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August 1972 • 50c



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**TEXAS PARKS & WILDLIFE
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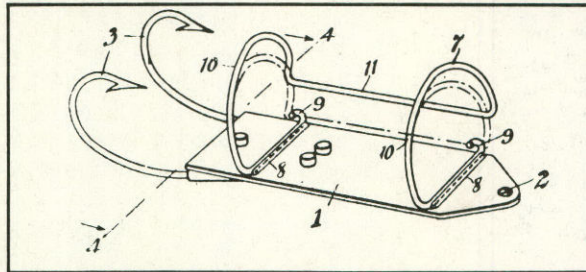
Dedicated to the conservation and enjoyment of Texas fish, game, parks, waters and all outdoors.

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20

2

TEXAS PARKS & WILDLIFE

- Buddy System Works for Cattle Egrets** by Jim Cox 2
This bird has developed the unique feeding technique of eating insects stirred up by grazing livestock.
- Know the Laws** by David Baxter 6
Ignorance of hunting, fishing and boating laws is no excuse.
- Pollution Sleuths** by Joe Mayhew 12
Department employees study fish kills to determine causes.
- Superbass** by David Baxter 14
Crossbreeding bass produces something special.
- Catching the Mud Cat** by Robert Sinclair 16
Although not as popular as channel, blue and flathead catfish, the bullhead provides many hours of fishing pleasure.
- Turn-of-the-Century Tackle** by Neal Cook 20
No fish catching device is too outlandish for the fisherman to try at least once.
- Crossword Review** by Ilo Hiller 22
A puzzle to test the memories of "Young Naturalist" readers.
- Voices of the Night** by Ilo Hiller 24
The night air resounds with the varied sounds of male frogs and toads calling for their respective mates.
- How To: Rig Terminal Tackle** by Ilo Hiller 29
There are probably as many different ways to rig tackle as there are types of fish.

Outdoor Books 10 Long Shots, Short Casts 11
Photo and Art Credits 11 Letters to the Editor 32

Inside front: The brilliantly colored green tree frog, *Hyla cinerea*, is found throughout southeast Texas. Photo by Terry Fischer.

Outside cover: Early morning dew glistens on the intricate threads of a spider's web. Photo by Neal Cook.

Buddy System Works for Cattle Egrets

by Jim Cox

Feeding alongside or under the feet of grazing livestock sounds like a dangerous pastime, but the cattle egret accomplishes the task with ease. The bird eagerly snaps up the insects disturbed by the passage of its large grazing companions.

To the cattle out in the pasture, the white bird constantly underfoot may be a nuisance, but in the ornithological world the cattle egret is an avian pioneer. Its remarkable migrations into new areas have the experts wondering just how far its range will spread.

The species was not found at all in North America a few decades ago. In fact, scientific studies indicate it originated in Africa. Forerunners of the Texas flock apparently found their way to South America and slowly extended their range north. This small and rather nondescript member of the heron family is now quite numerous in Texas, most other states and Canada as well.

First sightings of the birds in the United States were around 1940 when they were identified in Florida. The bird was first sighted in Texas in 1955 when one immature bird was seen on Mustang Island, and by 1958 many birds were reported nesting on Galveston Island. In 1970 there was estimated to be at least 71,000 birds nesting in Texas.

Since first sightings, the cattle egret has moved in like poor relatives, occupying roughly half the country. But unlike an out-of-town cousin, the cattle egret apparently

has not disrupted the ecology or crowded out other bird species in its new-found range. Even in areas of high egret and heron nesting concentrations, the cattle egrets moved in politely and appear to be compatible with existing crowds.

Because of the specialized feeding technique developed by the cattle egret, food competition with native species has been no issue. The bulk of the native heron's diet consists of fish and frogs while studies show that 80 percent of the cattle egret's diet consists of grasshoppers, crickets, spiders, flies and beetles. Earthworms, frogs and crayfish make up the remaining

20 percent.

The reasons for the bird's constant push into new territories are not known, but once the bird arrives, it is no secret how it grows numerous. The cattle egret has an extremely long nesting season—courtship begins in April and late nesting is still underway in July—and a fairly high tolerance to disturbances.

At the approach of the breeding season, the bird's appearance goes through a dramatic change. Within two days, hormones have caused

Leroy Williamson



Mature cattle egrets in non-breeding season coloration (above). Their compatibility with domestic livestock opened a unique niche for the birds (right).



the beak to turn from yellow to bright scarlet with a golden tip. The skin around the eyes becomes a scarlet-fushia color and the irises change from yellow to bright red with an inner yellow ring at the pupillary opening. The legs, which range in color from yellow-green to almost black, become bright scarlet. Both males and females undergo the color changes and cannot be positively identified as to sex unless actually mating.

Mating takes place during the construction of the nest, with

breeding and nest building covering a period of three days. A light blue egg is laid every other day until there are two to four in the nest. Within 24 to 48 hours after the first egg is laid, the bird's breeding colors are gone with the exception of an orange tint to the legs which disappears in another day or two.

Both parents share in the incubating process, taking turns on the nest. A series of vocal greetings accompany the exchange of nest duty. This constant attention to the eggs by the parents leaves little

opportunity for predation and helps insure a hatch.

The first egg hatches in 24 days and the firstborn has a two-day growth advantage before the next chick is born. For this reason, when three eggs are laid, the third chick usually starves or is pushed out of the nest by its stronger siblings. Under normal food conditions when just two eggs are laid, both chicks survive. But in times of food shortage, only the strongest will live. This seemingly cruel system assures that a few hardy offspring



Reagan Bradshaw

will mature, rather than a number of smaller, weaker individuals.

The very young chicks are guarded by one parent while the other is off foraging for insects disturbed by livestock grazing in nearby fields. When the forager returns to feed the young, the roles are reversed and the guard flies off to gather food.

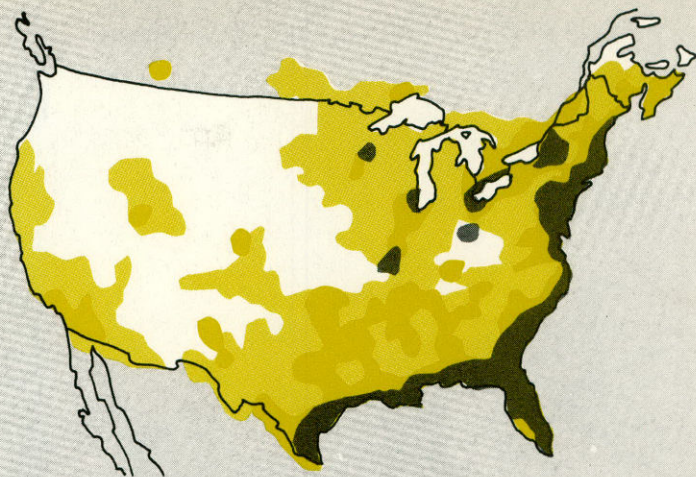
The chick's beak is touched with a wad of regurgitated food by the adult to stimulate eating. As the young become more aggressive eaters, they grasp the adult's beak and pull its head down to hasten regurgitation. It is at this point that the strong get the necessary food for survival and the weak starve.

The chicks are soon able to swallow wads of food the size of their own heads and are insatiable. Both adults are forced to forage constantly during the daylight hours to feed their offspring. By the time

the young are six weeks old, they are the size of their parents and the feeding process resembles a fight. The feeding often becomes so violent that the parent and the chick fall to the ground while the chick attempts to force food from the adult. When the young are between 50 and 60 days old they leave the nest to collect their own food.

In Texas, cattle egrets are becoming a common sight, especially along the coastal plains and the eastern half of the state. They have been sighted in almost every county except those in the upper Panhandle. Let's hope they have found their niche in the ecological balance. **





■ 1960 ■ 1965 ■ 1970

**Range Extension by Cattle Egrets
In the United States and Canada**

Since the first sighting of one immature bird on Mustang Island in 1955, the cattle egret population increased to an estimated 71,000 birds in Texas in 1970.

Leroy Williamson



Game Management Officers issued 503 citations for life jacket violations in only one month of 1971, but for good reason. Texas waters claimed the lives of 545 persons from January to December 1971, most of whom might have lived if life jacket precautions had been observed (above). Hunting after legal hours may lead to a number of additional violations (right)



Leroy Williamson

Know the Laws

by David Baxter

Ignorance of the law is expensive. In the pursuit of relaxation, Texas outdoorsmen paid over \$500,000 in fines for game, fish and water safety infractions last year.

Texans who take their recreation seriously need to sit down while oiling the fishing reel or deer rifle and take a look at some of the laws which are broken so often the cracks look like a jigsaw puzzle.

The old maxim that it "happens to the other guy" is as shopworn to Parks and Wildlife enforcement officials as it is to other peace officers. Some 22,000 "other guys" were caught at it last year.

Violations are seasonal in nature. Main warm weather infractions are for not having a valid fishing license and nonadherence to water safety laws. For example in April 1972, along with other violators, 530 persons were cited for not having fishing licenses and 149 Texas boaters had insufficient life preservers on board their crafts.

The fishing license laws are simple: everyone between the ages of 17 and 65 must have a license to fish in fresh and salt water. Exceptions to the rule are those persons fishing with a trotline, throw line or cane pole with no reel or other winding device in their county of residence. That is straightforward enough. The license fee will save you considerable embarrassment, a spoiled outing and from \$10 to \$100 in fines.

Bag limits, means of fishing and other laws vary from county to county within the state. To handle these variances the department publishes a yearly booklet entitled "Texas Sport Fishing Guide." It is

valid from September 1 of the year it is published until August 31 of the following year, the same period covered by fishing licenses. A yearly "Hunting Guide" is also published as well as a "Migratory Game Bird Digest." These guides are available upon publication at most of the 4,000 places which sell hunting and fishing licenses and at all offices of the Texas Parks and Wildlife Department.

In August 1971 there were 503 citations issued for failure to comply with life jacket regulations and 195 for operating a boat without a certificate of registration aboard. A lot of people are surprised when a game management officer pulls along side of their boat and not only checks fishing licenses but counts life preservers and asks to see the boat registration certificate. The Texas Water Safety Act gives GMOs as peace officers the responsibility of enforcing this act.

The Water Safety Act says that all boats must have one Coast Guard approved life preserver, buoyant vest, ring or buoyant cushion for each person on board. Operators of boats less than 16 feet in length and boats between 16 and 26 feet long shall require every passenger 12 years of age and younger to wear a life preserver of the type prescribed by the Coast Guard while underway.

Texas Parks & Wildlife magazine for July 1972 spells out the types of preservers required by law. The Coast Guard, local power squadrons and Coast Guard Auxillaries are also glad to provide this information.

Every boat owner must carry the pocket-size plastic certificate of registration on board while operating the vessel. Violations of the Water Safety Act are considered misdemeanors and carry fines up to \$200.

From the middle of November to the end of December the less scrupulous Texas hunter is most often fined for hunting at night, not tagging his deer or for discharging firearms along public rights-of-way. The hunting day of the deer season runs from one-half hour before sunrise to one-half hour after sunset, and that's it. Violation of this ordinance is punishable by a fine of not more than \$100 and each animal or bird killed outside of the legal hunting hours is a separate offense.

Hunting with a headlight is something else. The "Hunting Guide" spells out which animals and birds are considered as game species and which are unprotected. At no time of the year may those animals and birds considered as game species be hunted with a headlight. The possession of a headlight after legal hunting hours in an area where deer are known to range is considered to be evidence of a violation. Punishment is a fine of up to \$200, confinement in the county jail for not more than 90 days or both.

An untagged deer is the downfall of the hunter who thinks he can get more than his limit. Last year 261 people thought they could get away with it. After a deer is killed, it must be tagged and that tag must remain on the animal until the carcass is processed or destroyed. The instructions are on the tag.

Gone are the days of hunting on a right-of-way.





Discharging a firearm along a roadway, whether at a road sign or a rabbit, is punishable by a fine of not less than \$50 nor more than \$200. This is enforceable by GMOs and peace officers.

There is a misconception among a few Texas landowners. Landowners own the land, the wildlife belongs to the people of Texas. By leasing his land to hunters the owner regulates access to his property; he does not sell game animals.

