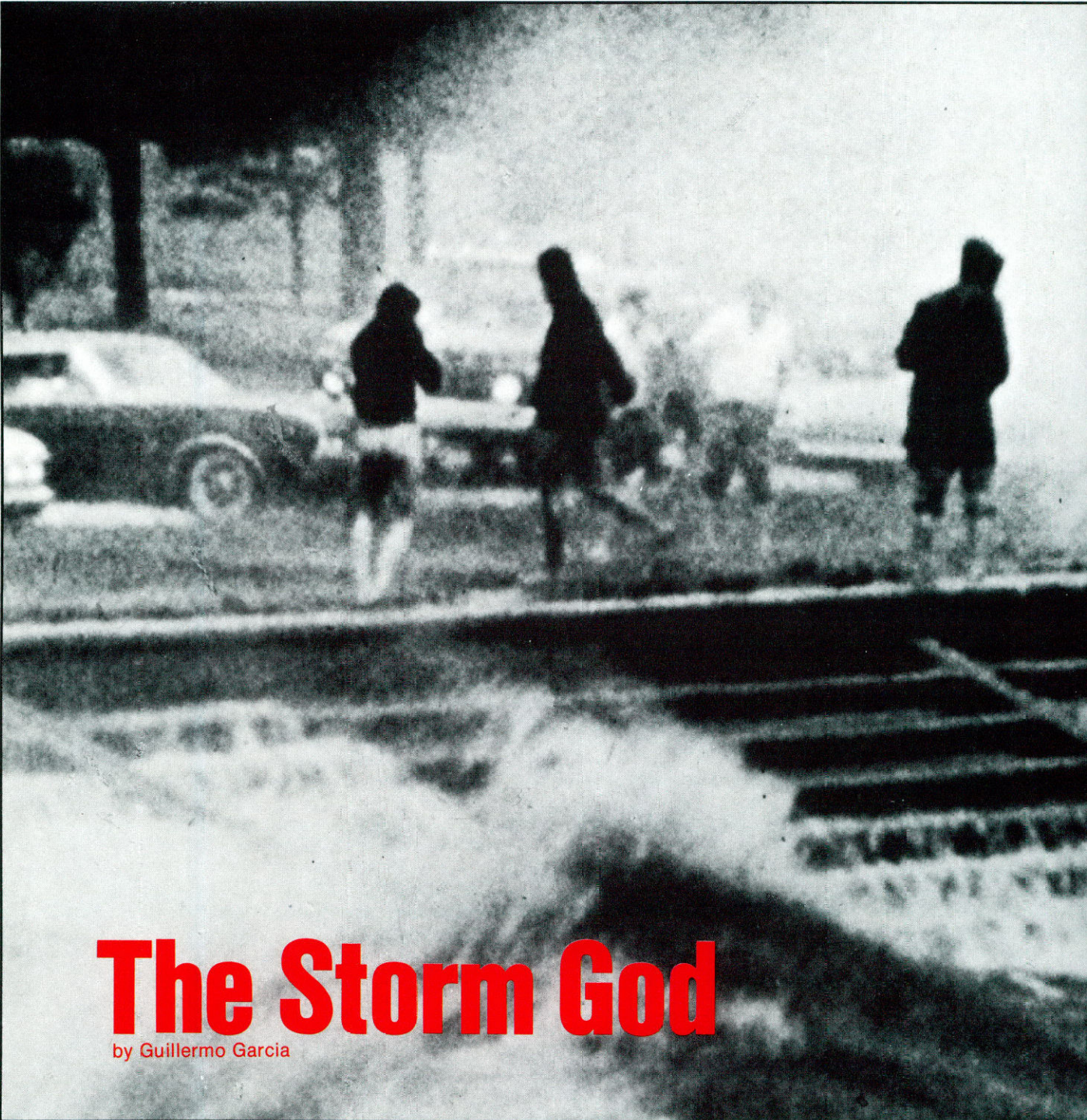


Bill Reaves



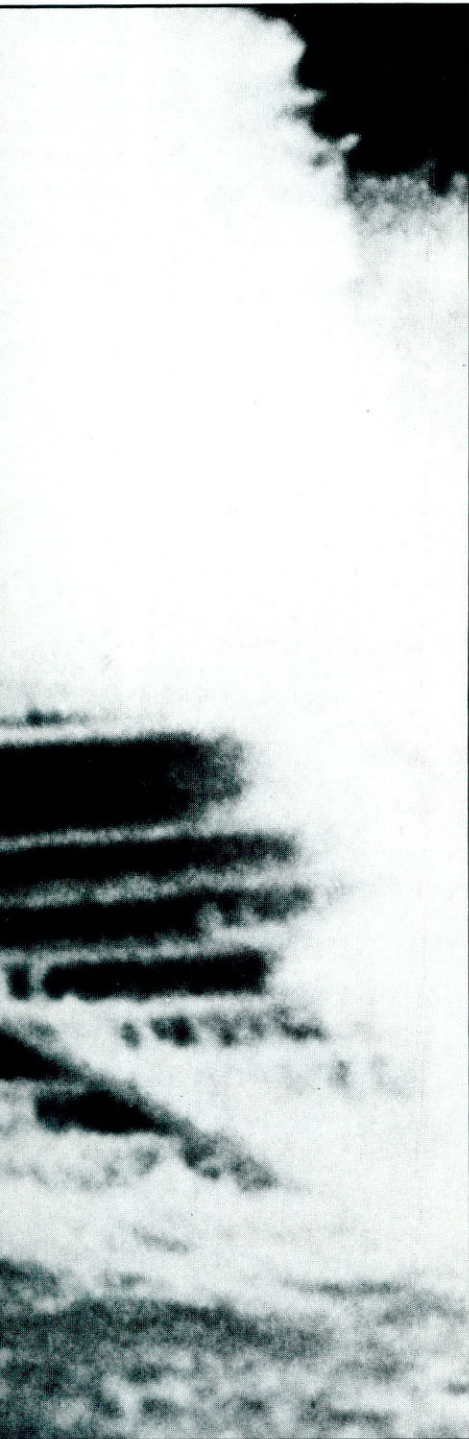
Nature litters the beach with sea creatures such as the man-o-war (opposite page), but dangerous as they may be to barefooted beach users, they cannot compete with the hazardous litter (above) strewn about the beach by man. Venturing off the traveled areas of the beach in a family car (left) often results in a hopelessly stuck vehicle that must be dug out by hand or towed out by a wrecker service.

