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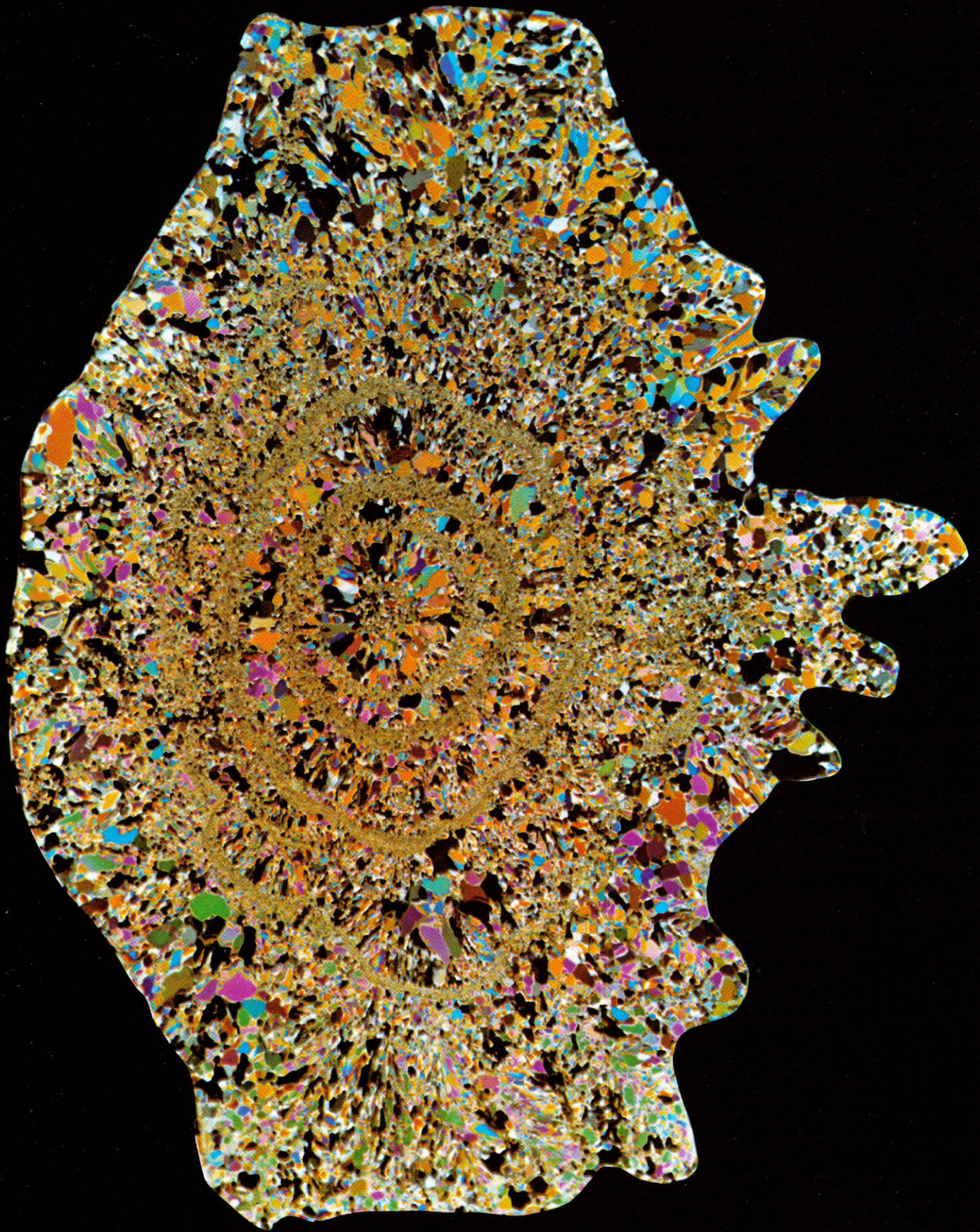
TEXAS

PARKS & WILDLIFE

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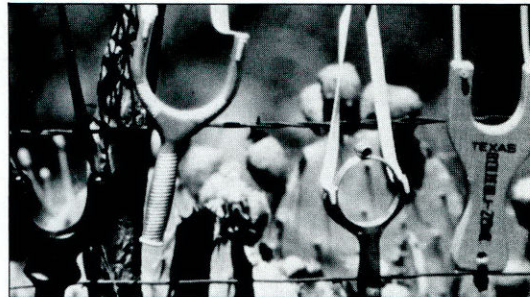
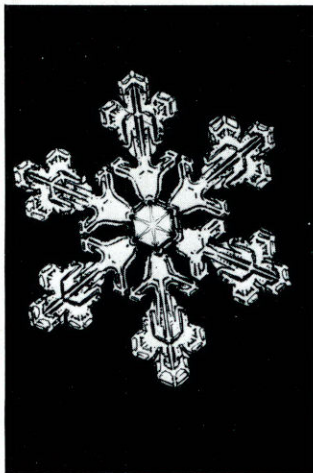
**TEXAS PARKS & WILDLIFE
magazine**

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

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Front Cover: While beautiful and unusual, last year's harsh winter made it difficult for many species of wildlife to survive. Photo by Martin T. Fulfer.

Inside Front: The largest hailstone ever recorded weighed 1.67 pounds and was 17½ inches around. This photograph of a cross-section of it was made with transmitted light and polarizing filters by Charles and Nancy Knight of the National Center for Atmospheric Research. Related story on page 28.



Welcome Aboard

Visit the Winter Home
of the Whooping Cranes

Article and photographs
by Perry Shankle, Jr.

WE HEARD the boat's public address system click on and the captain said, "I want to welcome you folks aboard the *Whooping Crane*. Please check the magazine rack near the rear door of the cabin. You will find birding check lists, a pamphlet on Aransas National Wildlife Refuge and a map of the route we will be taking during the next four hours. This will be a 32-mile round trip. We guarantee that you will see the whooping cranes or your money will be refunded."

The money referred to is the \$5.00 fee for adults and \$4.00 for children under 10 years of age which Captain Francis Brown, "Brownie," charges to take passengers on a cruise through the tidal marshes of the 55,000-acre Aransas National Wildlife Refuge.

The refuge was established in 1937 when it was determined that Blackjack Peninsula (the name it went by at that time) was the wintering ground for the world's remaining population of whooping cranes. The peninsula is surrounded by Aransas, Mesquite and San Antonio bays. In recent years over 300 species of birds have been observed on the refuge.

Brownie's first message to his passengers was the only completely serious message he would make during the next four hours. Over the years, he has learned to spice his factual information on wildlife with humor and an occasional yarn as he talks to his passengers. The passengers are usually made up of Audubon groups, rod and gun clubs, Sierra clubs,

photography clubs and other individuals interested in seeing the whooping cranes and learning more about the wildlife that abounds at the refuge.

In the beginning of 1973, approximately 50 wild whooping cranes, *Grus americana*, remained in the entire world. Although this number sounds low, it's a substantial increase from the 14 birds that existed in 1938.

The boating excursions begin around mid-October each year and continue through the first week of April going out on Wednesday, Friday, Saturday and Sunday. By the end of April the whooping cranes have begun to return to their nesting grounds in Wood Buffalo National Park in northwest Canada.

Brownie docks his boat at the Sea-Gun Sports Inn near Rockport, and conducts the only regularly scheduled excursion into Aransas Wildlife Refuge. His 65-foot boat is usually close to its capacity of 150 passengers by casting-off time at 1:30 p.m. As the boat leaves the harbor, Brownie turns on his public address system again and begins pointing out laughing gulls, ring-billed gulls, Foster terns and other waterbirds that follow the boat. The children on board quickly learn that the gulls will fly down and practically eat out of their hands in order to compete for popcorn. As Brownie says, "It's light, it's white, it floats on the water, the birds like it, and we like to sell it." In its deck cabin, the *Whooping Crane* maintains a snack bar of cold drinks, coffee and snacks. There



Captain Brown, "Brownie," combines humor and facts when telling about the birds and other animals seen along the 32-mile, four-hour trip.



are several tables for those who want to sit down and eat or fill out postcards.

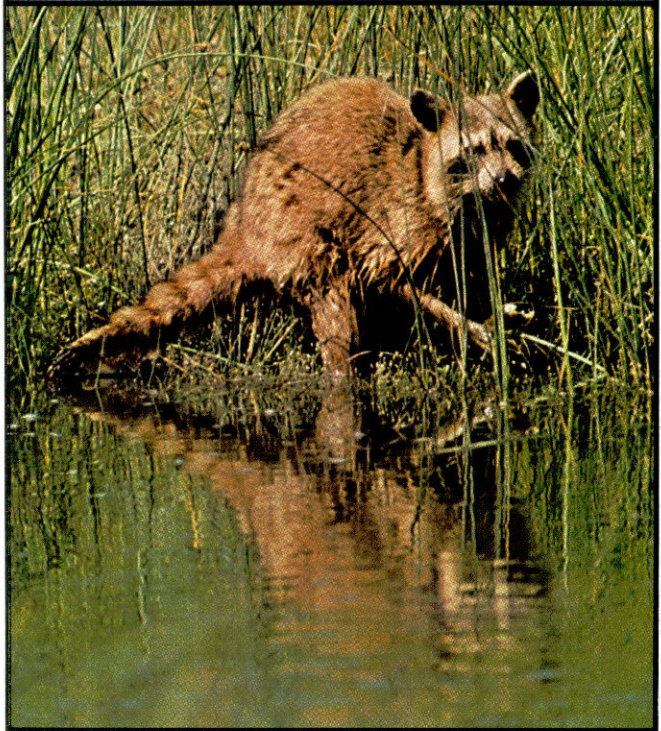
The distance from the Sea-Gun Marina to the intercoastal canal is about six miles. Along this part of the journey, porpoises (bottlenose dolphins) join the boat several times. Sometimes they leap in the wake of the ship and sometimes they race along in front of the bow. Brownie is alert to point them out as the kids run from bow to stern to verify their presence.

Several times during this part of the trip the boat nudges or drags the shallow bottom of Aransas Bay. "Don't worry folks," Brownie reassures us. "If we run aground completely, we can always walk in." The boat draws only 3½ feet of water.

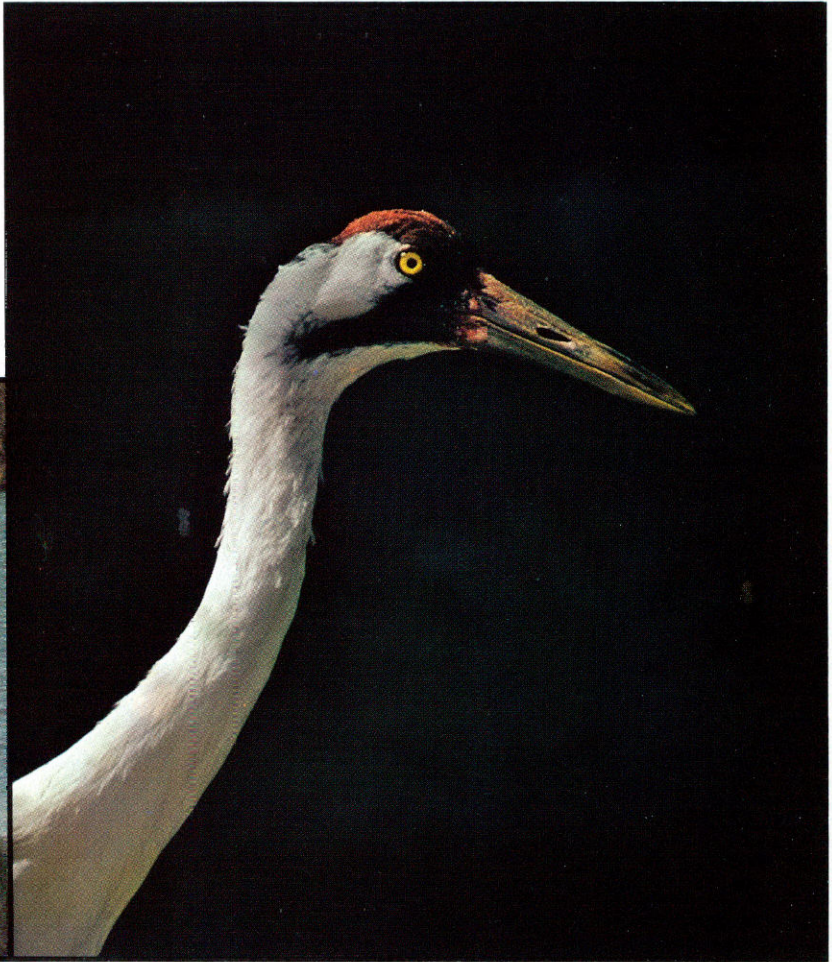
We pass one island that has 11 white pelicans. Brownie points out the physical differences between the white pelicans and the whooping cranes. He also explains that you would seldom, if ever, find this many whooping cranes in one location since there are so few and the whooping crane is very protective of its feeding ground—running off other whooping cranes not in the immediate family.

