

TEXAS

PARKS & WILDLIFE



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**TEXAS PARKS & WILDLIFE
magazine**

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

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Leave your artificial lures in the tackle box and scare up a few grasshoppers for a leisurely bass fishing trip.

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A new republic was born in the late winter chill of 1836, and the revolutionary spirit is preserved at Washington-on-the-Brazos State Park.

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The number of whitetails does not always mean much. Herds must be small enough for the deer to eat well if the quality of the herd is to be maintained.

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Familiar to every gardener as peat moss, sphagnum is a hardy and useful plant.

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Hunting season is getting close; is your scope accurate?

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TEXAS

PARKS & WILDLIFE

Outside Covers: Sargassum or gulfweed drifts about the Gulf of Mexico supported by the grapelike air sacs. Teeming with marine life, the fernlike creatures are hydroids and the fleshy fingers are sea anemones. The lacy mesh on some of the leaves are Bryozoa. For more information on creatures that depend on the weed, see page 6. Photo by Jim Whitcomb.

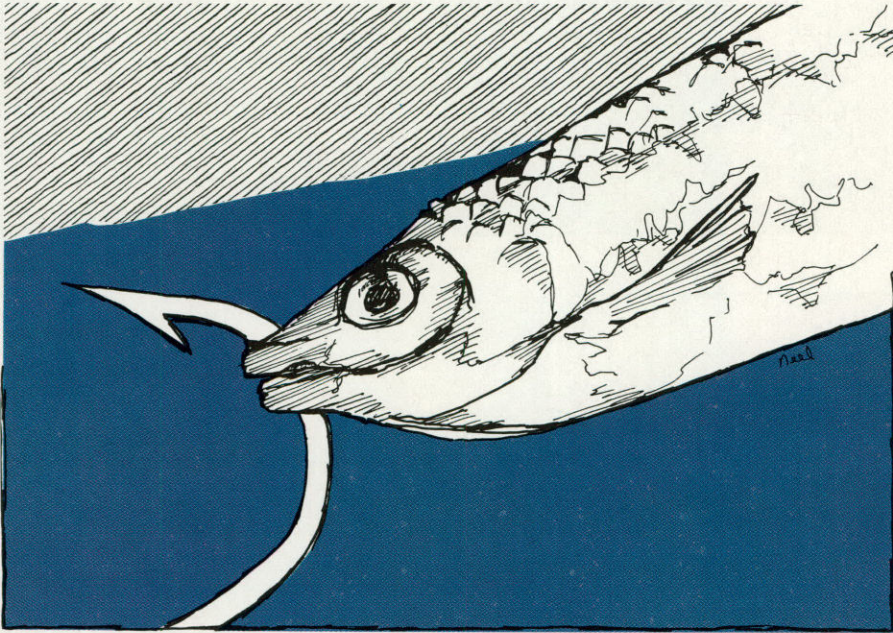
Inside: The hills of Central Texas are dotted with streams like this one—an unmeasurable resource. Photo by Leroy Williamson.

Bass Live^{on} Bait

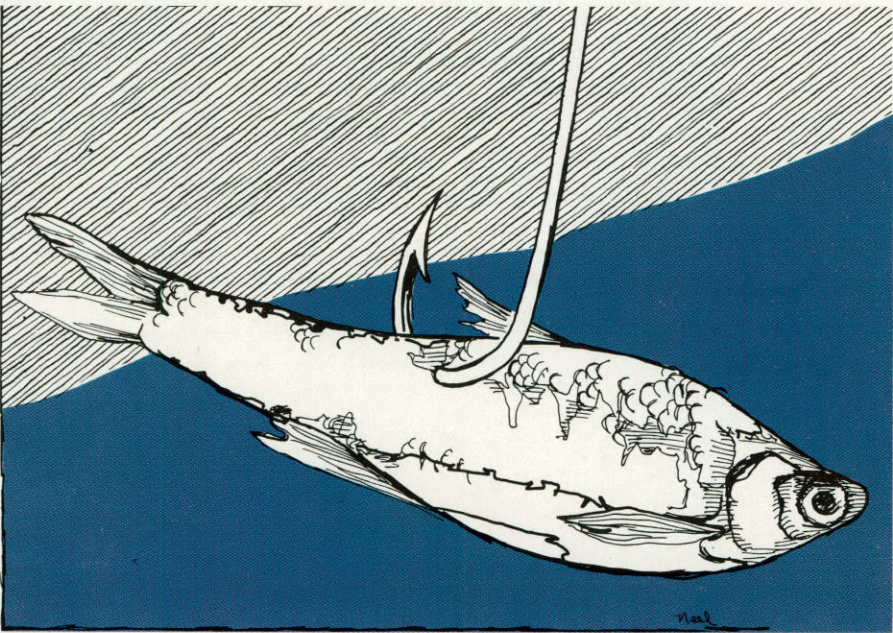


Bill Duncan

Sometimes a worm or a crawfish will take bass when nothing else will.



A minnow can be hooked two ways. through the lips. For other fishing, For trolling or casting, hook it put the hook through the back.



by Robert L. Sinclair, Jr.
Information Officer, Tyler

In this day of moon rockets, \$3,000 bass boats and artificial lures that cost what a good pot roast once did, the live bait fisherman may seem a little old-fashioned and out of place. So what!?

There's a lot to be said for a leisurely live bait fishing trip after the South's number one game fish, the largemouth bass. While the well-equipped lure fisherman rushes frantically from one bass hole to another, a fisherman using live bait works slowly and deliberately.

Equipment and techniques vary. Spinning, spin-cast and flyrod equipment work equally well, and the less sophisticated angler can use a sharp hook, stout line and long cane pole. Many skillful and productive anglers use a stiff flyrod and a single action or automatic reel equipped with C- or D-level fly line. A six- to eight-foot monofilament leader connects the fly line to the hook.