Photograph courtesy Texas Coastal & Marine Council



The Storm God

by Guillermo Garcia



Not realizing how quickly conditions can worsen, some individuals foolishly stay near the shoreline to observe or play in the rising water and larger than normal waves that precede the actual hurricane.

Born in the warm, moist summer air over the Atlantic Ocean, the gentle infant with its 15-mph winds needs only a matter of days to grow into a raging monster packing 150-mph winds. Much to coastal residents' relief, this schizoid creature lives but a few days.

In the Pacific it is known as a typhoon, in the Indian Ocean and the Arabian Sea it is known as a tropical cyclone while in Australia it is known as a willy-willy. In this country, it is a hurricane.

Its Indian and Spanish meanings fit it perfectly. To the Quiche Indians of Guatemala, "Hurakan" was the god of lightning and thunder. In the Mayan dialect, "Hunraken" was the storm god. Whatever the derivation, modern man knows all too well that a hurricane, the meteorological monster of the sea, is the greatest storm on earth.

Texas residents from Brownsville to Port Arthur know that from June to October, the hurricane season is with them. Many coastal residents have memories of past hurricanes — Carla in 1961, Beulah in 1967 and Celia in 1970. They were all killers.

Carla ravaged an area from Victoria to Dallas, causing more than \$400 million in damages and killing 34. It was the largest storm in recorded history to strike the Texas coast.

During the past 105 years, National Weather Service records show that 41 hurricanes entered the Texas coast, and 13 more came close enough to cause damages. In 1975 there were six hurricanes in the Atlantic, but only one, Caroline, affected Texas. It hit south of Brownsville.

How these seagoing storms are born, what paths they follow and how they build up their ferocious intensity has been the subject of much study.

Technically, a hurricane is a rotating cyclone of the tropical ocean packing 74-mph winds (64 knots) or greater. In the Northern Hemisphere, the wind circulates in a counter-clockwise motion. A well-developed hurricane covers a several-hundred-mile radius and, because of its size and intensity, it is the most dangerous and destructive of all storms.

Along our Gulf Coast and in the Atlantic, the normal season extends from early summer through October. Early in the season, the Caribbean and the Gulf of Mexico are the principal spawning grounds. In July and August this center

shifts eastward and by September, it spreads from the Bahamas southeast to the Lesser Antilles and east, across the ocean to the Cape Verde Islands off the west coast of Africa. After mid-September, principal areas shift back to the western Caribbean and the Gulf of Mexico.

If this is an average year, there will be 10 tropical cyclones that will develop into hurricanes; they will kill some 50 to 100 persons between Texas and Maine and they will cause more than \$100 million in property damage.

Designating hurricanes by women's names goes back to the prefeminist days of the 1940s. During World War II, this practice became widespread simply because it was the easiest, fastest way to identify tropical storms. For several hundred years, hurricanes in the Spanish Caribbean Islands were named after saints' days on which they occurred. Curiously, in Australia, a weatherman named them after politicians he disliked. That practice led to the forecaster describing politician-named storms as "wandering aimlessly around the Pacific," much to the politicians' distress.

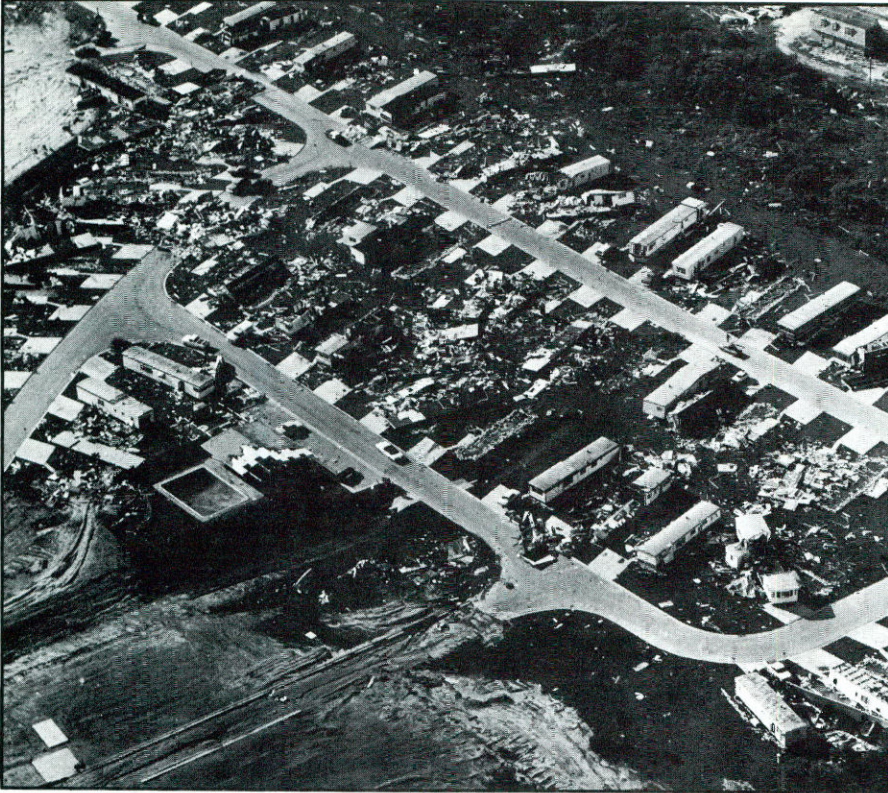
Although there is no exact understanding of the actual triggering mechanism involved, the Atlantic hurricane begins from one compatible mass of air in water temperatures of 79° F. or higher. Usually, the mass of air that forms the hurricane's center takes shape far from land. The air mass may then move 2,000 miles or more over water before it becomes unstable.

Many factors come into play to make the air mass unstable, including differing atmospheric pressures, temperature differences between the warm waters and the cooler air in the mass, and the flow of the prevailing winds.

