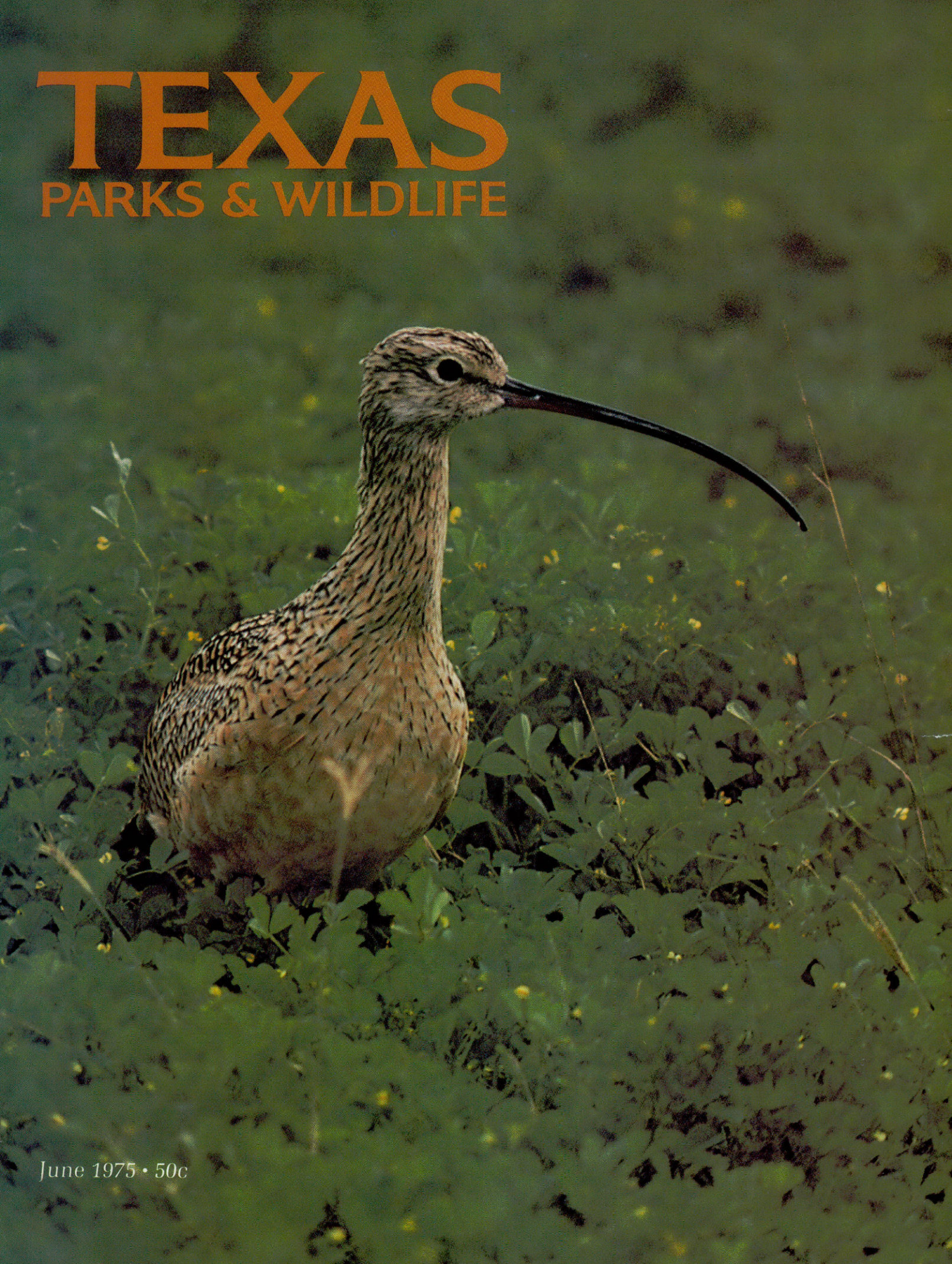
TEXAS
PARKS & WILDLIFE



June 1975 • 50c

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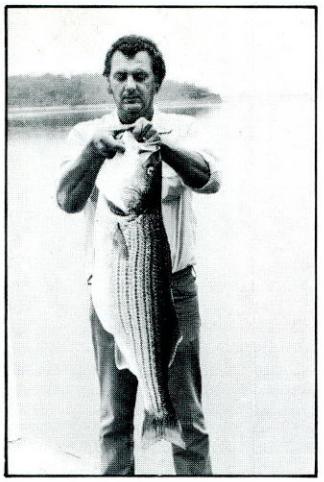

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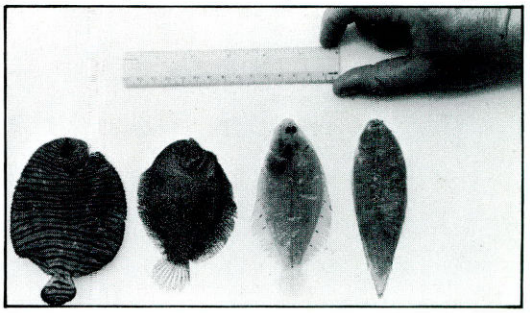


TEXAS PARKS & WILDLIFE

Front Cover: Most people associate the curlew with this type of coastal habitat; however, the bird travels annually to the northwest Texas Panhandle to raise its young. See related story on page 12. Photo by Jim Whitcomb.

Inside Front: June is for discovering one of nature's gems, such as this tiny aster. Related to the daisy family, it is one of 18 species found all over the state. The composite of tiny flowers in the center is called the disc, and the outside petals are the rays. Photo by Jim Whitcomb.

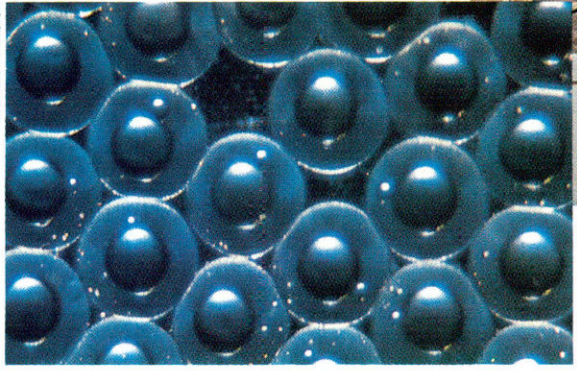
Ed W. Bonn

Once the mature striped bass are caught, the females are injected with a hormone to induce spawning, and the fish are put in a holding tank. Periodic samples of the eggs are taken from the female and checked with a microscope to determine their stage of development. They look like rows of tiny eyeballs.

Neal Cook

Neal Cook

Harlan R. Welch



THE STRIPED BASS STORY

by Ed W. Bonn, Fisheries Biologist, Denison

When our striped bass program began in 1967, we didn't know what to expect of this popular saltwater game fish in Texas.

Since then we have proven stripers can survive, grow and become sexually mature in Texas' inland waters. We have also learned that better survival can be expected in reservoirs with established fish populations if the stripers are introduced as fingerlings.

Our biologists knew that female stripers in their native waters on the east coast do not mature until they are about five years old, and that a moderate current of water is needed for about six days to enable the fertilized eggs to hatch and the larvae to develop enough to swim and eat.

In their natural spawning areas much of this needed water movement is provided by tidal currents moving in and out of the tributary streams. In freshwater this current must be from 75 to 100 miles of slowly rolling stream. If the current is too slow, the semibuoyant eggs and larvae will settle to the bottom and suffocate. In a strong current these delicate eggs and fish would be crushed against rocks, logs and other objects.

Texas is not blessed with too many streams which meet both the needed quantity and quality of water to provide natural reproduction for striped bass, but we believe our best chances might be the Brazos and Colorado Rivers. Therefore, our major introductions have been made in Lakes Granbury and Whitney on the Brazos, and Lakes Spence and Travis on the Colorado.

Until natural reproduction develops (if it does), we must rely on hormone spawning and hatchery rearing of fingerling fish. In 1973 biologists discovered that four-year-old female stripers at Lake Spence were mature and two million fry were produced. Last year this was increased to 3.4 million fry.

Some of our production has involved hybrid stripers. They are produced from striped bass eggs fertilized with sperm from male native white bass. These hybrid fish are stocked on a limited basis in isolated reservoirs where conditions for natural reproduction are not possible. This type of stocking is known as a "Put-Grow-and-Take" fishery program. Lakes Mayse and Bastrop have received most of these hybrids.

Striped bass or hybrids have been stocked in 17 Texas reservoirs. Subject to a successful spawning and rearing season this year, nine lakes will be restocked and three additional reservoirs will receive their first supply of stripers.

Our goal for 1975 is to produce about one million fingerlings. To do this we will need approximately five million fry, and about four million of these will be produced from Spence fish. The remainder will be obtained by trading native Texas fish for striped bass fry with various states on the Atlantic coast.

Lake Spence has a good supply of adult striped bass, but does not have a permanently flowing tributary to permit natural reproduction. Thus the spawning at Spence is accomplished by using a hormone to induce the captive female stripers to release their eggs.

Mature female stripers are injected with chronic gonadotropin as soon as they are caught. They are then held at a temporary spawning station on Lake Spence. The building and other facili-

A steady downward pressure on the abdomens of the male and female stripers releases the eggs and milt into a basin of water where they are gently stirred with a feather.

Neal Cook

Neal Cook

Neal Cook

ties are provided by the Colorado River Municipal Water District.

After about 24 hours a sample of the eggs is taken to determine the time of spawning. When ready, the eggs are stripped into a pan by exerting a steady, downward pressure on the abdomen of the female fish. Milt from the males is obtained by similar action, but most males do not need the hormone to release their sperm. The light green eggs and white milt are carefully stirred together with a feather in a small amount of water to insure fertilization.

Before they are placed in hatching jars, the eggs are washed to remove excess milt and body wastes. Water flowing into the bottom of the jar through a tube creates a rolling action to keep the eggs in constant motion. About 200,000 eggs are held in each jar and one large female striper can fill four or five containers.

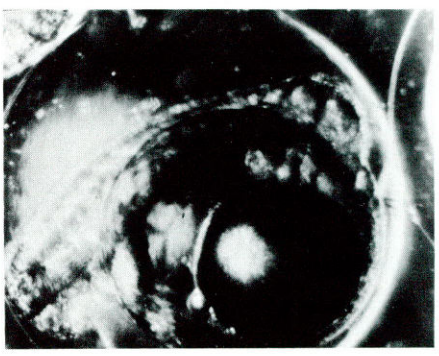
During the next 48 to 60 hours the jars must be constantly attended. Too little water pressure will let the eggs settle and suffocate, while excessive current will wash the semibuoyant eggs out of the jar. Water temperatures are kept between 60° and 65° F.

A microscope is used to check the eggs periodically to determine embryo development and to estimate the expected hatching time. As the eggs hatch, the larvae drift in a verticle, head-up position which they maintain for several days. During this period their mouth and digestive system are not functional, but they continue to get nourishment by gradually absorbing the yolk sac.

Since the larvae are unable to swim for several days, gentle water move-

Ed W. Bonn

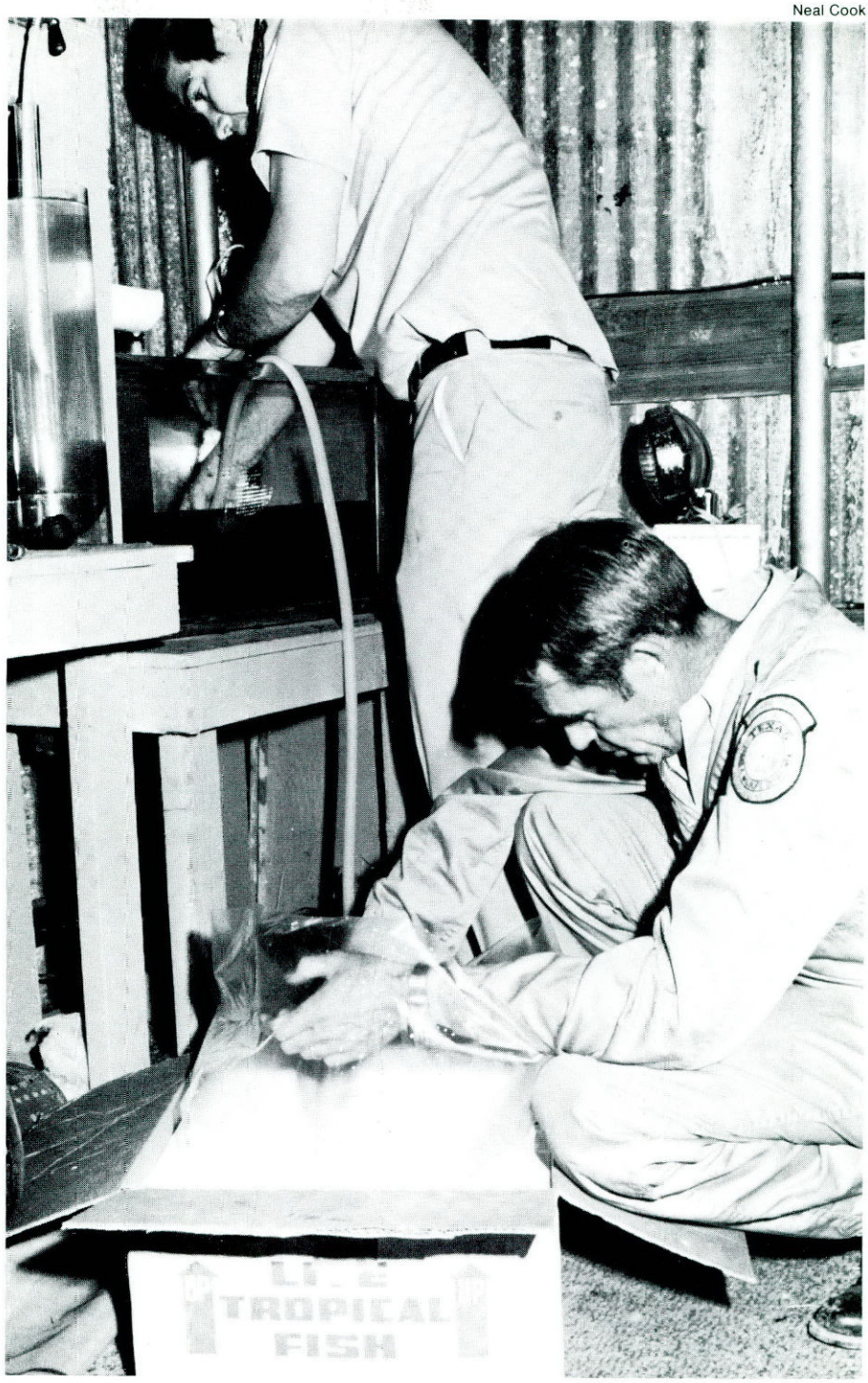
Periodic samples of eggs are withdrawn from the hatching jars to determine percent of fertility and expected hatching time. Below is a magnification of the embryo about 36 hours after fertilization. The round yolk is still visible. Once the eggs hatch, the larvae drift in a vertical position for four to five days before they are able to swim and eat. They live off the yolk during this period.