As such, all native wildlife, whether on private ranches or public land, is under the jurisdiction of the Parks and Wildlife Department. Infractions of game and fish laws by a landowner on his property are just as subject to punishment as those committed by a hunter leasing the right to hunt on private land. Game management officers have the right to enter private land for the purpose of enforcing these laws.

We have game, fish and water safety laws because private citizens have failed to police themselves. Sure, there are a lot of conscientious boaters who demand that everyone have a life preserver, and most landowners are scrupulous guardians of wildlife, but there are those who consistently violate such laws and are a hazard to public property and to those who abide by the regulations.

The game management officer has a job to do—he has to protect life. And life is hard to come by whether it be human or a wild creature.

**

OUTDOOR BOOKS

AMERICA'S NATURAL TREASURES by Stewart L. Udall; Country Beautiful Corp., Waukesha, Wis., 1971; 226 pages, \$14.95.

This colorful, authoritative volume is a compilation of photographs and information on 73 of America's beauty spots—the national nature monuments, national wildlife refuges, national seashores and lakeshores and national wild and scenic rivers.

Although these areas are not as accessible or well-known as the national parks, many rival the parks for both beauty and size.

Katmai National Monument, located on the east coast of the Alaskan peninsula leading to the Aleutian chain, is one of the largest units of the National Park System and protects over 4,200 square miles of primeval wilderness. This wilderness area is out of reach for the casual tourist because there is no road or rail access, and private or chartered planes are required to view the most scenic spots.

For those of us unable to visit Katmai in person, *America's Natural Treasures* takes a six-page tour of the wilderness. Color and black and white illustrations show the Martin Volcano, one in a chain of active volcanoes, located in the south-central part of the monument; majestic glaciers, snow-capped peaks; placid glacier lakes; and a small sample of the flora and fauna of the area. Although most people will never see Katmai in person, it is enough to know that this kind of wilderness exists and is being preserved and protected for the future.

Canoeists and white-water enthusiasts will be glad to see the section on the national wild and scenic rivers. When this book was published, there were nine river sections in a total of eight states so designated, but it is hoped that other rivers will be added to this new system of parklands in the years to come.

With the passage of the National Wild and Scenic Rivers Act, Congress declared: "... That certain selected rivers of the Nation, which, with their immediate environments, possess

outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural or other similar values, shall be preserved in free-flowing condition, and that they and their immediate environments shall be protected for the benefit and enjoyment of present and future generations."

Twenty-eight pages of *America's Natural Treasures* are devoted to the nine national wildlife refuges and the animals for which they provide sanctuary. Of interest to Texans is the chapter on the Aransas National Wildlife Refuge, located on the Texas Gulf Coast, which is the wintering grounds for the endangered whooping crane. Many species of ducks, geese, herons, egrets, shorebirds and mammals also call Aransas home.

Stewart L. Udall has done a fine job of presenting the areas in every part of our nation which are being preserved for the future generations. Helping him in this task are many of the country's finest nature photographers who provided the over 225 superb photographs, 96 of which appear in full color.

Regardless of where you live in these United States, your chest will swell with pride as you see the beauties of this great land.—Ilo Hiller

THE FOXFIRE BOOK edited by Eliot Wigginton; Doubleday & Company, Inc., Garden City, N.Y., 1972; 384 pages, \$8.95.

Few moderns could be dropped in the middle of the wilderness and manage for themselves because the necessary skills acquired by their grandparents and great-grandparents have not been passed on to the present generation. And when these older citizens die, their knowledge of the old ways is often lost forever.

Through the efforts of a few high school students in the hills of Georgia, some folklore and many mountain skills are being preserved for the future. Their effort, *The Foxfire Book*, is a compilation of some of the material they have gathered from the Appalachian mountain folk through the use of tape recording interviews, cameras and video

equipment. Much of the text appears in the dialect of the people, and the first chapter "this is the way I was raised up" was painstakingly written in pencil on notebook paper by Mrs. Marvin Watts. This chapter is published just the way she wrote it, and although her story may contain incorrect spelling, grammar and punctuation, it still gives an insight into her childhood.

Contained in the book are such varied subjects as how to split a log into usable lumber with hand tools; build a log cabin, fireplace, chimney and furniture with hand tools; slaughter hogs and cure the meat; hunt and dress small game; read weather signs; plant by the signs of the moon and zodiac; make moonshine; quilt; make soap, weave baskets; churn butter and cook on a fireplace, wood stove or in a dutch oven. Mountain recipes, home remedies, snake lore and a section on faith healing also appear.

The items in *The Foxfire Book* originally appeared in *Foxfire*, a quarterly, folklore magazine published by the Georgia students as a part of their English curriculum. The magazine, now in its fifth year, has a circulation of 4,000. It is supported by grants from the National Endowment for the Humanities, but money for the first issue was collected by the students.—Ilo Hiller

THE FOX BOOK, compiled and edited by Richard Shaw; Frederick Warne and Company, Inc., New York, 1971; 47 pages, \$4.95.

Written for beginning readers, *The Fox Book* consists of 12 narrative poems and three short stories. The collection of poems and fables includes works by such well-known authors as Aesop, La Fontaine and Frances Frost.

Illustrations include acrylics, watercolors, painted glass, woodcuts and collages by 14 artists.

The fox has been called one of the smartest animals alive, demonstrating unbelievable cunning in escaping the hunter. "Sly as a fox" aptly describes his natural instinct to evade hunting dogs by running through water and circling on the trail.

The Fox Book brings the fox to life as he verbally cons animals out of food or steals chickens from the barnyard. Often caught dirty-handed, the fox may pay for his deeds by being a bit too clever.

Each illustration in the book is unique as it depicts the fox trying to outsmart someone or something.—Terrie Whitehead

LONG SHOTS SHORT CASTS

compiled by Neal Cook

Front Cover—Neal Cook; Nikon-F, 55mm Micro-Nikor; Kodachrome.
 Inside Front—Terry Fischer; technical information not available.
 Page 2—Leroy Williamson; Mamiya C-33, 180mm; 2¼ Ektachrome.
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 Page 27 (lower)—Williamson; Pentax, 50mm with bellows; Kodachrome.
 Pages 29-31—Annette Morris Neel; pen and ink illustrations.
 Inside Back—Henry Compton; colored ink, pencil and gouache on illustration board.
 Outside Back—Reaves; Nikon-F, 80-200mm zoom, Kodachrome.

Wild Plants: Water hyacinths were brought into this country in the 1880's because many people thought the flowers were pretty. Today it has become an uncontrollable pest-plant familiar to most Texans. Prickly-pear cactus was introduced to Australia to be used for fences and for emergency cattle food; before it was brought under control it took over more than 60 million acres of rangeland.

Bota for Hikers: The bota is the wineskin which has been romanticized on television by the actors holding it at arm's length and aiming a flow of wine into their open mouths. Campers and backpackers now find these wineskins ideal for carrying drinking water. The bota is lighter and less susceptible to leaks than the canteen. It also is softer and does not make a hip sore like a canteen does when it bangs against it all day. If you decide to try one on your next camping trip, practice beforehand on aiming the flow of water into your mouth, and rest periods on the hike can be a fun experience with everyone amazed at your ability to drink from the bota.

Good For Canadians: The Atlantic salmon which is facing extinction due to heavy fishing pressure particularly by Denmark's fishermen will disappear from Canadian menus for the next six years. The Canadian government has decided to compensate fishermen for not catching the fish to allow them to return to traditional spawning grounds. It is hoped that Denmark will soon be shamed into stopping their fishing activities.

Backwards Bounty: For many years a bounty was given to anyone killing bald eagles in some states. Now a bounty is given to anyone giving information leading to the conviction of a person who kills an eagle. The \$500 bounty is offered by the National Wildlife Federation.

Be Nice to Plants: Plants are the only things which are able to take raw products from the soil, air and water and manufacture life. Without them there could not be any other forms of life.

Giant Clam Chowder: Scientists are now studying the raising of Pacific giant clams for food. There is some evidence that these clams grow very rapidly and attain a length of three feet in about 10 years. A 38-inch-long clam weighs about 600 pounds.



Pollution Sleuths

Fish kills test investigative skills of department personnel

by Joe Mayhew—Limnologist

More than six million fish died in Texas waters in 1970 as a result of man-made and natural causes.

The primary responsibility of determining the cause of these fish kills rests with the Parks and Wildlife Department, and the investigation is always a time consuming process even when the cause is simple. When the kills involve a complex interaction of many factors, determining the cause would

test the deductive skills of Sherlock Holmes.

Over the past three years, there were 250 reported fish kills. Sixty-seven percent of these kills could be traced directly to substances introduced by man's activities. Only nine percent were attributed to natural causes and 24 percent were listed as having unknown causes.

Why so many unknowns? In many instances the investigator was not informed of the kill in time. If an inves-

tigator arrives at the scene of a kill after the conditions which caused it have dissipated, he is restricted to indirect information such as the species of fish killed and the effect on other aquatic organisms. For example, if gar and frogs are killed, the investigator can deduce that something toxic was in the water and he can eliminate lack of dissolved oxygen as the cause. In the case of toxic elements, sometimes there will be a residual in the tissues of the fish killed.

If the investigator could be on the scene at the time of the kill or soon thereafter, his job would be much simpler. He could, by the process of elimination, narrow the range of possibilities with a few observations and analyses. Unless an investigator has some reasons for suspecting a toxic substance as a cause of the kill, he will usually try to eliminate other possibilities such as low dissolved oxygen levels, elevated temperatures, high carbon dioxide levels and high dissolved salts levels because these values are easily measured. Determination of toxic elements such as pesticides and metals is very time consuming and requires specialized equipment.

Another problem with toxic elements is identification. Since there are probably 200 or more chlorinated hydrocarbon compounds which are detected by the same analytical technique, how does the chemist determine which one he has in the sample—elimination would take too much time. In practice, the chemist can check only for compounds which he has reason to suspect. Even checking for the 10 to 15 compounds in greatest use or most likely to be in the water can take three or four days.

Probably the most common cause of fish kills is insufficient dissolved oxygen. Because water normally contains less dissolved oxygen at higher temperatures, fish kills caused by oxygen depletions are more frequent in warm weather. However, it is not sufficient to determine a deficiency of oxygen. Oxygen depletions can either be natural or man-made, but aquatic ecosystems (an ecosystem is any area of nature that includes living organisms and non-living substances interacting to produce an exchange of material between the living and non-living parts), will rarely exhibit oxygen depletions without the system being upset by man's activities. Oxygen depletions can be caused directly by oxygen-demanding wastes or indirectly by the wastes creating plankton blooms which can cause amplified daily oxygen fluctua-

tions. Mass mortality of the increased plankton populations would also increase the oxygen demand.

In some cases recurrent oxygen depletions are predictable. For example, there were six fish kills in 1971 on the Trinity River between Dallas County and Lake Livingston. These were large fish kills of some 10,000 to 100,000 fish. The immediate cause of the kills was probably oxygen depletion, the ultimate cause, however, was overloading of the stream with organic wastes from the Dallas-Fort Worth metropolitan area. The United States Geological Survey in their "Water Resources Data for Texas—Part 2" publication states that base flow in the Trinity River at South Loop 12 crossing is primarily sewage effluent. Depending on rainfall and other factors, we can expect more fish kills in the Trinity River in 1972; one has already occurred. The Parks and Wildlife Department is currently assessing the fish population in the Trinity River to determine if the kills will eventually deplete populations.

Because fish kill investigations are complex, the department uses a team approach. The first person on the scene is usually a game management officer who looks over the site of the kill, makes a rough estimate of the number of fish killed, takes water samples, dead fish samples and most important, makes a series of observations concerning water conditions. If the kill is significant, he radios local headquarters for the assistance of a chemist or biologist. The initial observations and samples are turned over to the chemist or biologist when he arrives at the site of the kill. Because time is so important in a successful investigation, initial observations of the GMO are indispensable.

Another member of the team is a specialist in fish diseases. He determines if disease is the cause of kill when requested by the investigator. After the field investigation is complete, there is still much work to be done in the laboratory. The analysis of tissues, water and sediments may take several weeks.

Now, how about a few actual cases of fish kills to determine your deductive skills? All of the facts available to the investigator will be given to help determine the cause of the kill.