After 45 minutes of easing through the flats, the boat enters the intercoastal waterway. Here it makes better time, but it is still about 30 minutes to the feeding ground of the endangered cranes.

The boat disturbs a group of Canadian honkers that were feeding along the intercoastal waterway. They take to the air and are spectacular as they circle, gain



“We guarantee that you will see the whooping cranes or your money will be refunded,” is the offer and visitors are seldom dissatisfied.



altitude and fly directly over the boat. A group of snow geese flies by and Brownie points out the differences between this game bird and the whooping cranes (both are white with black wing tips). The snow geese are much smaller and are usually found in flocks. As we enter the whoopers' feeding grounds there is a sign posted on both sides of the intercoastal waterway identifying this national wildlife refuge.

Soon a small green and white boat pulls up. As the driver comes on board and ties his skiff behind our boat Brownie explains that our new visitor is David Blankenship, a National Audubon Society research biologist. David and Brownie have been looking for a crane that has been missing for the last several days and David has come on board to give Brownie some new information concerning the bird.

It's interesting to note that there are three different types of people represented on the boat that are vitally interested in the whooping cranes. Brownie makes his living from his guide service in the area. David Blankenship is employed by the Audubon Society, a private group interested in the birds' future, and we have on board Chuck Ward, a staff member from the refuge headquarters. It's not uncommon for the refuge staff or Department of Interior visitors from Washington to ride the boat since this is one of the best ways of observing a large number of the birds in a short length of time. The only better method would be small

aircraft.

“Well there they are folks. The guarantee I promised you,” Brownie says.

Looking in the next little inlet, we see two mature and one immature whooping crane searching the watery flats for crustaceans and other edible tidbits.

As is his custom when he gets close to the cranes, Brownie revs the two diesel engines and heads toward the birds at full steam. About 10 feet from the shore he cuts the diesel engines and lets the boat's inertia ram the bank. The boat hits and settles on the sand. The cutting of the engines and the beaching of the boat delight the photographers on the sun deck. Now they are able to “shoot” to their heart's content without the vibration of the engines or the rocking action created by the small waves.

The birds are about 40 yards off but have not been disturbed by our approach. Brownie doesn't get in a rush at this point in the tour. He usually has 10 or 20 photographers on board. Some of them like to work fast, some like to work slow. The elevated top deck allows the photographers to shoot over the tall coastal grass. After 15 minutes the diesels start up, and we begin pulling away from the sandbar.

After a short ride we startle an American egret feeding along the canal. He flies a short distance and begins to land in an inlet. Inadvertently he alights close to a raccoon out in the shallow water digging



for clams and crustaceans. As quickly as he lands, the egret rises and leaves the raccoon for a more secluded area. The raccoon is not disturbed. He continues his search.

Through his years of guiding experience, Brownie knows just what to expect in the way of wildlife on the refuge. Because of this he saves comments about an animal species until we are directly in front of it, which, of course, makes the tour more meaningful. At one point he says, "It's very common for rattlesnakes to swim between these islands in search of food just as the raccoons do. If you will look off to the left you will see a Western diamondback rattlesnake headed for the shore of that small island." The crowd looks. Sure enough, there is the snake. The kids are very excited (not to mention us adults).

The intercoastal waterway is dotted with various white birds. Most are American or common egrets. Many are snowy egrets and Brownie explains the difference between the two. For these relatively common birds he does not stop the engines. The cameras continue to click. Up ahead we see two whooping cranes directly on the intercoastal waterway. About 200 yards from the birds Brownie cautions the passengers not to yell, whistle or make any quick movements that may startle the birds. "Now if any of you make any noise, I'll throw you to the rattlesnakes and alligators, so please be quiet."

When he gets about 50 yards from the cranes, Brownie cuts the engines. Forward speed continues to move the boat toward the cranes.

Miraculously the birds do not fly. They walk back from the shore perhaps 10 steps, turn and view the boat with suspicion. The photographers on board are ecstatic. We are perhaps 20 or 25 steps from the birds. We are so close at this point that the larger telephoto lenses can capture only the head and neck of a single bird.

After perhaps 10 seconds, it's too much for the cranes. With their majestic 7½-foot wingspread they take to the air and fly 100 yards inland to a more isolated area.

Brownie's public address system clicks on. "That'll be an extra dollar folks," he kids. We all laugh but would be glad to pay the price if he were serious.

In between sightings of the whooping cranes, we observe kingfishers, roseate spoonbills and turkey vultures flying from place to place throughout the marshy flats in search of their respective kinds of food.

Beginning in early March the whooping cranes begin their mating ritual by first bugling to one another and then by dancing and jumping five to seven feet off the ground with wings extended. Because of the size of these birds, as well as their extreme rarity, this is perhaps one of the most dramatic and exciting courtship rituals in the entire wild kingdom.

Brownie has studied the birds enough to have a feel when they are approaching their courtship routine. When he observes the beginning of such behavior he forewarns his passengers so that they will be ready with their cameras and binoculars. It's a most beautiful sequence of events and it gives the wildlife photographer an immeasurable feeling of accomplishment to have this ritual in his photo files.

Today we are in luck. As we close on one of the whoopers, he turns toward one of the other cranes about a half mile off and begins bugling. After several return messages of encouragement, the two cranes rendezvous midway between their original locations and begin their annual mating dance. Every time the huge wings flap and one of the birds takes to the air, the crowd lets out an "Oooh!" in unison as though they had been carefully schooled and were now under the direction of a concert conductor. After several moments of dancing the ritual ends and the birds return to feeding. The actual mating will take place some weeks later perhaps 2,500 miles away in northern Canada.

As the afternoon sun begins dipping in the west, the *Whooping Crane* turns toward home. As the boat eases back through the Aransas Bay flats the passengers begin itemizing each little victory on the four-hour trip. It has been an interesting flashback into a wild, free environment that once covered every tidal flat, forest and mountainside of this great country. It's comforting to see our wildlife heritage retained as it is on Blackjack Peninsula along the Texas coast.**



Carry a Slingshot

Article and photographs
by Adrian Benke

THWAP! A thumb-size chunk of nest tumbled down through leafy branches and floated softly on the Medina River. An angry swarm of red wasps circled high in the tree then gradually settled back on the nest. Greg and I—we were 12 or 13 at the time—fired off more rocks with our slingshots, and although we scored a hit now and then, the nest held, and the wasps became more hostile.

Finally Greg sneaked through the brush and trees to a point several yards closer. It may have been his first or second or fifth shot that connected. I

can't recall which. In fact, I didn't even see the nest fall, but I did see Greg's retreat. His eyes were bulging, and his slingshot was whipping back and forth in his hand slapping his sides as he tore past me. And tight behind him, like an armada of tiny but deadly guided missiles, the wasps droned in for the kill.

I blanched and cringed behind my tree and listened to the crashing sounds growing faint in the distance. Greg made quite a run, for nary a wasp touched him.

We later circled downstream and fetched the nest out of the water. It was

loaded with big juicy "grubs," as we called them. They were all the bait we needed for catching a mess of sunfish.

That was one of the most practical, though not-too-bright, experiences I ever had with a slingshot. My father taught me to make the things years before, and his father had taught him. Slingshots were, and probably still are, a traditional part of growing up. No one seems to know who invented slingshots nor how long they have been around. A good guess, though, would be at least 100 years—some time after vulcanized rubber processing began in 1839.

But vulcanized rubber was not made with slingshots in mind. It was used primarily in making tires and inner tubes. Farm boys and city kids from coast to coast once attacked discarded, patched-up inner tubes with everything from dull pocketknives to their mothers' best scissors. They cut beautiful, stretchy rubbers for their slingshots, and all was well until World War II which brought about a shortage of rubber.

In the early 1950s, enterprising fellows detected a craving for slingshots. Many sporting goods manufacturers added slingshots to their lines of merchandise, and some backyard operations boomed into sizable businesses. Slingshots were the rage, and clubs sprang up across the country. Everyone wanted a slingshot. The writer Ernest Hemingway, yeast king Max Fleishman, movie actor Lloyd Nolan and several Army generals tucked slingshots in their hip pockets. Even the White House ordered several models for unidentified personnel.

Some of the great shots of this era were Jim Gasque, William "Slingshot Shorty" Hutchins Jr. and Johnny Milligan. Gasque, using No. 0 buckshot, could hit a quarter at 30 feet, and Slingshot Shorty could send a pellet down the neck of a bottle and knock out the bottom. But Milligan, a Ford employee from Detroit, was probably the best of the lot. He could snuff candles at 30 feet and once scrambled four dozen eggs tossed in the air at 25 feet. His feats were featured in newspapers, television and even the mass magazines. Milligan took advantage of his fame and began producing cast aluminum slingshots which are still sold.

Although the slingshot fad tapered off during the late '50s, there remained a healthy demand. This demand has been increased by another wave of interest. The challenge or sportsmanship in slingshot hunting is attracting many new enthusiasts. The hunter who uses a slingshot is giving the game a chance. No shot is a cinch.

The slingshot is an effective weapon within limits. I have heard that during the Depression, and even before, many poor families relied on homemade slingshots for supplementing their diets. And even now, the same is true of illegal aliens from Mexico. Many of them depend on slingshots for whatever meat they eat while walking north looking for work. I have seen a number of their confiscated slingshots, and these are some fascinating weapons.

The most obvious indication of a revived interest in slingshots is the



number of tournaments being held. Earlier this year, the first U.S. Open Indoor Slingshot Tourney was held in Las Vegas, and now there is talk of forming a national slingshot association. In Texas, the Dimmit County Chamber of Commerce has just sponsored its annual "World Championship Slingshot Tournament." The response has been such that the event may become a traditional affair.

In general, the shooters in the above tournaments used two different shooting styles. Those in the Dimmit County tournament shot in the traditional manner. They held their slingshots at about a 45-degree angle from the ground and shot instinctively, without aiming. Shooting in this manner is like throwing a rock; you simply develop a "feel" for it.

Most of the Las Vegas shooters used the so-called "Saunders Method" (developed by the Saunders Archery Company which sponsored the event). I have tried this technique, and it really works. It's simply a variation in which

the shooter holds the slingshot at a 90-degree angle, with the handle horizontal, and literally aims by placing the bull's-eye just above the top fork. Judging from the results of the two tournaments neither method is superior. It is a good idea to try both to see which works best.