Once it turns unstable, it takes three to six days for the small vortex of swirling air to build up to hurricane intensity. During those days, the mass of air will travel an additional 1,500 to 2,000 miles. In storms that affect the Texas coast, the mass moves in an east-by-northeast direction.

No two hurricanes are alike; each is a distinct entity. Atlantic hurricanes, however, do have some shared characteristics.

One common characteristic is the amount of power generated. Mature hurricanes carry the equivalent of 16 trillion kilowatts, or enough energy to



Sammy Gold



Sammy Gold

supply the needs of the United States for six months.

The average-sized hurricane will squeeze out 20 billion tons of water in a 24-hour period. Roughly translated, this means the energy equivalent of that released by fusion of 400 20-megaton hydrogen bombs. Other calculations indicate that a hurricane with a 500-mile radius releases energy at the rate of 10

trillion horsepower and maintains it for as long as 10 days — a powerful force, indeed.

A hurricane derives its main source of energy from the release of heat brought about by the condensation of the water vapor in the air. As moist air flows into the storm core from low levels and rises to the upper atmosphere, energy is produced. Condensation from the rise of

Each hurricane is unique and can inflict distinctly different types of damage. Celia (1970) did her damage with winds, packing strong gusts of at least 162 mph. Beulah's damage (1967) resulted from freshwater flooding and tornadoes, while Carla's salt-water surge (1961) caused saltwater flooding more than 10 miles inland.

the air from approximate sea level to upwards of 50,000 feet provides the mechanism to turn heat into energy. To further the formation, interaction between the low level disturbance and the upper atmosphere takes place. The initial low-level disturbance provides an area into which air from the surrounding area can converge. As a result, the disturbance becomes better organized, and large quantities of air are lifted high into the atmosphere, causing a cyclonic circulation of air, due to the earth's rotation.

Since air is flowing into the disturbance near sea level, it must flow out of the hurricane's core at the upper level of the atmosphere. If more air flows into the core than out, the disturbance will die out; but if the upper outflow exceeds the flow of air into the core, as is usually the case, the cyclonic circulation will grow, generating more power, and intensifying the storm.

This view of a hurricane as an engine of the atmosphere is a general one, as the precise role of these factors is not totally understood. A host of general conditions must all be present for the atmosphere to produce a hurricane. The infrequency with which these conditions exist indicates to weather forecasters that many potential hurricanes end up "misfiring" somewhere far out at sea. Meteorologists admit there are many factors, not yet well understood, that act as triggering and generating devices.

Scientists have discovered that hurricanes are by no means low-level phenomena. In fact the core often extends upwards of 30,000 feet or more, well into the upper atmospheric layers. Size and intensity of hurricanes, however, decrease with elevation, so that maximum winds at 5,000 to 10,000 feet above sea level decrease considerably at 25,000 to 30,000 feet.

The average diameter of hurricane force winds extends well over 100 miles from the core, while gale force winds (39 to 54 mph) can cover a 400-mile area. During infancy, a hurricane's diameter may be quite small, but as it develops and gathers strength, its diameter enlarges. "Average-sized" hurricanes, however, are difficult to classify, even in comparison with each other. The Great Atlantic Hurricane of 1944, for example, had hurricane-force

winds extending over a 200-mile width and gale winds of 600 miles in diameter.

Wind circulation patterns in a hurricane can be divided into three distinct sections. The outer region extends from the perimeter of the storm system to within 20 miles of the center. Wind speed increases steadily as the center is approached, and velocities from 20 mph to 150 mph can be found within this area. The second section contains the region of maximum-force winds that surround the eye. Wind speeds of approximately 200 mph may be present in this section, and may extend for up to a 25-mile radius.

The final section is the eye, or innermost portion of the storm. Nowhere else in nature is such a phenomenon known to exist. From the area of maximum winds, there is a dramatic and rapid decrease to almost absolute calm. Winds in the hurricane eye can be as gentle as 15 mph, compared to 200-mph winds located just a few miles away.

People who have lived through a hurricane describe conditions in the eye as oppressive, suffocating and full of strange odors. Scientists believe this reaction is largely psychological and is due to the rapid transition from hurricane winds and cool rains to relative calm. Also, temperatures within the eye are considerably warmer than they are throughout the rest of the storm. The size of the eye of the storm tends to vary in proportion to maturity and size of the hurricane. The average diameter of the eye is 14 miles, but it may vary from four to 40 miles. It is known that as a hurricane touches land, the eye area expands and becomes elongated because of friction between the storm system and land.

The average life span of a hurricane is nine days. August storms live the longest, about 12 days, while July and November storms usually live eight days. It is important to note that hurricanes will not dissipate as long as they remain over warm tropical waters, unless outside forces, such as cold or dry air masses, enter the hurricane circulation. It is extremely rare for situations to change quickly enough to dissipate a system, once it has developed to hurricane force. This is especially true if the hurricane is located over tropical waters, from which it feeds, grows and strengthens.

As powerful as the hurricane is, most of the death and destruction it causes are due to related phenomena — flooding as a result of torrential rains, hurricane-spawned tornadoes (Beulah spawned more than 100 in 1967) and the rise in the sea known as the storm surge.

Of these, the storm surge is probably the worst.

Over the deep oceans, waves generated by the storm may reach heights of 50 feet or more. As long as these waves remain in deep water far from coastlines, they present little danger; however, as these waves approach the shore, several conditions come into play to produce the storm surge.

As the storm crosses the Continental Shelf on its way to the shore, the water level may increase as much as 15 feet or more. Sea swells and hurricane tides emanating from the storm reach the shore long before the actual storm and cause advanced flooding in low areas.

When the true hurricane surge hits, its destructive waves can demolish any structure not specifically designed to withstand the tremendous force of the water. Since water weighs around 1,700 pounds per cubic yard, it is understandable why few man-made structures can withstand these pounding waves. The rapid surge of great quantities of water is also responsible for the majority of the drownings associated with a hurricane. Most of the 6,000 deaths attributed to the 1900 Galveston hurricane were caused by the surge.

The height of the storm surge depends upon a variety of factors, such as the size and intensity of the hurricane; the angle at which it strikes the coast; the height of the regular tides; the slope and profile of the shoreline and ocean bottom; inlets; estuaries; and the amount of vegetation and construction in the impact area. The surge will be the highest where onshore winds are the strongest, and a surge greater than eight feet high can extend for 150 miles along the coastline, causing flooding miles from the center of the hurricane.