Regardless of the other equipment used, hooks for live bait fishing are either heavy steel "jaw-busters" or the lighter wire hooks used by most crappie anglers. Sizes 2/0 to 4/0 are preferred. The choice of hook size and construction depends upon the technique employed in setting the hook after the bait attracts the bass. Those who strike the fish the instant the bait is taken need the extra strength and rigidity of the heavier steel hook to penetrate the tough jawbone of the bass. On the other hand, many allow the bass to take the lure, swim off and swallow the bait. This takes steady nerves and knowing when to strike,

but few bass, even the lunkers, are lost once the hook is set in the bass' lower throat or stomach. Proponents of the lighter wire hooks feel the free swimming minnow is more active with a lighter hook and that the minnow's increased darting and flashing results in more fish on the stringer.

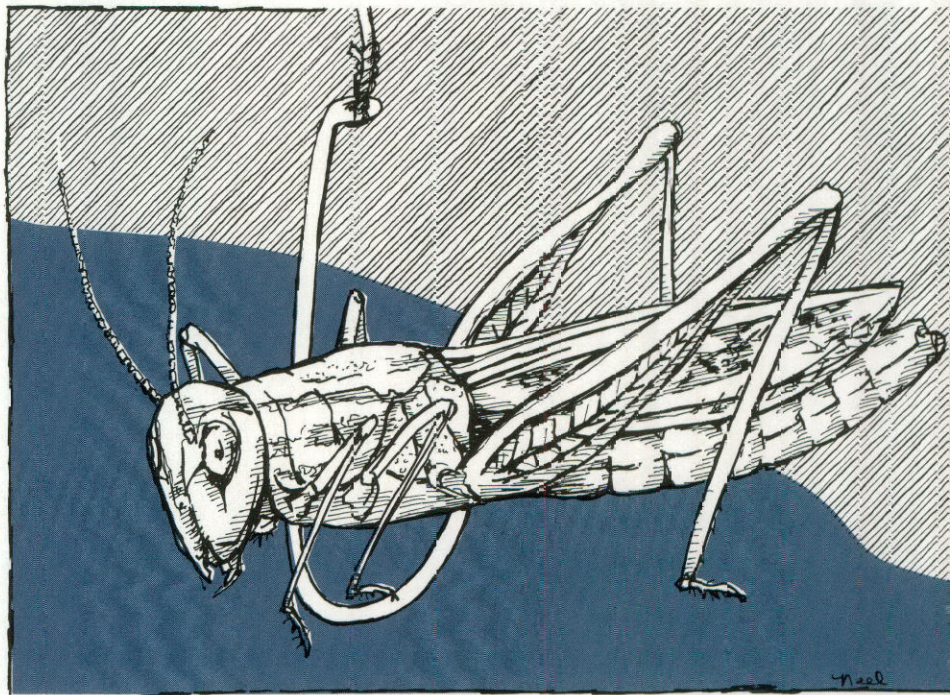
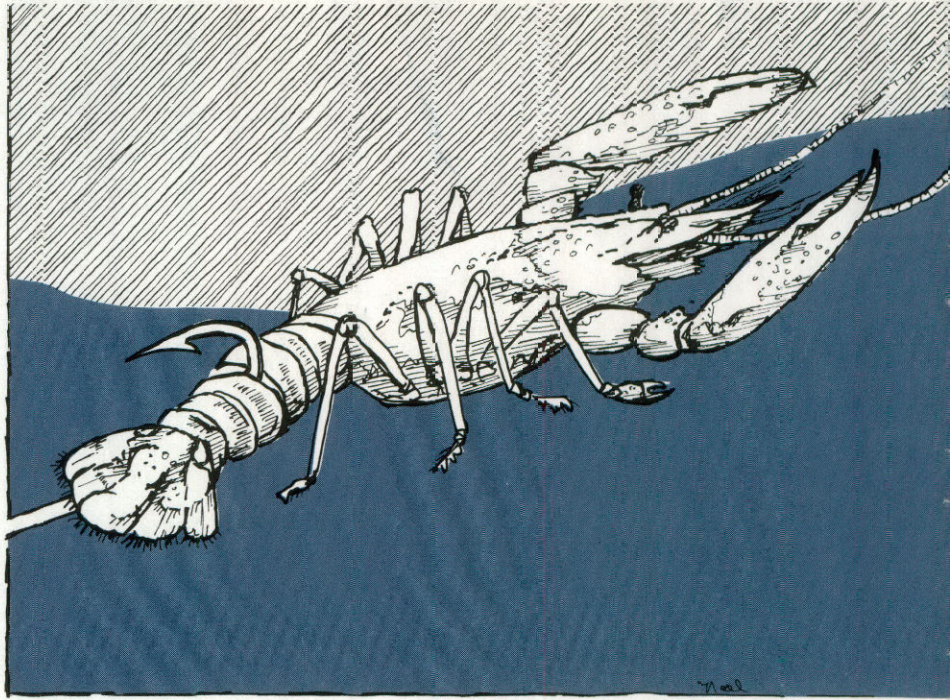
Most fishermen prefer jumbo-sized minnows for largemouth bass. Large golden shiners, creek chubs, flatheads or any of the more common shiner minnows are preferred. Bass fishing techniques dictate somewhat rougher handling of bait and require a stronger minnow than those gently lowered into brush tops by crappie fishermen. Also, because the largemouth is often moody, but is always a greedy creature, a larger minnow is probably more appealing as it swims by frantically. Few bass hesitate to attack when one does. If you're on the other end of the line, you're in for a great time.

It takes quick reactions to catch a bass which has darted out of cover and seized the bait, but it takes real patience to wait for a bass which takes the bait and moves off lazily before swallowing. All the while, the angler has skillfully played out line so as not to alarm the bass. The fish's first pause is the moment to strike. Sometimes the angler connects and at other times only jerks a mangled minnow from the water, spit out at the last instant by a suspicious bass.