Regardless of which technique a person adopts, he should strive for consistency. A worthwhile aid in this respect is the "anchor point." This is an archer's term for picking a spot on the face and drawing the hand back so that it touches that spot each time a shot is fired. When I anchor, I draw the pouch back so that my thumbnail touches the corner of my mouth.

Also, it is important that shooters with right dominant eyes shoot their slingshots right-handed. The opposite of course is true also. To check which is your dominant eye, simply cut or tear a half-dollar size hole in the center of a page of paper. Then hold the paper in both hands at arms' length, and with both eyes open, look at some small

Whether it is a modern manufactured slingshot like the ones shown at right or a homemade one something like those below, slingshots are effective weapons when going after small game.



object several feet away. A light switch will do. Without shifting your gaze, move the paper up so that the object can be seen through the hole. If you can close your left eye and still see the object without shifting the paper, you have a right dominant eye. If you see the object when your right eye is closed, you have a left dominant eye.

The right-handed shooter should grip the slingshot in his left hand and stand at nearly right angles to the target—with his left shoulder pointing toward the target. And he should grip the slingshot properly. There are two basic types of slingshots—the wrist-brace models and those made along the lines of the forked stick. It is almost impossible to improperly grip the wrist-brace models. However, a person could grip the forked stick or Y-type slingshot entirely by the handle, and this would be wrong since it places too much stress on the wrist. A shooter will relieve this stress by moving up on the handle so that his thumb and index finger rest along the forks.

Accuracy with a slingshot boils down to consistency. The only way to achieve this is through practice. An essential item for backyard shooting is a good backstop. An old rug or piece of carpet draped over a clothesline is ideal. A backstop of this type will stop the pellet and allow the shooter to use the same ammo over and over.

On a smaller scale, a similar backstop can be fashioned for indoor shooting. Simply take a large cardboard box and

cut out one end, leaving a two- or three-inch margin for strength. Next, drape a piece of carpet across a rod secured atop the box toward the rear. Finally, hang a target in front of the carpet and shoot through the open end of the box. It is a good idea to situate your shooting range so that a wild shot won't knock out the television or damage anything else.

The slingshot should be accorded the same common-sense rules and respect applied to shooting firearms. It is more of a weapon than a toy. Some towns and cities have ordinances prohibiting the use of slingshots. Such laws tend to vary so it is best to check out the legal aspects before setting up a range.

So far as hunting is concerned, game laws tend to ignore the slingshot as an individual weapon. The slingshot hunter, however, must be licensed and must abide by the bag limits and legal shooting times set forth for the gun or bowhunter. And although birds make tempting targets, it might be well to mention that only three non-game species may be taken. These are the European starling, English sparrow and feral pigeon.

When it comes to taking larger birds and animals, the slingshot fairly well sets its own limitations. I have heard of slingshot hunters bagging everything up to and including foxes, and I know of some who are hot after coyotes and bobcats. But I think this is pushing things a bit. Judging from my own experience, the slingshot's effectiveness

ends with the cottontail. And by effectiveness, I mean that a solid hit in the front half of the body will put the game in the bag.

If a fellow is good enough and limits himself to head shots, he can probably take on jack rabbits, ringtails and even turkey gobblers since these animals have rather fragile protection about the head. The larger animals, from raccoons on up, have heavier muscle and bone structures. Then it becomes a matter of making a precise head shot from an absolutely correct angle. Since this is impractical at best, a person should go after larger game with a more potent weapon.

I have learned through bitter experience that selecting the right ammo is extremely important. The time-honored pebble is about the worst projectile you can pick up. Its primary drawback is that it lacks accuracy. No two will weigh the same, and very few are round enough to fly a straight course. Also, they lack density and therefore energy which is important in hunting. Rocks are admittedly abundant and will do in an emergency.

Marbles and sizes 0 and 00 buckshot are inexpensive, easy to obtain and fine for target shooting and hunting the smallest game birds and pests. I have used buckshot on cottontails and have run into trouble. The small pellets would go right on through, and unless they were luckily placed, all I had was a sick rabbit needing a *coup de grace*.

The best ammo is called buckshot but

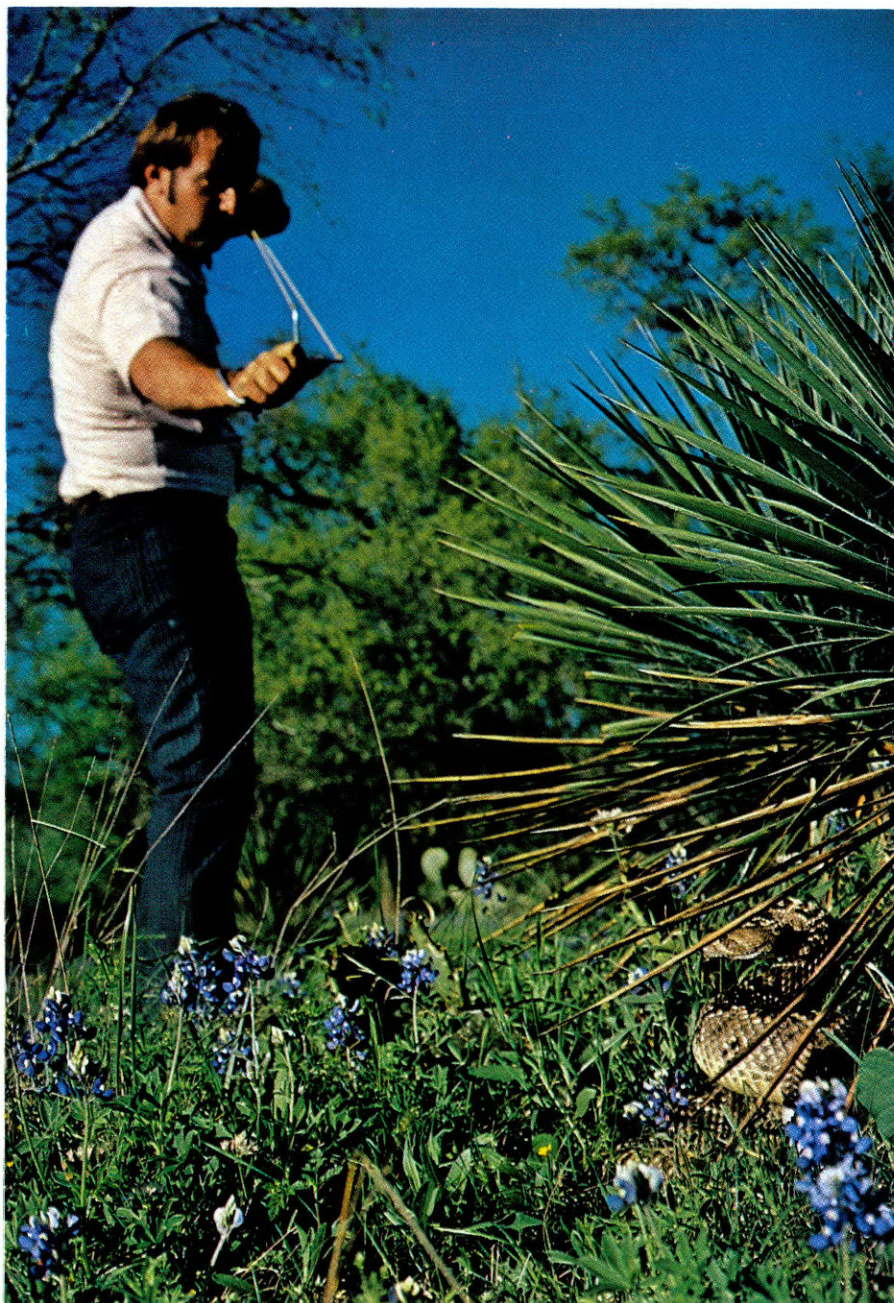
comes in super-sized .45 and .52 calibers—just right for hunting. N. L. Industries of Granite City, Illinois sells these slugs in five pound bags under the brand name "Lawrence." For about \$2.50 a bag, a person should be able to get these slugs through most stores handling reloading supplies.

Such stores will carry or be able to order .526 or .536 caliber round-cavity molds used by muzzle-loader enthusiasts. Such molds should turn out excellent slingshot ammo. Simply get a supply of scrap lead or wheel weights and follow the instructions for casting sinkers in the July 1973 issue of *Texas Parks & Wildlife*. That should put you in business.

Awhile back a friend and I ran some informal experiments with various projectiles and slingshots. We discovered that, in most cases, the slingshot would send the .52 caliber (225 grain) slugs as far as the 00 (47 grain) buckshot. A bit of calculating shows that the larger slugs have about five times as much weight, and at least as many times the energy, of the smaller shot. The reason for this seeming phenomenon is that, on release, the buckshot quickly outruns the pouch and contracting rubbers. The larger slugs are harder to move along and therefore absorb more energy. However, there is a point of diminishing returns. When we went to slugs much larger than .50 caliber, we got rainbow-like trajectories and poor handling qualities with little if any gain in energy.

The experiments we did also disproved the common notion that slingshots with the surgical tubing rubbers shoot harder than those with flat rubbers. Both types will send the .52 caliber slugs from about 160 to 200 yards, depending on the shooter. With the smaller 0 buckshot, however, the flat rubber slingshots outperformed the harder-to-pull surgical tubing variety by sending the pellets an extra 15 to 20 yards. Since the heavy slugs should be used for most hunting, there is little reason to recommend one type over the other.

Slingshots are also helpful in taking big game. Some deer hunters have actually used slingshots to put venison into the freezer—no, they don't knock over deer with buckshot and ball bearings. In parts of the brushy-canyon, open-hillside areas of Texas, the older bucks often develop the annoying habit of sitting tight like quail in heavy cover. If they know you're around, you can hardly drag them out with lassoes. But what these hunters do is sneak up to



a vantage point and stay hidden. They then begin peppering the brush with stones, and theoretically, the deer begin to wonder what's going on. They can't smell anything. It sounds as if they are surrounded, so they decide to seek peace and quiet elsewhere. And when they do—ker-blam!—fresh venison.

Most deer hunters also see plenty of rabbits, quail and squirrels while out poking around in the woods, yet they are hesitant to yank the trigger of "Old Betsy" or even a .22 pistol for fear of scaring their primary quarry. Nonetheless, they would like a change of diet from the beans and canned goods back in camp. The slingshot is the answer. It is light, quiet and convenient and

even has plenty of power for dispatching big, scaly rattlesnakes (with head or neck shots).

The slingshot's usefulness is limited as much by a person's imagination as by anything. Mentioning the small game a deer hunter might toss in the pot reminds me of the enormous bullfrogs which bellow along the edges of my favorite bass pond. I have many times tried the trick of dangling pieces of red flannel in front of their noses, but to no avail. They would invariably croak and leap before I could get within dangling distance. The next time I visit that pond, though, things are going to be different. You guessed it of course. Next time I'll be packing a slingshot. **

OUTDOOR BOOKS

THE AMATEUR'S GUIDE TO CAVES & CAVING by David R. McClurg; Stackpole Books, Harrisburg, Pa., 1973; 191 pages, \$2.95 paperback edition.

To some people the word "cave" conjures up thoughts of mystery, adventure, discovery and beauty, but to others it invokes thoughts of darkness, tight places, cave-ins and danger. Caving is really a combination of all these things.

For those individuals who think they would enjoy crawling around in darkness, wriggling through tight places, climbing up and down steep crevices or walking on muddy, slippery surfaces, David R. McClurg has written *The Amateur's Guide to Caves & Caving*.