Saltwater fishermen should especially be aware of the long-reaching effects of the surge and the erratic, destructive nature of this tremendous, tropical storm. Some anglers have been known to rush to the coast ahead of a hurricane to try to catch the redfish that move into the surf before the storm hits. They foolishly endanger their lives just to catch a fish. Is catching a redfish really worth the risk? Hurricane warnings should never be ignored.

From its inception, a hurricane assumes schizoid characteristics. The same forces that feed it and enable it to grow, finally act to destroy it.

As the entire mass moves out of the tropical waters that spawned it and into cooler temperatures, the great storm becomes sluggish, and begins to cave in on itself. Hurricanes decay rapidly as water temperatures decrease. The same holds

true after a hurricane travels inland. Without its source of heat, and with the friction created by land terrain, the cyclonic circulation pattern rapidly disintegrates. A hurricane's suicidal tendencies push it northward away from the tropics, where it weakens or dies or undergoes a total change into a nontropical storm, possibly causing heavy rains.

Destructive as hurricanes may be to man and man-made structures, these tropical storms do benefit marine life in the Gulf and coastal bays. Records indicate that when Beulah hit the Texas coast in 1967 with 100-mph winds and torrential rains, South Texas bays reaped the benefits. Salinity levels, which had been extremely high, were reduced by Beulah's rains. By 1968 conditions were ideal for the juvenile shrimp, crabs and fish that had been under severe stress due to the high salt content of the bays. Prior to the storm, oyster disease, associated with high salinity, was rampant. However, by 1968 oysters were thick for the first time in five years and almost big enough to harvest. Hurricane tides also apparently brought millions of larval fish, especially redfish, into the bays. A year after Beulah nine- to 16-inch redfish were everywhere, and the lower coast reaped the biggest redfish crop in at least eight years.

For those individuals interested in hurricanes, there are a variety of booklets and pamphlets available on the subject with specific emphasis on the Texas Gulf Coast. One such booklet, produced by the Sea Grant College at Texas A&M University and distributed free of charge, is "Hurricanes on the Texas Coast." The National Weather Service also has free material on hurricanes available to the public.

A survival checklist and area maps of the coastal regions are also available, free of charge, from the Texas Coastal and Marine Council. To order, send a postcard to "Hurricane," Box 13407, Austin, Texas 78711. Specify which area map is requested — Beaumont-Port Arthur, Galveston-Houston, Bay City-Freeport, Port Lavaca, Corpus Christi, Kingsville or Brownsville-Harlingen.

New residents of the Texas coast, as well as natives, would do well to acquire some of this information. It could save lives simply by preparing you to act sensibly, without panic, when confronted by the greatest storm on earth.**

Editor's Note: The above-mentioned material, along with "Atlantic Hurricanes" by Dunn and Miller, were used as source material in the preparation of this article.

Boat Trailering

by Alan Allen

Boat owners who trailer their boats should know something about trailer maintenance, laws concerning trailers, safe trailering techniques and how to choose the right trailer-boat-vehicle combination.

One of the most important things to keep in mind when purchasing a trailer is that it must match both the boat and the towing vehicle. For example, the trailer should be long enough to allow clearance between the boat and the towing vehicle, but still let the boat transom rest on the rollers or rear cradle area.

Before you buy a trailer, make sure it is the same width as the boat, has rollers that fit or can be adjusted to fit the boat hull and is rated to handle the weight of the boat, including equipment (check the load-capacity plate on the trailer). There should be enough tie-downs to secure the boat, and a winch and winch line capable of handling it. Power winches also should have manual operation capabilities.

Sturdy hitches and mountings are a must in trailering. The hitch rated for your boat may not be up to the job of pulling a friend's boat, or even extra equipment. Most bumper-mounted hitches will carry a 1,000-pound rig easily, but the frame-mounted hitches are stronger and safer. In fact, many boat dealerships recommend only frame-mounted hitches. The hitch should be firmly attached to a secure part of the car. Make sure the ball rotates freely inside the trailer coupling and that the release is tight, but works easily.

Good trailer maintenance will make loading or unloading easier, and the trailer will last much longer. Inspect all clamps and springs; lubricate the working parts of the coupler, winch and tilting mechanisms periodically, and put a dab of oil on the rollers or moving brackets. You should be able to turn the rollers by hand.

Wheel bearings need frequent service and inspection — at least once during the boating season and once before winter storing. To do this, force off the hubcap with a tire tool or screwdriver and hammer. Remove the cotter pin and spindle nut, and pull the hub off the spindle. The grease seal and inner bearing can be removed from the hub by

forcing through a hammer handle or similar wooden object.

Inspect all parts, including the bearing race, and replace those that are rusted or pitted. Do not replace bearings without replacing defective or damaged bearing races. Thoroughly grease the bearings and install new grease seals. Force the grease seals into the inner hub until they are flush with the end of the hub.

Low air pressure can cause good trailer tires to blow out. Follow this inflation schedule to properly inflate your particular tires for normal highway speeds:

CAMPER & BOAT TRAILER TIRES, LOAD AND INFLATION DATA				
Tire Size	Ply Rating	Load Range	Max. Load	Inflation PSI*
480/400-8	2	A	390	30
	4	B	590	60
	6	C	745	90
570/500-8	4	B	715	50
	6	C	910	75
	8	D	1075	100
16 x 6.50-8	2	A	395	20
	4	B	620	45
	6	C	790	70
18 x 8.50-8	4	B	760	35
	6	C	930	50
	8	D	1120	60
690 600-9	4	B	885	40
	6	C	1120	60
	8	D	1375	85
20 x 8.00-10	10	E	1510	100
	4	B	900	35
	6	C	1095	50
480 400-12	8	D	1320	70
	10	E	1520	90
	4	B	780	80
530 450-12	6	C	990	90
	4	B	840	55
	6	C	1045	80
690 600-12	4	B	1060	40
	6	C	1345	60
	4	B	1095	35
23 x 8.50-12	6	C	1335	50
	4	B	920	32
	6	C	1320	60
6.00-13	4	B	920	32
6.50-13	4	B	1050	32
	6	C	1320	60

*Pounds per square inch

Check the lights while the trailer is attached to the car. Connect the light wires and turn on the car lights. If the trailer lights don't burn, trace the wiring from the car to the boat and back, looking for bare wires, cracked insulation, burned or worn spots and burned-out bulbs. Check all wire attachments. Once the lights are functioning, check the turn signals and pump the brakes to make sure the brake lights are working.