Harlan R. Welch

Just before they are able to swim in a horizontal position, the fry are packed in a plastic bag with water and oxygen for shipment in styrene plastic boxes to rearing ponds throughout the state.

Neal Cook



ment is still needed. They overflow from the hatching jars into aquariums supplied with both running water and aeration.

In about four or five days they begin to maintain their body control and swim horizontally. They are also ready to feed and will soon starve if food is not available. Shortly before they reach the feeding stage is the best time to transport the small fish, which are about one-eighth inch long.

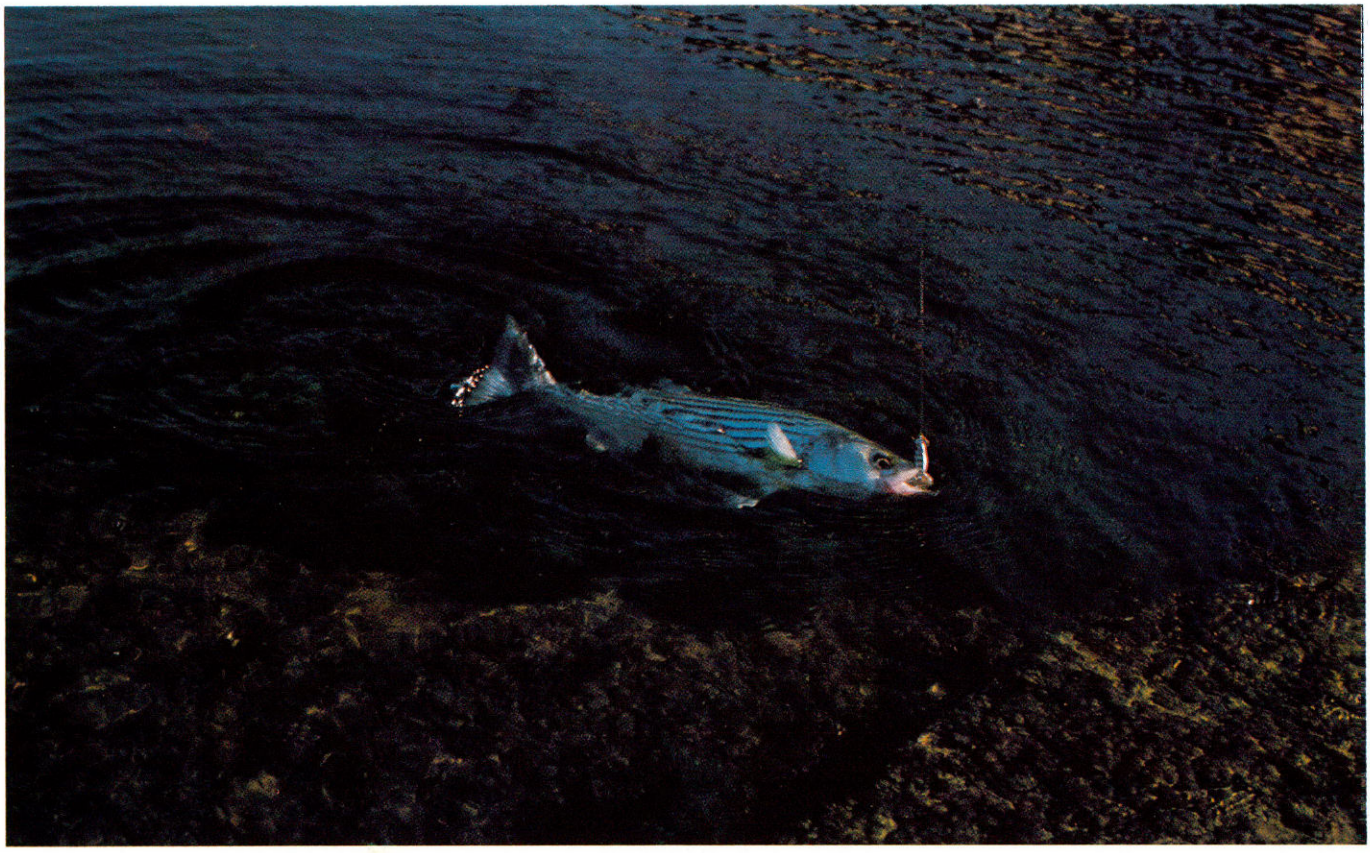
From 60,000 to 100,000 larvae can be shipped in two gallons of water in a plastic bag. The bag is topped with oxygen, sealed and placed in a styrene plastic box. In this condition they can survive for over eight hours as they are moved to rearing ponds throughout the state. A truck is adequate for short moves, but a department airplane is used to transport them to more distant locations.

About nine days elapse from the time the female striped bass is injected with hormone until the larvae are ready to ship. During much of this time, the induced spawning operation requires around-the-clock care, but by staggering the schedule, several spawns can be handled at the same time.

There is a constant decrease in survival from the number of eggs in the ovary to the number of fingerlings reared for stocking. With each successive step, from stripping to fertilizing, hatching, aging, shipping, tempering, rearing, harvesting and stocking, the numbers decrease. Therefore, from a female striper containing one million eggs, we are successful if we stock about 60,000 fingerlings.

We feel the striped bass is worth the extra effort and cost. After all, the entire program is aimed at providing more and better fishing for Texas sportsmen. **

Fishing for Striped Bass



Frank Aguilar

by Ilo Hiller

Catching a fish large enough to strip the gears of that favorite bass reel is probably the dream of every freshwater angler. Someday in the future that dream may become a reality in Texas.

More and more fishermen are hooking into those tackle-bending striped bass and, as each year passes, the stripers get bigger and bigger. Our biologists claim this transplanted saltwater fish has the potential of reaching 50 pounds in our freshwater reservoirs.

Before you laugh, you should know that a fisherman on a stretch of the Colorado River in Arizona, which was experimentally stocked with stripers for the first time in 1959, almost proved their claim last fall. His striper was just under the 50-pound mark.

Those of you who keep track of Texas fish records know that on February 10, 1973, Toledo Bend produced a record striper weighing 22 pounds, four ounces. This record stood until December 29, 1974, when a 27-pound, five-ounce specimen was caught in the Red River below Denison Dam. Texoma should have stripers of equal size just waiting for the right lure, and biologists report netting striped bass in the 22-pound class in Spence near San Angelo this year. Fisheries experts expect to see the Texas record broken time and again as the stripers continue to grow and the fishermen's skill in catching them improves.

Catching stripers is a hit-or-miss situation for many anglers because they don't know where to find the fish, but don't let this discourage you. We haven't had a striped bass fishery long enough for our biologists to conclusively study the movement of the stripers to know what these fish are doing at all times of the year. So the best fishing advice we can offer is what fishermen have learned by trial and error on the striper lakes.

Take E. V. Spence Reservoir near San Angelo, for example. We are told that the best fishing there occurs in the spring and fall. July and August are the least productive as far as the large stripers go, but fish less than three pounds are landed during those months. Really hot weather seems to slow down the big fish and cause them to lose interest in the fisherman's offerings. Since stripers school to feed on shad like white bass, keep your eyes open during the summer for surface-feeding gulls. They will lead you to the shad and stripers. Winter catches are usually made by the trotline fishermen who brave the cold weather to work their lines.

During the prime fishing period, jigging with lead slabs or trolling deep-running lures produce the best results. For jigging, locate the underwater river channel and work your slab on the ledges and dropoffs.

They will be at least 30 to 35 feet deep. The best area for trolling is found down near the dam in about 35 feet of water. When you find the stripers feeding on shad, almost any lure will catch them, but casting a sinking lure into the shad may give you an edge. The bigger stripers tend to lurk down beneath the school feeding on the sinking, wounded shad.

For those planning to fish Spence for the first time, a word of caution. The wind is a definite factor to keep in mind. It comes up quickly and in no time at all the lake can have four- to five-foot waves. March and April are especially windy and there may be very few days during these months when you will be able to get on the lake at all.

Although one of the first record stripers was caught on the upper end of Toledo Bend Reservoir, reports indicate that very few are caught in the upper reaches of that lake now. Most of the action centers above and below the dam.

Fishermen there started catching stripers in the five- to 10-pound class last November, and with each succeeding month the action improved. By March the bigger stripers began showing up. Catches in the 18- to 22-pound class were not uncommon, and a 26-pounder was landed the first week in April.

Anglers were fishing off the dam on the lake side, in the tailrace below the dam, from the banks on both the Texas and Louisiana sides or trolling deep-running lures back and forth behind the dam in about 50 feet of water. The best fishing occurred during the night or early morning hours.

From May to November the heavy action slacks off, but stripers can still be caught in the deep, open-water areas above the dam. On cloudy, windy days when the water is choppy and rolling into the dam, fishing off the dam and banks improves. The stripers seem to congregate closer to the structure at this time.

Texoma had a fishable population of stripers between three and 10 pounds as early as four years ago, but since very few people were aware of the fact, few fished for them. However, within the last four years the fish's popularity has grown. The fish have increased in size and stripers in the 15- to 20-pound class have been landed in the lake proper as well as the tailrace area. In fact, the state record striper was caught in the tailrace below Denison Dam.

Good catches are being reported from all areas from the dam up the Washita arm of the lake, especially the Little Glasses area, and up the Red River arm around the islands. These areas are producing mainly because the striper fishermen are concentrating their efforts there, but fishermen after other species of fish are being surprised by stripers in many parts of the lake. In fact, anglers are liable to hook a striper almost anywhere in the lake.

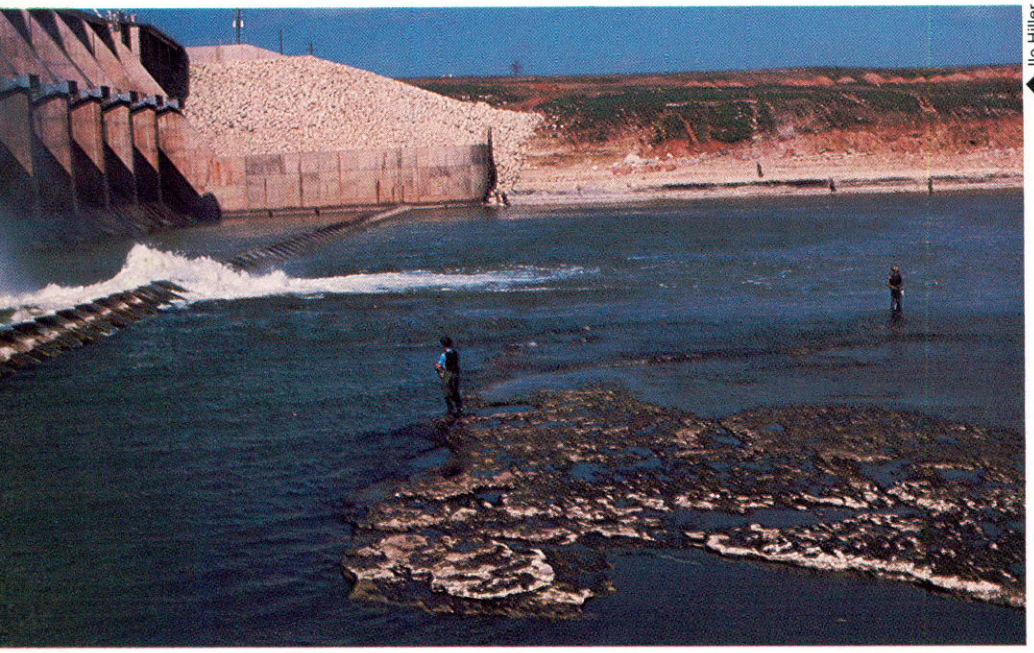
At Texoma, the most popular method of fishing for stripers is trolling for them with deep-running lures along the ridges, dropoffs and points in 15 to 40 feet of water. After locating the school by trolling, the angler often switches to jigging for the fish with a heavy spoon, bucktail jig or other bass-type lure. Experts claim the striper will take almost any black bass lure you are able to get down to its depth. However, the lure must be more actively worked or jigged than when fishing for blacks. Trolling speeds should also be 1½ to two times as fast as that used for blacks.