McClurg quickly points out that caving is dangerous and not a sport which should be undertaken lightly. But if you are determined to learn how, you will find his book more than helpful. In his section on safety, McClurg stresses the point that caving is not a solitary pastime and that to cave alone is suicide. A minimum of four should cave together. That way, in case of an accident, one can stay with the injured member while the other two go for help. That's right, even when going for help, a caver should not go alone.

Exploring caves and exploring mines are two different things, and McClurg advises that mines should be avoided at all times. He feels they "are about as near to death traps as one would ever want to come." Caves practically never have bad air since they "breathe" as the outside barometric pressure changes, but mines are known for their killing gas pockets and bad air. Cave-ins are also more likely in mines due to falling timbers or collapsing passageways. So if you were considering exploring a mine, take McClurg's advice and reconsider your plans.

According to the author, about the best way to get into caving is to first visit commercial caves to be sure you really enjoy being beneath the earth and do not suffer from claustrophobia. Then contact the National Speleological Society to find out where their nearest chapter (grotto) is located. Contact this organized caving group and go along on their next outing.

Since caving requires a bit of personal equipment, McClurg devotes a chapter to this subject. Although the basic equipment for the beginner on his first trip is a hard hat, light, a good pair of hiking boots and old clothes, other equipment such as packs, ropes, knee pads, carbide lamps and a water canteen will be needed if the sport is actively pursued.

The beginning caver must remember that movement inside a cave is both vertical and horizontal, so he must be able to walk, crouch walk, crawl, belly crawl, scramble up and down inclines, shimmy up and down a 30- or 40-foot crevice, traverse a narrow ledge, rapel, negotiate overhangs, and use rope ladders. These vertical and horizontal techniques as well as instructions on knot tying are carefully explained in the book.

Throughout *The Amateur's Guide to Caves & Caving*, McClurg stresses safety, but he also stresses conservation. The underground beauty found in caves took millions of years to develop, but it can be destroyed in seconds by careless cavers. For conservation of this beauty, the caver should not collect or damage any geological formations or take specimens of plants or animals found in caves. The accepted way to preserve beautiful or unusual formations or finds is through photography. Caves should remain undamaged for all to enjoy and cavers should adopt the motto of the National Speleological Society: "Take nothing but pictures; leave nothing but footprints; kill nothing but time."—Ilo Hiller.

GAME AND FISH FROM FIELD TO TABLE by Roy Wall; The Naylor Company, San Antonio, 1972; 132 pages, \$4.95.

For the hunter or fisherman who believes that the harvested animal or fish should find its way from the field to the dinner table in an edible form, Roy Wall has written *Game and Fish from Field to Table*.

Wall first expounds the basic principles of cookery giving tips on what the cook should or should not do to the meat to retain the natural juices and original unique flavor. Many cooks do not realize that piercing with a fork

during the cooking process breaks the seal on the meat and allows the juices to escape or that salt draws out the juices and should not be added until just before the meat is done.

There is no secret recipe or magic marinade which can restore the flavor lost by improper field handling, so before giving his big game recipes, Wall devotes a chapter to caring for the carcass in the field and aging the meat for the correct length of time prior to cooking. If the carcass has received proper care, it can be prepared by any one of Wall's recipes and served with pride.

Not everyone hunts big game, so the same information is given for small game, upland game birds, waterfowl, shore birds and fish.

Sauces and garnishes can do much to add to the enjoyment of meat and fish dishes, and Wall includes a section for preparing various ones. Have you ever tried an egg sauce on baked, broiled or sautéed fish, or a mint sauce with roasted or broiled venison, goose or duck?

Armed with Wall's book, the cook should be able to turn out some delicious meals in the field and gourmet delights in the kitchen at home.—Ilo Hiller.

THE BIGHORN SHEEP by Iona Seibert Hiser; Steck-Vaughn Company, Austin, 1973; 30 pages, \$4.25.

Another children's book has been added to Steck-Vaughn's Wildlife Series, and this one presents the bighorn sheep and its endangered relatives.

In her usual competent style, Iona Seibert Hiser introduces the bighorn, discusses its habits and describes the physical characteristics of the various species. She also discusses the habitat problems caused by advancing civilization which are endangering the bighorns. But the book doesn't end on a depressing note. She goes on to say that efforts are being made to establish wilderness areas such as the Desert Game Range in Nevada, the Cabeza Prieta Game Range and the Kofa Game Range in Arizona and the San Andres Refuge in New Mexico where the animals may live undisturbed.

This well-written book is further enhanced by the beautiful wildlife illustrations by Nancy McGowan. Long-time readers of *Texas Parks & Wildlife* magazine will remember when McGowan illustrations appeared monthly in our publication.

The Bighorn Sheep is truly a nice addition to this wildlife series for children.—Ilo Hiller.

LONG SHOTS SHORT CASTS

Front Cover — Martin T. Fulfer; 4x5 Graphic View, 300mm Schneider; Ektachrome.

Inside Front — Charles and Nancy Knight; Courtesy of National Center for Atmospheric Research; Technical information not available.

Pages 2-5 — Perry Shankle, Jr.; Technical information not available.

Pages 6-9 — Adrian Benke; Leica M-5; other technical information not available.

Page 12 — Jim Whitcomb; Nikon F, 55mm Micro Nikkor; Kodachrome X.

Page 13 — Fulfer; Nikon F, 55mm Micro Nikkor; Kodachrome X.

Page 14 — Richard Moree; Technical information not available.

Pages 16-18 — Fulfer; 4x5 Graphic View, 150mm Schneider; Ektachrome.

Page 20 — Fulfer; Nikon F, 28mm Nikkor; Kodachrome X.

Page 24 — Fulfer; Nikon F2, 50mm Nikkor; Kodachrome X.

Page 26 — Charles Shaw; acrylics on illustration board.

Pages 28-29 — W. A. Bentley; Courtesy of University of Vermont; Technical information not available.

Page 30 — Charles and Nancy Knight; Courtesy of National Center for Atmospheric Research; Technical information not available.

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

Back Cover — Fulfer; Nikon F2, 400mm Leitz Telyt; Kodachrome X.

compiled by Neal Cook

Fish Poster: A 30- by 48-inch chart printed on washable, non-glare paper showing 49 marine fish found in the South Atlantic and Gulf of Mexico is now available. The beautiful full-color poster is the fourth in a series produced by the U. S. Commerce Department's National Oceanic and Atmospheric Administration showing aquatic inhabitants of United State's waters. Copies may be ordered from the Superintendent of Documents, Washington, D.C. 20402, for \$2.00 each. Specify stock number 0320-00065 when ordering.

Deer Cleaning: This department has available a reprint from the magazine which deer hunters will find of interest. This sheet shows how to field dress and butcher the animal and is entitled "Now That You've Killed It." Write to Parks and Wildlife Department, John H. Reagan Bldg., Austin, 78701 and request the reprint by name.

If Interested: The Smithsonian Institution—Peace Corps Environmental Program is looking for volunteers interested in working with developing countries on wildlife ecology and management. Persons with scientific backgrounds in such fields as forestry, fisheries, wildlife management, geology, ecology, park planning, air or water pollution research and other environmental programs can write Robert Poole, Office of Ecology, Smithsonian Institution, Washington, D.C. 20560 for more information.

Big Bass: Dave Zimmerlee of Claremont, Calif., knew he had a big bass, but he didn't know just how big when he caught one which was described as an "overstuffed medicine ball." The fish was verified as weighing 20 pounds, 15 ounces and measuring 26 $\frac{3}{4}$ inches long with an amazing 28-inch girth. Caught from San Diego's Lake Miramar, the fish is only a little less than the world record of 22 pounds, four ounces caught in 1932. The fish is probably one of the Florida strain of bass transplanted to California in the early 1960's.

Working on the Waste: About 40 percent of a slash pine is "waste" and much of it is left in the woods. This waste includes the stump, roots, bark, branches and needles. The Southern Forest Experiment Station is working to find an economical way to use this waste.

Communications Center: For the hunter or fisherman who needs information about laws or regulations or who wants to report game and fish law violators, this department has set up a 24-hour-a-day, seven-day-a-week center for answering these questions. The number is **not** a toll free call and no collect calls will be accepted, but if you have ever had a question about the bag limit or season at 10 o'clock the night before you are going hunting and needed an answer, then you will be glad to pay for the call. Simply dial 512/475-5909.





The First Mobile Homes

by Terrie Whitehead

TURTLES, tortoises and terrapins—which name applies to which reptile, and what are the differences among them?

Scientifically, the distinctions are clear and easy, but the names are confusing because different geographic regions apply the names somewhat interchangeably. The true turtles, such as mud and snapping turtles, are amphibious, spending part of their time on land and part in water. Species of terrapins like the diamondback and slider are strictly aquatic, living in marshes and brackish water, while the tortoises are confined to the land.

The history of turtles dates back some 200 million years in the Triassic Era, making them among the first living

vertebrates to lay eggs outside the water. These first reptiles evolved from the amphibians and acquired such characteristics as the absence of teeth along the margins of the jaws, reduced number of skull bones and the development of a shell.

Although very old folklore and legends have greatly exaggerated the turtle's longevity, it is the longest-lived vertebrate, not excluding man. Some sea turtles and the giant Galapagos tortoises live past the century mark, and it is not uncommon for a box turtle to live from 40 to 150 years.

A turtle's shell might be termed as both its greatest asset and greatest liability. On one hand the shell affords protection and is almost indestructible,

but when the turtle is flipped on its back with its underside exposed to heat, insects and animal predators, the shell becomes a trap.

Many experts are baffled that the turtle still exists with such a specialized, structured shell while many other animals have become extinct. One expert thinks that the turtle's success lies in the military strategy of defense rather than aggressive attack. In respect to all land turtles, this theory seems plausible. However, true turtles and terrapins are somewhat more aggressive in the water where they must actively pursue fish and aquatic invertebrates for food.

The slow-moving box turtle and Texas tortoise set a different pace



when it comes to obtaining food. With a diet that varies from insects to wild fruit in the wild to table scraps, dog food and raw hamburger in captivity, these species seem content to take food as it comes. One expert notes that most persons assume that land turtles are herbivorous (plant-eating) and that aquatic ones are carnivorous (meat-eating). However, he cites examples of exceptions to both rules.

A characteristic typical of all reptiles is hibernation, a sleep-like condition spent during the cold winter months. Some turtles occasionally wake up during their winter's nap to catch up on lost meals and fill their empty stomachs. When the weather gets warmer in the spring, turtles become more active and begin looking for a mate.

Although turtles differ slightly in physical appearance, habitat and diet, they all have one characteristic in common—all turtles lay their eggs on land. From egg incubation until the shell becomes thicker and hardened with maturity, the turtle suffers a high mortality rate. Many mammals like raccoons are notorious for digging the eggs from the ground and eating them.

Even after the turtle hatches, it is in danger of birds and raccoons that strip the top shell in order to get to the meat. For the true sea turtles and terrapins, other predators such as ghost crabs, sharks and large fish take their toll on the young. Once the turtle reaches maturity, its primary foe is man, who transforms the turtle into soup, crushes them with cars on the highway or destroys the natural habitat.

Substantial evidence indicates that land turtles injured by a car can regenerate their shells. Where the carapace (upper shell) has been cracked or even a small portion broken off, these turtles have lived, and after several years, healed and replaced the broken places with only scar tissue leaving tell-tale signs.