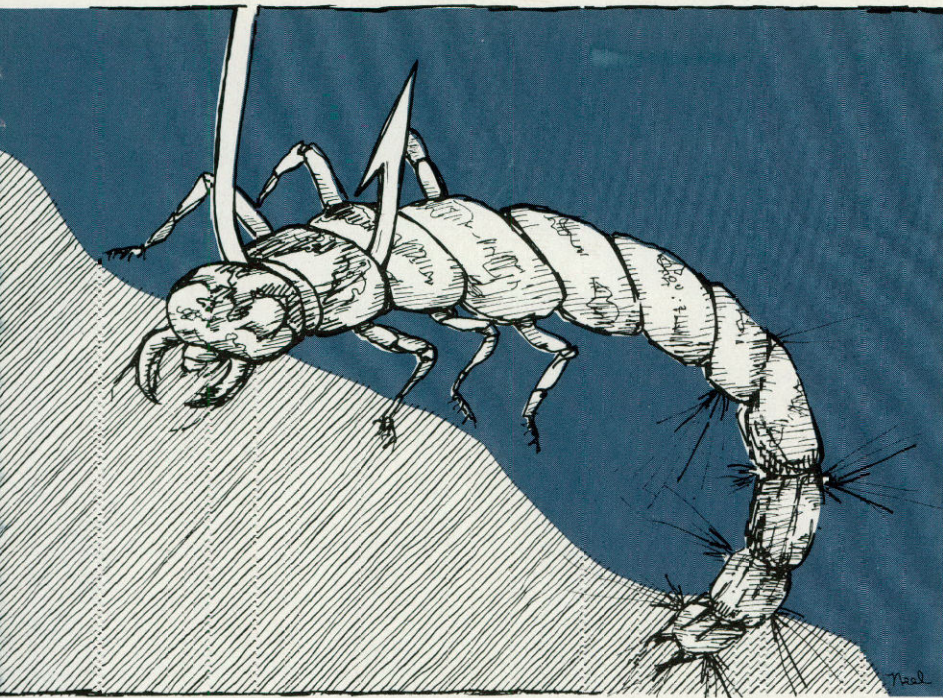
Once the hook connects, the battle is far from won, as the bass may have swum in and out of brush, weeds and other underwater obstacles. With every survival instinct he possesses, the bass doggedly resists the rod's pressure. There is little chance of pulling the hook loose, and most bass lost using this technique break off a snagged line.

Two main hooking methods are employed by minnow fishermen. Some prefer to hook the minnow in the lower or middle back, passing the point of the hook under the dorsal fin and out again. Others hook the minnow through the lips, feeling that the bait is injured less, can be cast easier and remains active longer than one hooked through the back.

Extensively imitated by most of the nation's lure manufacturers, the minnow and minnowlike forage fish



The bait must be hooked in way that will keep it alive and active. Over the centuries fishermen have found that these are the best places to hook various baits.



are perhaps the bass' greatest food source. A large golden shiner cast gently into a small opening among lily pads can often produce a lunker bass when man's best imitations have repeatedly failed.

A favorite technique is to cast a large minnow near a bass spawning bed. The minnow is then gently worked into the bed. When the spawning or nest-guarding bass picks up the bait to remove it (bass don't feed while nesting) the angler immediately sets the hook. Many of the really big bass are caught using this technique.

Generally speaking, fish your minnow in weedy shallows, in brush tops and along drop-offs where bass like to lie in ambush, ready to pounce on unwary minnows and other forage fishes which happen by.

Crawfish, or crayfish, are favored in many places for taking bass, especially the scrappy spotted bass. Spotted bass can be taken with crawfish impaled through the tail with a light wire hook and allowed to settle gently to the bottom over sandy or gravelly points or submerged creek beds. Both are favorite hangouts for the spotted bass because crawfish are usually abundant in such places.

One or two small sinkers pinched on the line approximately six to 12 inches from the bait help settle the crawfish to the bottom and allow it

freedom to move about naturally. A gentle line-throbbing tug tells the angler to set the hook. Lake O' the Pines and Caddo Lake in Northeast Texas are noted for their superior spotted bass fishing.

Frogs are "easy pickings" for a feeding bass. Lying motionless in a dense weed bed, or under a patch of lily pads near shore, the bass is aware of all that is happening nearby. Foolish frogs, venturing from protective cover, are easily ambushed by the stealthy bass.

Bass are easily caught with such bait where they are observed feeding regularly on frogs along the shoreline. Devise a simple harness by slipping a small rubber band around the waist of a spotted frog or young bullfrog. Run the point of a 2/0 or larger steel hook under the rubber band and cast the frog into an opening in the weed bed. If a hungry bass is anywhere near, the frog won't have a chance to kick but once! Be ready to strike hard when the frog disappears from the surface because the action will be sudden!

Testimony to the bass' fondness for frogs is that most "plunker" or "chugger" type of artificial lures are designed to catch bass by simulating one of its favorite natural foods, the frog.

The time-honored standby among the live bait fishing fraternity is the earthworm, garden variety,

night crawler or the cultured "red wiggler." While not used as extensively by bass fishermen as the minnow or crawfish, the earthworm will catch bass when other varieties of live bait or artificials will not. In midwestern and northern states, a June bug type spinner with a gob of wiggling night crawlers attached is a favorite bait.