Anglers fishing Texoma's tailrace area use spoons, jigs, shallow-running lures and, occasionally, topwater lures. One trick the tailrace anglers have developed is to anchor their boats as close to the dam as is safe and trail a couple of boat rods with deep-running lures attached in the swift current behind the boat. They then cast toward the dam with another rod and try to hook a striper. When the hooked fish heads down-

Steve Seale, Denison Herald

Last December this state record 27-pound, five-ounce striped bass was caught on the Red River below Denison Dam by John M. Smith of Pottsboro.

Striped bass are found in the open water of a reservoir or in the tailrace area below the dam. Use extreme caution when fishing any tailrace.



Ilo Hiller

Bill Reaves

stream to shake the hook, the striper school tends to move with it. As a result another striper or two can often be caught on the trailing boat rod lures. You can see how the action could get a little hectic when the system works for the fisherman.

Lake Granbury has only been stocked with stripers for the last three years, so the fishermen there are still in the learning stages. However, this year the action picked up with fish between six and nine pounds being caught in the lake and tailrace areas below the dam.

Fishermen have had the best results in this lake jigging with slabspoons or grubs in 20 to 30 feet of water. The best areas seem to be located between the town bridge and the dam along the underwater river channels and creeks or around the sand bars. Those anglers who know where the old gravel pit areas are located claim they are also good areas to try.

Most tailrace fishing is done with the white slab or small white crappie jig, but a live minnow, rigged with a popping cork four to five feet above it, has also brought in the stripers below the dam. The minnow is cast into the swift current and then popped back to the fisherman.

When fishing for stripers in the tailrace area behind any dam it is well to remember that the swift water can be quite dangerous as well as restricted in many instances. In your eagerness to catch fish, don't get so close to the structure that you endanger your life or end up paying a fine for fishing illegally.

One other thing to keep in mind when fishing for those big stripers anywhere is that the fish should be played against the drag. They are powerful fish and, when the drag is set too tight, something has to give—the line breaks or the hook straightens. In either case, the striped bass gets away.

For those of you interested in breaking the state striper record, the biggest stripers in Texas are located in Texoma, Toledo Bend and Spence. These lakes have been stocked the longest and the fish have had time to grow. These lakes will, of course, also have many small stripers, but you can count on the big ones ranging between 15 and 27 pounds.

Generally speaking, stripers achieve a one-pound growth during the first year. By the second, they weigh about three pounds and by the third, they are between five and six pounds. However, it is possible for some three-year-old stripers to weigh as much as nine or 10 pounds. This has occurred in Lake Granbury.

Hybrid stripers, a result of a cross between a female striped bass and a native white bass male, have exhibited a little faster growth rate in the two years they have been stocked. These hybrids, located in Lakes Mayse and Bastrop, have already reached four pounds. Only time will tell whether this faster growth will continue and what the hybrid's potential may be.

Creel limit for the striper is one per day with a possession limit of two, except on Toledo Bend Reservoir where the limit is two per day with a possession limit of four.

Some 30 states have experimented with stocking the saltwater striped bass in freshwater reservoirs, but not all were successful. The top inland striped bass fisheries in the nation at this time are found in Oklahoma, Florida, Georgia, North and South Carolina, Alabama, Tennessee, Kentucky, Arizona and Texas.

We are proud of our state's growing striped bass fishery which is providing still another game fish for our freshwater sport fishermen to enjoy. **

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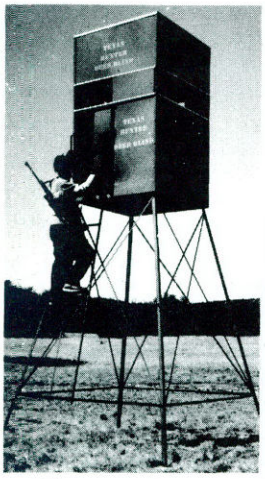

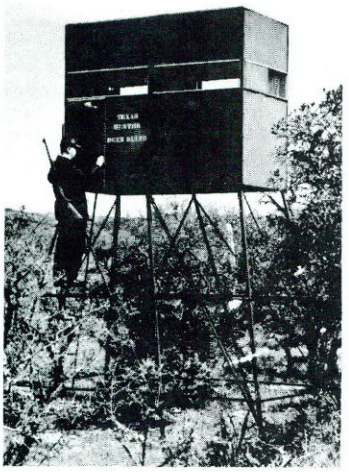

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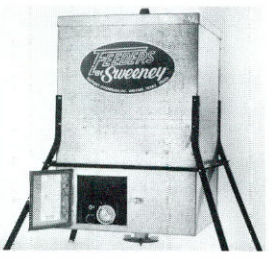

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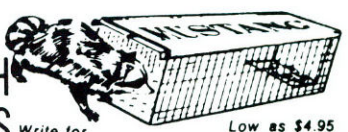

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OUTDOOR BOOKS

FIFTY BIRDS OF TOWN AND CITY written and illustrated by Bob Hines; U. S. Department of the Interior, U.S. Government Printing Office, Stock number 2410-0332, Washington, D.C. 20402, 1973; 50 pages, $1.05 paperback, $4 cloth.

If your son or daughter lives in an urban atmosphere, you might like to write for this sidewalk guide to identifying birds living in our cities.

The author lists the birds' scientific names, where they frequent, some of their nesting habits and other information the author feels is interesting or important. Unlike many field guides, the text is written in complete sentences in a very readable and interesting style.

Secretary of the Interior Rogers Morton writes in the introduction that "these are not endangered birds, except as all living things are endangered; some of them are living in or passing through your backyard or city park right now."

In identifying the birds, the author illustrates several species in full color. Hines' artistic style is detailed and realistic, rendering the birds easily identifiable.

Many field guides are directed to the country dweller or occasional visitor, but this equally important city guide fills a vacuum. *–Terrie Whitehead*

CADDO LAKE, MYSTERIOUS SWAMPLAND by Mildred Mays McClung; Carney, Mays & Carney, P. O. Box 23, Atlanta, Tex. 75551, 1974; 103 pages, $3.75.

"In the northeast corner of the vast land of Texas and the northwest of Louisiana lies a body of water with an enchanting history and perhaps a more fascinating future." Thus begins the introduction of a carefully researched book documenting facts about the Caddo Lake area probably not contained in any available history book.

For those with ancestors from Jefferson and the Caddo region, this book would be particularly interesting to compare with family trees and heritages. Family names are frequently mentioned as they fit into the weave of history, and many famous and significant people originated there.

Many of those interviewed in the research are only one to two generations removed from the pioneers who participated in the area's history. This adds a bit of realism and color to an already exciting folklore.

Caddo Lake was originally a dissertation for the author's Master of Arts degree from East Texas State University. For this reason the presentation is somewhat limited in arrangement and style to conform with the guidelines and standards of that university. *–Terrie Whitehead*

SHELLS by Mary Saul; Doubleday & Company, Inc., 245 Park Ave., New York, N.Y. 10017, 1974; 192 pages, $14.95.

What resources from the sea can be used for salt and pepper shakers, pipes, money, feeding cups, buttons, jewelry, dyes, collecting and carving? Well, if nothing else, the buttons should have been a giveaway. The answer: seashells.

The title of the book is somewhat misleading because the mind associates the word shells with those found on the beach or otherwise personally experienced. But the author intended her title to include all mollusks such as snails, slugs, oysters, mussels, octopuses, squids and several others.

The text incorporates mollusks in the biological ecosystem, as commercial products and food and, probably most interesting, in history. Ms. Saul relates how man has used shells for personal adornment and currency, and cites their apparent impact on older cultures in some of our literature. It is interesting now to see why man prizes certain shells and is willing to pay several thousand dollars for a single shell recovered from the ocean depths.

The author deviates from the colorful folklore and references in history to include some little known facts about mollusks. For example, some snails can live in such diverse temperature changes as from −30° F. to 122° F., and one lived in a dormant condition for 47 years.

Not only is this book attractive, but it is written in an enjoyable, easy-to-read style. It is a collector's item for a discriminating library of fine works. *–Terrie Whitehead*

THE ONLY WORLD WE HAVE by Philip Gray; Dorrance & Company, 1617 J. F. Kennedy Blvd., Philadelphia, Pa. 19103, 1974; 80 pages, $3.95.

After glancing at the title of this book, you might be slightly surprised when leafing through the pages to learn the contents. It's a book of poems about man's relation to nature.

Many environmental writers are too busy crusading an issue to stop and philosophize a bit. That's why it is refreshing to come across a book with a different mode of expression.

When it comes to poetry, some people are turned off completely or simply prefer a certain style, such as the light and humorous. *The Only World We Have* follows a consistent theme and, for the most part, is serious in tone.

Gray writes in free verse without contrived end rhymes. To achieve this he makes excellent use of such devices as imagery and some alliteration.

In the final analysis, the reader's preference is the determining factor in purchasing a book. If you like literature and particularly poetry in a flowering style, you will more than likely be delighted with this book. – *Terrie Whitehead*

PHOTO AND ART CREDITS

Front Cover — Jim Whitcomb; Nikon F2 with motordrive, 400mm Leitz Telyt; Kodachrome 64.

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Page 3 (left & right) — Cook; Nikon F, 55mm Micro Nikkor; Kodachrome II.

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Page 7 — Steve Seale, Denison Herald; Technical information not available.

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Page 12 — Reagan Bradshaw; Nikon F, 300mm Nikkor; Ektachrome X.

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Page 17 — Broderick; Mamiya C-330, 80mm Sekor; Ektachrome.

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Page 27 — (top & bottom) — Reaves; Nikon FTN, 55mm Micro Nikkor; Kodachrome 25.

Page 28 — Bradshaw; Nikon, 55mm Nikkor; High Speed Ektachrome.

Page 29 — Leroy Williamson; Mamiya C-33, 80mm Sekor; Ektachrome X.

Inside Back — Bradshaw; Sinar F 4x5 View Camera, 150mm Symmar-S; Ektachrome.

Back Cover — Reaves; Nikon F2 with motordrive, 28mm Nikkor; Kodachrome II.

LONG SHOTS SHORT CASTS

compiled by Neal Cook

Inflation Survival Information: Designed to help the U. S. consumer get the most for every dollar, this 368-page, hardcover book is the 75th in the Department of Agriculture's yearbook series. It includes detailed tables to help spot the best comparative values when buying anything from fishing reels to refrigerators. The book is available for $5.70 from the U. S. Government Printing Office, 732 N. Capitol Street, N.W., Washington, D.C. 20401.

Giant Frog: The Goliath frog of West Africa is the world's largest frog. One specimen weighed seven pounds and measured 32 inches from its nose to the end of its extended rear legs. Supposedly an even bigger one got away.

U.S.–Russian Environmental Cooperation: While not always agreeing on ideology, the United States and Russia have been working together on some programs of interest to conservationists. Our countries have conducted joint polar bear and caribou studies, banded and dyed snow geese migrating between the countries and exchanged scientists to study each other's wildlife. Last spring 40 musk oxen were transported by air to Russia from Alaska to start a herd to replace the musk oxen that had become extinct in Russia. The musk oxen were also hunted to extinction in Alaska during the last century, but during the 1930s some were brought from Greenland to again start the Alaskan herd. It now numbers about 700 animals and threatens to reach the limits of its food supplies on the Nunivak Island where it is located. If the countries will expand these cooperative programs into whaling and fishing, then all mankind will benefit.

Brown Pelican: One of the coast's most interesting birds, the brown pelican, almost disappeared from Texas a few years back, and only a few still remain along the coast for nesting. Pesticides and pollution have been blamed for making this bird one of the endangered species but while these are still very real problems, a study in Florida shows that fishhooks and fishing lines are the birds' biggest threat in that state. In Florida 80 to 85 percent of the pelicans studied had a hook or line still attached or showed scars of past ensnarement. The birds should be reeled in if they become hooked so that both the line and hook can be removed. The birds have a sharp tip on their bill but not much closing strength so they cannot bite. Grab them by the bill and hold it shut, and they will become docile while the hook is removed.

Country Curlews

by James E. Dillard, Biologist, Mineral Wells

It would be hard to determine who was more perplexed, me or the strange-looking birds that circled overhead, voicing their cries of defiance at my presence.