Unlike snakes and alligators, turtles do not seem to elicit the hatred and fear in man. These creatures are generally liked, and children still cheer the tortoise on to victory in the great race with the hare in story books. And as the perfecter of nature's first mobile homes, the turtle may have even inspired man to invent his version of a "house on wheels." **

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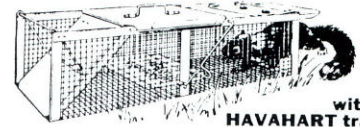
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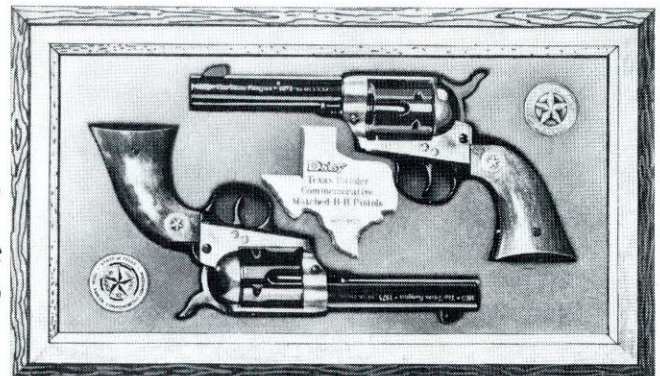


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Gifts for Hunters and Fishermen

by C. K. Winkler, Regional Director of Wildlife, Rockport

HOW many times have you heard someone say, "I wish I knew what to get him for Christmas. He's got everything." You've probably said this yourself, or had someone say it about you. Well, relax. If you're having trouble finding a gift for someone who fishes or hunts, this article is written for you. If he or she doesn't hunt or fish, maybe your gift will get them started.

For some reason, people who don't hunt or fish hesitate to buy hunting or fishing equipment for gifts, but this needn't be the case. Surely it couldn't be any more frustrating or embarrassing than it is for me to try and pick out a nightgown or other lingerie for my wife. Salespeople in sporting goods departments are just as helpful as those in ladies' wear, and stores are just as accommodating in exchanging sporting goods as they are with other items. Besides, there are many items on the sporting goods shelves that you can buy without worrying about sizes, colors, and styles or even calibers, gauges and rod action.

From the time a caveman started looking for a better way to catch a fish than by scooping it out of the water with his hands, the art of fishing has evolved into a complicated means of putting bait where the fish can get it. Basically, this means using a line, one end of which is attached to a pole and the other to a lure, hook or device for attaching bait.

The line then is the first thing to consider as a gift for a fisherman. Believe it or not, fishing line wears out, and experts recommend that it be replaced every year. Fishing lines are made of various materials and strengths, but the most popular lines today are made of monofilament nylon. Strengths of six- to 12-pound test are the most popular for light-tackle fishermen and are strong enough to handle most of the fish found in Texas' lakes, streams and coastal bays. Of course, heavier tackle is necessary for offshore fishing.

Hooks come in a multitude of sizes and shapes and even though most fishermen have their own preference, an assortment of different-sized and shaped hooks makes a good gift. The artificial lures are the "purties" of any fishing tackle display. While the colors catch the shopper's eye, the names conjure images of stringers so loaded with fish that they can't



be lifted—Jitterbugs, Hula Poppers, Whopper Stoppers, Lucky 13, Bombers and Hawaiian Wigglers. All catch fish when used in the right way at the right time, but if you're at a loss in deciding which one to buy, choose a silver or gold spoon. These are undoubtedly the bread-and-butter lures for freshwater and saltwater fishermen alike.

One of the most popular freshwater lures is the artificial worm, which looks just like a large earth-worm but comes in a variety of colors. One day the fish may be biting on red worms and the next day on purple, so it really doesn't matter what color you buy—and they're cheap enough for you to buy several.

Saltwater fishermen also use worms, but theirs are only about three inches long and about as big around as a pencil. They come in different colors too, and like the freshwater variety, the preferred color seems to change every day.

Sinkers, like hooks, come in a wide variety of sizes and shapes, and although some are designed for specific fishing methods or bottom types, fishermen have their own preferences.

At the other end of the line is the pole, or rod and reel. These are usually personal items to a fisherman, and unless you know exactly what he wants, buy some other item of fishing tackle.

A tackle box is an essential piece of equipment, and one of the best gifts I ever got was a second tackle box. It was of plastic construction and ideal for carrying all my saltwater tackle. I still use my old metal box for freshwater gear, but it never would have lasted this long if I'd had to use it for my saltwater fishing.

In addition to lures, hooks, sinkers, extra line and possibly even an extra reel, the tackle box holds a multitude of other items that a fisherman has to take with him—stringers, fish scalers, knives, needle-nose pliers, spare reel parts and first aid items.

The list of gifts for fishermen doesn't end here, however. There's still chest and hip waders, bait buckets, life preservers, boat anchors, anchor ropes, ice chests, seat cushions, landing nets, minnow seines and one of the most ingenious inventions of recent times, the battery-powered aerator for keeping live bait alive. The list is practically endless, and if you haven't found any ideas here that will help you, ask the man in the sporting goods department for suggestions. He's bound to have some new product that the fisherman can't do without.

The list of gift items for hunters is just as long as the one for fishermen, although perhaps a little more complicated because it seems that every day someone dreams up a new method of hunting or a new caliber of ammunition. But most Texas hunters use either a bow and arrow, a rifle or a shotgun.

Most of today's bows are practically indestructible, so forget about buying your hunter a spare bow. But what about arrows? These have a high loss rate, particularly practice arrows since many more arrows are shot in practice than at game. The novice, in particular, has a heavy loss of equipment before he gets to the field for the first time. A few broadhead hunting arrows would also be a welcome addition to most bow hunter's quivers.

There are many other accessories available for the archer—bowstrings (a spare is an absolute necessity),

finger guards, wrist guards, many styles of quivers, sharpening stones to sharpen broadhead tips, replacement tips and fletching tools for the archer who makes his own arrows.

The first thing that comes to mind when shopping for a gun hunter is ammunition, but the shopper must know the caliber or gauge of the gun. This information is usually stamped into the barrel of the gun, but it may also be obtained from a box of the hunter's ammunition or from the rear end of a bullet or shotgun shell. In buying any accessory for a firearm it is best to know the manufacturer and model number.

One of the best gift items to come out on the market in recent years is the trigger lock. This is a locking device that fits inside the trigger guard of a firearm and makes it impossible to fire the weapon as long as it's in place. It's an absolute must for anyone who keeps guns in the same house with children, whether the guns are kept on a rack or in a cabinet or closet.

Most hunters who use a rifle eventually find that a sling is one of the handiest accessories they can have on a gun. It is not only used for carrying the firearm but can be a big help in steadying the gun when shooting—particularly from the standing or off-hand position. If you do buy your hunter a sling, remember to also get sling swivels which are used to fasten the sling to the gun.

A gun case is another accessory that I consider a necessity. It not only protects the finish on a gun from

scratches and scrapes, but will also help keep the sights adjusted in case the gun gets bounced around or jarred during the trip to the hunting area.

Other firearm accessories that make good gifts are lens caps for telescopic sights, stock finishing kits and gun cleaning kits.

Hunters also use a lot of equipment that isn't part of their firearms. Cartridge belts, or cartridge holders that fit on belts, are handy for carrying extra ammunition. A small block and tackle is useful for hanging game in a tree to dress it, skin it or just let it cool off. Cheesecloth game bags are used to protect game from flies and other insects and varmints. A game vest is a necessity for the bird hunter, and a relatively new item on the market, shooters' gloves, would be a welcome gift for any hunter who hunts in cold weather. Duck or goose decoys cost too much for many people to consider buying a whole spread (three or four dozen) for a gift, but the waterfowl hunter usually manages to lose a few each season, so a gift of a half dozen or so would probably be a welcome sight under the Christmas tree. The list can go on and on—knives, handwarmers, flashlights and all manner of clothing from caps to shoes.

In Texas, hunting seasons open several weeks before Christmas, so keep your ears open and make a note when you hear those remarks about hunting and fishing equipment being old, worn out, lost or just not available. **



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Christmas Tree Fish Shelters

by Allen Forshage, Fisheries Biologist,
Fort Worth

ONE PROBLEM encountered in many farm ponds and other water impoundments is the absence of shelter for fish. Shelter is just as important as food for it provides an area where fish can hide from predators, rest, forage and spawn.

Shelters also provide areas where fish concentrate. Knowledgeable fishermen fish around some type of

cover and usually increase their catch. Since cover benefits both fish and fishermen it seems like a wise policy to provide some type of shelter when natural cover is limited.

Many questions arise in the construction, placement and use of artificial fish shelters. Some of these questions are: At what depth should shelters be placed? How many shelters should be put in a given area? What material works best and is most economical? Answers to these and other questions are being sought in a new study initiated by the Parks and Wildlife Department. There is no doubt that artificial fish shelters work. The major objective of the study is to find the most efficient and economical structure for Texas waters.

One structure which is economical and easy to use is the Christmas tree fish shelter. After the Christmas season, hundreds upon hundreds of Christmas trees are available for the asking.

You can either collect them from people after they have discarded them or you can get the extras at the Christmas tree lots. Two things to remember are to remove all of the alu-

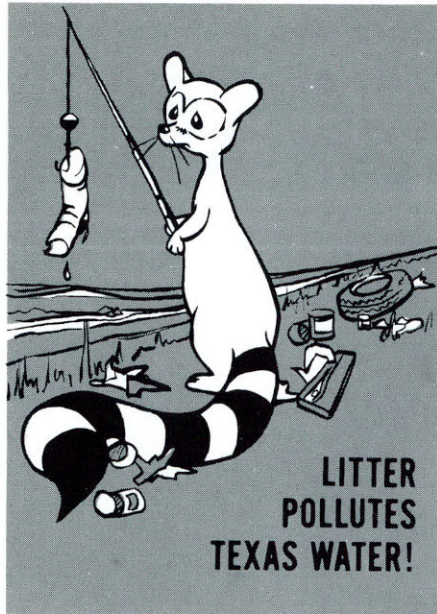
minum tinsel from discarded trees and if the trees on the lot are wrapped in nylon netting, be sure to remove it. These objects are hazardous to fish.

These trees are ideal for making brush shelters. All that is required is some galvanized wire or rope, an anchoring device (such as cement construction blocks, bags of sand, large rocks, etc.) and the labor of collecting and installing them in the pond.

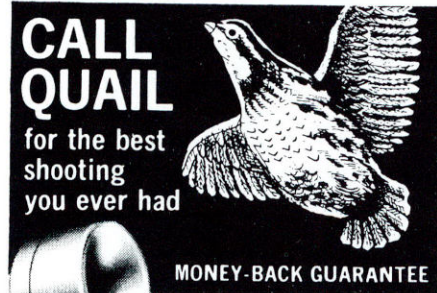
Christmas tree fish shelters are made by securely fastening enough weight to the base of each tree to permanently anchor the tree. Weighting the base in this manner will cause the tree to stand in an upright position when placed in the water. This will enable the shelter to be fished easily and provides a greater vertical distribution for the fish.

The trees should be placed in circular clusters of five to 10 trees. The number per cluster would depend upon the size of the trees. Each cluster will act as one shelter and the shelters should be scattered over the water impoundment at various depths. Those placed in shallow water will most likely attract the largest number of fish except during the winter months. Cold weather causes the fish to move into deep water and therefore use deeper shelters. Placing the shelters near drop-offs, creek channels or in areas devoid of natural cover is also recommended. Since shelters should be completely submerged for best results, the clusters should be recorded or marked so that they may be located whenever desired.