Case One: A citizen reported a frog kill in a pond on his property. The investigator went to the site and found many large bullfrogs out of the water. Some were dead and all appeared to be dying. The pond covered about one-half surface acre and was from one to five feet deep. No fish or other orga-

nisms were found dead or dying. Several domestic ducks were in good condition. Water temperature was 87°F, air temperature was 92°F. Dissolved oxygen and other critical requirements for aquatic life were satisfactory. What would you suspect as the cause of the kill?

Case Two: A rancher reported that he had found several hundred dead fish in five separate ponds on his property. An investigation indicated that only two of the ponds had a common tributary. The rancher had several other ponds which were not affected. Several species of fish were killed, although some live fish remained. Water chemistry indicated no irregularities, with the exception of temperature which was 3 to 5°F cooler in the affected ponds. Fish were apparently the only organisms affected. One day before the kill was noted, several thunderstorms were in the area and about one inch of scattered rain and hail fell on the ranch. What caused the kill?

Case Three: Fish were reported dying in several creeks in a three-county area. All creeks that had dying fish were direct tributaries of the Trinity River. Fish were apparently leaving the Trinity River and going upstream in the creeks. Riffle areas in the creeks stopped them and the fish were dying in these riffles. Several species were affected including gar, carp and minnows. White bass was the predominant species killed. Water analyses indicated only marginal dissolved oxygen in the Trinity River but suitable dissolved oxygen in the areas where fish were dying. Ammonia levels in the river were not abnormally high for the Trinity River. There were no other notable irregularities in dissolved materials in the river. Tissue, sediment and water samples were analysed for pesticide content. DDT, DDE and DDD were found in the tissues but not at levels which are unusual for the Trinity River. Disease was apparently not responsible for the kill. What would you suspect as the cause of the kill?

In the first case, the bullfrogs were apparently killed by pesticides. The adjacent landowner sprayed his horses for flies the day before and some of the poisoned flies reached the water and transmitted the toxins to the frogs.

The second kill was probably caused by a rapid change in water temperature as a result of the hail. Another possibility is that lightning hit the water.

The reason for the last kill is a mystery. Parks and Wildlife officials are still searching for the solution which may never be found.

**

SUPERBASS

A hybrid that's touted as the best of the big bass

by David Baxter

Ever dream of catching a 20-pound bass?

Parks and Wildlife biologists are working on it at the Jasper Fish Hatchery in East Texas, quietly laying the groundwork for a potential revolution in the bass fishing records.

Texas anglers have long noted the difference between native largemouth bass and those caught by their neighbors in Georgia and Florida. The southeastern bass are huge compared to the Texas fish. Reasons for the size difference would make a lengthy thesis in genetics. But department biologists are making genetics work for them and the product will hopefully be the delight of every Texas fisherman: a "superbass."

Earlier this year, the department obtained a couple of loads of adult female Florida bass. The first group did not survive the ordeal of the long trip but the second batch did.

Native largemouth males were taken from Lake Murvaul, a small reservoir on the Sabine River north of Nacogdoches known for lunker bass.

They were paired at spawning time and by mid-June it was apparent that the offspring of the Florida/Texas cross were, as hoped, something special.

Region III fisheries supervisor Bob Kemp and hatchery personnel seined some hybrid bass from the ponds and for comparison netted a few native bass from nearby B. A. Steinhagen Lake.

In a case of typical individuals, an eight-week-old superbass was six inches long and fat. A slimmer native bass of the same age was only 2½ inches in length.

"It has to be pointed out," said Kemp, "that the superbass lived under almost ideal conditions in the hatchery and the native bass is from the wild. But I feel that the comparison is still valid.

"As a back-up to the Florida brood bass, we imported some equally large fish from Georgia." The world's record

largemouth, 22¼ pounds, was caught in Georgia.

Since the first stage of the program to develop a superior bass appears to be a success, back in May some month-old fish were released in four experimental Texas lakes not open to the public. Two lakes are in East Texas and two in Central Texas.

At the same time, four other lakes were stocked with Florida bass at the same age. The same geographical breakdown was maintained.

Generally, waters of East Texas are acid and those of Central and West Texas are alkaline. The progress of the hybrids can be compared with that of the Florida bass and we can also get some indication of the superbasses' tolerance of the two types of water.

The Parks and Wildlife Department has four-year leases on the lakes and hopes to see continuing good results by fall. Kemp warns that this is only a start and conservatively estimates the program to be 10 years in the making.

"We hope to have 10-pound bass swimming around in some of those private lakes in four years," said Kemp. "My personal goal at the end of 10 years is a bass that tips the scales at 20 pounds. I must point out that a similar program in California using a pure strain of Florida bass took 10 years to produce a 16-pound fish, so we just have to wait and see."

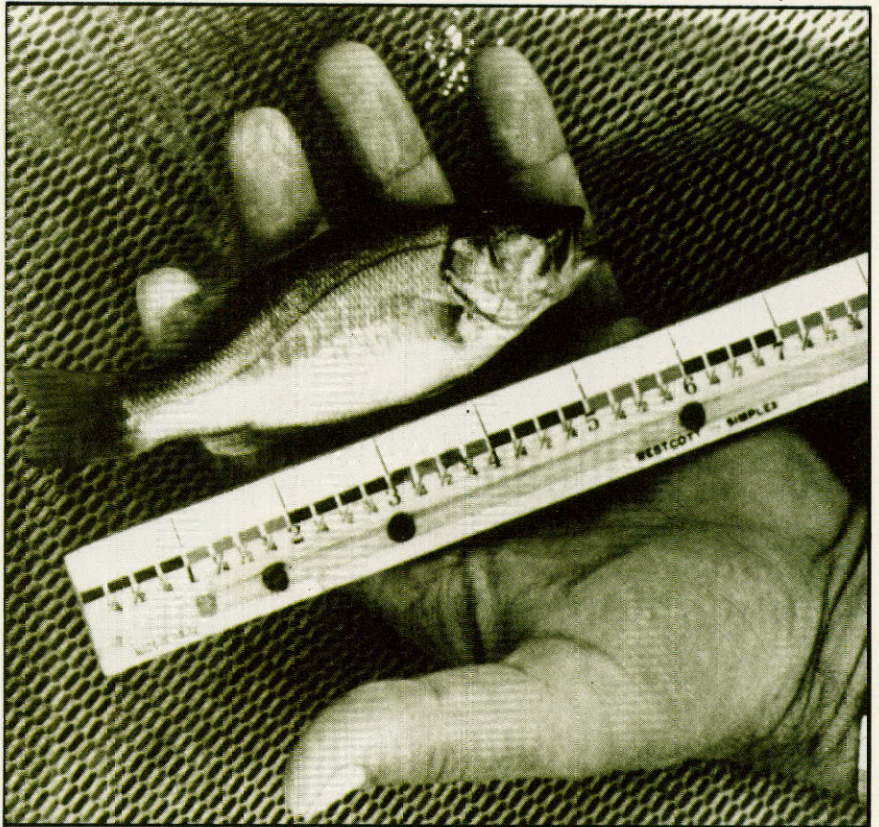
All that has been done so far are the initial crosses; the project will be turned over to a geneticist next year for control of selective breeding.

In addition to the largemouth cross, a hybrid of equally astonishing growth potential resulted from crossing female Florida largemouth bass with the native Texas spotted bass. Although the spotted is smaller than the largemouth (the state record is 5 pounds, 9 ounces), the progeny of this pairing at eight weeks were as hefty as the superbass and almost as long, at 4½ inches.

A thesis in genetics, indeed, may be written in progress reports from the time of this simple beginning to the day of the 20-pound bass. As in the culture of everything from horses to hogs, there are countless more generations of superbass to be spawned and untold studies of fishing waters to be conducted in the meantime.

But to most fishermen seeing the photographs of these initial results, it's a dream we can all share in hopes of coming true. **

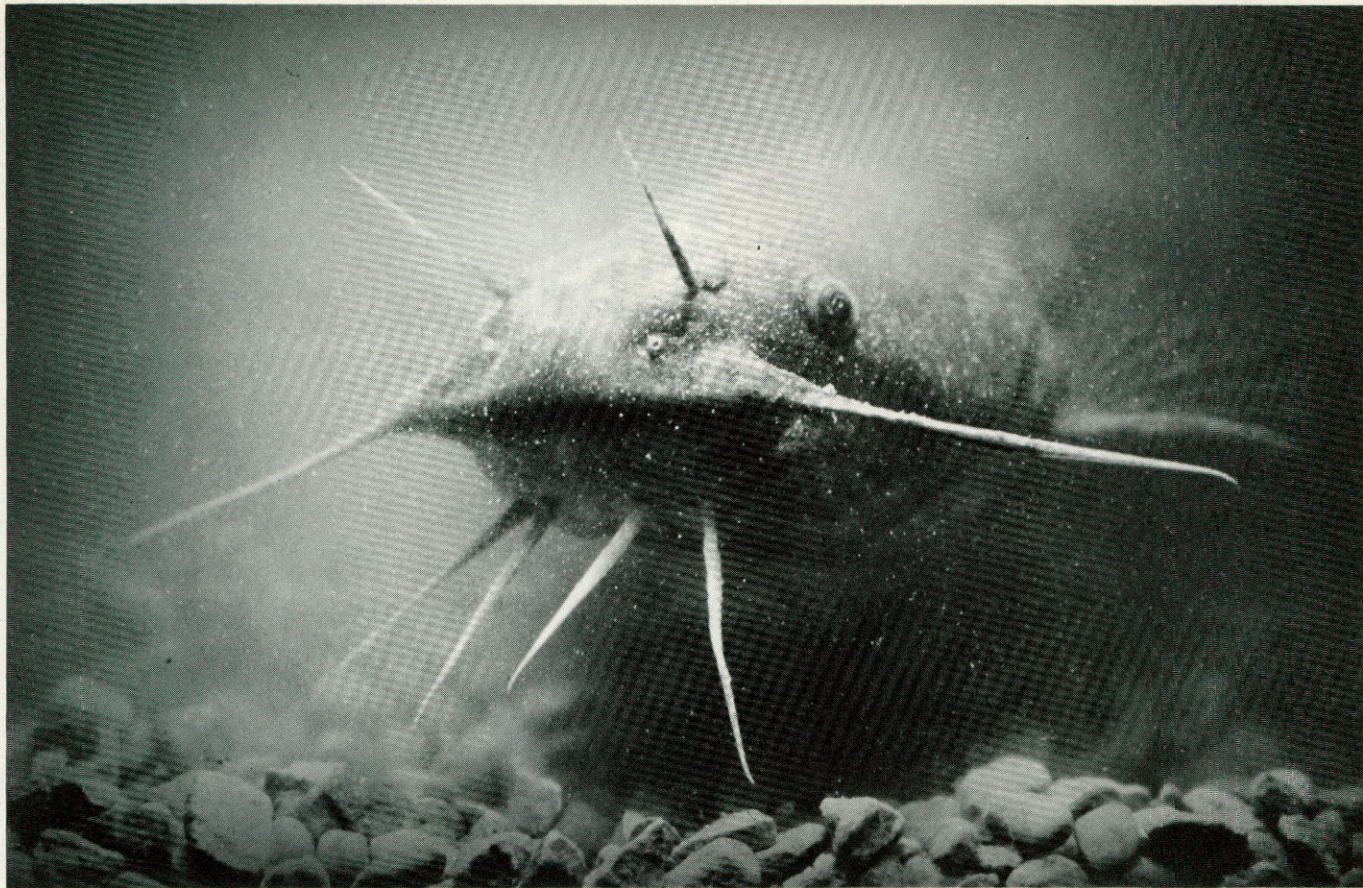




Texas anglers have long envied the tackle-bending bass hauled from the waters of Florida and Georgia. The Texas hybrid or "superbass" is a cross of the best of Texas largemouths and Florida bass. It is hoped that the combination will yield a superior fish. The initial indications are promising. Eight-week-old superfish were seined from the ponds at the Jasper Fish Hatchery and placed in holding tanks like the one above to compare their development with native fish and other hybrids. The Florida/Texas largemouth hybrid was a hefty six-incher. From left to right in the adjacent photo: a largemouth superbass, a 4½-inch Florida/Texas spotted bass combination and a native largemouth bass of the same age as the hybrids.