While searching for antelope fawns on the vast expanses of a Texas cattle ranch in the northwest Panhandle, I had encroached on the nesting territory of a pair of long-billed curlews. Before long, other curlews joined in the attack, determined to evict this intruding biologist from their homestead. At belt level to my right came a curlew in full flight with bill agape. I forced myself to hold my ground, and it zoomed skyward only a few feet in front of me. Others followed suit with repeated strafing raids until they succeeded in driving me from the area.

From the safety of my pickup cab, I pondered what had just happened. What were these large, shore-type birds doing out here in antelope, prairie dog and sagebrush country?

Scientifically referred to as *Numenius americanus,* the long-billed curlew is a member of the sandpiper family, Scolopacidae. They travel annually to the northwest Texas Panhandle to raise their young during the spring and summer months, having spent the winter in southern Texas, Louisiana, California and Central America. They nest from northwest Texas northward through the prairie states to southern Canada and west to the Pacific coast. Once found in the eastern United States and along the Atlantic coast, they have been pushed steadily westward with the diminishing prairies. Long-billed curlews began to disappear from the eastern United States around the turn of the century and now they are rarely found east of the Mississippi River.

In the Panhandle, they are referred to as "sickle-bills" because of their long, down-curving bill, 4½ to 8¾ inches long. When alighting on the ground, they gracefully sweep upward to check their speed and flash their cinnamon-colored wings.

Although their long legs adapt them for wading, they are strong and graceful walkers on dry land. Curlews are strong fliers and travel in wedge-shaped flocks during migration. In the fall of 1971, I observed a migrating flock of more than 400 of these birds resting in a field in Hartley County.

Long-billed curlews arrive in the Texas Panhandle in late March and remain through September and October. Here they find their preferred nesting habitat, shortgrass prairies, consisting primarily of buffalograss and grama grasses. Soon after their arrival on the prairie, courtship begins and nesting territories are established. These territories, although ill-defined, are usually several hundred yards apart. A long "curluoo" call from the adults apparently is used as a territorial signal to other curlews in the area.

Once a nest site is selected, it is believed that the female curlew builds the nest which consists of a small depression on the ground lined with grass. Here, four spotted, olive-green eggs are laid, each at two-day intervals. Both the male and female participate in the incubation duties and the eggs hatch about 30 days after incubation begins.

Long-billed curlews are conscientious parents and, once they begin setting, they are singularly devoted to the job at hand. Incubating curlews are fairly tame and when approached with caution will even allow themselves to be gently stroked. The male curlew, however, is very protective of the incubating female and attempts to drive off any intruder. Often, decoying tactics, such as feigning lameness, are employed to lure away potential nest robbers. While sitting on the nest, the birds maintain a low profile with the head and neck extended on the ground in front of the nest. Although the curlew is a large bird, it is not easy to see. Its protective buff coloration is excellent camouflage on the grassy prairie.

There may be several weeks difference between the hatching dates of birds in the same area. The young, which leave the nest soon after hatching, are well adapted to hiding due to their coloration and size and their ability to "freeze" when danger approaches. Were it not for this ability, they would become easy prey for a wide variety of predators.

Adult curlews have been observed removing egg shells from the nest and carrying them some distance away before dropping them and returning for more.

Curlews feed almost exclusively on animal matter. On their wintering grounds in the south, they are

James E. Dillard

associated with the seashore and coastal prairies and feed on a wide variety of animal life. Snails, mollusks, frogs, crayfish, crabs, worms and spiders are common food items. The birds are known to insert their long bill deep into the sand to reach food. On their prairie nesting grounds, where water is often scarce, they feed largely on insects, and have been observed turning over "cow chips" in search of beetles and larvae. Small birds may also be preyed upon. Curlews often feed in groups and are frequently seen around prairie dog towns and playa lakes.

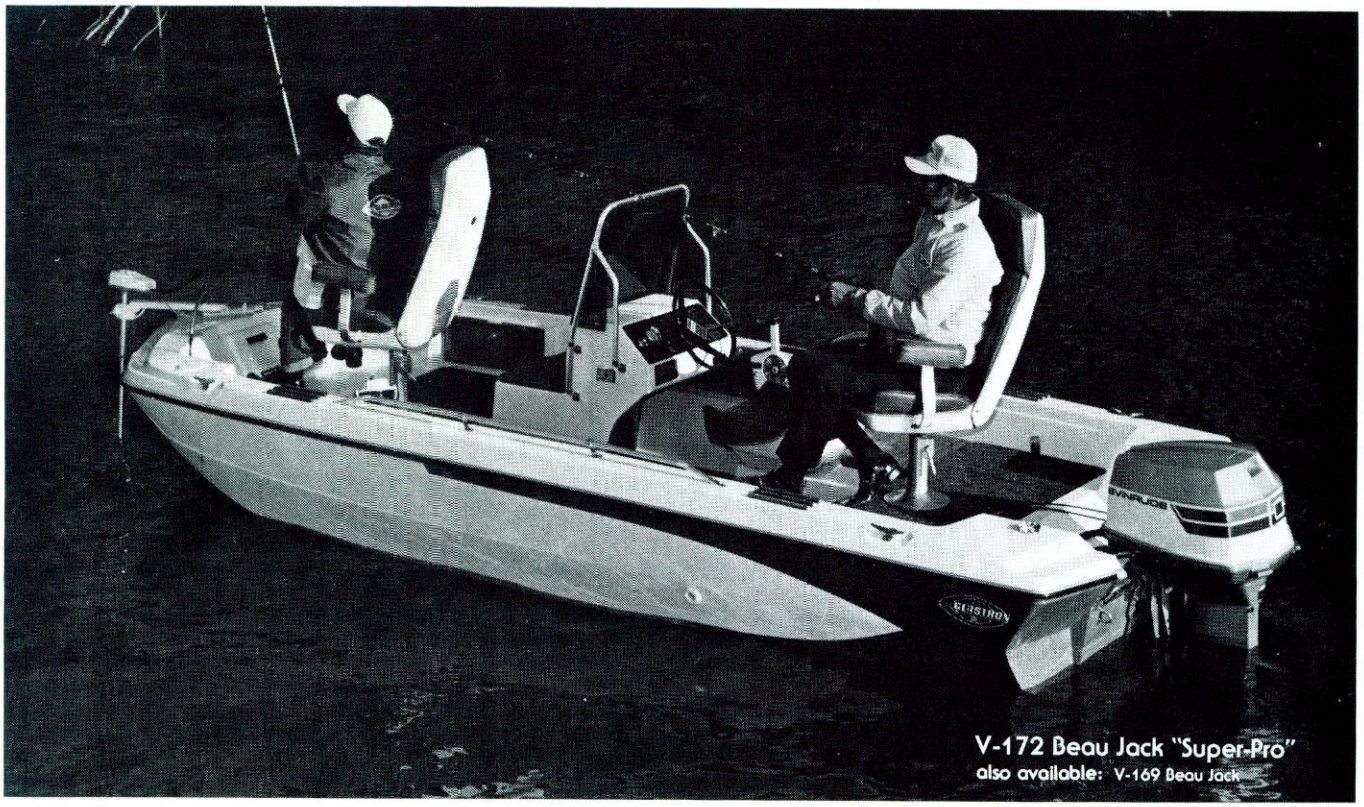
Long-billed curlews are loud by nature, as anyone can verify who encounters them. Eight distinct calls which the adults use on different occasions have been documented, and observers have noted four calls used by the young. When flying, their long bill can be seen opening with each call.

In 1928, Arthur Cleveland Bent, in his book "Life Histories of North American Shore Birds," wrote, "One cannot see this magnificent bird for the first time without experiencing a thrill of enthusiasm for the largest, one of the most interesting and notable shore birds, one that seems to embody more than any other, the wild roving spirit of the vast open prairies." Those vast open prairies he mentioned are for the most part gone or rapidly disappearing. In the Texas Panhandle, large acreages which once supported antelope, buffalo and nomadic Indians, now sustain a bustling farm economy.

Long-billed curlew numbers have greatly decreased since the turn of the century. Contributing to this decline has been the loss of nesting habitat to modern agriculture. Millions of acres have been converted from shortgrass prairies to irrigated farmlands. Curlews will likely remain in the Texas Panhandle only as long as there are large, open ranges where, undisturbed, these birds can continue to breed.

One species of curlew, the Eskimo curlew, *Numenius borealis,* may be extinct. It was unique in its elliptical migration from the Arctic coast to the Pampas of Argentina and Patagonia in South America. Two thousand miles of this distance was traversed over open water. Eskimo curlews, not unlike the long-billed curlew, were relatively tame and unsuspicious. They were extremely vulnerable to hunters as they returned to their breeding grounds each spring. In the western prairie states, they were slaughtered by the wagonloads. Hunters called them "dough-birds" due to the layers of doughlike fat in their breast. Their numbers began to decline in the late 1800s, and they were almost wiped out before the enactment of protective conservation laws. According to Harry C. Oberholser, in his new book "Bird Life of Texas," the last Eskimo curlew reported was seen in April 1968 near Rockport, Texas.

Hopefully, the long-billed curlew will not follow the Eskimo curlew into near extinction and will remain in Texas to be enjoyed by generations to come. **



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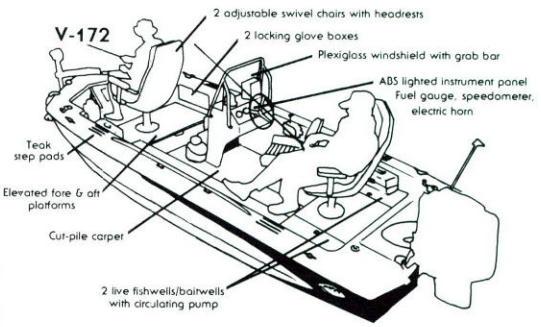

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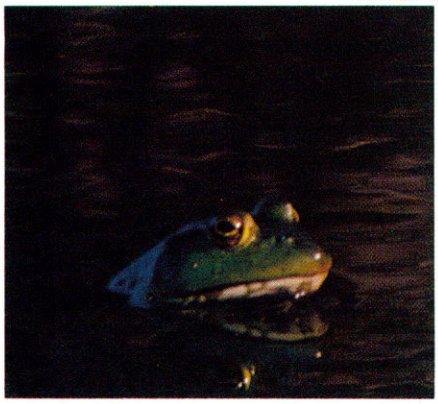
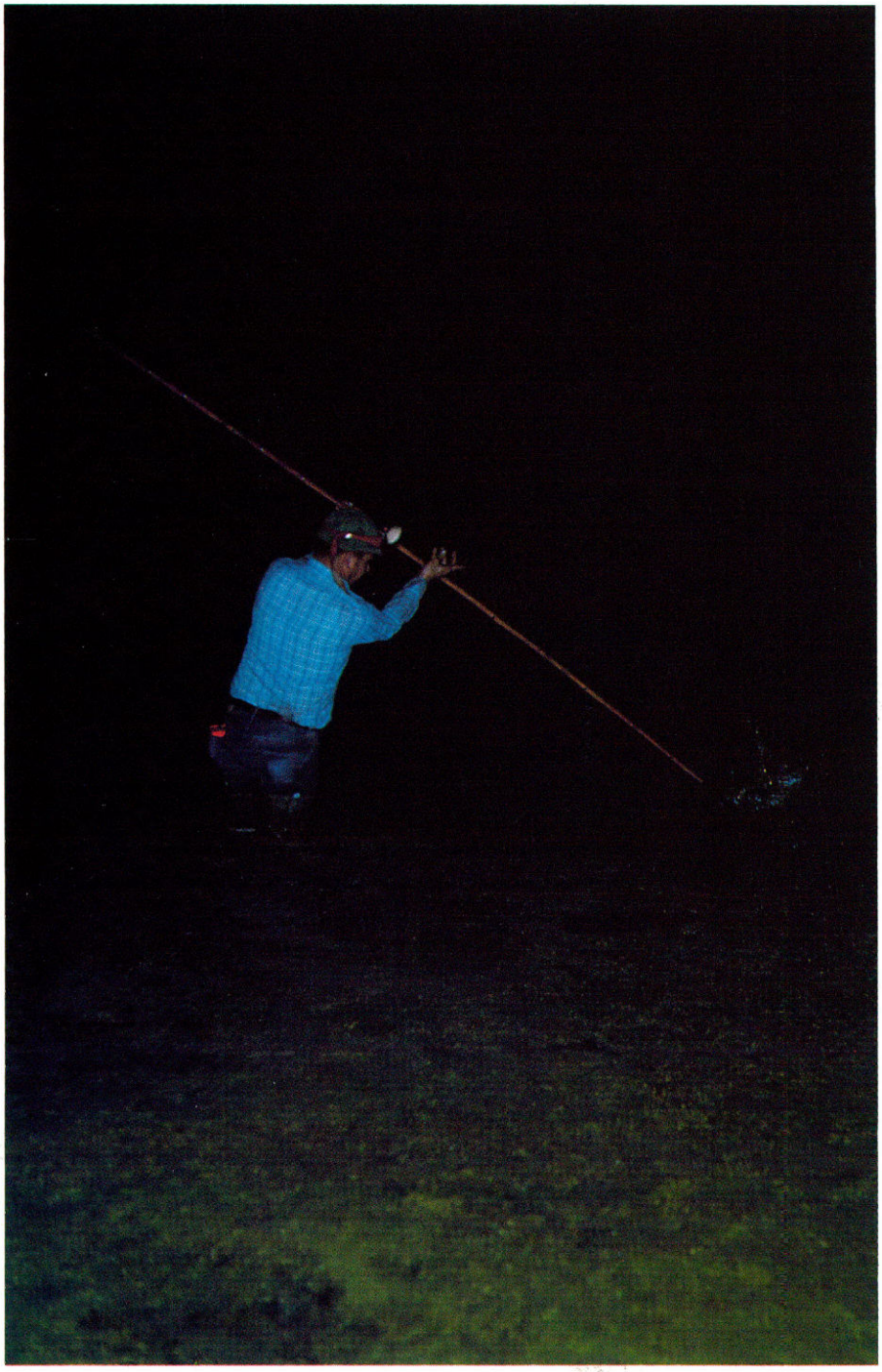


by A. E. Walters III

Bullfroggin'

Bill Broderick



Frogs live almost anywhere, from Death Valley to the mountain tops of the Andes.