Fish concentrations around Christmas tree shelters may not be noticed immediately; but generally, they increase after the shelter has been in the water two to three months. **

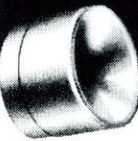


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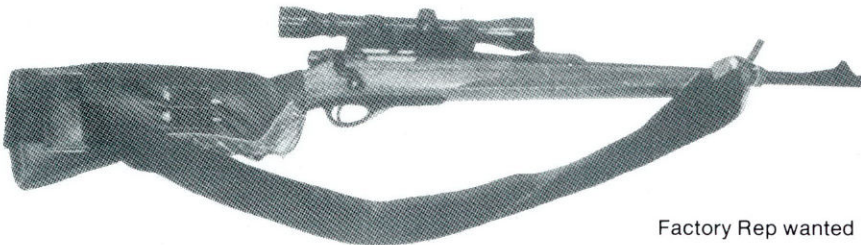
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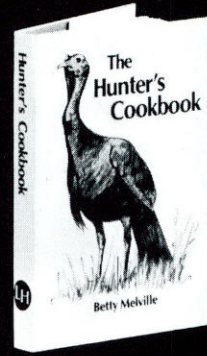
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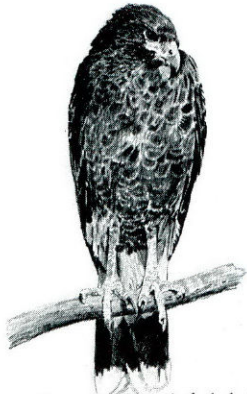
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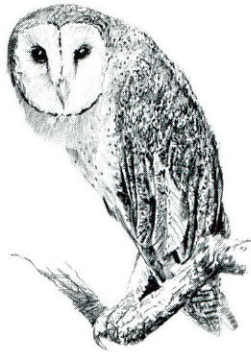
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51 HARRIS' HAWK



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52 BARN OWL



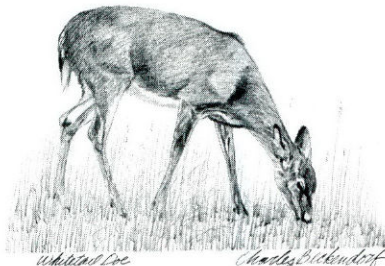
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53 BARRED OWL



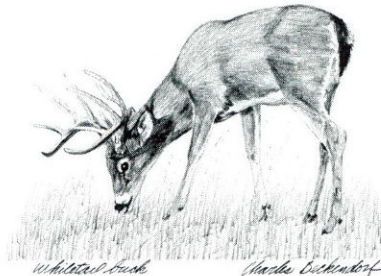
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54 STRIPED OWL



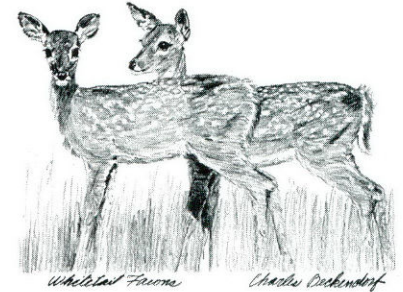
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55 WHITETAIL DOE



Whitetail Buck Charles Beckendorf

56 WHITETAIL BUCK



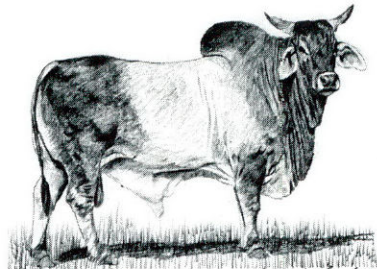
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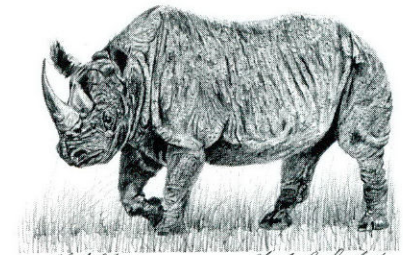
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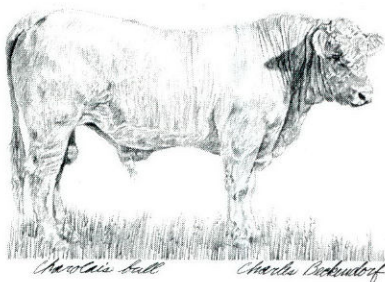
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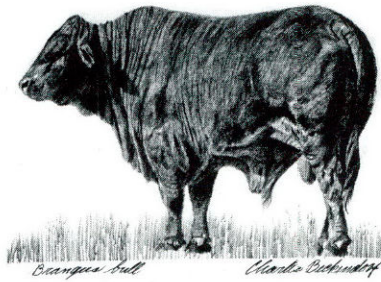
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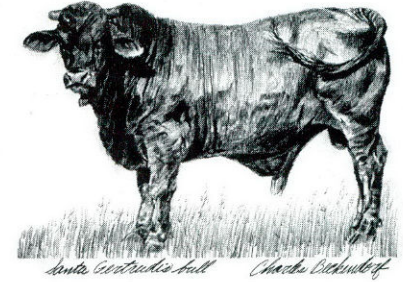
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61 CHAROLAIS



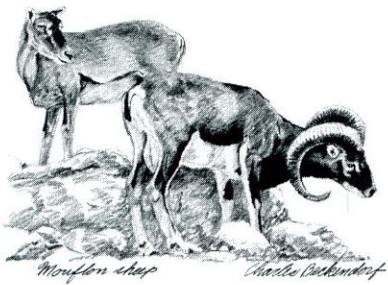
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62 BRANGUS

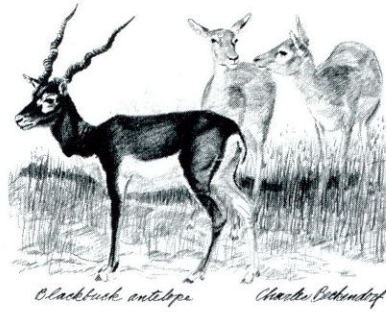


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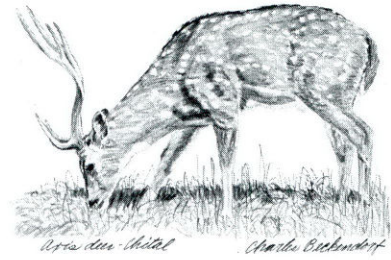
63 SANTA GERTRUDIS



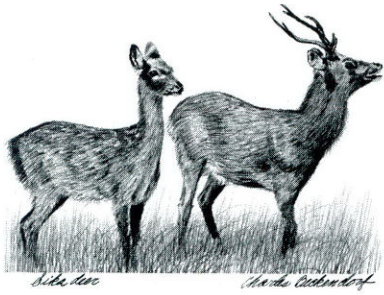
64 MOUFLON



65 BLACK BUCK ANTELOPE



66 AXIS



67 SIKA



68 FALLOW



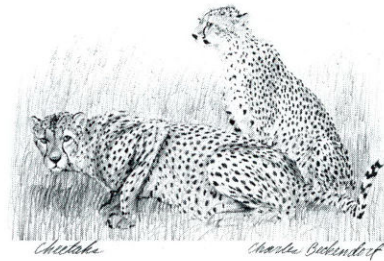
69 AUODAD



70 AFRICAN LION



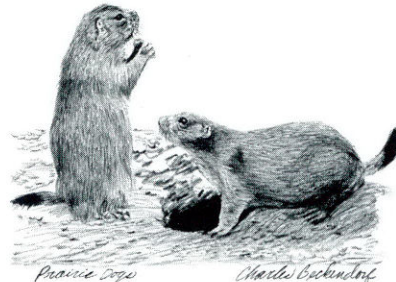
71 SIBERIAN TIGER



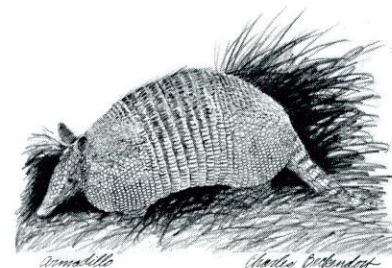
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Bird Dogs Improve the Hunt

By Royce W. Jurries, Wildlife Biologist, Victoria

THERE'S NO THRILL in hunting quite like walking up behind a bird dog on point and experiencing the flush of a covey of bobwhite quail.

The bobwhite can be hunted without the aid of a dog, but the beauty and grace of a well-trained dog improves a quail hunt tremendously. Dogs locate more birds for the quail hunter, and also find many crippled birds which otherwise would be lost.

Texas is fortunate in having a quail season that runs for nearly three months in many parts of the state. After hunters have packed away their rifles and duck decoys they still have quite a bit of quail season to which they can devote their full attention.

A beginner may find it quite discouraging at first to join the quail hunting fraternity. First, he must get a bird dog. Most hunters use either pointers or setters with personal preference deciding which breed to select. Setters usually work in closer to the hunter

than pointers, but some dog men don't like setters because of their longer hair which often accumulates grass burs. Also because of their coats, the setters are somewhat more affected by heat than pointers.

After deciding on a breed, one must decide if he can afford a trained dog, or invest less in a puppy and train the dog himself. A trained dog will cost from \$200 to \$500 while a well-bred puppy can be purchased from \$50 to \$100. Since trained dogs are expensive and hard to find, most hunters must buy a pup. Remember that a registered dog eats no more than one without a pedigree and though papers do not guarantee the pup to make a good dog, they do show what bloodlines the dog carries. Selected breeding increases the odds of producing a good dog. A registered dog may cost more initially, but in the long run will probably be cheaper. Also, if the dog turns out to be a good one and is later used for breeding,

it is of utmost importance to have papers for selling puppies.

Try to have a puppy from eight to 12 months of age at the start of quail season. After hunting for a season with a dog this age, you will know if the dog is worth keeping.

The key to training a bird dog is patience and persistence. The beginner should invest in a good book on training bird dogs. Training the pup yourself will sometimes be frustrating, but the feeling of accomplishment when you have trained your own dog is very satisfying.

Once you have a dog, the next major problem is a place to hunt. Of course one can always go to a shooting resort where you can hunt for a fee. The other alternative is to do some driving on country roads and ask permission of landowners to let you hunt. Don't be discouraged by a few "no's." You may be surprised at the number of landowners who will

let you hunt provided you ask in a nice, polite manner.

Once you obtain access to a place, there are a few pointers worth remembering. Leave the place like you found it. By all means, don't litter. Pick up spent shells. Be sure to close all gates. If you are hunting on a farm that has chickens, keep your dog on leash or at heel until you are clear of the chickens because a bird dog not exposed to domestic chickens is a sure bet to catch one of the farmer's hens.

One of the best ways to get a return invitation is to clean a mess of the birds and leave them with the landowner. You will be amazed at how much they appreciate a meal of dressed birds.