Tim Fuller



Catching the Mud Cat

by Robert Sinclair
Information Officer, Tyler

Experienced anglers and novice fishermen alike have thrilled to a husky bullhead's steady tug on their lines. Although not classified as a game fish, it offers excellent recreational opportunities to thousands of Texans.

Members of the family Ameiuridae, the black bullhead, *Ictalurus melas*, and yellow bullhead, *I. natalis*, are distributed throughout Texas streams, rivers and lakes.

The bullhead is so named because its head is so large in proportion to the rest of its body. Its mouth is more than twice as wide as that of a channel catfish of the same weight.

As you would expect, the black bullhead is black to greenish-black. Its belly is gray or white and the chin barbels are black. The yellow bullhead is light yellow to olive green, and its belly and chin barbels are white.

As with other native catfish, the bullhead has sharp spines in its dorsal and pectoral fins. Fishermen soon learn to avoid these barbed spines because a puncture from one is quite painful.

Mature bullheads weigh between two and four pounds, but larger ones are occasionally taken. One caught by the author from a private reservoir in East

Texas weighed 5½ pounds. Another taken recently from Lake Tyler weighed in at a whopping 10 pounds.

Tons of bullheads are taken regularly from our rivers and streams by fishermen using a rod and reel, throw line, trotline or cane pole and line. The fish is not particular about what it feeds on and will take a gob of earthworms, a piece of liver, blood bait, a shiner minnow or a great variety of natural or prepared baits.

Although normally a bottom feeder, the bullhead sometimes can be caught on crickets and grasshoppers fished on the surface of shallow lakes and farm ponds. Another favorite place for catching bullheads is in the swift discharge below dams or spillways.

When fishing in such swift waters, use a stiff rod and a heavy bass reel or one designed for light salt-water fishing. For the lightweight bullheads, use a 1/0 to 4/0 long-shanked hook. Depending on the swiftness and depth of the water, use enough sinker to keep the bait down where the bullheads congregate.

A two-pound bullhead taken from swift water can be a thrill. Several dozen taken during a single outing can leave arms and shoulders aching from the fun of catching them. Testimony to the enjoyment of



bullhead fishing can be seen in the faces of fishermen lined shoulder to shoulder along the stream bank when the fishing is good.

While the flesh of bullhead catfish is not considered by some to be as palatable as that of its more sought after cousins, the channel, blue and flathead catfish, it is nevertheless eaten by many, especially in northern states where fishing for bullheads has a much higher degree of acceptance among the general public than in Texas.

Bullheads caught in muddy water may have a disagreeable muddy flavor, but when taken from flowing streams the fish is quite tasty. In fact, the average person can hardly taste the difference between a portion of deep-fried bullhead catfish and channel, blue or flathead catfish. Next time you catch a bullhead

make your own taste test.

When cleaning bullheads follow the same procedures as when cleaning other species of catfish of similar size. Strip away the skin with pliers to expose the firm yellowish-pink flesh. Remove the entrails, head and fins, including the caudal or tail fin. Rinse in cold water, then cut into convenient size steaks for deep fat frying. Roll the pieces in meal, fry until golden brown and judge for yourself. Although it may never replace the channel catfish as the preferred item on the menu, the bullhead is quite tasty.

Next time the river is on a rise, get your gear together and join in the fun. Good action and good eating can be had from a trip after one of our most common fish, the bullhead catfish. Try him out!

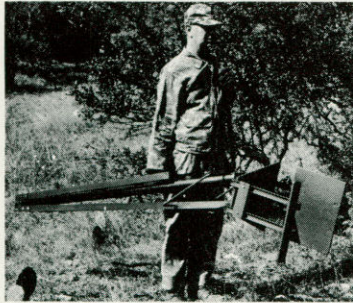
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Turn-of-the-Century Tackle

by Neal Cook

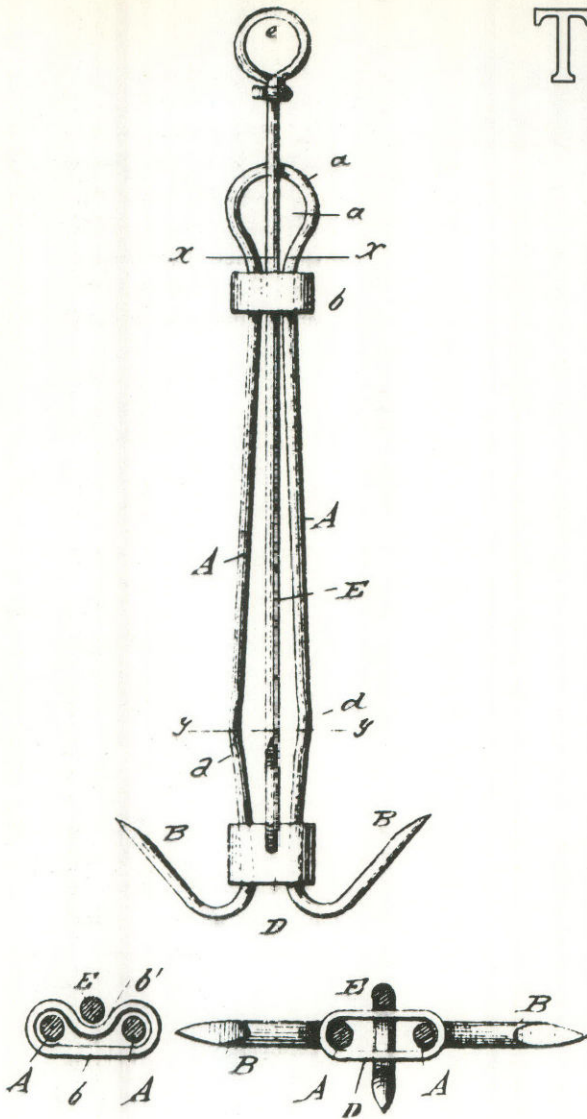
Since man first found that he could not catch many fish with his hands, he has tried almost every imaginable method to snare this elusive game

Trying to outsmart fish is an obsession with many people and these examples of fishing hooks and lures patented at the turn of the century show that there is nothing man won't try if he thinks it will help catch fish.

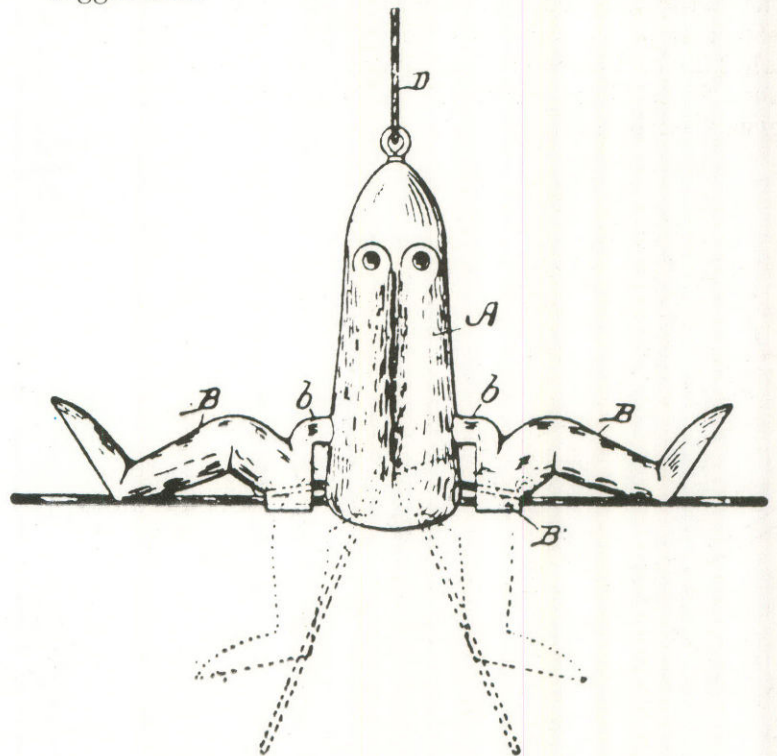
Obviously none of these devices proved to be the "perfect fishing device" or they would be in every fisherman's tacklebox.

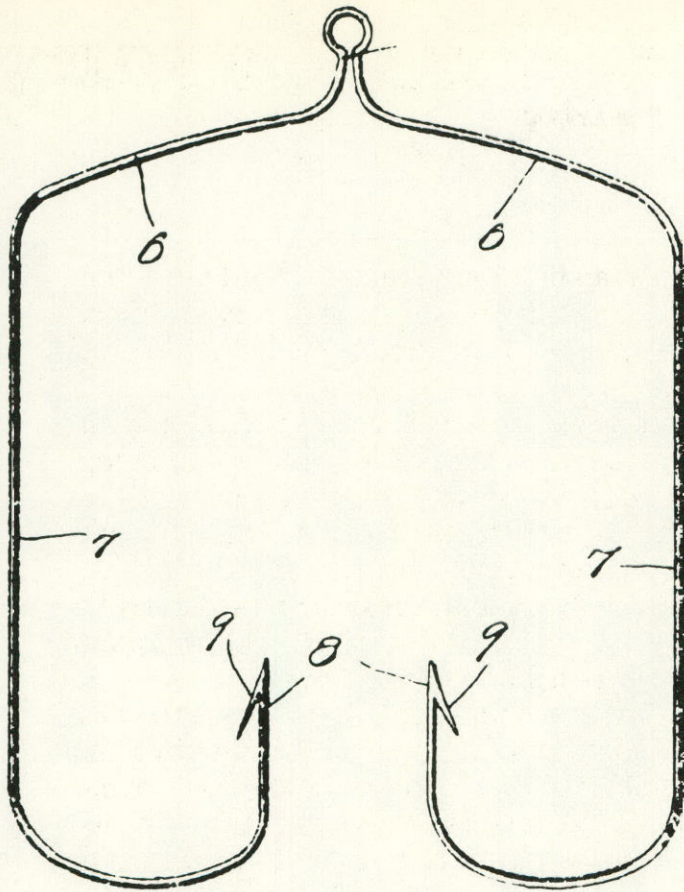
Today, new shapes of hooks, different types of rods and new reels appear quite often on the shelves of tackle shops but the basic principles of fishing tackle have changed very little in many years. New lures are tried and some prove worthwhile; others soon disappear from the market.

Man will always try any means possible to catch fish, but no matter what the tackle, much skill and a great deal of luck will be the final factors in attempts to catch more and bigger fish. **

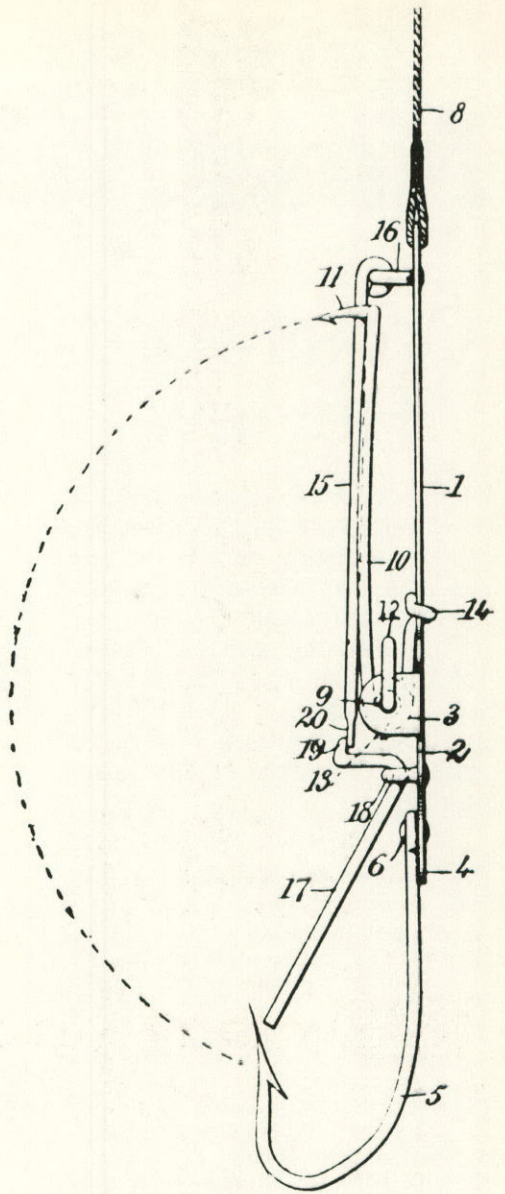


The hook shown above was patented in 1887 and worked on the principle that when the fish bit, the line pulled "D" up to "b" and the points of the hook spread in the fish's mouth. Another spreading lure, shown at the right, is a 1905 frog which gave the fish more than they bargained for. The frog's legs were supposed to spread out and wedge in the fish's mouth when it bit the lure.