Some grow to be no more than a half inch long while the largest, found in Africa, may be three feet in length.

Worldwide there are more than 3,000 species, but the largest and probably the most popular frog in North America is the bullfrog, *Rana catesbeiana,* which includes Texas in its natural range. A full grown bullfrog may weigh as much as three pounds and, with legs extended, be 18 inches long.

Bullfrogs have had a long adventure on earth; their fossil ancestors can be traced back to Devonian times. The early Romans dined on frog legs and considered them an especially palatable dish. Even today they are considered quite a delicacy and premium prices are paid for a plate of them in any gourmet restaurant. Teachers of biology use thousands of bullfrogs each year in laboratory classes.

In winter bullfrogs do not actually hibernate in Texas as they may in the northern parts of their range. Instead they seek the more permanent deep pools and become dormant. As spring approaches they become active again, appearing along creeks, streams and sloughs; and around ponds, lakes, stock tanks or almost any other relatively permanent body of water. There they lead a rather leisurely life, eating, growing and reproducing.

Although they have a tongue especially adapted for securing insects, a large percentage of their diet consists of crayfish. They have been known to eat ducklings, rats, salamanders and other bullfrogs. There is one case on record of a 17-inch coral snake being taken by a bullfrog.

When mating season arrives in late

With a quick, decisive jab of his spring-loaded "grabber," this man successfully catches his quarry. Using a grabbing-type gig allows the frogger to release unharmed any unwanted frogs.

Bullfroggin'

spring, the males begin making the low gutteral call for which they are so well known. Their calls or bellows serve to attract the females which, incidentally, do not call. Once the female is ready to breed, she releases her eggs into the water, being stimulated to do so by the presence of a male of the right species. At the same time, the nearby male releases his sperm to fertilize the eggs. This gelatinous mass of fertilized, free-floating eggs may measure three to five square feet in surface area and contain as many as 20,000 eggs.

It takes about five days for the eggs to hatch and the emerging tadpoles are quite small. However, by the end of the summer, their hind legs appear and the surviving bullfrog tadpoles will be six to seven inches long from snout to tail tip. In Texas, they remain as tadpoles for about two years, but in the northern states where water temperatures are cooler and the growing seasons shorter, they may remain as tadpoles for three full years. Once the tadpole has become a frog, it will still take two to three years for it to reach good eating size.

Attempts have been made to farm bullfrogs for the commercial market, but the most effective and popular way of collecting them is still the old-fashioned method of "gigging." There is a continuous open season on bullfrogs in Texas, but most hunters begin the frog season on a warm summer night in June or July when the water becomes suitable for wading.

There are two types of "gigs" used for collecting bullfrogs. One is the pronged gig which looks much like a miniature pitchfork with barbs. The other is a spring-loaded device which cocks by hand and then grabs the frog automatically when contact is made. This style gig grabs and holds the frog without breaking its skin. Any frog not wanted may be returned to the water unharmed, which is not the case when prongs are used. In some states the pronged gig is outlawed and only the "grabber" may be used.

The bullfrog is a tremendous jumper. It is able to make leaps of four or five feet, as Mark Twain popularized in his story about the frog jumping contests held in Calaveras County, California. Many a nicked or wounded frog has escaped its captor with one of these great leaps. When the "grabber" is used you either catch the frog or you don't, regardless of the leaps. Since a special skill is required in using the grabbing device, a greater sense of accomplishment may accompany a good or bad catch, and the frogs which escape return to their environment free from harm. A beginner at using the grabber may miss more often than if he had a pronged gig; but the skill is easily acquired.

Along with the sturdy gig, a headlight and a stringer or a potato sack are all that are needed for a night of frog giggin'. In days past – or rather nights – the carbide headlamp was the most popular means of providing light; however, the lightweight, battery-powered, headlights of today probably provide the best and most practical light source available. Once you are properly equipped, you need only find a likely body of water and await sundown.

Once darkness arrives, a flick of the switch on the headlight and a survey of the area to be "frogged" is all that is required to begin the night's hunt. Just because their bellow is not heard is no indication that frogs are not there. Many a large haul has been made on nights when few or no calls were heard. This may be particularly true in early fall when mating season is over.

Gigging from the bank can be successful, but many frogs crouch in the vegetation on the water's edge facing away from the bank or simply float in the water where they cannot be seen or reached from the bank. Thus, approaching the frogs either by boat or by wading from the water to the shore is certainly advantageous. It is amazing how many more frogs may be seen from the water than from the bank.

An area that has been "frogged" infrequently usually requires only that you steadily shine your light on the frog and slowly approach it. By taking your time and moving slowly, the gig may be eased to within inches of the creature. Then with a sharp, resolute jab forward, you have yourself a bullfrog.

Waters that are frogged frequently produce more of an inconvenience and less frogs. A bullfrog that has been hunted in the past will slowly sink as your headlight approaches and swim off underwater. It is a good idea to then switch off your headlight and wait for the frog to surface. By following this process you may eventually collect your frog, or you may waste a lot of time chasing a very wary one. Biologists caution that it's possible to overgig the adult population of bullfrogs in a given pond. So use your discretion since it takes four to five years for the frogs to again reach harvestable population numbers.

Once the catch is made there are several ways to clean the frogs. The most popular method seems to be to simply cut off the hind legs and skin them. Another alternative, perhaps less wasteful even though the majority of the edible flesh is on the rear legs, is to clean and skin the entire body except the head.

When holding the frogs you may note a slimy mucus coating on their bodies. This coating aids in respiration and water absorption. Bullfrogs do not drink water in the normal sense, but absorb it through their skins. This limits land travel to relatively short distances and is the primary reason that bullfrogs tend to concentrate along and around bodies of water.

When your night of frog "gigging" is behind you, and the catch has been cleaned, and you have been cleaned, and the meat has been prepared . . . a delicious meal awaits, along with fond memories of an exciting adventure. **

Fried Bullfrog

Make shallow cuts in the frogs' muscles crosswise to the grain of the meat. Place pieces into a bowl filled with salted water. Allow pieces to soak for six to eight hours (overnight) in the refrigerator. During the first hours of this soaking process, you will notice that the salt solution causes the frog legs to twitch. This should prevent any twitching in the frying pan later. However, if you like your frog legs to jump around in the pan, you can skip the soaking process.

To cook, coat the pieces with corn meal; or dip them in an egg and milk solution, then coat with a mixture of flour, salt and pepper to taste (repeat process for thicker crust) and deep fry as you would chicken or fish.

Serve with lemon wedges, fresh blackeyed peas, boiled and then fried new potatoes with red onions, a salad and iced tea. A dry white wine is also good.

Broiled Bullfrog

Soak pieces in garlic-flavored melted butter for a few minutes, then chill so the butter will adhere. Put in a hinged broiler and cook over moderate heat until nicely browned. Serve with lemon wedges, potato salad, French bread, pickles and olives.

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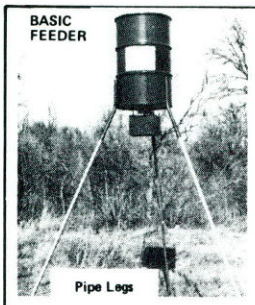

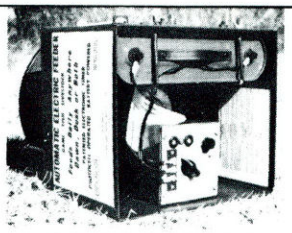

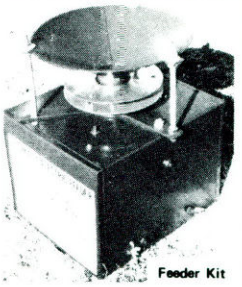

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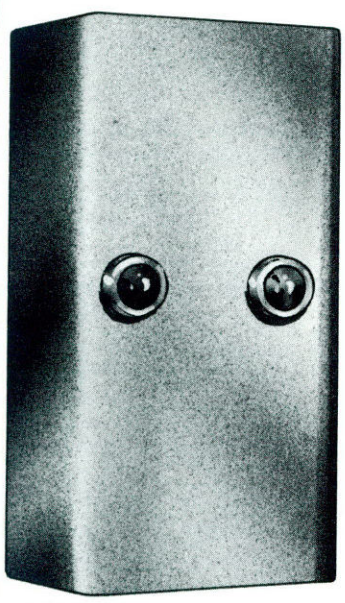

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How To:

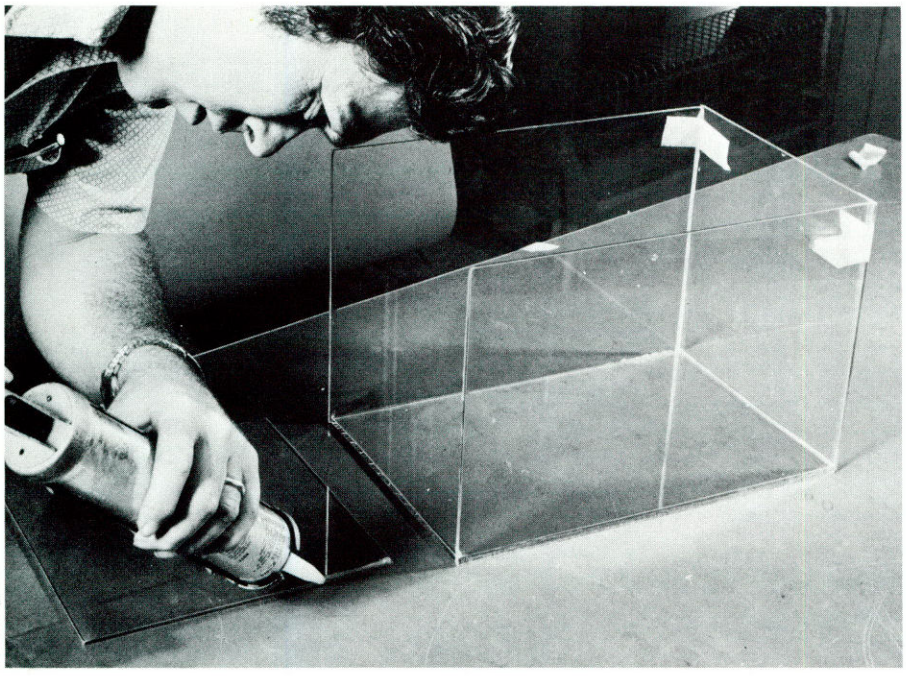
Build an All Glass Aquarium

by C. K. Winkler, Program Director, Big Game, Austin

Have you ever wanted an aquarium that would fit in a special place, such as a bookcase, or on an end table, but couldn't find a commercial model that was the right size? Well, now you can have one, and even better, you can have the satisfaction of making it yourself.

Ten years ago, making a homemade aquarium was an almost insurmountable task, primarily due to the stresses of water on the frame and bottom. Now, thanks to the space age, making an aquarium is a relatively simple matter.

The first thing you must do is figure out the dimensions you want your aquarium to be. If you want it in a bookcase or inset in the wall, remember to leave at least a couple of inches of free space at the top to allow you to feed the fish, add water and permit some access to the tank for cleaning and other chores. If you're not too concerned about the tank fitting in a specific place, there are two tips that might help you decide on your dimensions: (1) generally, the larger the tank, the easier it is to maintain; and (2) the more surface area, the more oxygen will be absorbed into the water.



Frank Aguilar

A tube of silicone sealer, available at most stores where glass is sold, provides airtight seals for your aquarium. Masking tape is used to hold the pieces of glass together while the sealer is curing. The sealer should be allowed to set for 48 hours in order to form a good bond.