Extension posts that keep your trailer lights out of the water during launching will lessen trailer light problems. They are fairly easy to install and should be about three feet long. If you don't want extension posts, at least unplug your lights and let the bulbs cool a couple of minutes before launching. Also, a sealant should be applied wherever water

might enter the lighting fixtures.

Give your trailer brakes the same care your car brakes receive. The trailer brakes should apply as soon as you use the car brakes. A brake that "grabs" will cause sway as you stop. With the boat on the trailer, check to see if the brakes apply evenly and steadily by watching it in the rearview mirror. During the wheel bearing inspection, look over the brake parts for signs of wear.

To properly balance your rig, use a bathroom scale on a level surface to check the tongue weight. Load your usual equipment and place chocks on both sides of the trailer wheels to keep it in place. Stand a piece of two-by-four (length determined by the height of your hitch) on end on the scale and set the trailer tongue on top of it. The tongue should rest at about the same height as it would on the hitch.

A tongue weight of about 75 pounds is desirable when the trailer is fully loaded. The weight may be controlled by repositioning the axle (if it is adjustable) either forward to reduce weight or back to put weight forward. Moving your equipment around can also affect tongue weight.

Practice backing and driving your boat and trailer before going to the lake. It may keep you from backing into the dock, and your fellow boaters will appreciate your speed and efficiency in clearing the boat ramp.

At each stop along the road check these parts for tightness: the car hitch, trailer ball, trailer hitch, winch stand, winch line, rollers and bolsters or cradles, transom tie-downs and safety chains. (Remember, if your chains are too long they'll drag, and if they're too short they'll hamper you on sharp turns.) The bow of the boat should be firmly in position, spring shackles and brackets in good shape and the lights in good working order.

Around mid-season check for alignment of bunks, bow cradles and rollers. A bunk is usually a board or beam covered with carpet or thick cloth, upon which the hull rests. Also, wash the trailer, check for rust spots or chips and touch them up with paint or primer.

If you store your boat for the winter, remove the motor and put the boat and trailer into its storage area. Place the axle on blocks to hold the wheels off the ground. Undo all tie-downs. Remove the wheels, reduce air pressure to 10 pounds and store them in a cool, dark dry area. Inspect and repack wheel bearings. If the boat is stored outside, cover it completely and elevate the trailer so water will drain out the transom drain hole.

TRAILERING TIPS

1. Insure your boat and trailer against damage while trailering.
2. When backing up, turn the car wheels to the left and the trailer goes right. Turn them to the right and the trailer goes left.
3. When negotiating a left-hand curve, keep as far to the right as you safely can; for a right-hand curve keep to the left. This helps keep the trailer wheels on the pavement.
4. Avoid passing, but if you must, be sure to allow for the extra length of the trailer before returning to your lane.
5. Pump your brakes when stopping and allow yourself extra stopping distance.
6. Travel with the boat motor in the up position. To avoid shearing the locking pins, install a motor-support bracket or similar device.
7. Match hitch size to ball size.

8. Slow down on rough roads to protect your boat hull.
9. When launching, station a guide outside the car, be sure the motor is raised and keep the trailer out of the water as much as possible.
10. Secure light objects in the boat or they may be sucked or blown out.
11. Rinse salt water off with fresh water immediately.
12. Don't forget to replace drain plugs in the hull before launching.

TRAILERING PROBLEMS

1. If the trailer or boat pitches up and down, move part of the load forward or move the axle (if it is adjustable) to the rear a couple of inches. Try different settings until the pitching ceases.
2. A low tire, or a weak or broken spring, can make the trailer sway from side to side. Check tire pressure and springs.

3. If the trailer fishtails or sways at high speeds, one tire may be lower than the other, there may be too much weight in the rear or the axle (if adjustable) may be too far forward.
4. If the trailer "bottoms" over rough roads or other bumps, check the car tires, the trailer tongue weight (which should be 10 percent of the total weight or less) and the car shock absorbers. Four to six pounds per square inch of air may be added over recommended tire pressure for trailering.
5. Grinding noises may be wheel bearings rubbing due to a lack of grease, high temperatures or overloading. Check the bearings and, if they're dry, don't tow the trailer until new, lubricated ones are installed.
6. Bumping noises may be caused by a loose ball, hitch clamp or lug nuts. **

TEXAS TRAILER REGULATIONS

TURN SIGNAL LAMPS REGULATIONS — Reference: Article 6701d, V.C.S., Sections 69 and 118

Every motor vehicle, trailer, semitrailer and pole trailer shall be equipped with electric turn signal lamps, except that passenger cars and trucks less than 80 inches in width, manufactured or assembled prior to model year 1960, need not be equipped with electric turn signal lamps, unless the body or load of the vehicle or combination of vehicles extends to the side more than 24 inches from the center of the top of the steering wheel post, or the rear limit of the body or load exceeds more than 14 feet from the center of the top of the steering wheel post.

VEHICULAR HAZARD WARNING SIGNALS REGULATIONS — Reference: Article 6701d, Sec 125

After January 1, 1972, every bus, truck, truck-tractor, trailer, semitrailer or pole trailer eighty (80) inches or more in overall width or thirty (30) feet or more in overall length shall be equipped with hazard warning lamps. The lamps used to display such warning to the front shall be mounted at the same level and as widely spaced laterally as practicable, and shall display simultaneously flashing white or amber lights, or any shade of color between white and amber. The lamps used to display such warning to the rear shall be mounted at the same level and as widely spaced laterally as practicable, and shall show simultaneously flashing amber or red lights, or any shade of color between amber and red. (The use of a flasher switch causing the turn signal lamps to flash simultaneously may be used to comply with this section.)