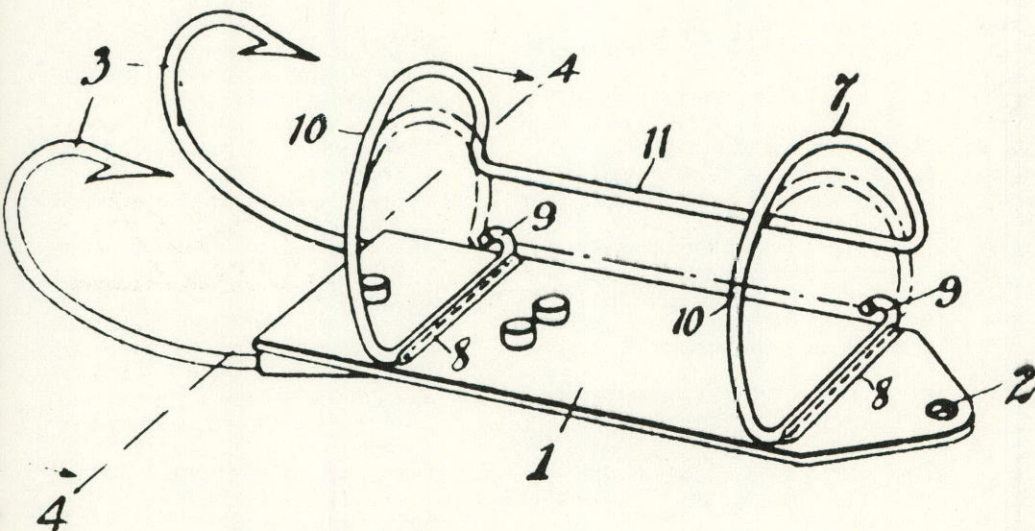




Double-hook arrangements are still in use today, but the 1905 hook above leaves some doubt as to how a fish could be hooked unless it placed its head through the opening between the points. The inventor of the 1906 hook at the right probably thought he would revolutionize fishing. The bite of the fish was supposed to trip lever "17" to release hook "11" which would spring down to catch the fish. This method would not work in most Texas waters since the dead tree limbs and vegetation would trip the lever prematurely.



Whether for holding live bait or trolling dead bait, this 1906 piece of tackle seems almost practical. The bait was placed on the metal sled "1" and brace "7" was then clamped over it.



Young Naturalist

by Ilo Hiller

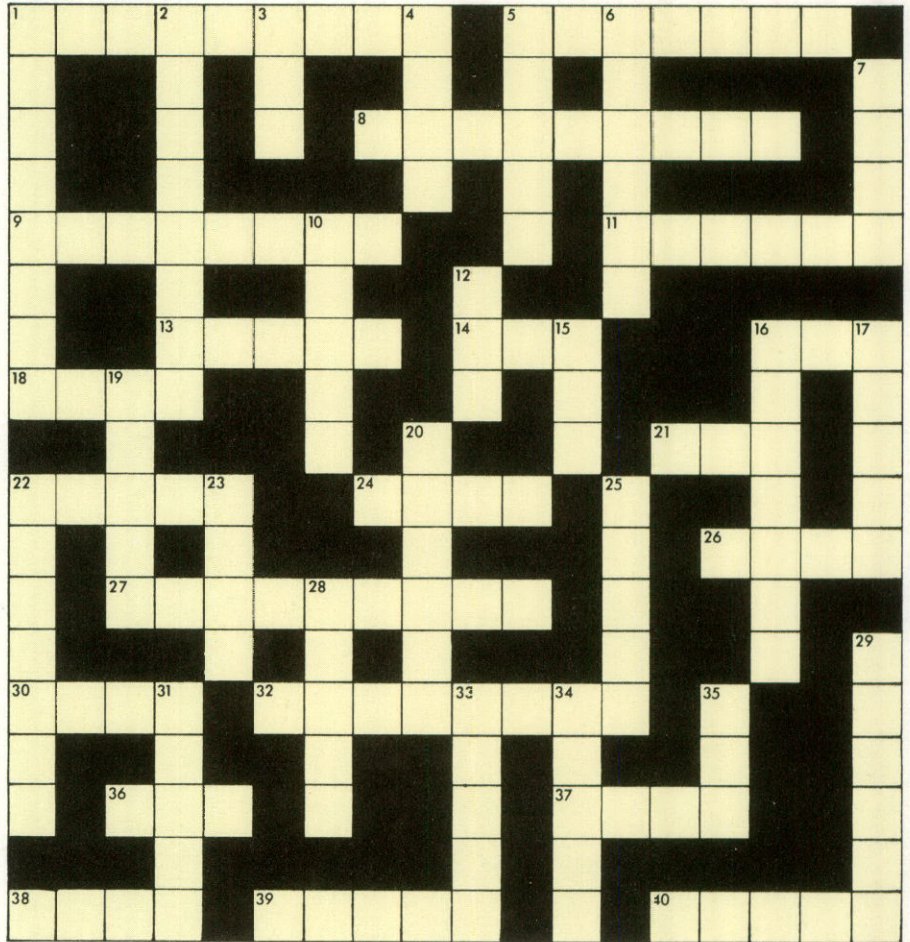
Crossword Review

This section of our magazine is designed especially for you, the young naturalist, and we would like your comments or suggestions concerning it.

To review the last four Young Naturalist features—"Beaks and Bills," "Crystals," "Bee Stings" and "Beachcombing"—here's a crossword puzzle to test your memory.

ACROSS

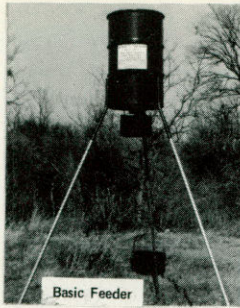
1. To search the beach for things to keep
5. Weapon of bees
8. Type of seaweed with gas bladders along its stalks which help it float
9. Purple quartz
11. Substance from which diamonds are formed
13. Ruby crystals generate the powerful burst of light for this beam
14. Frozen water crystal
16. Man-of-war bladders are filled with this
18. The left-handed whelk lays these in parchmentlike cases
21. Another name for the ocean
22. Birds' mouths are often called _____
24. Insects and their eggs are found in and among this outer tree covering
26. Changing water level of ocean caused by gravitational pull of the moon
27. The ocean is made of this
30. This flying insect does not have a barbed stinger and can sting several times in succession
32. Animal which hides under the sand and has a needle-sharp barb at the base of its tail
36. Can cause painful burns on the beach
37. Substance from which pyramid-shaped crystals will grow
38. Many aquatic birds are _____ eaters
39. Seed eaters have short, _____ bills
40. Official Texas gemstone



DOWN

1. Objects washed in on the beach often have this marine animal attached
2. Salt, diamonds and quartz are all _____
3. A soft drink or food _____ should never be left to litter the beach
4. The sea variety grows primarily in Jamaica on wood vines in pods up to five feet long
5. This sweet crystal is man-made
6. This item appears in many bird diets
7. Causes the high and low tides with its gravitational pull on the earth
10. Eaten by birds with short, stout bills
12. A snowflake has _____ sides
15. Birds' bills are adapted to the food they _____
16. This type of rock contains three crystals—feldspar, quartz and mica
17. The egg case for this marine animal is known as the "mermaids' purse"
19. Ghost crabs store saltwater here
20. Bird with tiny, weak beak which opens wide to scoop up flying insects
22. Product made by honeybee which is used in polishes, cosmetics, ointments and candles
23. Household seasoning crystal which is cube-shaped
25. Sweet liquid made by honeybees
28. This substance is boiled out of the sugar cane juice
29. Common grains of sand are usually made of this crystal
31. This is located on the underside of the pelican's lower bill
33. Beach crab which blends perfectly with the sand and can race across the sand at speeds up to 30 miles per hour
34. The colorful swirls in this rock are composed of microscopic crystals
35. Diamonds, rubies and sapphires are _____ stones

Answer on page 32



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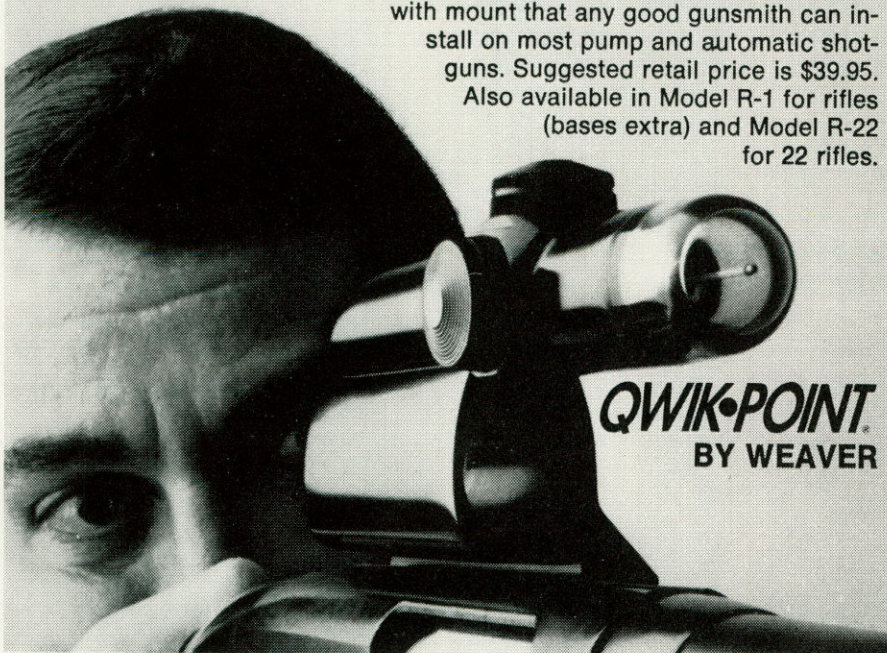
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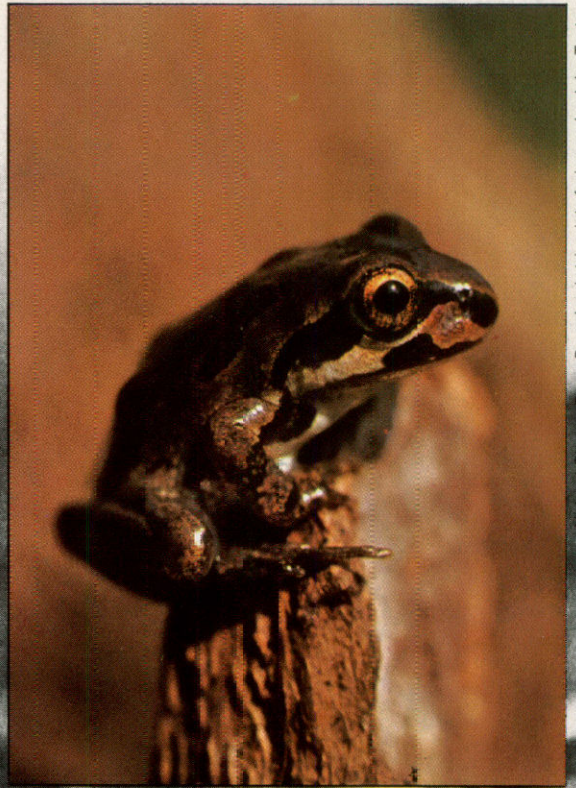
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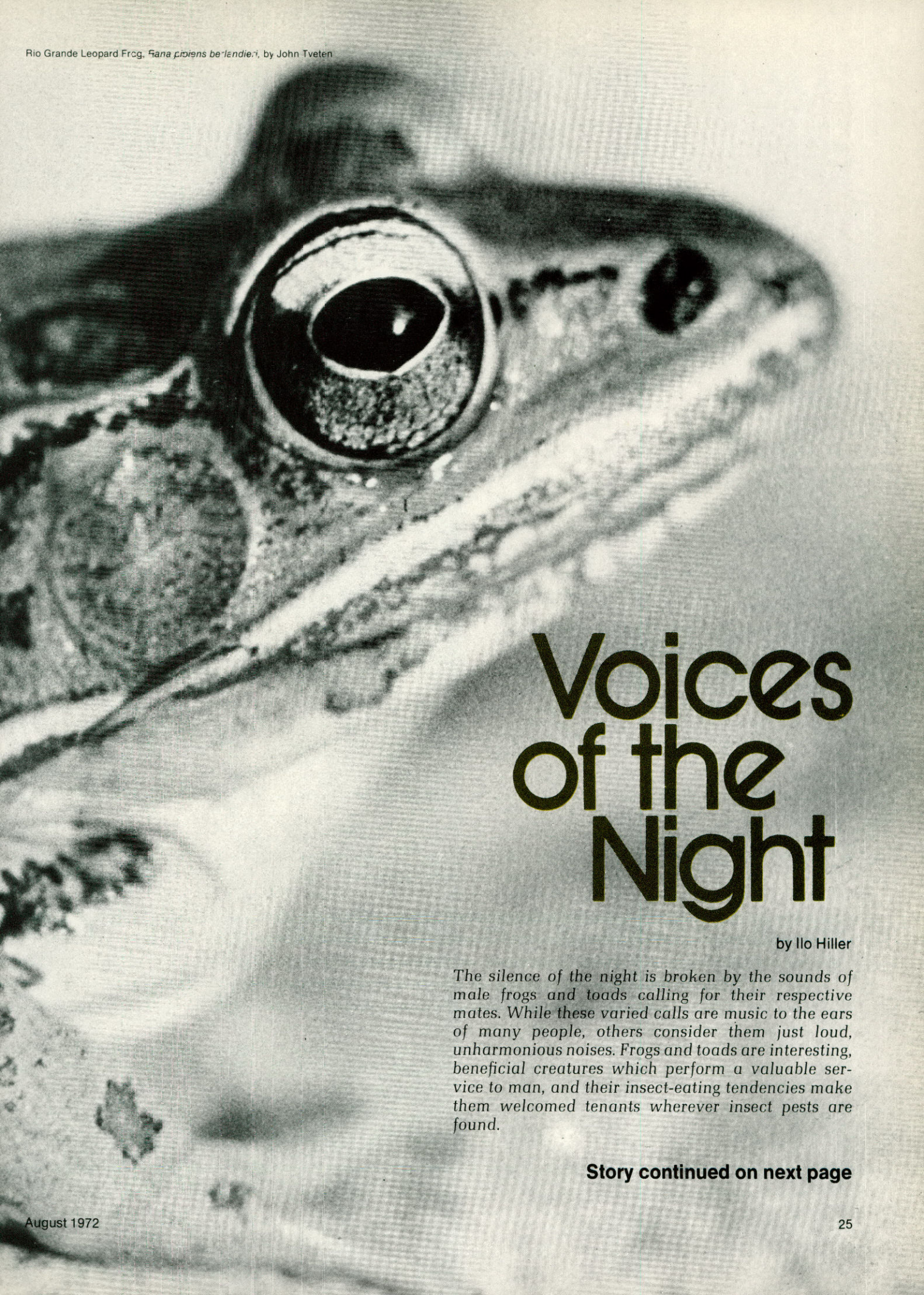
Gulf Coast Toad, *Bufo valliceps*, by John Tveten