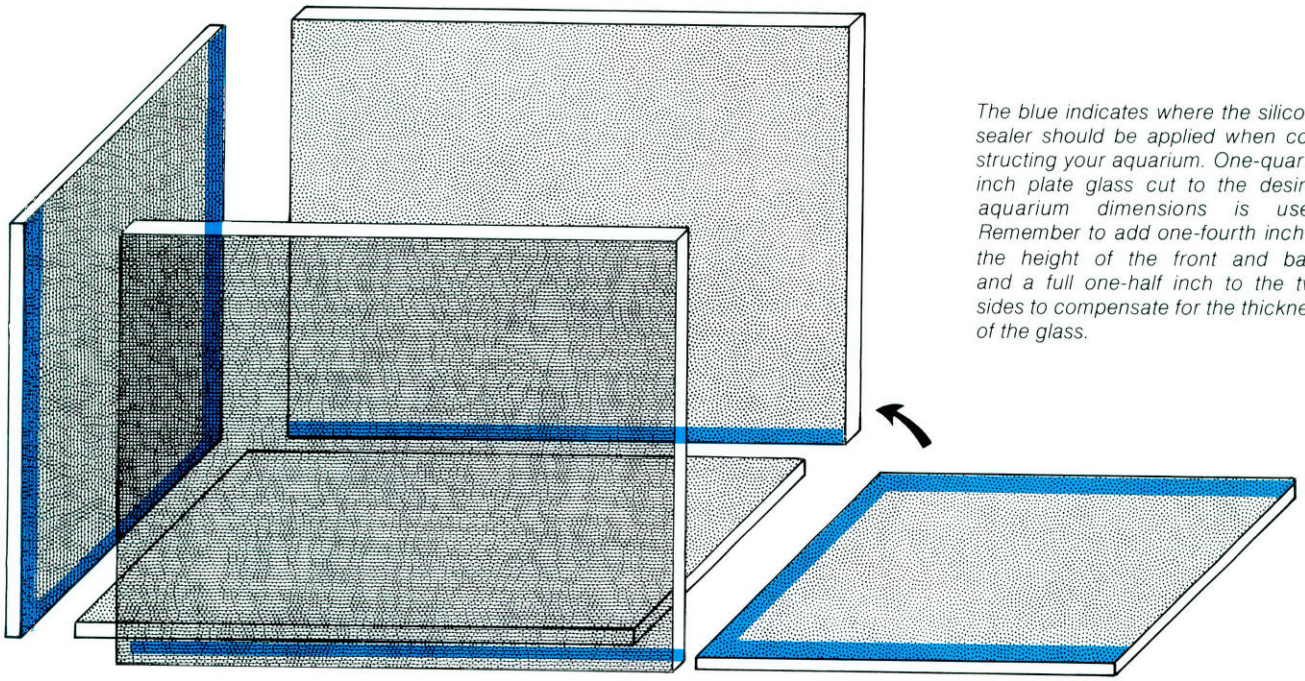
Once you have decided on the dimensions of your tank, the next step is to figure out the size of each piece of glass. The bottom, of course, would be one-half inch smaller than the length and width of the area you want the tank to cover. The front and back will be the same length as the bottom and as high as you want the tank to be plus one-quarter inch. The sides should be the same height as the front and back but one-half inch *wider* than the bottom to allow the sides to overlap the front and back.

Next step is to buy the materials. You will need five pieces of one-quarter inch plate glass cut to the aquarium dimensions (these are the bottom, two sides, the front and the back), a tube of silicone sealer (this is the space-age product developed for providing airtight seals for hatches on space capsules), masking tape and some single-edged razor blades.

When you buy your plate glass, ask that it be cut from used or salvaged glass because it is considerably cheaper than new glass. You should also have the glass cutter grind the sharp edges, or you can do it yourself with a medium-grade abrasive sandpaper.

Now you are ready to begin actual construction of the aquarium. Clean the glass to remove any oil or dirt for better adhesion of the sealer. Lay the sides, front and back around the bottom piece of glass and then apply a small line of sealer on the bottom side of the back glass and set this upright against the bottom glass, making sure that all of the edges are flush and firmly pressed together. Next apply sealer to the inside edges and bottom of one of the sides and stand the side up against the bottom and back.

Run a line of sealer along the bottom edge of the front and stand this against the bottom and side. Finally apply the



The blue indicates where the silicone sealer should be applied when constructing your aquarium. One-quarter inch plate glass cut to the desired aquarium dimensions is used. Remember to add one-fourth inch to the height of the front and back and a full one-half inch to the two sides to compensate for the thickness of the glass.

sealer to both edges and bottom of the remaining side and press this against the bottom, front and back glasses.

Use strips of masking tape to hold the components of the tank in position.

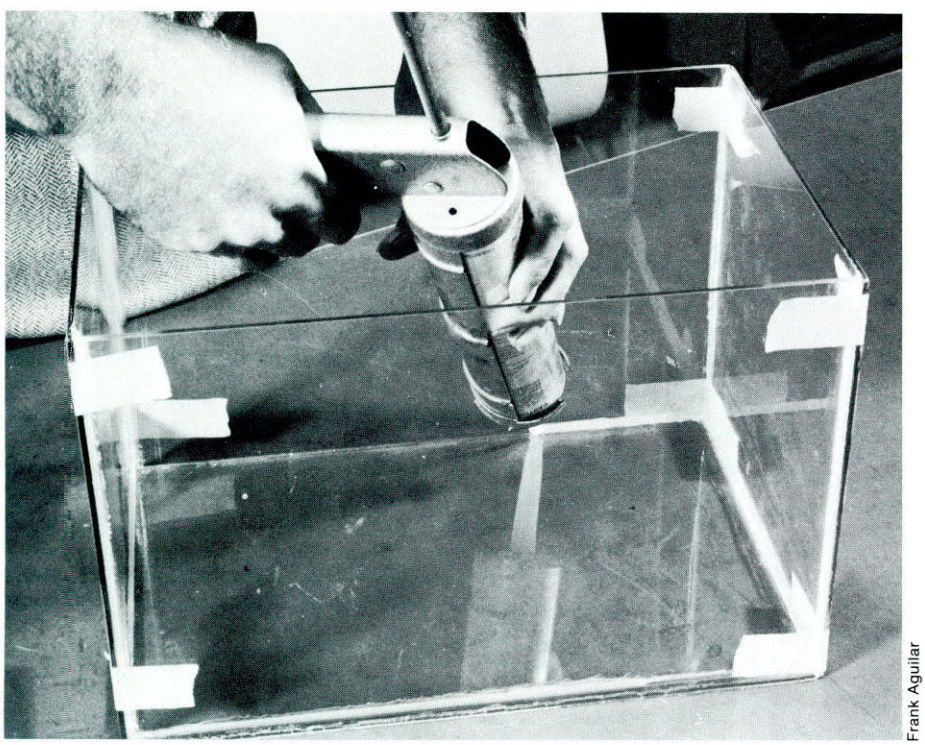
Do not try to smooth the seams while the sealer is wet. All this will do is smear the sealer and mess up the appearance of the aquarium.

Curing will take at least 48 hours. After this period, remove the tape and, from the inside of the aquarium, apply a bead of sealer to all the joints and let it cure for another 48 hours. Any excess or smeared sealer can be removed by scraping with a single-edged razor blade, but be careful not to scratch the glass.

When this has been done, fill the tank with water and check it for leaks. It's a good idea to leave the tank filled for a day or so to see if any leaks develop due to the weight of the water.

If it doesn't leak, you're ready to put the tank in its permanent place and stock it with fish. But if the aquarium should leak, simply empty it, dry it and remove the sealer in the area of the leak. Redo the last application of sealer on the inside of the joint and let it cure again.

Be sure to empty the tank before you move it since the stresses created by water sloshing back and forth are considerably greater than those formed in still water. Silicone sealer may be super strong, but it may not hold up under this kind of treatment. **

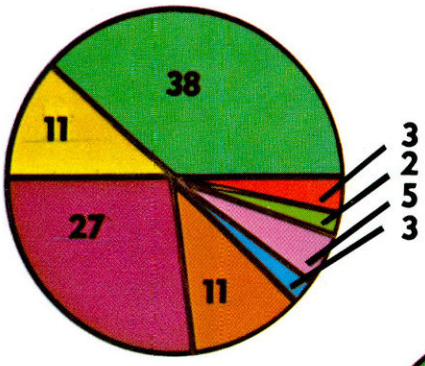


Frank Aguilar

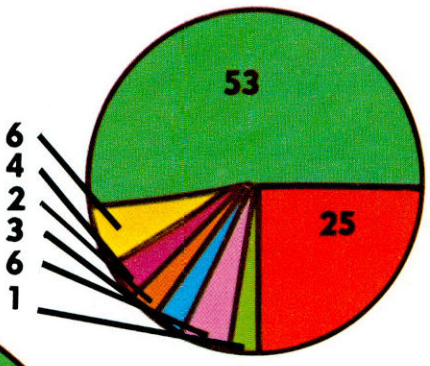
After the sealer has cured, apply more sealer to all inside joints of the aquarium and let it cure for another 48 hours. After that, fill the tank with water and check for leaks. If none develop, you're ready to stock it with fish.

ESTIMATED COMPOSITION OF SPORT HARVEST BY BAYS

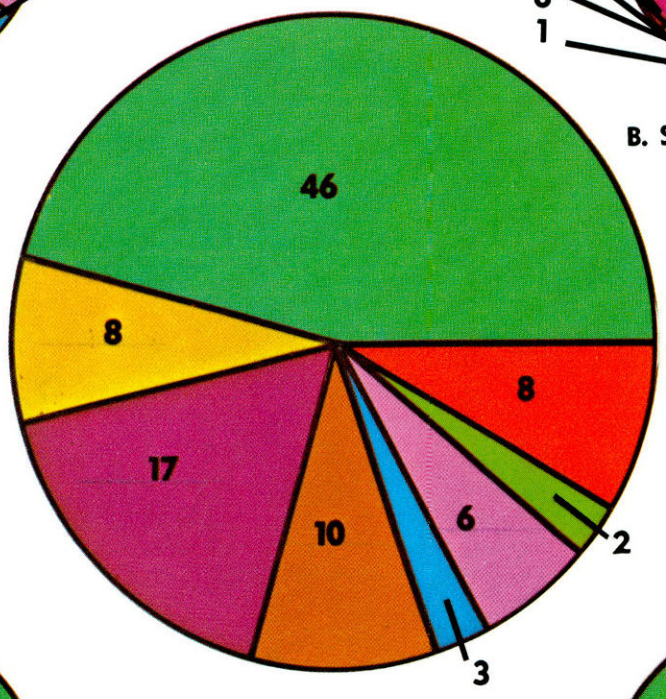
JUNE - NOV 1974



A. GALVESTON BAY



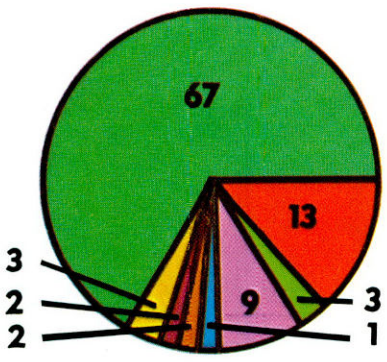
B. SAN ANTONIO BAY



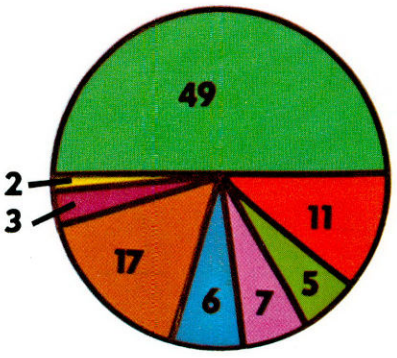
E ALL BAYS COMBINED

LEGEND

- TROUT
- REDS
- DRUM
- FLOUNDER
- SHEEPSHEAD
- CROAKER
- SAND TROUT
- OTHER SPECIES



C. ARANSAS BAY



D. UPPER LAGUNA MADRE BAY

NO. = PERCENTAGE

Coastal Creel Survey

by Tim Leifeste

More trout are caught by sport fishermen along the Texas coast than all other species of fish combined.

If you're a coastal fisherman, this fact probably comes as no real surprise. But let's get a little more specific.

Did you also know that, from June to November of 1974, of the total sport harvest surveyed in Aransas Bay 67 percent were speckled trout while the Galveston Bay survey indicated only 38 percent were specks? Or that three times as many sand trout, percentagewise, were caught in Galveston Bay than in the Aransas, San Antonio and Upper Laguna Madre Bay Systems combined?

Sure, those are impressive facts and figures; but what, you may ask, do they have to do with me?

Plenty, if you're a coastal fisherman. Biologists will use those figures in helping to insure that there are plenty of sport fish in our coastal waters for years to come. And, if you like to catch fish, that's important.

Figures are great for livening up a conversation, but as management tools they are essential. It's important for us to know exactly what's going on in our bay systems in order to effectively manage this important natural resource. Such is the objective of the Texas Coastal Creel Survey, initiated by the Parks and Wildlife Department in Aransas Bay in April 1974 and extended to three other bay systems – Aransas, San Antonio and the Upper Laguna Madre – the following June.

The purpose of this particular survey is to provide our department with an estimate of the total sport fish harvest by species and the percent composition of those species in the creel. It is hoped this information will enable our coastal biologists to develop a sound base for regulation of both sport and commercial fishing along the Texas coast.

Cooperation from sport and commercial fishermen has been excellent, according to department personnel conducting the survey.