TRAILERS OF THE TYPE, WEIGHT, AND DIMENSIONS LISTED BELOW, OPERATED ONLY DURING DAY-TIME AND WHEN VISIBILITY IS MORE THAN 1,000 FEET, ARE PARTIALLY EXEMPT FROM THE LAMP AND REFLECTOR REQUIREMENTS BUT MUST DISPLAY LAMP AND REFLECTOR EQUIPMENT AS INDICATED BELOW.

DAYTIME OPERATION AND WHEN VISIBILITY IS MORE THAN 1,000 FEET

Trailer Type	Width Length	Less than 80"		80" or More	
		Under 30'	30' and Over	Under 30'	30' and Over
Boat Trailer 0 to 3,000 lbs. gross weight		E	B,E	A,C,E	A,B,C,E
Boat Trailer 3,000 lbs. but less than 4,500 lbs.		D,E,F,	B,D,E,F,	A,C,D,E,F	A,B,C,D,E,F

REQUIREMENTS

- A — Two amber reflectors, one on each side near front.
- B — One amber reflector on each side, centrally located on body of trailer.
- C — Two red reflectors, one on each side near the rear.
- D — Two red stop lamps on the rear, one on each side.
- E — Two red reflectors on the rear, one on each side.
- F — Electric turn signal lamps on rear.

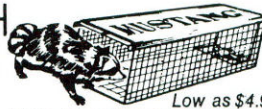
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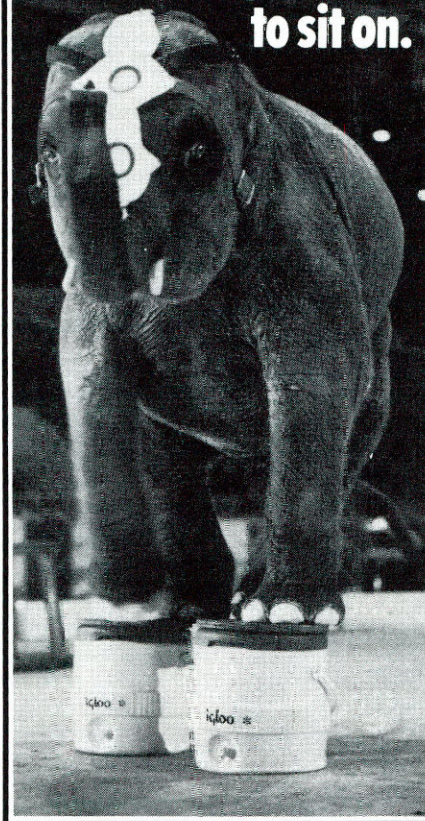
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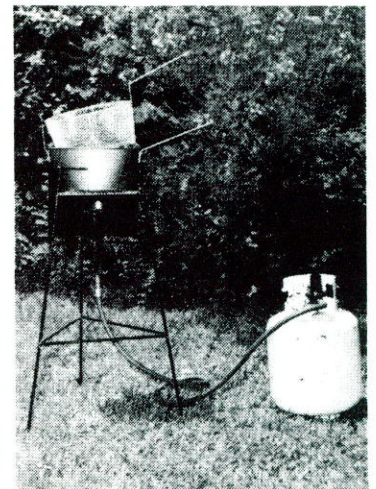


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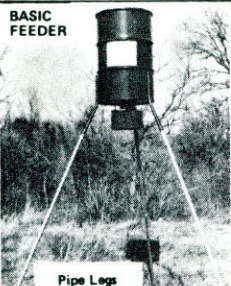
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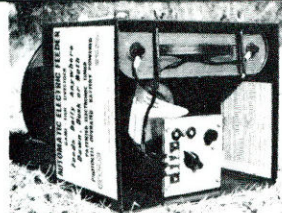
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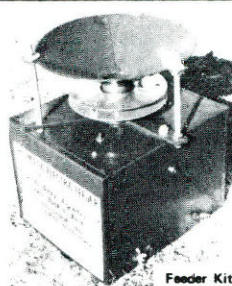
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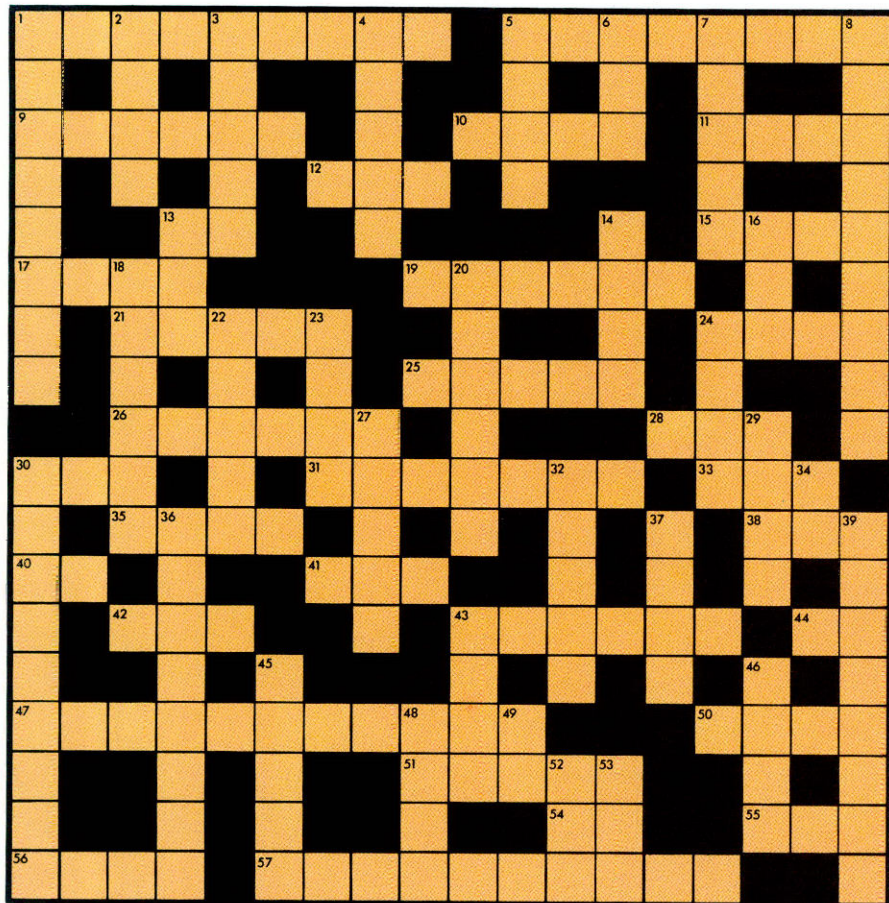
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Young Naturalist

Summertime Crossword by Ilo Hiller



Summer activities are in full swing, and all you young naturalists should be spending as much time as possible enjoying the wonders of nature and the varied outdoor recreational opportunities available to you. However, in case you run into a rainy day or find yourself with absolutely nothing to do, here is a crossword puzzle to keep you busy.