Even though it's too late to get a dog to hunt with this season, now is the time to start planning for next year by shopping around for a well-bred pup. The pride in watching the dog you trained handle a covey of wild bobwhites will be a most rewarding feeling of satisfaction. **



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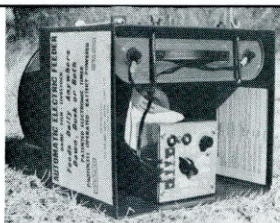
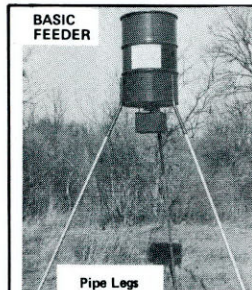
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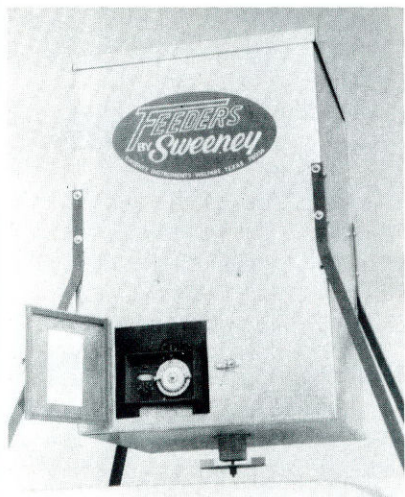
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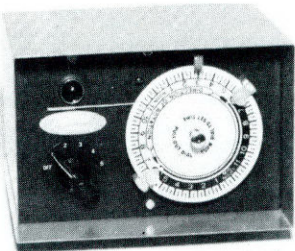
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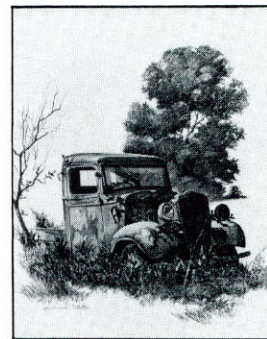
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Young Naturalist

Precipitation

by Ilo Hiller

EVERYONE knows what a cloud looks like, but not everyone knows that this white, puffy formation is actually a mass of tiny water droplets and ice crystals suspended above the earth by air currents.

Clouds are formed when warm, moist air rises and cools. During this cooling process the water vapor (water not in a liquid state) in the rising air condenses (changes into a liquid state) to form water droplets or sublimates (changes into a solid state without becoming liquid first) to form ice crystals. From these water droplets and ice crystals come all forms of precipitation, such as rain, drizzle, sleet, snow and hail.

Air currents within the cloud keep the water droplets moving about, and when they collide, the larger ones absorb the smaller ones. This process is called coalescence which means "growing together into one body." When they grow large enough—one to three millimeters in diameter—gravity causes them to fall as raindrops. To give you an idea of just how small the cloud droplets are, the average raindrop contains about a million of them.

Cloud temperatures may range from 75 degrees above to 40 degrees below zero. In the colder air, when water vapor comes in contact with a microscopic, airborne particle of dust, soil, rock or volcanic ash, it crystallizes and forms a single tiny ice crystal. As more water vapor freezes around it, the original crystal forms branches and slowly grows into a small, flat, six-sided snowflake.

Very cold air contains too little moisture to produce big snowflakes, so large flakes occur only when the temperature is just a few degrees below freezing. Ideal temperatures for the formation of snow range between 10 degrees above and four degrees below zero.

Although all snowflakes have six sides, no two are alike. Their shapes depend on the temperature and amount of moisture in the air. Solid patterns are formed in the colder temperatures because there is less moisture and the crystal grows slowly. However, in the warmer temperatures the crystals grow quickly forming lacy, feathery branches.

Once the snowflake has reached the proper size, it begins falling. If the air near the ground is warm,



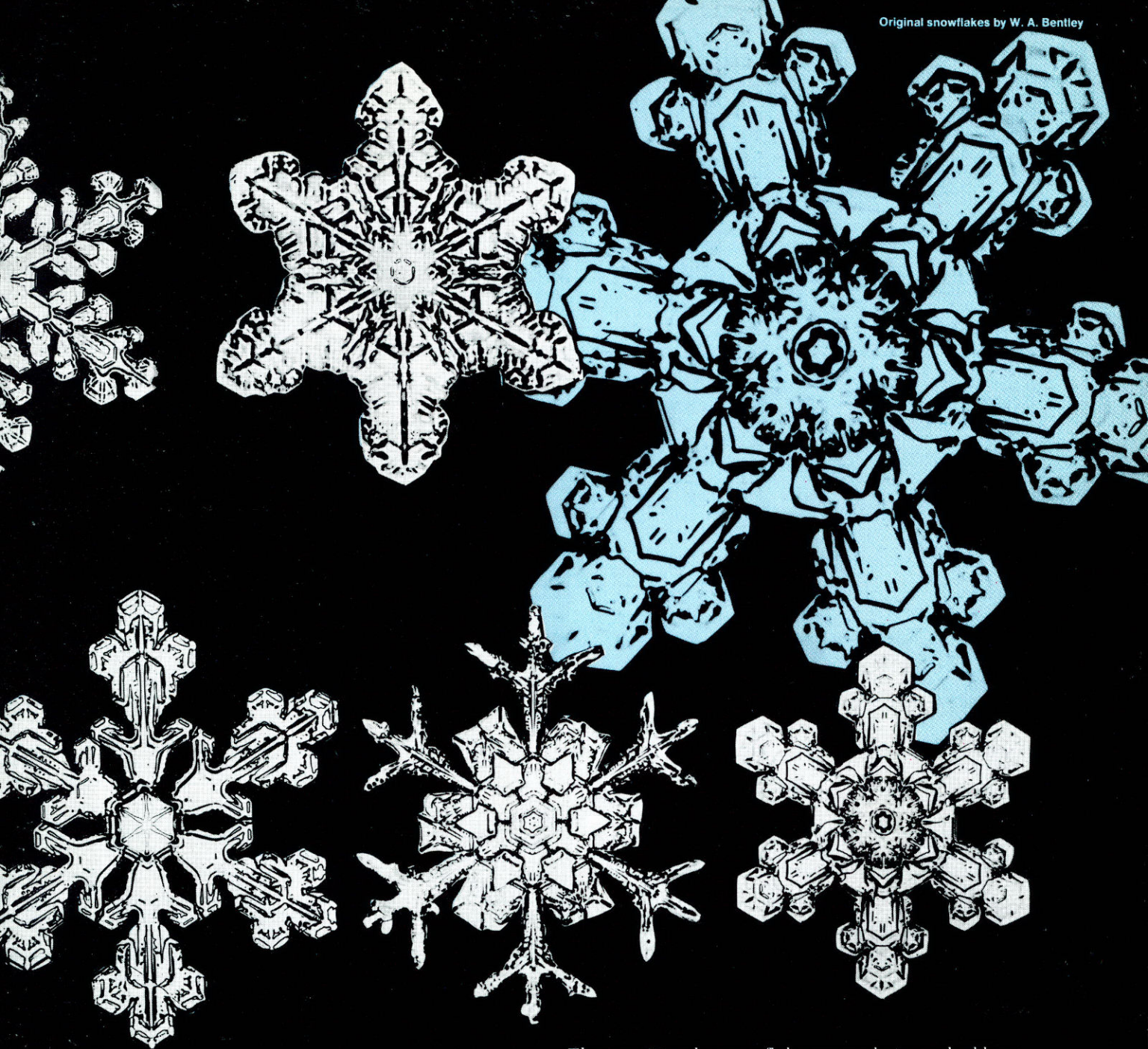
the snowflake melts on the way down, becomes a raindrop and we never realize that it was once a snowflake. However, if the air temperature is cold, the snowflake falls without melting and we are able to see it float to the earth.

Whether the snowflake melts when it touches the earth or remains a frozen crystal depends on the ground temperature. Because the ground is solid and cools much slower than air, it is possible for the air temperature to be cold enough for snowflakes to fall before the ground is cold enough for them to remain frozen when they land. This explains why snow often covers the cold metal surfaces of a parked car or garbage can lid yet does not stay on the ground. When the ground is cold enough, the snowflakes quickly cover it with a blanket of white.

Sleet is another cold weather product, but it forms when the air near the ground is freezing or below and the air above that is warm enough to allow raindrops to pass through. When the raindrops strike the cold air, they freeze into beads of cloudy-white ice which fall to the ground. These little ice pellets are usually about one-eighth inch or less in diameter.

Sleet is often referred to as a freezing rain, but true freezing rain is known as glaze. Glaze occurs when rain or drizzle (very fine, light rain droplets 0.1 to 0.25 millimeters in diameter) is supercooled but not frozen as it falls through the air. When it comes in contact with a cold surface, it freezes immediately forming a clear ice coating on everything it touches. These ice storms can be beautiful, but as the ice builds up, extensive damage may occur. Tree limbs break under the weight of the ice and telephone and electrical lines are often pulled down or broken.

Another damaging type of precipitation is hail. Although there are three basic kinds of hail—soft hail, small hail and true hail—only true hail grows large enough to break windows and windshields, dent automobiles and metal buildings, tear roofs to pieces, destroy crops and vegetation and sometimes kill small animals and livestock. Millions of dollars worth of



damage can result from a single 15-minute storm containing true hail.

Soft hail is a white, snowlike pellet about one-fourth inch in diameter. It is easily crushed and usually falls apart when it bounces on the ground. It occurs at temperatures above the ground freezing point and appears before or with snow.

Small hail usually has a center of soft hail with a thin layer of ice formed around it. This gives it a glazed, semitransparent appearance. Small hail occurs at temperatures above freezing and often falls with rain. It does not fall apart when it hits the ground, but like soft hail, it is too small to be destructive.

True hail is a hard pellet of ice which may vary in size from one-fourth inch to five inches or more

These spectacular snowflakes were photographed by a Vermont farmer who devoted his life to the study and photography of nature's wondrous ice crystals. Using a camera adapted to a microscope, W. A. "Snowflake" Bentley photographed more than 5,000 snowflakes before his death in 1931 at the age of 66. With infinite patience he caught the fragile flakes on a piece of black velvet, transferred them to a microscope slide with a wooden wand and photographed them. Although all equipment he used was as cold as the outside air, speed was still an important factor since minor evaporation changed the patterns of the flakes. Seeing this small sampling of Bentley's work, we too can wonder at the intricate and lacy-shaped flakes formed in the warmer, moist air and the solid patterns slowly formed in the colder, dryer air.



Lasting only a few minutes, hailstones can quickly beat down crops and other vegetation causing tremendous financial loss to farmers in a hailstorm area. Shown at the right is a comparison between the size of the largest recorded hailstone which fell in Coffeyville, Kansas, and an ordinary chicken egg. For an inside view of this 1.67- pound hailstone with colors produced by crossed polarizing filters, see the inside front cover.

in diameter. Since it is only formed in the extremely cold air found in a thunderstorm cloud, hailstones and violent thunderstorms occur together.

The hailstone usually starts out as a frozen raindrop. As it collides with supercooled water droplets, the water is spread over the frozen raindrop's surface and quickly freezes into a layer of clear ice. When ice crystals and snow come in contact with the surface, they freeze into a cloudy layer of ice. Cutting a hailstone in half will reveal these growth layers which resemble the rings in an onion slice.

There are two theories as to how the hailstone acquires these growth layers. The first and oldest theory is that strong updrafts of air lift the hailstone into the area of freezing temperatures where it quickly gathers a coating of snow and ice crystals. Then the hailstone falls back into the area of water droplets where it gathers a layer of water which quickly freezes to its surface. It is then forced up by another updraft to gather another layer of snow and ice crystals. The size of the hailstone depends on the strength of the upward air currents and the number of times the hailstone travels up and down before falling to the earth.

The second theory assumes that the hailstone's growth takes place in one continuous drop through the cloud during which it captures supercooled droplets that lie in its path through the subfreezing layers of air. Although the fall is slowed and even



stopped at times by updrafts, the hailstone is not lifted by air currents and always maintains a downward direction. The layers result from differences between freezing rate and water accumulation rate.

Which ever theory is correct, the hailstone grows until it becomes too large to be supported by the air currents and then it falls to earth. It is easy to see that the larger the hailstone the more damage it can cause.

Hailstones are not always round. They may also be pyramid shaped, saucer shaped or covered with spikes. The pyramid shape is caused when the hailstone falls without tumbling. As it passes through water droplets and ice crystals they collect on the bottom forming a teardrop or pyramid-shaped pellet. If this type of hailstone is cut in half, you will be able to see that the rings grow downward from the pointed end. The saucer shape results from a tumbling, rotating action within the cloud.