Fishermen are interviewed at designated check stations and the number of fish caught, types of fish, weight and length of fish, duration of fishing trip, gear used and type of bait are recorded. A weather summary of each sample day is also included.

Jim Whitcomb

Sport and commercial fishermen are cooperating with department personnel by providing information on their coastal fishing trips. This data will help our biologists insure that there are plenty of sport fish in Texas' coastal waters for years to come.

Survey samples are taken from three specific fishing categories, or methods: 1) private boat fishing, 2) commercial pier fishing and 3) wade/bank/private pier fishing.

Data is further categorized into quarters of the year with 26 sampling days (14 on weekends and 12 on weekdays) chosen at random for each quarter. Fishing methods are also randomly selected for sampling.

At the end of each quarter, the information gathered from fishermen is sent to our data processing section for compilation and analysis.

Even though all the results are not yet in for the year, the survey is already beginning to show results.

Preliminary data indicates that 40 to 60 percent of the total sport harvest is coming from boat fishermen. When the complete data is compiled, biologists will be able to determine what percentage of fishermen are catching what percentage of fish and on what types of bait. They will also be able to determine types of fishing success and get some indication of the effects of sport fishing pressure on a particular fish species.

The accompanying chart, "Estimated Composition of Sport Harvest by Bays," compiled from the data collected during the first six months of the survey, should provide this department with some valuable insight into our coastal sport fisheries and an estimate of total fish harvest from the bays when compared with a similar chart on commercial catches.

Furthermore, it's conceivable that it would be possible to determine from the data already collected just how much, dollarwise, a day of saltwater fishing is worth, or to set a dollar value on our entire coastal sport fisheries.

The Texas Coastal Creel Survey, which this department hopes to expand to cover all bay systems in Texas, has many potential uses; however, as a management tool it should prove invaluable in our efforts to regulate fishing along the Texas coast and insure there are fish to catch for many generations to come. **

Young Naturalist

Birds

by Ilo Hiller

About 100 years ago in a limestone quarry in Bavaria, workmen discovered the fossil remains of a reptilelike bird. Scientists named the creature *Archeopterys lithographia* which comes from the Greek words meaning "ancient wing" and "imprinted on stone."

A study of the fossil showed that the reptilelike bird was about the size of a crow. It had a short, blunt, skinny bill and teeth with which it probably ate fruits and berries or possibly lizards and insects. It had the long, bony tail of a reptile, but the tail was fringed with large feathers—a pair growing from each of the 20 tail joints. Its feet and legs were very similar to those of the modern-day crow.

This creature's feathered wings were small and weak looking and it did not have a large breast bone to support flight muscles. For this reason, scientists believe it was a flutterer or glider. The front of each wing had three fingers, each armed with a claw. It is suspected that these fingers helped the bird climb, pry into crevices for food or grasp a branch to bring fruits or berries closer to its mouth.

This reptilelike bird lived about 130 million years ago during the Jurassic period when dinosaurs roamed the earth. Evolutionary changes during the passing millions of years slowly changed this prehistoric bird into the bird we know of today. However, modern-day birds, as a carry-over from their reptilian ancestry, still have scales on their legs and feet.

Birds are probably the easiest group of animals to identify. Just as we learned last month that all mammals have hair, all birds have feathers. This one characteristic separates them from all other creatures. Many people think of the prehistoric pterodactyls as the first birds, but scientists agree that they were flying reptiles, not birds. Their wings were similar to those of a bat.

Although all birds have wings, we cannot claim this as an identifying characteristic of just this group. If it were, the bat, which is a mammal, would qualify as a bird. The ability to fly is not a means of identification either because some birds, such as the ostrich and penguin, do not fly. New Zealand's rare kiwis, which are also flightless, have wings so short they are completely hidden beneath their body feathers.

All birds lay eggs, but this is not a fact unique to this group. You will remember we learned last month that some mammals are egg-layers too. Many reptiles, amphibians and fish also lay eggs. So, feathers seem to be the only things which will identify a member of the bird group.

Birds come in all sizes, shapes and colors. They range from the tiny hummingbird to the giant ostrich. The smallest, the Cuban bee hummer, is only about 2½ inches from bill tip to tail tip, and it would take about 14 of them to weigh one ounce. The ostrich, which can weigh up to 340 pounds when full grown, stands about eight feet tall.

Among the largest flying birds are the Andean and California condors, which have a wingspan of 10 feet and weigh about 25 pounds, and the wandering albatross with its 11-foot wingspan from wing tip to wing tip.

If anyone should ask you to describe a bird, you might tell them it is a warm-blooded, bipedal (two-footed), air-breathing, vertebrate (animal with backbone), with forelimbs modified into wings or winglike structures and a body covered with feathers.

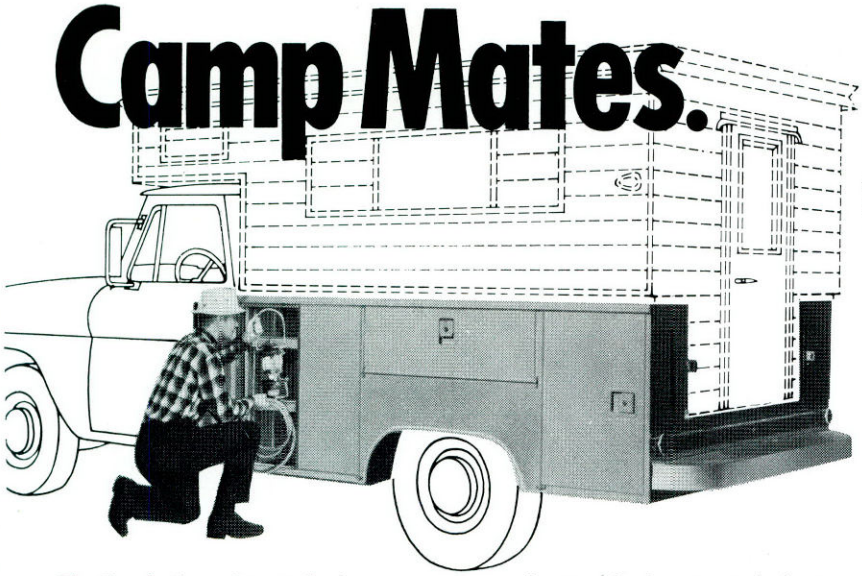
Some members of the bird family are hidden in the seek-and-find puzzle below. See how many of the 48 names you can locate. **

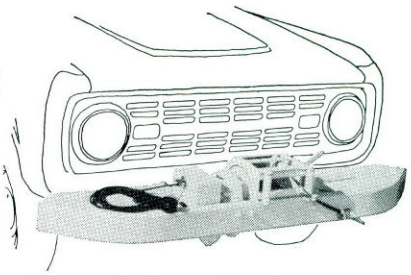
K	R	B	L	U	E	J	A	Y	X	L	H	E	R	O	N	G	A
O	W	L	S	P	O	O	N	B	I	L	L	T	E	L	L	U	G
A	R	A	O	B	L	C	E	A	F	G	E	E	A	L	I	A	R
H	E	C	J	O	A	K	U	L	H	L	D	E	G	R	E	T	A
M	N	K	N	P	N	Q	O	C	O	A	F	G	L	O	M	A	C
B	O	B	W	H	I	T	E	I	K	C	W	D	E	N	O	F	K
L	C	I	B	R	D	F	R	C	C	O	D	K	R	I	C	S	L
U	R	R	N	K	R	O	I	M	U	Q	O	I	O	T	K	S	E
E	A	D	O	R	A	H	T	G	D	A	V	L	A	R	I	W	C
B	N	G	C	W	C	J	N	R	E	T	E	L	D	A	N	A	K
I	E	F	L	Y	C	A	T	C	H	E	R	D	R	M	G	N	W
R	K	R	A	L	C	N	C	C	O	O	T	E	U	E	B	U	A
D	E	K	F	I	A	R	N	A	B	D	T	E	N	L	I	T	H
T	O	A	L	S	A	I	F	I	B	I	S	R	N	P	R	H	T
I	T	E	A	L	F	L	N	T	G	R	E	B	E	R	D	A	H
S	P	E	E	W	O	O	D	P	E	C	K	E	R	U	C	T	G
B	H	S	A	P	S	U	C	K	E	R	D	G	I	P	X	C	I
P	I	G	E	O	N	D	R	I	B	G	N	I	M	M	U	H	N

(Answer on page 29)

BLACKBIRD
BLUEBIRD
BLUE JAY
BOBWHITE
CARDINAL
CHICKADEE
COOT
CRANE
CROW
CUCKOO
DOVE
DUCK
EAGLE
EGRET
FALCON
FINCH
FLYCATCHER
GOOSE
GRACKLE
GREBE
GULL
HAWK
HERON
HUMMINGBIRD
IBIS
JAY
KILLDEER
LARK
LOON
MOCKINGBIRD
NIGHTHAWK
NUTHATCH
ORIOLE
OWL
PELICAN
PIGEON
PURPLE MARTIN
QUAIL
RAIL
ROADRUNNER
ROBIN
SAPSUCKER
SPOONBILL
SWAN
TEAL
TERN
WOODPECKER
WREN

Camp Mates.





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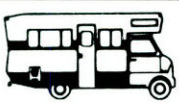

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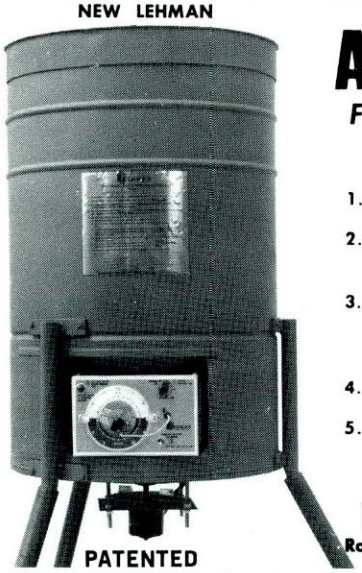

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Southern flounder by Bill Reaves

Flatfish

by Gary M. Stokes, Marine Biologist, Rockport

Flatfish are not all flounders, but all flounders are flatfish.

Fluke, flounder, sole, whiff, hogchoker and tonguefish are all common names which are variously applied to the more than 25 species of flatfish found in Texas coastal waters. Most of them are small and generally go unnoticed; however, the southern flounder ranks as one of the state's top food fish.

All flatfish, as the name indicates, have a flattened appearance and can be distinguished from other fish by the presence of both eyes on one side of the head and the absence of pigment on their blind or under side.

Flatfish spend most of their time on bottom. To reduce buoyancy and maintain this position, they have a small body cavity, lack an air bladder in the adult form and have a low oil content in their flesh. In fact, this low oil content is one reason why the southern flounder is such a desirable table fish.

Most fishermen know that flounder can change body color rapidly to match their background. This trait, shared by most flatfish, makes them difficult for the fisherman to locate when floundering. Color change is accomplished by rearrangement of pigment granules within the chromatophores, or color cells. This ability is so developed that when a flounder is placed on a checkerboard, it can simulate the light and dark pattern.

Flatfish larvae are similar to the larvae of most other fish. They have an eye on each side of the head, generally have chromatophores on both sides of the body and swim vertically in a normal manner. However, while the fish is very small, metamorphosis occurs. One eye migrates over the top of the head, the pigment disappears from the now blind side and the fish begins to spend most of its time on the bottom.

Although the exact time at which flatfish emerged as a distinct fish group is not known, the fossil record shows they were already present 50 million years ago. Several modern-day fishes, belonging to the order Perciformes, are known to rest on one side on the bottom, and it is believed that the earliest flatfish evolved from a fish of this type.

The southern flounder, *Paralichthys lethostigma*, is by far the most common flatfish taken by Texas sportsmen and it accounts for over 95 percent of the

sports flounder catch. The only other species seen with any regularity by the average sportsmen are the Gulf flounder, *Paralichthys albigutta,* and the ocellated flounder, *Ancylopsetta quadrocellata,* sometimes referred to as fourspot. Although all three of these fish are sometimes called flukes, the term flounder is preferred by most authorities today.

Southern and Gulf flounders are very similar in appearance, but the Gulf flounder can usually be distinguished by its three ocellated, eyelike, spots in the shape of a triangle. It is also smaller, seldom exceeding 16 inches, while southern flounder of up to 25 inches are not uncommon. The ocellated flounder, a third type found off the Texas coast, seldom exceeds 12 inches and can be recognized by its four large eyelike spots with whitish centers. Ocellated refers to a spot of color encircled by a band of another color.