Upland Chorus Frog, *Pseudacris triseriata feriarum*, by John Tveten



Cliff Frog, *Syrnischia albigularis*, by Larry Williamson



Voices of the Night

by Ilo Hiller

The silence of the night is broken by the sounds of male frogs and toads calling for their respective mates. While these varied calls are music to the ears of many people, others consider them just loud, unharmonious noises. Frogs and toads are interesting, beneficial creatures which perform a valuable service to man, and their insect-eating tendencies make them welcomed tenants wherever insect pests are found.

Story continued on next page

Voices of the Night

Frogs and toads can generally be defined as short-bodied, long-limbed, tailless, leaping amphibians. Most commonly recognized true frogs are usually of the genus *Rana*, while the genus *Bufo* includes the most common and most numerous toads.

Toads are generally more terrestrial in nature than frogs, but most of them return to water to lay their long strings or masses of gelatinous eggs which hatch into tadpoles. The toad's skin is rough, dry and warty as compared to the smooth, moist skin of the frog.

Contrary to popular belief, handling toads does not cause warts. Although the skin glands located on the toad's body produce several poisons which are irritating to the mucus membranes, it is not dangerous to handle them if care is taken not to touch or rub the eyes, nose or mouth prior to washing the hands. Toads do, however, have an annoying habit of eliminating body wastes on persons handling them.

During the breeding season, the night air resounds with the varied sounds of the male frogs and toads calling for mates. Each individual species has its own unique call which serves two purposes. First, it attracts the frogs or toads to the breeding site. Second, it acts as an isolating device to insure that only females of the right species are attracted to the calling males.

To call, the male takes air into the mouth through the nostrils, passes it into the lungs and closes the nostrils with nasal flaps. He then constricts the flank muscles and forces the air back and forth between the lungs and mouth, against the vocal cords. Air, escap-



Giant Toad, *Bufo marinus* by John Tveten



Southern Leopard Frog, *Rana pipiens sphenoccephala*, by John Tveten



Texas Toad, *Bufo compactilis*, by Leroy Williamson

ing through the one or two slits in the floor of the mouth, is caught in one or more balloonlike resonating organs. These resonating organs, called vocal sacs, can be either external or internal. When the skin balloons out into a large translucent sac under the chin—or into a pair of such sacs, one on either side of the throat—the sac is external. If the skin is not thinned and the whole throat assumes a swollen appearance, the sac is internal.

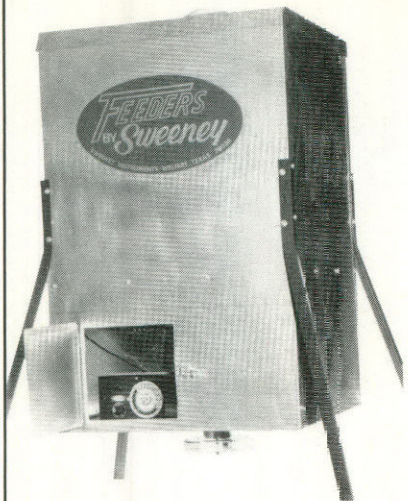
Frogs and toads, although primarily insectivorous, do not have marked food preferences. The bulk of their diet consists of insects, spiders, snails, worms, tadpoles and

in some instances, small turtles, mice, birds and other frogs and toads.

Due to their terrestrial nature, toads devour all types of surface insects, with ants a predominant item. Frogs, on the other hand, capture the more aquatic forms of life because of their choice of a watery habitat. Toads and frogs are voracious eaters and the common toad may fill its stomach completely four times during a 24-hour period.

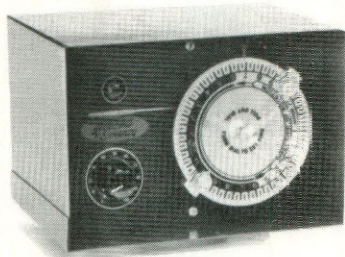
Their insect-eating tendencies make these amphibians welcome visitors around greenhouses, gardens, farms and other places where man battles the insect world. **

Treefrogs, genus *Hyla*, are well adapted for their arboreal life. Their toes end in adhesive discs which help them cling to twigs and bark. As a protection against predators, many species of frogs and toads are known to secrete poisonous substances from their parotid and skin glands, and the sticky, white poison produced by the *Bufo marinus* (top left) is virulent enough to paralyze or kill a dog that has not learned to leave this toad alone. After handling frogs and toads, remember to wash your hands thoroughly before touching your eyes, nose or mouth.



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How To: Rig Terminal Tackle

by Ilo Hiller

Ask a saltwater fisherman what type of terminal tackle he uses for natural baits and you will get about as many different answers as there are types of fish.

Each fisherman seems to have his own favorite way of rigging, but there are still basic types used for trolling, casting and bottom fishing. Since these rigs play such an important part in catching fish, the smart angler learns which one to use and when.

Trolling is an effective method of taking fish because it keeps the bait in the water for long periods of time and presents it to many different kinds of fish while covering large areas of water. The rod should be held off to the side while trolling so the shock of the strike will be taken by the line, and the rod tip will bend to cushion the effect.

Rods built for trolling have light, medium or heavy actions which require different strength lines. Light outfits use 15- to 45-pound test line, medium outfits need 45- to 72-pound test line and heavy outfits require 72-pound test line or stronger.

The selection of the type of line to be used is determined by the depth at which the fisherman wishes to troll. Linen, braided nylon, dacron and monofilament lines are sufficient for surface trolling, but lead-core nylon and braided or twisted wire lines are required for use at medium depths. Deep trolling requires solid wire lines.

Trolling rigs are relatively simple. A leader is a must, and it should be a few pounds stronger than the main line to take the shock of the fish hitting the bait. It should be at least two or three feet long and up to 15 feet in length when trolling for the larger fish such as marlin, sailfish and tarpon.

The prime function of the leader is to provide a safety zone between the line and the bait, but it will also reduce line twist. Cable-type or single-strand stainless steel leaders help prevent the rough-scaled fish, which wrap themselves in the line or thrash it with their tails, or sharp-toothed fish from breaking free. The cable-type leaders are

made of braided or twisted wires which are more flexible and less likely to kink than solid wire. However, the braided or twisted wire has more drag and resistance in the water than solid wire. Braided wire leaders may be purchased with a nylon covering which helps prevent the strands from fraying and cuts water resistance.

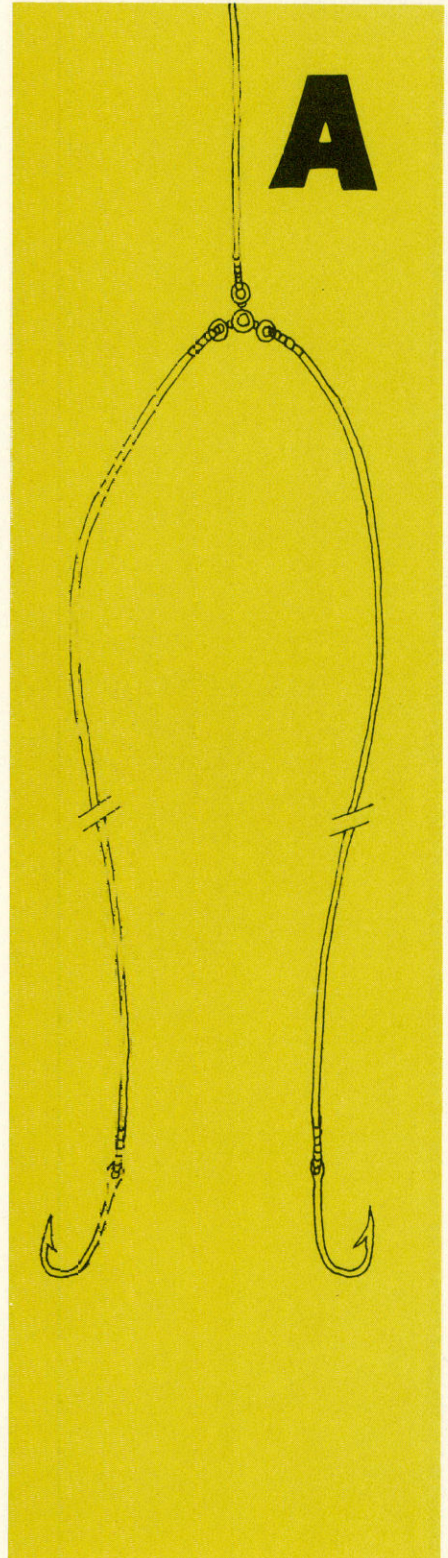
Weights are not usually attached to the line when surface trolling because letting out more line causes the bait to ride at a slightly lower level. Keel sinkers are used to keep the line from twisting while trolling at a medium depth, but in strong currents or very deep water, weights varying from a few ounces to several pounds may be necessary. Trolling aids such as planing and gliding devices may be purchased to take the line deep and keep it there.