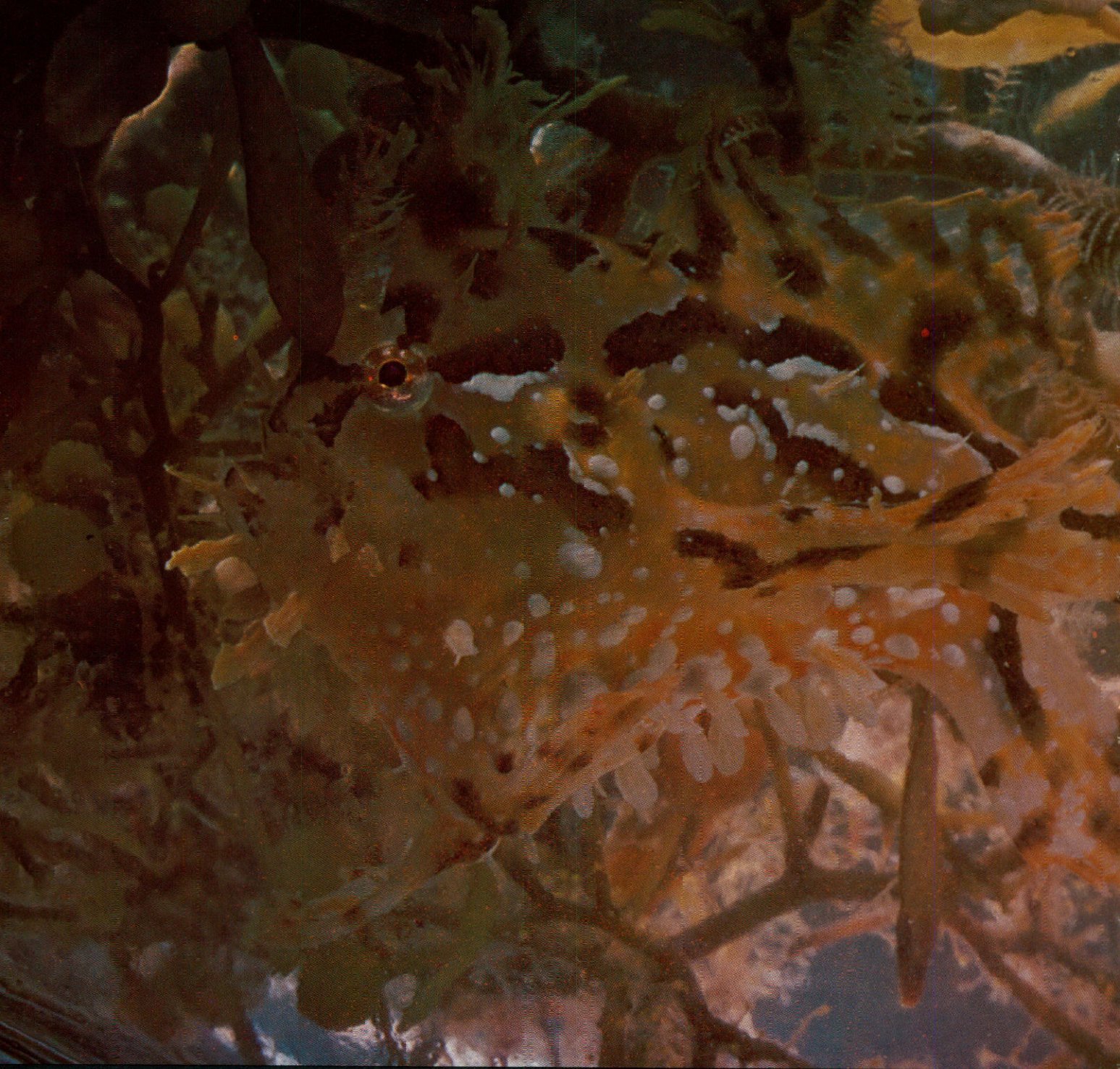
Find an underwater tangle, such as an old tree that has toppled off the bank, and gently drift a frisky night crawler into its submerged branches. Few bass can resist such a tempting morsel. The use of worms for taking bass is especially effective after heavy rains have filled lakes and swollen streams with earthworms and other natural foods.

Big grasshoppers rarely escape the attention of bass after falling into a lake or pond. A favorite trick of many who regularly fish farm ponds for bass is to circle the pond a few yards from the bank to stir up the grasshoppers and other insects. Some will invariably fly over the pond's surface, only to fall when exhausted and be greedily snapped up by obliging bass and bream. Hook a large grasshopper through the tough exoskeleton covering its thorax, or middle part, and gently cast the hopper several feet out from the bank. One kick, two kicks, whoosh! If a fat bluegill doesn't beat him to it, you may catch a bass more quickly than you ever have before. Don't underestimate the size of farm pond bass—they can grow as large in an acre-sized farm pond as in a large lake.

Hellgrammites are lively and tough dobsonfly larvae. Many Central Texas stream fishermen know bass are easily fooled by hellgrammites drifted into a quiet pool below a gravel bar. The only problem here is that a bass had better be on his toes, or a channel catfish may beat him to the wiggling bait. But then, what angler would mind such a happy circumstance?

You may not catch as many bass on frogs or other live baits as Old Sam does on his Super Duper Whirling Dervish cast from his deluxe bass boat, but the ratio of effort to enjoyment may be just as great or even greater.

Live bait fishing for bass can be an exciting and satisfying change of pace. But you'll never know without giving it a try. **



by David Baxter
Photography by Jim Whitcomb

Floating Hotel

Sargassum weed contains
an amazing variety of life.