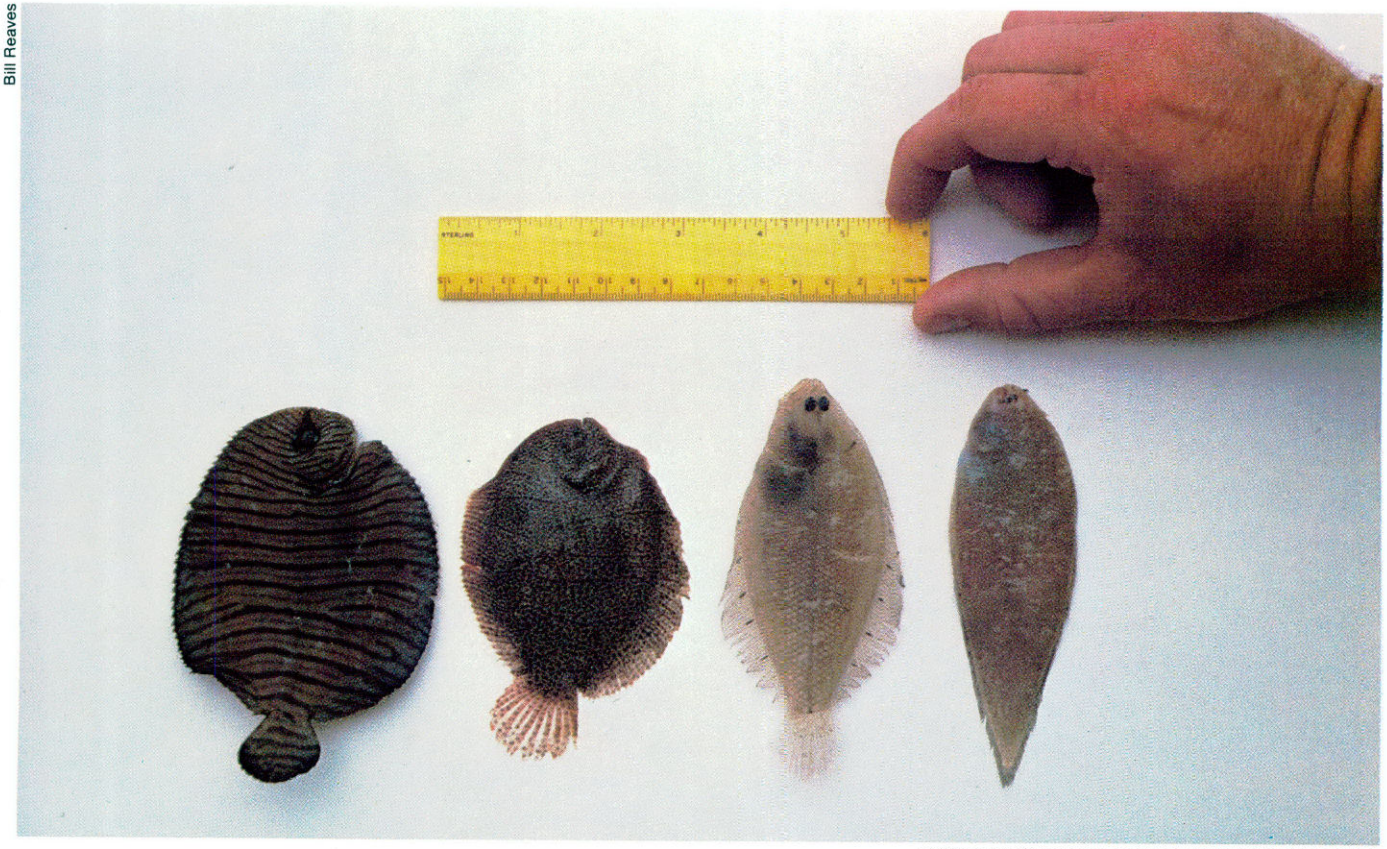
Sportsmen, using minnow seines or shrimp trawls to capture live bait, sometimes encounter a few of the smaller varieties of flatfish. These are generally tonguefish, soles and whiffs. Tonguefish are appropriately named because of their tongue-shaped appearance with the dorsal and anal fins not separated from the caudal, or tail fin. Soles can be distinguished by small eyes located on the right side of the head and by a small mouth. Whiffs belong to the same family as the southern flounder but are smaller, seldom exceeding six inches, and are a light tan or sandy color.

Adult southern flounder leave the bays during the fall for spawning in the Gulf. It is at this time that

Southern and Gulf flounders by Bill Reaves

Camouflage ability of the southern flounder is shown by the top fish on the opposite page. Its color matches its surroundings. In the post larval stages (above), the flounders' eyes have already migrated to one side of their bodies. Below are some of the other flatfish found along the Texas coast.

Bill Reaves



Left to right: Fringed sole, lined sole, bay whiff and tonguefish.

the sports fishery reaches a maximum with most fish being taken in or near passes leading to the Gulf. Although the exact spawning location is not known, evidence indicates that it is in water between 50 and 150 feet deep. The eggs are buoyant.

During late winter and early spring, postlarval southern flounder begin to enter the bays. They are less than one-half inch in length and migration of the right eye to the left side of the head has already occurred. At first the small flounder feed mainly on crustaceans, but as they become larger they become more piscivorous, or fish eating.

Most of the adult population leave the bays for spawning in the Gulf during the winter; however, some adults remain behind and over-winter in the bays. These fish show no sexual development which indicates that virtually all spawning occurs in the Gulf.

During the spring, adult southern flounder enter the bays from the Gulf. The spring influx is rather gradual and does not occur with the intensity that characterizes the fall emigration.

With the re-entry of adults into the bays, the sports flounder fishery swings into high gear. Although many

Flounder are popular game fish with both the rod-and-reel angler and the night wader with a gig. Although flounder may be caught year around, the best gigging is in the fall on calm, dark nights on an incoming tide. The fall is also best for the rod-and-reel angler as the fish move into passes in bays before migrating to the Gulf. Mud minnows, live shrimp or artificial lures and worm jigs are good baits.

Reagan Bradshaw

Leroy Williamson

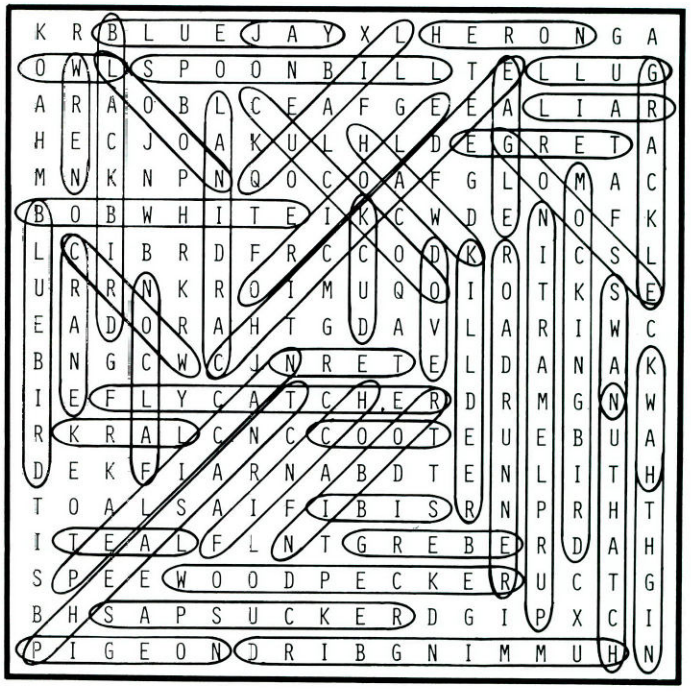
flounder are caught on rod and reel, most are taken with gig. Gigging is done at night when the fish enter shallow waters to feed. The fisherman walks along in shallow water, uses a lantern to spot flounder and then gigs or spears the fish. Wind, tide and moon are the most important factors influencing the number of flounder taken by gig, with best catches obtained on calm dark nights on an incoming tide.

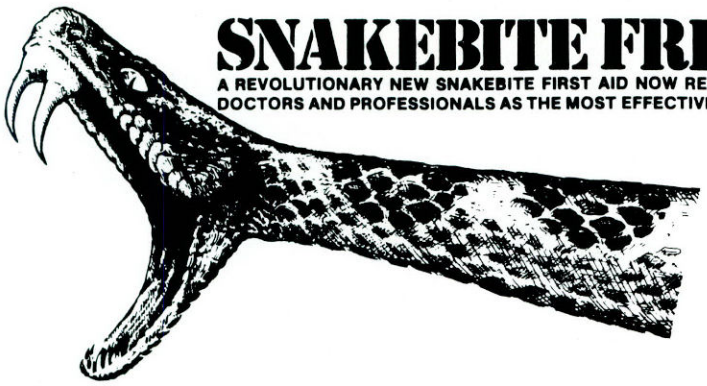
Male southern flounder are slower growing than females and are seldom taken in excess of 12 inches. The sports and commercial catches are mainly composed of 12- to 16-inch females weighing between one and 1½ pounds. These fish are in their second year of life. Often the catch will include a few larger flounder, the largest of which are around 25 inches long with a weight of about nine pounds. Although fish in excess of 25 inches are occasionally reported, they are very rare.

The official state record for southern flounder is an 11-pound, two-ounce fish taken in Galveston West Bay by Jefferson D. Huddleston, Jr. on May 9, 1972.

Next time you catch a flatfish, whether it be the highly prized southern flounder or one of the smaller varieties, stop and examine your catch. You will find it is truly an unusual fish. **

Answer to Young Naturalist page 24





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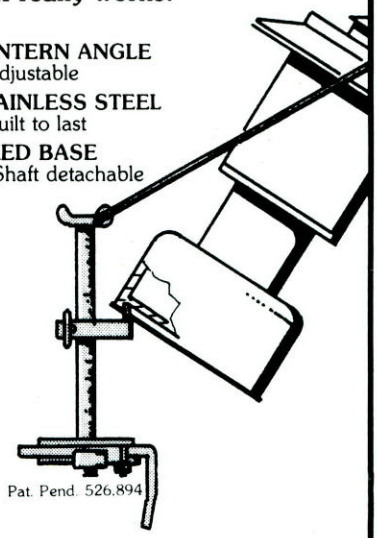

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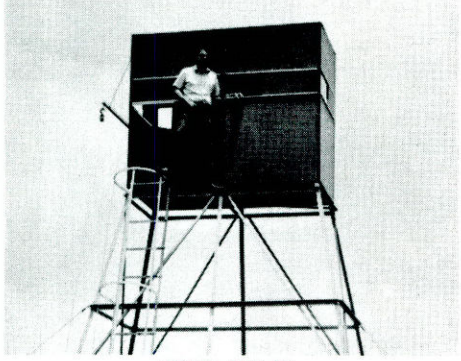

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LETTERS TO THE EDITOR

Pronghorn or Antelope?

In your article "Pronghorn Progress" in the March issue is the statement: "Male pronghorns, unlike *true* antelope, shed their horns . . ."

What is the pronghorn and what is an antelope?

Grady E. Hill, M.D.
El Dorado, Arkansas

■ Besides shedding their horns (antlers) while the antelopes retain theirs, pronghorns are taxonomically assigned to the family Antilocapridae, while true antelopes are in the family Bovidae, which includes the bison, bighorn sheep, mountain sheep, and domestic cattle, sheep and goats.

Here are a few of the distinguishing characteristics of the families:

Antilocapridae

1. Horns shed each year
2. Horns made of fused (agglutinated) hair
3. Horns of adult males branched
4. Horns arise close to and above eyes
5. Dewclaws present

Bovidae

1. Horns permanent
2. Horns bony, of keratin
3. Horns not branched
4. Horns arise farther back on head
5. Dewclaws absent

Additionally, the individual hairs of the pronghorn are hollow while those of the American bovids and, possibly, all bovids, are solid. The pronghorn also has the ability to raise the hair on its rump, a characteristic employed when it is alarmed. American bovids do not exhibit this "alarm system."

These are the most readily discernible differences between the families although there are probably others which can be determined from examination of the internal organs.

Prickly Bites

Our school library receives your magazine and, while glancing through it, I noted especially the picture on the inside back cover (March 1975 issue of TEXAS PARKS & WILDLIFE). I can't imagine what sort of creature could take bites out of a prickly pear, and yet, it seems that this is the case. The areas seem as though they were made by single bites rather than the nibbles of rodents. Can you enlighten us on this?

Sanford Lee
Mellette, South Dakota

■ The prickly pear is a valuable livestock and wildlife food plant and very abundant in Southwest Texas as well as other southwestern states. It is burned by many ranchers to remove the stickers for livestock grazing purposes, and many cattle become so accustomed to eating the plant that they eat the unburned pads as well as the burned ones. Deer, javelina, cattle and rodents, including cotton rats, also eat this plant. Apparently the stickers don't bother them.

Tagging Butterflies

A few months ago you published an article on the migration of the monarch butterfly. My curiosity over one part of the article has finally gotten the best of me. How does one tag a butterfly? The article stated that some gentleman had been doing this sort of thing for several years for study purposes; now how in the heck does he go about it?

Linda Sherrill
Matagorda

■ One tagging method utilizes paper tags which are clipped to the major vein of the forewing. However, the simplest way to tag a butterfly is with a fabric-type pen. The tagging number or code is written directly on the wing. It is usually written large enough and in a location where it can be seen when the butterfly is at rest on an object. If the number cannot be seen, the butterfly must be caught in order to verify tagging.

BACK COVERS

Inside: Dolan Falls, located on the Devil's River above Amistad Reservoir, spans the width of this major watercourse. Canoeists will find that a portage is necessary at this point. Photo by Reagan Bradshaw.

Outside: Offshore fishing can be quite productive around the shrimp boats. The material culled from the nets attracts various sport fish to the area. Photo by Bill Reaves.


ROBIN