ACROSS

1. To observe birds
5. Often picked up on the beach
9. A hot cup of this tastes good around the campfire
10. Scaled creature that lives in the water
11. Placed on hook used to catch scaled water creature
12. Place where many different animals can be seen

13. Abbreviation for steamship
15. Two work animals are joined by this
17. The substance inside this plant's leaves is said to be good for sunburn treatment
19. A body of running water
21. Large pleasure boat
24. A type of spoon fishing lure
25. To gain knowledge
26. Animal footprints
28. Substance used in suntanning preparations
30. Insect that buzzes from flower to flower
31. The relationship between organisms and their environment
33. Forms after a rain
35. Poison ivy will give you this
38. To move a boat with oars
40. You may need this to cut firewood
41. A receding tide

42. This will keep your summer drinks cool
43. A piece of boneless fish
44. Abbreviation for road
47. Opposite of warm-blooded
50. To ride a wave on a board
51. You may need this bound volume of maps to plan your vacation
54. Abbreviation for United Kingdom
55. International signal for help
56. You can ride in this on the water
57. Eating in a state park

DOWN

1. To hike with a pack on your back
2. People float down the river on this
3. Shallow-water vegetation in which fish often can be found
4. You can paddle this
5. To travel in a boat by wind power
6. Substance left when a campfire is burned (also type of tree)
7. Name given to a pastime such as collecting seashells or butterflies
8. One who litters such places as our state parks
13. Another name for the ocean
14. Precipitation which can hinder outdoor fun
16. Nocturnal bird with extremely good eyesight and hearing
18. Delicious mollusk often eaten raw
20. A fishhook with three sharp barbs
22. Marine crustacean with pincers and a body shell
23. A small child
24. To propel yourself through the water by your arms and legs
27. Used for breathing while swimming underwater
29. Artificial bait used for catching fish
30. To pick up things along the beach
32. Large, white coastal birds often seen around shrimp boats
34. To bring about (present tense of did)
36. Don't spoil your summer fun with this unfortunate event
37. Underwater structure sometimes made of coral or oysters
39. To fish while wading in the water
43. Protect these by wearing shoes on the beach
45. Get plenty of this at night so you will have energy for summer fun
46. Foam on water at the beach looks like this
48. Another name for sunrise
49. Abbreviation for driver's license
52. A black and white diving seabird that breeds in colder parts of the northern hemisphere
53. To be pulled across the water on one or two boards attached to the feet

(Answers on page 32)

LETTERS TO THE EDITOR

Calories Questioned

In your April 1976 issue in the article about hummingbirds, the author states that a 170-pound man's average daily output is 3,500 calories, whereas a hummingbird's is 155,000. That's so hard to believe. I wonder if the facts were not confused. As stated, because a hummingbird cannot consume more calories than it digests, a hummingbird also would have to eat food equivalent to 285 pounds per day.

M. G. Langhorne
Dallas

Will you please clear up one point in the April hummingbird article entitled "Sparkling Acrobats"? It states that a 170-pound man's average daily output is 3,500, whereas a hummingbird's is 155,000. That is an incredible daily output. Don't you mean that if a hummingbird weighed 170 pounds, its average daily output would be 155,000 calories?

Sidney E. Stout
Fort Worth

■ You are both correct. The information presented in the magazine was misin-

terpreted by the author. In the original source, "Song and Garden Birds of North America," published by the National Geographic Society, the following statement appeared:

"For its size a hummingbird outperforms any warm-blooded animal. While hovering, it has an energy output per unit of weight about ten times that of a man running nine miles an hour. If a 170-pound man led the equivalent of a hummingbird's life, he would burn up 155,000 calories a day and evaporate about 100 pounds of perspiration an hour."

"Lost Maples Park"

We have read about the Lost Maples Park and would like to know a bit more about it. Where is it located? When will it be open to the public? What facilities does it have?

Ann Perry
San Antonio

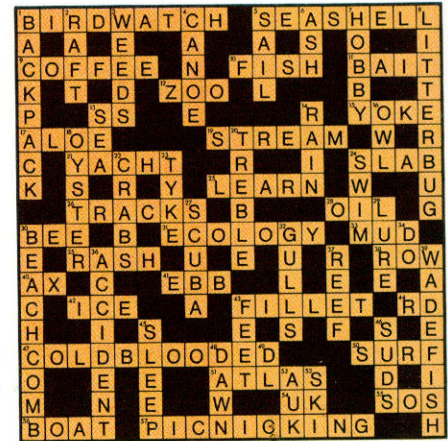
■ Lost Maples State Natural Area is located in Bandera County, north of Van-

derpool, on the headwaters of the Sabin River. At present, this park is still in the planning stages with an anticipated completion date of October 1978. It will not be open to the public until that time. Preliminary plans include limited camping, day-use areas, hiking, picnicking, nature study and other related outdoor activities. A primitive camping area is also being considered. One of the main objectives of the park will be to protect the bigtooth maples that grow there.

Mrs. to Mr.

In the listing of individuals authorized to rehabilitate injured birds of prey, which appeared in the May 1976 issue, a "Mrs." was inadvertently added to Dennis Bartz' name. Anyone in the Fort Worth area who finds an injured bird of prey should contact Mr. Dennis Bartz, Director of Interpretation, Fort Worth Museum of Science and History, 1501 Montgomery, Fort Worth, Texas 76107, phone 817/732-1631.

Young Naturalist Answers



BACK COVER

Wading alone in a shallow creek on a calm, summer day flycasting for sunfish is just the type of recreation some Texas anglers seek. Success of the trip is not measured by the number of fish caught, but by the amount of relaxation and peace of mind the solitude of the natural surroundings can bring. Photo by Jim Whitcomb.