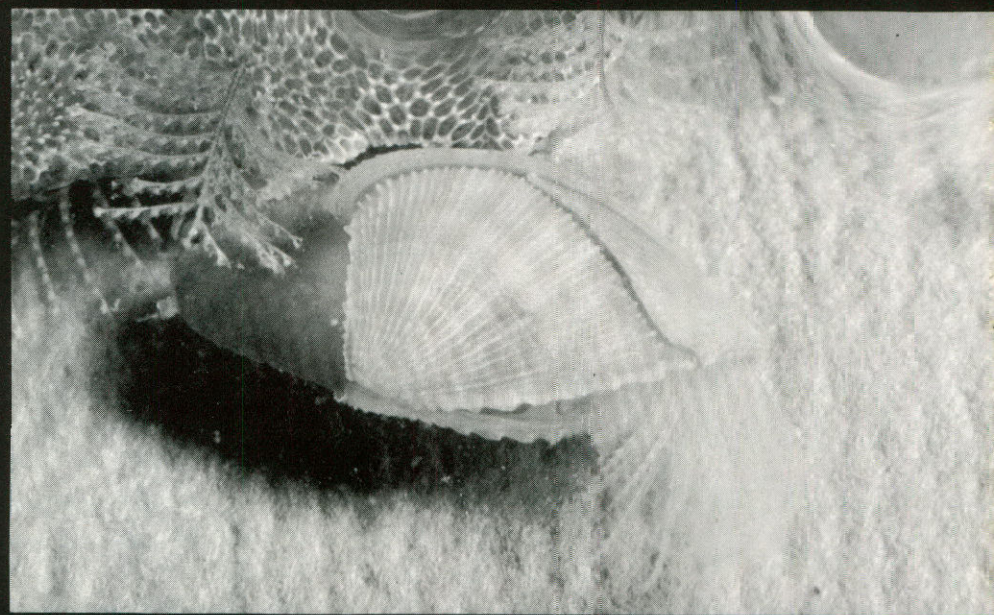
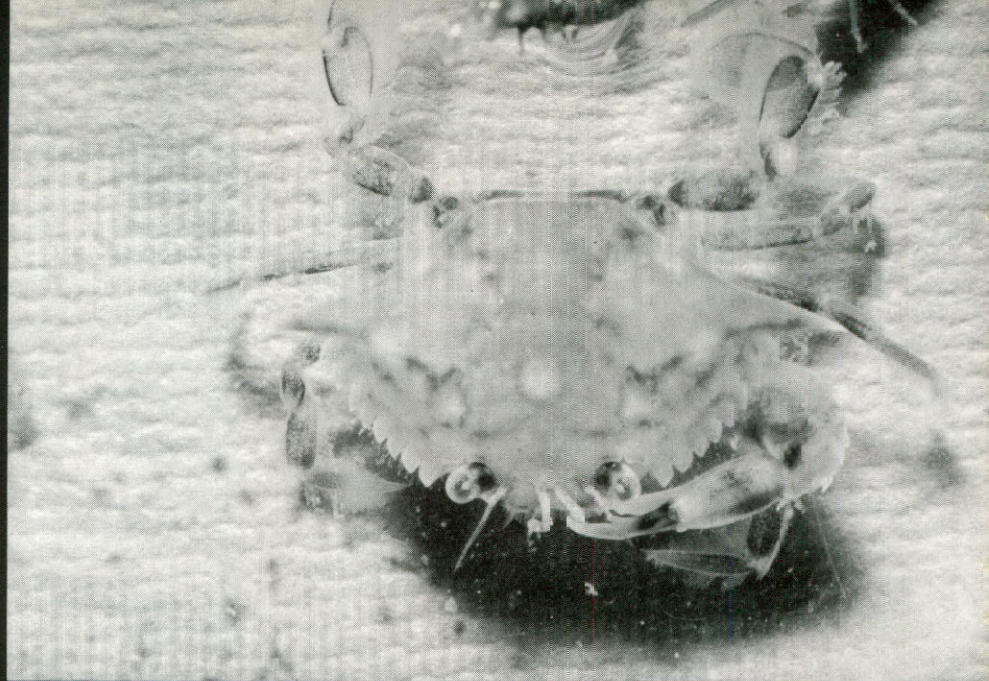


A bright eye betrays the shaggy sargassum fish in the upper photo and on page six. About an inch long, the tiny fish uses his fins to grasp the weeds. It has an appendage on its forehead which it uses as a lure to attract a meal. The sluglike creature in the lower right is a nudibranch.

Columbus was on the lookout for signs of land during his first voyage to find a new route to the Far East. He spotted a bit of seaweed floating by with an odd little crab clinging to it. This was taken to be a sure sign of land or at least shallow water.

Poor Columbus was only half-way across the Atlantic. Instead

of land, he was sailing on the edge of the so-called Sargasso Sea, a vast eddy of slowly turning water and floating weeds in the Atlantic off of Florida. The sea is ill-defined, covering an area as large as the United States and is estimated to contain about 10 million tons of a seaweed known as sargassum or gulfweed.



Sargassum gets its name from the Portuguese word for a particular variety of grape. This is an obvious reference to the grape-like air bladders which keep the weed afloat. The yellow-brown seaweed begins life attached to rocks or dead coral reefs along the coasts of Florida and the West Indies. Occasionally torn free of its anchorage by wind and high seas, it continues to grow as a floating weed. As a free-floating plant, the sargassum is able to multiply by fragmentation or by growing new fronds. Plants which

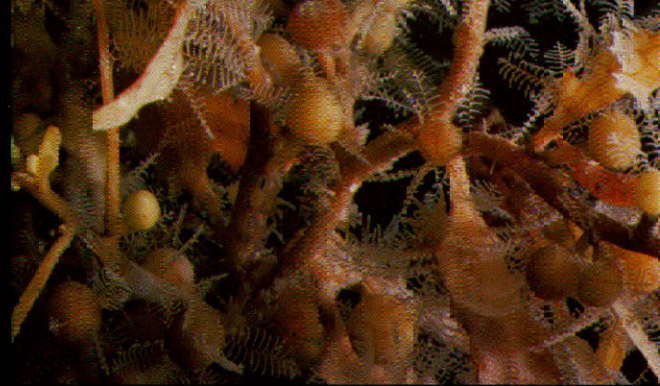
flourish by floating free in the open ocean are usually microscopic in size, but the sargassum is the only exception.

Some of the weed is washed into the Gulf of Mexico, but most of it is carried by the Gulf Stream into the Sargasso Sea. The two species found in the Gulf are *Sargassum fluitans* and *S. natans*.

The floating environment is home to specialized marine life. There are hydroids, sluglike nudibranchs, sea mats, sea squirts, barnacles, yellow shrimp, crabs and the shaggy, spotted sargas-

sum fish. The mobile creatures have adopted a camouflage which resembles the color and general shape of the sargassum weed.

The most interesting of these creatures is the sargassum fish, *Histrio histrio*, sometimes called a fishing frog. It matches in detail the weed of its home, the brown color, the berries and the small white spots. Its pectoral fins are modified into jointed appendages with which it can crawl among the weeds. The cannibalistic little fish has a mouth large enough to



swallow a fish or shrimp as large as itself.

The sargassum fish and certain shrimp, crabs and flatworms live exclusively in the weed and are so well adapted to this particular environment that this type of life must have been in existence for millions of years. Some of the non-swimming animals such as the adult crab are so dependent upon the weed that to lose their foothold on the plant would mean that they would sink to their death at the bottom of the ocean.

Occasional visitors to the weed

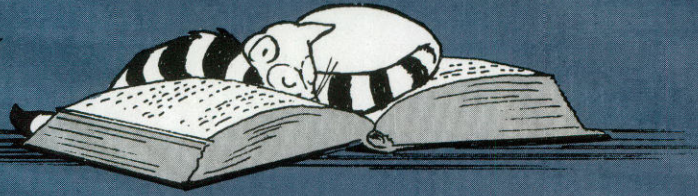
are flying fish which lay sticky strings of eggs in the sargassum. The mottled, young flying fish resemble the weed and live in relative safety until they attain the blue color of the adult stage. The young of sailfish, dorado and other offshore game fish also find refuge in the sargassum.