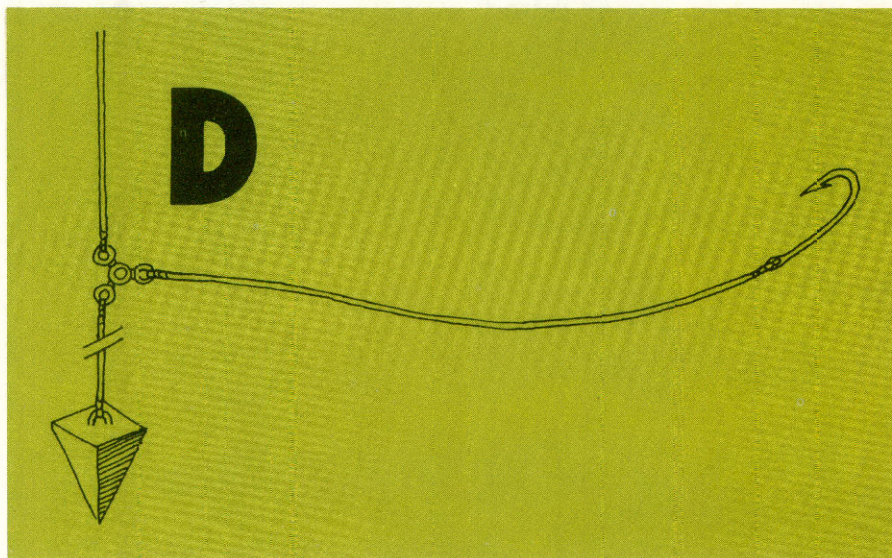
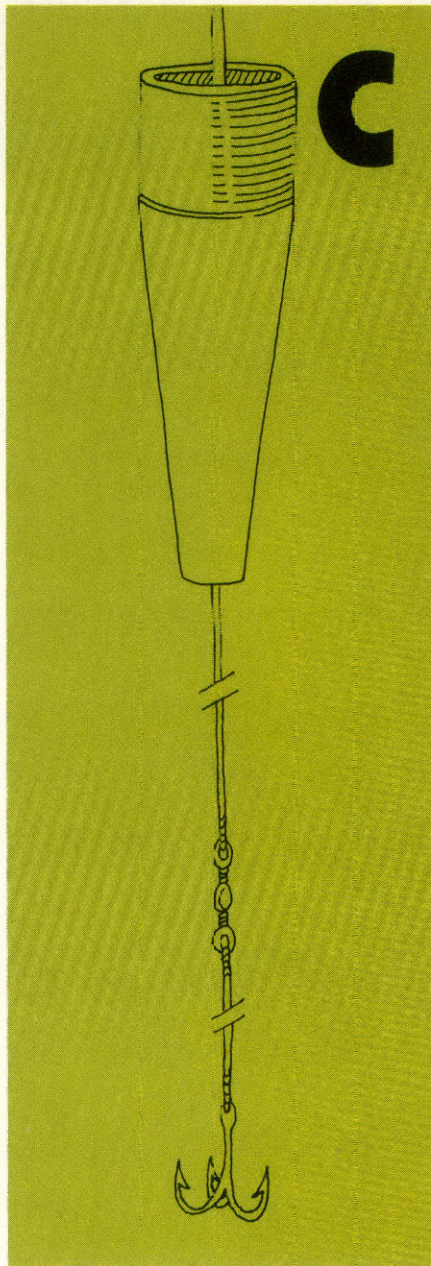
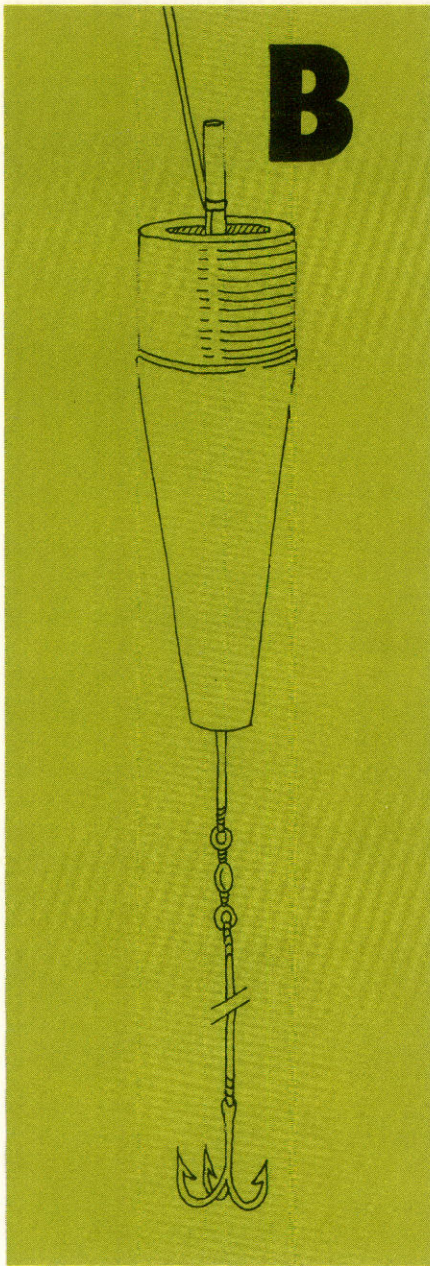
Baitfish used on trolling rigs may have to be cut, cleaned, deboned or sewn on the hooks to obtain the proper action in the water. A little time spent talking with local saltwater fishermen or charter boat captains will help determine which natural baits should be used and how they should be prepared for the best results.

Casting rigs vary from the free-floating to the bottom-hugging varieties.

A very effective free-floating method is known as free shrimping. (Illustration A) It can be accomplished with a single or double rig. In the first, a single hook and leader are attached to the line with a swivel. In the second, the line is attached to one eye of a three-way swivel and a leader and hook is attached to each of the other two eyes. Both rigs are quite effective when baited with live shrimp hooked just behind the horn. Weights added to this rig restrict the bait's free swimming action.

Another casting rig employs the use of a weighted popping cork, a treble hook and an 18-inch leader. This is a good combination for any kind of fish and should be worked slowly and left in the water as long as possible. The line should be kept tight and the rod tip up or to the side. The rod tip should be jerked just enough to make the cork





“pop.” Some fishermen pop the cork every few seconds, others only once or twice per cast. (Illustration B)

The popping cork may also be set so the line will slip and allow the bait to work at a different depth. A small sinker may be attached above the bait to keep the rig from tangling. (Illustration C)

Bottom fishing rigs are preferred by many individuals whether casting in the surf or fishing from boats, piers or jetties.

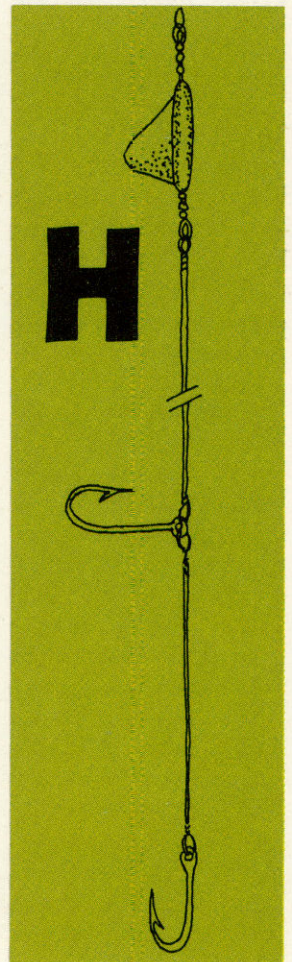
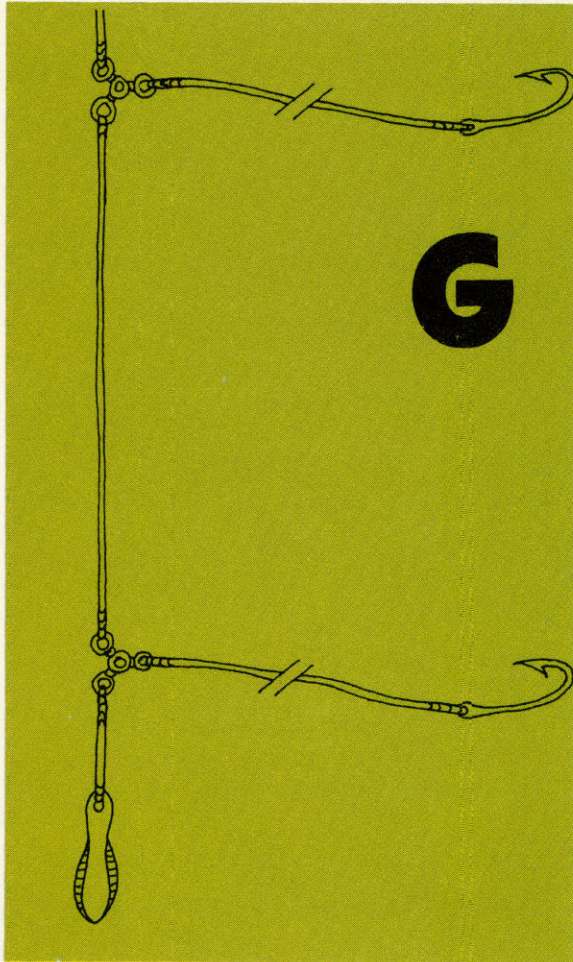
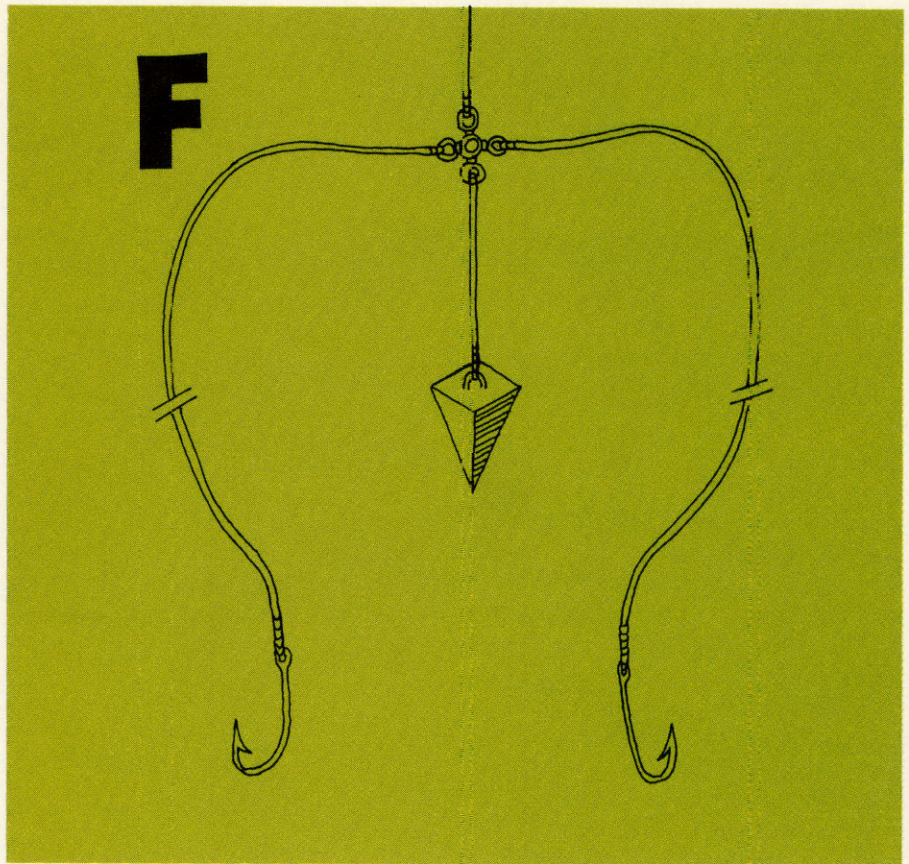
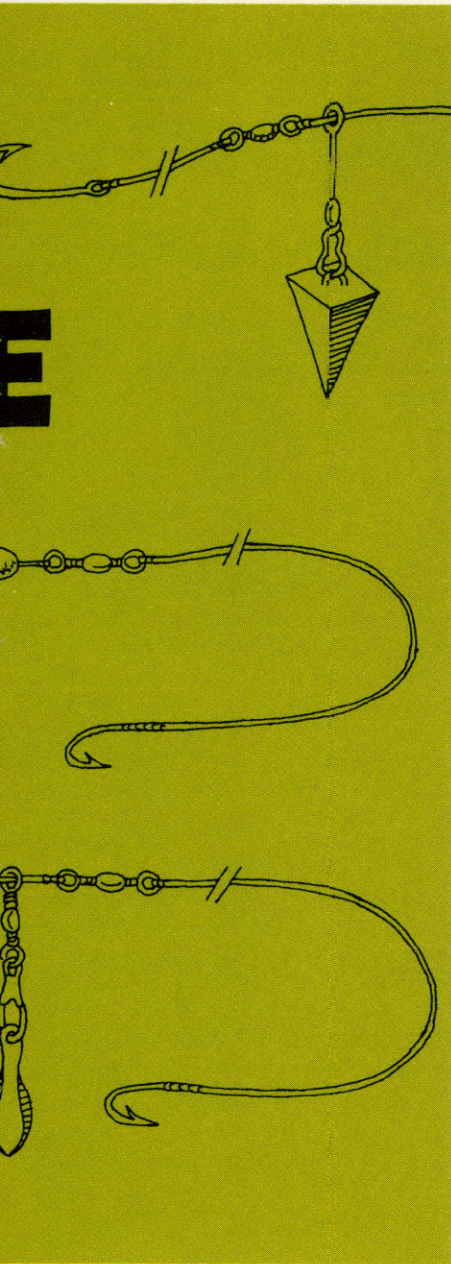
One popular bottom rig utilizes a three-way swivel with the line attached to one eye, the hook on a two-foot leader attached to the second eye and a three- to six-ounce pyramid sinker on a short line attached to the third eye. The pyramid sinker will hold in the sand of the surf when round sinkers won't, but a bank sinker is best for areas with rocky bottoms. Live or dead bait is effective on this rig. (Illustration D)