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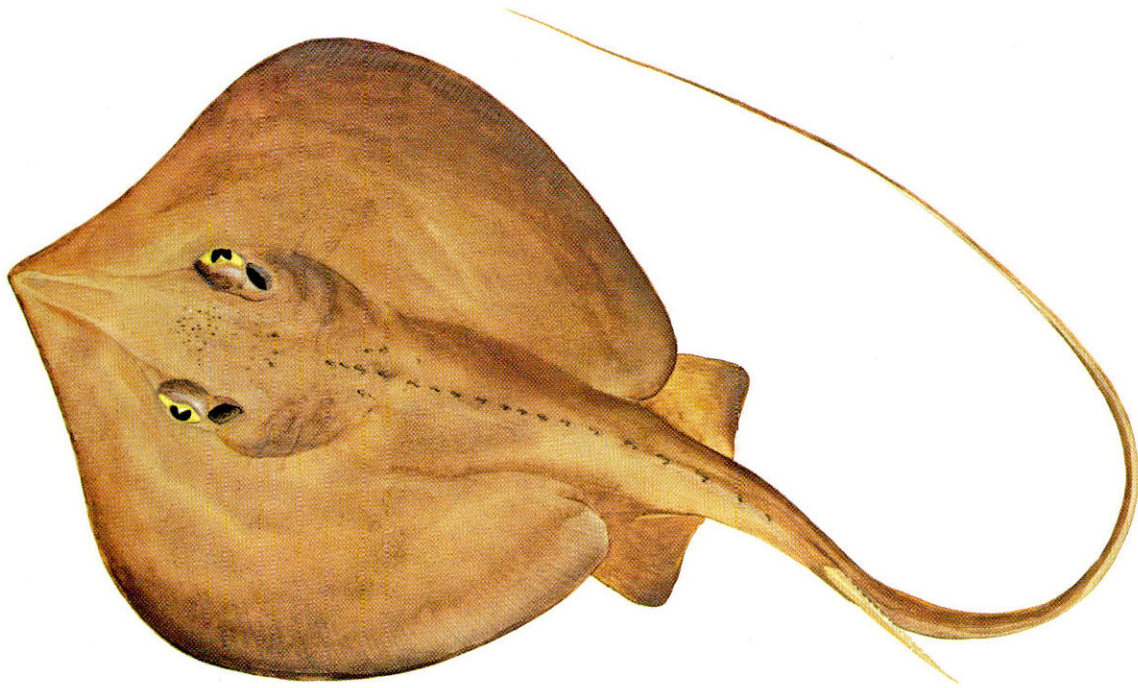
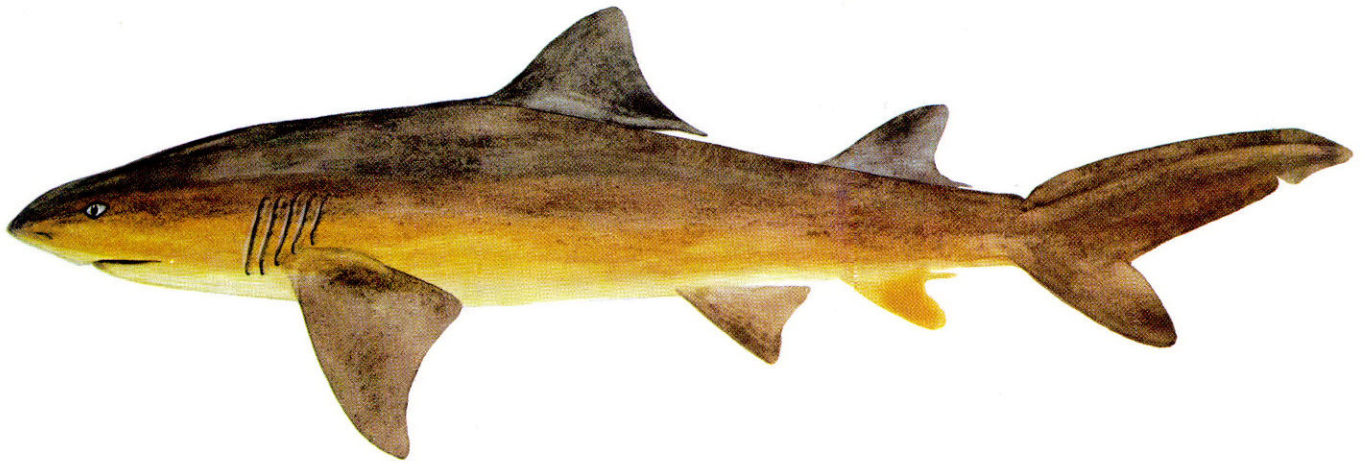
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TEXAS SALTWATER FISHES

The lemon shark, *Negaprion brevirostris*, (top) is predominantly a shallow-water shark that is quite common near docks and piers. This inshore species feeds on fishes, such as mullets and crustaceans; and it apparently feeds more at night than during the day. Young are produced in late spring or early summer. Adults reach a length of about 11 feet, but they do not grow as heavy as other species of about the same length. They occur singly or in schools predominantly of one sex. Lemon sharks have been implicated in attacks on humans. Their vicious habits in captivity and their common occurrence in shallow water make them a potential danger to swimmers when present.

Largely a tropical species, the Atlantic stingray, *Dasyatis sabina*, (bottom) is common from North Carolina to Brazil and occurs predominantly about

Florida and in the Gulf of Mexico. The most common of all rays found in Texas waters, it frequents the shallow bays in the spring and summer and moves into the deeper water of the Gulf during late fall and winter. However, it is seldom found in water more than a few fathoms deep. It also frequents river mouths and has been taken in fresh water. The average size of this stingray is six to eight inches, but it sometimes reaches one foot in width. It remains on or near the bottom, bedding in the sand like a flounder. It feeds on bottom worms, mollusks and crustaceans. The flesh of this small ray is edible, but there is no commercial use for it. Commercial fishermen consider the Atlantic stingray a nuisance as it often gets entangled in their nets and sports fishermen should be alert to the barbed spine on the tail which can cause a painful wound.

Artwork by Henry Compton.