Because of the life associated with the weeds, fish of all sizes are found near the floating beds. The food chain in and near sargassum ranges all the way from microscopic zooplankton and tiny shrimp to large pelagic fish. **

Mobile creatures, such as the crab and the shrimp blend in with the weed by imitating its color and form. Can you spot the shrimp in the upper right photo? Other animals such as the barnacle in the lower photo on page eight hitch a ride on the weed as they do on the bottom of a boat.

Outdoor Books

by David Baxter



BIG MEN WALKED HERE! THE STORY OF WASHINGTON-ON-THE-BRAZOS by Stanley Siegel; Jenkins Publishing Co., The Pemberton Press, Austin and New York, 1971; 103 pages, \$6.95.

March 1, 1836, was a cold day in a Texas village called Washington-on-the-Brazos. An unfinished house in the town served as the meeting place for a delegation of men elected to consider the question of Texas' independence. The cold wind blowing through the cotton cloth covering the windows was as harsh as the business at hand was serious.

Hastened by the weather and the press of events, the delegates completed their first day's work quickly. On the following day, March 2, a draft of a declaration of independence was presented to the convention and unanimously adopted. The initial step in the creation of the Republic of Texas had been boldly taken.

A discussion of the actions taken at this important convention is included in Dr. Stanley Siegel's *Big Men Walked Here!*, a book centering on the story of Washington-on-the-Brazos. Dr. Siegel's narrative, which comprises half of the book, is a historical summary describing the town's role in the struggle to create and maintain an independent republic. It should not be considered as a definitive account of the town.

Professor Siegel begins with the Austins' colonization efforts and carries the first part of the story through the events which culminated in the San Jacinto victory. He then portrays the town of Washington during the years of the Republic. While the emphasis in this part on the problem of locating and relocating the capitol of the young nation is pertinent to the narrative, it presents a narrow view of other important events of the period. A few short paragraphs would have been helpful in keeping the story in perspective.

The remainder of the book, follow-

ing Dr. Siegel's narrative, is composed of a section of brief biographical notes on the signers of the Texas Declaration of Independence, a section of illustrations and a final section relating a brief history of the creation of Washington-on-the-Brazos State Historic Park. Included in this last section is a list of officers and directors of the Washington-on-the-Brazos State Park Association and the Barrington Society, organizations dedicated to the development of the park.

This book provides a general introduction to the history of Washington-on-the-Brazos. The addition of a short bibliography or reading list would have been helpful to readers who might wish to pursue items of special interest. Also, a more thorough editing job would have removed several unfortunate grammatical errors and inconsistencies.

The book was designed by Larry Smitherman, a former artist on this magazine.—*Barry Hutcheson*

HOW TO MOUNT FISH by Richard H. Schmidt; Teachers College Press, Emporia, Kansas, 1971; 32 pages, \$2.00.

I have never really given much thought to stuffing fish; most of mine never made it past the fillet stage. After reading Mr. Schmidt's little book, it is not so much stuffing as rebuilding.

A plaster cast must be made of the entire fish; the fish must be skinned; a papier-mache manikin must be made to fill out the body, and the natural colors must be restored to the scales. It sounds as if there are plenty of ways to make a trophy bass look like a loser in a contest with an outboard motor prop.

But the author goes through all the steps in rebuilding a fish, lists all the material needed (all of which are inexpensive and available) and tells how to mend broken fins and to keep scales from raining all over your fireplace

mantel. All procedures are illustrated.

So, for the fisherman who thinks he can do a better (and cheaper) job than the local taxidermist, Mr. Schmidt's book is the one to get. Copies are available for \$2 from the Teachers College Press, Kansas State Teachers College, 1200 Commercial, Emporia, Kansas 66801.—*David Baxter*

ROCKY MOUNTAIN WARDEN by Frank Calkins; Alfred A. Knopf, Inc., New York, N. Y., 1970; 266 pages, \$6.95.

You either blame a game warden for low game populations or you blame him for arresting your good friend. It's the way the world has run since the King of England hired men to keep Robin Hood from stealing the deer, and even though times have changed and we still need men to do the job, people still think the same way.

Frank Calkins was a game warden in Utah back before they became game management officers, and he has seen all the ways of stealing deer and trout and trying to slip them past the game warden. He has encountered men driving around the backroads with loaded deer rifles in their cars who explained that they were shooting rabbits. He has known wardens who have casually looked inside of deer carcasses and found illegal geese. He has also known the other headaches of a game warden—the people who chase fish hatchery trucks around the countryside so they can fish for the trout as soon as they are released, and the judges who let people get away with crimes for inexplicable reasons.

More than that, Frank Calkins has a deep appreciation of nature's beauty and is outraged by the way people spoil the wilderness. Describing a stream or the way the sun played across a meadow in the high mountains, Calkins shows that he is deeply impressed by what goes on around man.

Calkins is a good writer. For a time he edited Utah's game management office magazine, and he must have done a fine job. He writes precisely, saying only what needs to be said and saying it very well.

This is the type of book the cover blurbs describe as imminently readable; if that means it is well written and it holds the reader's attention, I agree. If you enjoy the outdoors and want a book that you can relax with on occasion, meet some interesting characters and see the Rocky Mountains through a game warden's eyes, this is the book for you.—*Don Walden*

Answer to How To: Elevation 16 clicks up; windage 8 clicks left.

PHOTO AND ART CREDITS

Covers—Jim Whitcomb; Nikon FTN, 55mm Micro-Nikkor; Kodachrome-II; Port Aransas.

Inside front—Leroy Williamson; technical information not available; Kodachrome-II.

Page 2—Bill Duncan; Bronica, 75mm; Ektachrome-X; Limestone County.

Pages 3-5—Annette Morris Neel; ink and designer's tempera on illustration board.

Pages 6-9—The photographs of the sargassum weed environment were made by Jim Whitcomb with a Nikon FTN and a 55mm Micro-Nikkor on Kodachrome-II at Port Aransas.

Page 12 (upper)—John Suhrstedt; Hasselblad 500C, 80mm; Ektachrome-X; Washington-on-the-Brazos State Park. (lower left)—Suhrstedt; Hasselblad 500C, 80mm; Ektachrome-X; Washington-on-the-Brazos State Park. (lower right)—Suhrstedt; Hasselblad 500C, 50mm; Ektachrome-X; Washington-on-the-Brazos State Park.