Some surf casters prefer to feel the bite of the fish without the drag of the sinker. To do this, they place a slipping sinker ahead of the swivel, leader and hook. Select an egg-shaped, pyramid or bank sinker according to the area's bottom texture. The sinker will anchor the line to the bottom, but when the fish takes the bait, the line pulls through the sinker to alert the fisherman. (Illustration E)

Another good bottom rig consists of a four-way swivel with the line attached to one eye, the sinker attached to the opposite eye and a hook on a two-foot leader attached to each of the remaining two eyes. Dead bait works well with this rig. (Illustration F)

A popular hook arrangement for the weakfish (sea trout) is the high-low rig which varies according to personal preference. The basic rig contains a low hook on a leader attached just above the sinker by means of a three-way swivel. A high hook on a leader is attached the desired distance above the low hook, also by means of a three-way swivel. Monofilament leaders are recommended when fishing for sea trout because wire restrains the action of the live shrimp used for bait on this rig. (Illustration G)

Drift fishermen use two hooks in tandem to fish for king mackerel. The size of the hook should be determined by the size of the fish available, but numbers 4/0 or 5/0 are commonly used sizes. A wire leader is essential for this rig since the kingfish has razor-sharp teeth. A trolling sinker with swivels on the line and leader ends is sometimes attached just above the leader. Squid,



mullet, ribbonfish or a strip cut from any baitfish will do for baiting the hooks. (Illustration H)

The simplest rig used for saltwater fishing is the cane pole with a hook tied on the end of the line or nylon leader. Sometimes a float or bobber is attached above the hook, and a sinker is added above the hook and below the float to keep the bait at the proper level.

Whether you plan to use the simplest or most elaborate rig, look around to see what is being used by other fishermen. Notice the size of the hooks, the type of line and the bait, and don't be afraid to change your rigging to match theirs if they are catching fish and you aren't. After all, catching fish is what it's all about. **

LETTERS TO THE EDITOR

Survival?

I often release saltwater gamefish when they are not wanted for food or mounting purposes. Do released fish actually survive their ordeal? Does the protective film which is removed from the fish's body during netting and handling regenerate? If the hook is left in a released fish's mouth, what is likely to take place?

S. D. Cook
Houston

Fish have a better chance of surviving capture and release if a few suggestions are followed.

We do not know how long it takes for the protective film to regenerate, but keeping the hands wet while handling the fish will prevent the removal of this coating. The film acts as a lubricant to help the fish move through the water, and an unprotected area is susceptible to fungus and bacteria.

When handling a fish, try not to squeeze the throat region just behind the gill covers because the heart is located there and pressure could

seriously injure or kill the fish.

If a fish is played on light tackle for a long period of time, it tends to develop a great deal of lactic acid in its muscles and it is unable to swim efficiently when released. It then becomes prey to predator fish. For this reason avoid fighting a fish for long periods, and release it as quickly as possible.

It is much better to leave a hook in a fish's mouth than to remove it by force and damage the mouth area. Snip off the leader or cable just in front of the hook because the hook will eventually deteriorate under the strong corrosive action of seawater. If the hook is swallowed into the stomach, digestive juices quickly attack the metal.

Coral Snake

I killed a snake near the Brazos River about 40 miles from Houston. It was marked with red, yellow and black bands. Enclosed is a drawing of the snake.

Please tell me what kind it was and

if not a coral snake, then how is a coral snake marked.

W. W. Echols
Houston

According to your description and drawing, the snake you killed was a coral snake. The boldly marked snake is an eye catcher but comes from a family of deadly serpents which includes the cobra. Although not as aggressive as the rattlers, it should not be handled.

There are several harmless snakes which resemble the coral snake. The scarlet snake is sometimes referred to as the false coral snake because it mimics the coral snake's color pattern, but the scarlet's snout is red and the coral's is black.

Several harmless banded milk snakes also have black snouts and the same colors as the coral snake, but the coral has black body bands as wide as the red bands and both are separated by narrow yellow bands. All banded milk snakes, as well as the scarlet snake, have narrow black bands which are bordered on one side by broad red spaces and on the other side by narrow yellow bands.

A good way to remember the difference between coral snakes and the nonpoisonous mimics in reference to whether or not certain colors touch, is "Red and yellow, kill a fellow; Red and black, venom lack." Another reminder is to think of a traffic light—red means stop, yellow means caution, and when they touch, take warning.

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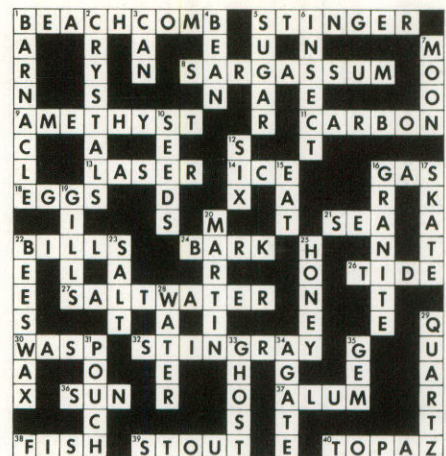
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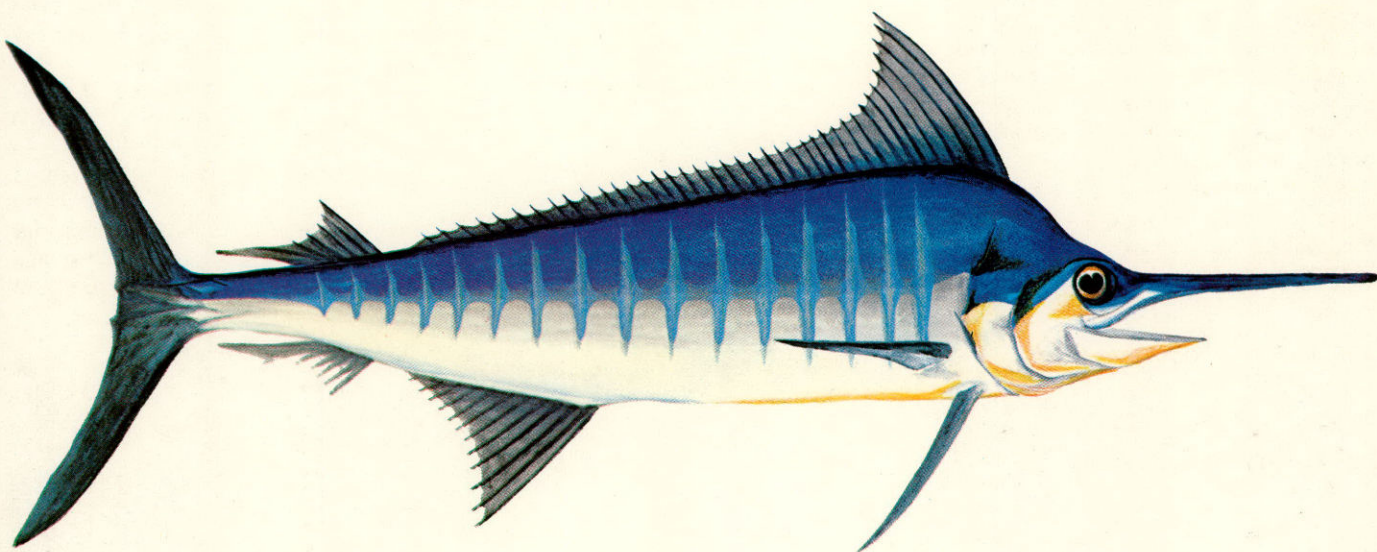
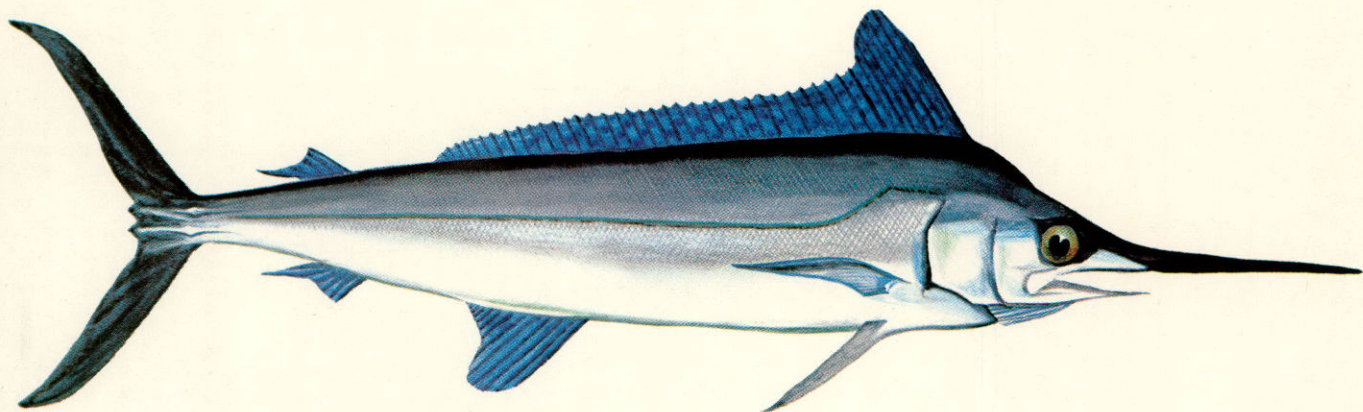
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OUTSIDE BACK

Heading home after a long day of fishing with a loaded stringer, or with empty hands after a few unsuccessful casts. Just being in the outdoors at a time like this... that's all that really matters. Photo by Bill Reaves.



TEXAS SALTWATER FISHES

These two "bluewater" fishes, the white marlin and the Atlantic blue marlin, have gained the respect of most deep sea fishermen through their fighting ability. The white marlin, shown at top, inhabits the Atlantic from Massachusetts to Venezuela. It is much smaller than the blue with the average size ranging from 50 to 100 pounds. The Texas record white marlin caught off Port Aransas weighed 106 pounds and measured 7 feet 9 inches.

The Atlantic blue marlin, lower, is known to reach an enormous 1,500 pounds, but the average weight is around 200 pounds. Common to Texas offshore waters in July and August, this usually solitary fish is found in the Atlantic from New York to the West Indies. Most blue marlin are caught off Port Isabel, an exception being the state record, a 547-pound trophy caught off Port Aransas.

Artwork by Henry Compton.