When the frozen raindrop center is shaped similar to a top, the hailstone turns as it falls through the cloud. This turning action causes the surface water to move away from the hailstone the way water and mud are thrown from a spinning bicycle tire. If the rotation is slow enough, the water freezes before flying off the hailstone and forms bumps. Additional water follows the same pattern and the bumps slowly grow into icyclelike spikes.

Sometimes an irregular mass of ice is mistaken for

a single hailstone when it is really two or more frozen together. The only way to be sure the large mass is a true hailstone is to cut it in half and look for the single pattern of expanding growth rings.

The largest hailstone officially recorded fell in September 1970 at Coffeyville, Kansas. It measured 17½ inches around the outside and weighed 1.67 pounds.

The first recorded hailstorm in America was reported in the journals of the Coronado Expedition; 1540-1542. It is believed that Coronado was probably somewhere in Texas at the time of this recording.

"While the army was resting in this ravine, as we have related, a tempest came up one afternoon with a very high wind and hail, and in a very short space of time a great quantity of hailstones, as big as bowls, or bigger, fell as thick as raindrops, so that in places they covered the ground to a depth of two or three spans or more deep. (A span is nine inches.) . . . The hail broke many tents, and battered many helmets, and wounded many of the horses, and broke all the crockery of the army, and the gourds, which was no small loss, because they do not have any crockery in this region."

Damaging as it may be, hail is just one of the forms of precipitation that is with us all year long. Precipitation can only occur when there are clouds in the sky, so watch those clouds as they build and grow and be ready for their gifts of moisture whatever form they may take.

**



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Since 1919, the Texas State Rifle Association has served the best interests of Texas sportsmen, hunters, and firearms owners — law abiding citizens who enjoy and pursue the shooting sports in a lawful manner. This is your invitation to join and be a member of this honorable organization. TSRA is the authorized state association of the National Rifle Association, and is sanctioned by the U.S. Army Director of Civilian Marksmanship. TSRA is also a member of the National Shooting Sports Foundation, the American Defense Preparedness Association,

and the National Muzzle Loading Rifle Association. Its members are composed of thousands of individuals like yourself, and affiliated sportsman and shooting clubs throughout Texas.

Every year, each member receives the famous "Snortin' Bull" decal with his Membership Card, and quarterly, the Association's Bulletin, the TSRA Sportsman, containing timely information on the latest hunting regulations, game limits and seasons, legislative information, and vital aspects of the shooting sports at national, state, and local level. To assure the accuracy and timeliness of information, TSRA subscribes to the Texas Legislative Bulletin Service and maintains direct liaison with the Texas Legislature, the Texas District and County Attorney's Association, the Texas Criminal Justice Council, and the Texas Parks and Wildlife Department. As required, TSRA publishes special bulletins of interest to its members. Over 70,000 such bulletins were mailed concerning legislation before the 62nd Texas Legislature.

Additionally, TSRA encourages and sponsors junior training programs, hunter safety programs, home firearms safety, competitive marksmanship, state championships, and selects teams to represent the State of Texas at the annual National Championships. Annual dues are \$3.00, and memberships run from January 1 through the following December 31st each year. We urge you to join your fellow Texans and become a member of this honorable Association. You'll be glad you did!

(Please allow 45 days to process your application.)

Make Checks Payable To: **TEXAS STATE RIFLE ASSOCIATION**
Mail Application and \$3.00 Membership Dues To:
TEXAS STATE RIFLE ASSOCIATION

Lafe R. Pfeifer, Secretary, P.O. Drawer 34809, Dallas, Texas 75234

(Your ZIP code is an essential part of your address. Without it, your application cannot be processed.)

TSRA MEMBER'S PLEDGE

I certify that I am not now and never have been a member of any organization which has as any part of its program the attempt to overthrow the government of the United States by force or violence; that I have never been convicted of a crime of violence; and that if admitted to membership in the Texas State Rifle Association I will fulfill the obligations of good sportsmanship, and uphold the Constitution of the United States and the Second Amendment thereto.

NAME _____

ADDRESS _____

CITY, STATE _____

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CONSERVATION OF NATURAL RESOURCES • WILDLIFE MANAGEMENT • MAINTENANCE OF LAW AND ORDER**

LETTERS TO THE EDITOR

Hunting Leases

Although it is quite late in the season, I must confess that I have been unable to locate a deer hunting lease. Could you give me any advice on how to find one?

Mike Phillips
Houston

One fast way to receive information on leases is to call the Chamber of Commerce in the larger towns in the area you want to hunt. They should be of some help. Another good source for this information on a statewide basis is a book compiled by John Jefferson entitled Hunters Guide to Texas which sells for \$4.35 and may be ordered from P.O. Box 2085, Austin, Tex. 78767. This book not only includes information on the various types of hunting found throughout the state but also lists the people to contact for leasing purposes in each area. A sample lease agreement appears on page 135 of Jefferson's book and the novice hunter might wish to

study this sample prior to leasing any hunting area.

Antelope Information

Having just completed a hunt for antelope, I wonder if you could tell me about the number of antelope in Texas, the number of permits issued, the average and record horn sizes and how our Texas antelope compare with those of other states.

F. X. Schloeder
Houston

At one time the pronghorn antelope was nearly extinct in Texas, but restocking efforts and controlled hunting have helped the animals make a comeback. Since 1944, there have been limited seasons and although there have been considerable year-to-year fluctuations, the population has gradually increased. It was estimated that Texas had about 15,000 antelope in 1973

and over 1,400 permits were issued for hunting.

Two subspecies are found in Texas. Antilocapra americana mexicana is a native to the Trans-Pecos area and Antilocapra americana americana is native to the Panhandle. The Panhandle antelope has had mexicana blood introduced through restocking efforts. Most literature says that it is very difficult to distinguish between subspecies. In general, antelope in the northern states are slightly larger than those in Texas.

An antelope killed in October, 1948 by Charles W. Carrol of San Antonio had horns that measured 18 1/4 inches in length. Other states have killed antelope with longer horns. The record antelope for Oregon had horns that measured 19 3/4 inches and an Arizona animal had horns that were 20-1/16 inches in length.

If you wish to research the pronghorn subject further, I would recommend: The World of The Pronghorn, Joe Van Wormer, J. B. Lippincott Co., Philadelphia, 1969.

Exhibit Praised

I teach Life Science at Bowie Junior High here in Amarillo, Texas. While attending the Tri-State Fair this past week, I observed your wildlife exhibit, and thoroughly enjoyed it. All species of Texas wildlife were well represented through the department's efforts and the exhibit was a wonderful experience for young and old alike. It was great. I think the department deserves a hand.

Jay Roseluis
Amarillo

TEXAS

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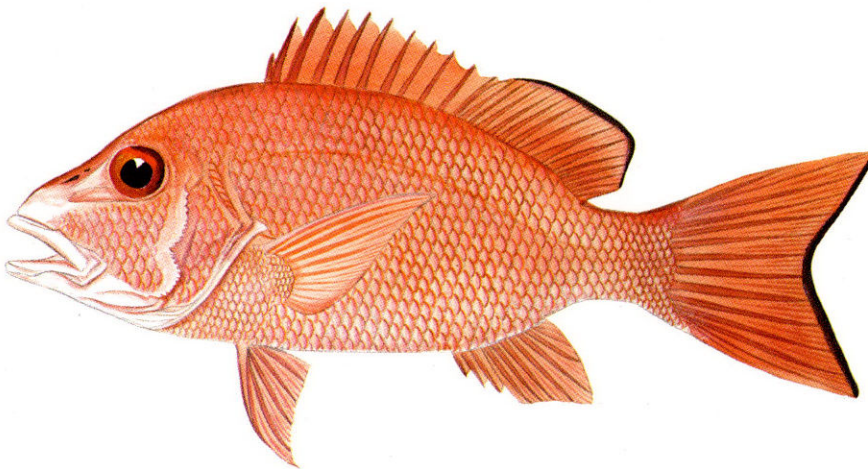
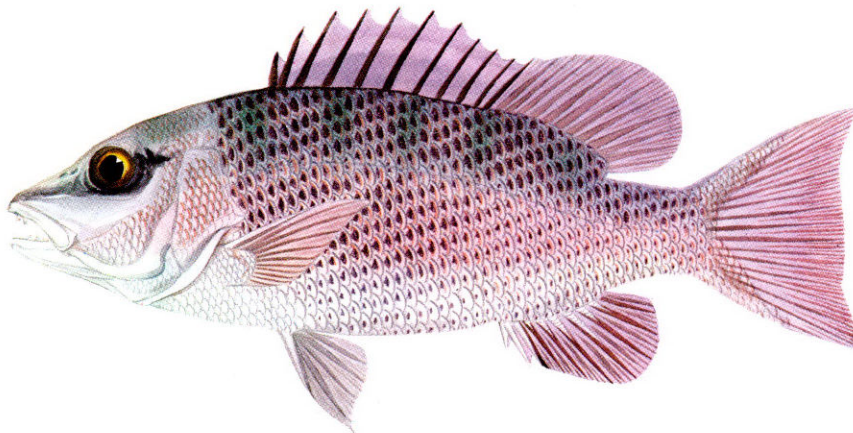
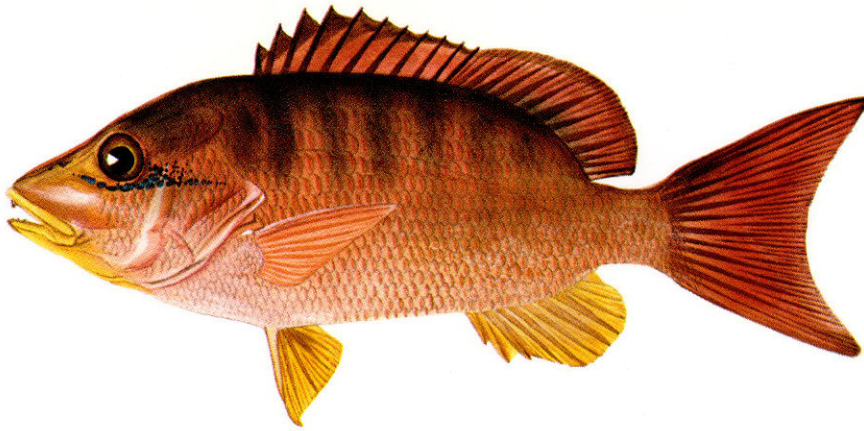
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TEXAS PARKS & WILDLIFE
MAGAZINE
MAKES A GREAT GIFT
GIVE A SUBSCRIPTION
TO A FRIEND

BACK COVER

All species of sparrows have their own habitat preferences which may help in identifying them. This young white-crowned sparrow is found in hedgerows, thickets or on the edge of woods that border fields or open areas and feeds mostly on seeds which are found on or near the ground. Photo by Martin T. Fulfer.



TEXAS SALTWATER FISHES

The snappers are a group of primarily reef fishes that feed upon small fishes, crabs, shrimp and squid. Largest of this group is the dog snapper (top) which averages from 25 to 50 pounds with a record fish of 128 pounds having been caught out of Port Aransas. Small dog snappers are often mistaken for large grey snappers (center). Grey snappers are really

the smaller of the two as they average only two to five pounds with reports of fish up to 25 pounds. The red snapper (bottom) is the most popular of all the snappers as it is most often caught by anglers. It averages two to four pounds and is expected to reach a maximum weight of about 55 pounds.

Artwork by Henry Compton.