Page 13 (lower left)—Suhrstedt; Hasselblad 500C; 80mm; Ektachrome-X; Washington-on-the-Brazos State Park. (upper right)—Suhrstedt; Hasselblad 500C; 80mm; Ektachrome-X; Washington-on-the-Brazos State Park.

Page 14—Suhrstedt; Hasselblad 500C; 80mm; Ektachrome-X; Washington-on-the-Brazos State Park.

Page 16 (upper)—Williamson; Mamiya C-33; Ektachrome-X. (lower)—Williamson; Mamiya C-33; Ektachrome-X.

Page 18—Duncan; Bronica, 75mm; Ektachrome-X; Lyndon B. Johnson State Historic Park.

Page 20—Anella Dexter; Leica, 90mm lens with long focus lens; Kodachrome-II; Newton Co.

Page 24—Dr. Kenneth W. Stewart; Practica Fx2 with Tessar 50mm and portrait lenses; Kodachrome-II.

Page 26—Stewart; Practica Fx2 with Tessar 50mm and portrait lenses; Kodachrome-II.

Page 27 (both)—Stewart; Olympus microscope with Nikron microflex adapter and Olympus JM dark-field base; Kodachrome-II.

Pages 30-31—Neel; ink and designer's tempera on illustration board.

Inside back—Reagan Bradshaw; Nikon-F, 500mm Nikkor reflex; Ektachrome-X; Corpus Christi Bay.

Long Shots, Short Casts

Compiled by Neal Cook

Feather Count: Have you ever wondered how many feathers it takes to cover a bird? The most is 25,216 feathers on the whistling swan. The fewest is 940 feathers on some hummingbirds. For passerine (perching) birds, the number varies according to species from 1,500 to 3,000 feathers.

One Time Only: The bighorn sheep in Colorado is a once in a lifetime hunting trophy because any hunter lucky enough to have his name drawn to receive a license to take one of these animals and then bags one can never apply for another license. If a person receives a license and is not successful in getting a sheep, he is not allowed to apply for another license for three years.

Parts Per Million: When discussing pesticides and pollution, the amounts of various substances are given in parts per million (ppm). Just how much is one part per million? It is about one minute in two years, one inch in 16 miles, one ounce of salt in 62,500 pounds of sugar, one ounce of sand in 31 tons of concrete.

Nation's Capital: The Federal Environmental Protection Agency has warned citizens and the government of the District of Columbia against touching the water of the Potomac River. Following the EPA's warning, the District government said it would seek a legal ban on water-skiing, swimming and wading in the river. Although they decided to allow boating and fishing, they warned that anyone touching the water or having it splashed on them should wash the area thoroughly.

Biodegradable: Pyrethrins are insecticides derived from the flowers of the chrysanthemum family and one of the safest insecticides known. Proven effective in household bug-bombs, they have had such a rapid breakdown that they have not proven effective in agricultural insect control until recently. Now scientists have developed a new formulation which keeps the insecticides active for about 48 hours. After this period, the formula breaks down into harmless components and disappears.



Birthplace of Texas Liberty

by Don Walden

When the 59 Texans met at Washington-on-the-Brazos on March 1, 1836, they had already decided what to do. For 10 years relations with their mother country had become more and more bitter over questions of schools, religion, trial by jury and the colonists' contention that Texas should be a state, not a province of Coahuila, Mexico. In 1835, things had come to a head. The government had sent troops up to collect taxes, and then tried to retrieve a cannon the army had loaned to Gonzales for protection.

In November 1835 delegates from all over Texas had assembled at San Felipe to write demands and to organize a government for Texas until Mexico City responded. The demands were never met, and on January 17, 1836, a call went out for delegates to a convention that

would consider independence for Texas.

At that time Washington contained about 500 people. Sitting at the confluence of the Navasota and Brazos Rivers, it was a major center of trade; there were several trading houses, a ferry and some freight businesses. It was the second town established in Stephen F. Austin's first colony. It had been named for Washington, Georgia, the hometown of many of its residents and the first town in the United States to be named for George Washington. Thus, Washingtonians read their pedigree back to George Washington and thought it appropriate that their town be the site of the convention that would write Texas' Declaration of Independence.

To this end, several merchants banded together in a booster committee, hired a gunsmith shop being built in town and offered it to the convention as a meeting site. The owners—men named Byars and Mercer—agreed to have it completed by March 1, and the merchants would pay \$170 for three months' rent. The whole agreement was a source of conflict, for the building was not finished by March 1, and the merchants would not pay. Byars and Mercer tried to get the government to pay them, but the government was penniless.

March 1, 1836, dawned clear and cold. It was 33 degrees outside and the same inside, for the building had no windows or doors; cotton cloth was stretched across the holes to keep out the wind.

The pre-convention activities had been punctuated with a series of disturbing notes from a colonel holed up with 180 men in a chapel in San Antonio. Colonel William B. Travis was threatened by the flamboyant "Napoleon of the West," Antonio Lopez de Santa Anna, president of Mexico. Members of the convention wanted to adjourn immediately and go to San Antonio to help defend the Alamo, but Sam Houston pointed out that it would be certain death and that there would be no help from the United



States until Texas had made itself an independent country.

Somewhat chastened, the delegates assembled on March 1, organized the convention and proceeded to the first order of business. George Childress, a lawyer from Milam, introduced a resolution to draft a declaration of independence, and the convention quickly adopted the resolution and adjourned to warmer quarters. Childress was appointed to chair the committee to write the declaration.

Many think Childress had come to Washington with the declaration in his pocket. At any rate, when the delegates assembled the next morning, he read them his declaration, which was modeled closely after that which the United States had published 60 years before. Houston again rose to make an eloquent speech in favor of adopting the declaration, and the convention voted unanimously. The signing ceremony followed, and Texas, as far as it was concerned, was free and independent.

As far as Santa Anna was concerned, Texas was still just a rebellious province. Almost immediately after the declaration was adopted, there was a new note from the Alamo, and there arose a new clamor to adjourn to San Antonio. Once more Houston pleaded with the delegates to erect a real gov-



The Republic of Texas was born in a gunsmith shop similar to the reconstruction shown in the upper left, and its last attendant, President Anson Jones, lived in the house shown on the extreme left. Inside the house, the furniture is from the period of the republic. Outside, there is a picnic area and playground, shown in the upper right.

Birthplace of Texas Liberty

ernment that would support his army, and then he set off for Gonzales to assume command. Within a few days the weather improved, and the government settled down to write a constitution.

The effort was delayed, though, by the ghastly news from San Antonio. On the morning of March 6, the Mexican Army, after rushing the walls three times, had breached the fortifications of the Alamo and killed everyone inside but a few women and children. The news must have been especially harsh for one delegate, Francisco Ruiz: Santa Anna had required his son, the alcalde of San Antonio, to burn the bodies of the defenders, denying them a proper burial.

The delegates felt even more the urgency of the situation when

Houston began to retreat. Patrols were posted west of Washington to warn of Santa Anna's approach, and every morning on their way to the hall the delegates expected to see the town ringed with bayonets glimmering in the sun. The citizens were boarding up their houses and leaving; the delegates fretted about their families who would also have to flee; and some may have even reflected on their own dubious honor: their names would be at the top of a list of persons to kill if the revolution failed.

Finally, on March 16 the constitution was approved. Then, working through the night, the delegates nominated people to fill the positions in the government, and finally after midnight the elections were held. At four a.m. the new officers were sworn into their posts, and the convention adjourned at last.

The rest of the revolution is well known. Houston, in a maneuver that won him only contempt at that time, fell back toward East Texas, and Santa Anna moved as far as Buffalo Bayou, once nearly capturing President Burnet and his cabinet. Many Texians fled pell mell across the border into the United States and cursed Houston. But

finally, after training his troops well, he surprised Santa Anna on a prairie near Buffalo Bayou, killing or capturing nearly the entire command. The next day the president himself was captured, and he guaranteed that all troops of Mexico would leave Texas immediately.

But Washington had had its moment of glory and wanted to perpetuate it. When the people of Texas returned to their farms and villages, the next political issue they faced was the choice of a seat of government. At first the government was moved to a new town near the battle site at San Jacinto, named for General Houston himself, but that choice soon proved unsatisfactory.

Another element of Texians, led by Houston's political enemy Mirabeau Lamar, proposed a little settlement called Waterloo, on the Colorado River. Easterners opposed it as too vulnerable to raids from Texas' enemies, but the archives and the government were moved there in 1841, and the town was renamed Austin.

Sam Houston, though, continued to press for a more easterly site. He was aided in his cause in 1842 when General Adrian Woll, a Frenchman in the service of Mexico, raided San Antonio. What made this raid especially remarkable was that the district court was in session, and Woll carried off the court, judges, lawyers, claimants and all. Finally, Houston hit upon a compromise: Washington-on-the-Brazos.

In October Houston moved his family and the executive department to Washington and called for a session of Congress to meet in November. Congress met, but the delegates were slow in reaching the meeting place, and only after 18 days was a quorum present.

In the meantime, Houston had ordered the archives of the government moved to Washington. Legally, he had this right, granted by a constitutional provision which Woll's attack on San Antonio justified using. Quietly, agents of the government began to round up 20 wagons, and on the morning of December 30, while the city of Austin slept, they loaded the archives into the wagons to move them to Washington. Mrs. Angelina Eberly, however, was not asleep. She fired

The museum



a six-pound cannon on the capitol grounds, waking up the city, and the aroused citizens stopped the wagons just outside of town. The government once more returned the archives to their place in Austin, and they have been there ever since.

Washington, in fact, was fast dwindling as a town. By 1840, there were only about 250 citizens and between 50 and 100 transients—"gamblers, horse racers, etc."

On June 16, 1845, the Congress met for the last time at Washington. The United States Congress had passed a joint resolution of annexation whereby Texas would enter the Union, the first nation ever to be granted that privilege. Anson Jones, president of the republic, called for a session of the Congress to consider the offer, and with the dispatch that marked so many of the meetings at Washington, the Texas Congress accepted the resolution. Within six months, Texas became one of the United States. Not long after, the seat of government was finally moved to Austin to stay.

Today, Washington-on-the-Brazos is a state park. The state owns a little over 70 acres dedicated to the memory of the men who signed the Declaration of Independence. A replica of the gunsmith shop is fitted with furniture of the period. The home of Anson Jones, last president of the republic, has been moved to the park and is furnished with furniture from the period, and a new museum has been constructed. Built in the shape of a star, the museum houses displays of colonial and republican Texas and of the events that occurred at Washington.

In addition to historical structures, there are recreational facilities. The park is too small for camping, but there are picnic sites and room to toss a Frisbee or a football. Along the Brazos River there is an opportunity for some fishing.

The park is in Washington County, 14 miles northeast of Brenham. Although the park and the museum are open all week, Anson Jones' home is closed on Monday and Tuesday; and from September to May, Independence Hall is open only on Saturday and Sunday from noon until five p.m. **



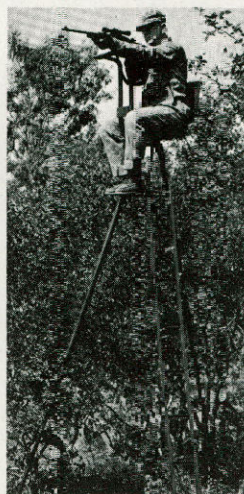
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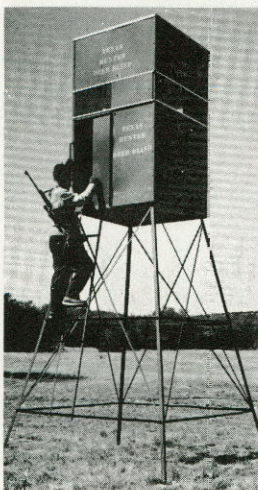
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Quantity vs. Quality



by Jack Ward Thomas
and R. G. Marburger
Wildlife Biologists
Pittman-Robertson Project W-62-R

This is a revised version of an article that appeared in the October 1965 issue. Next month we will discuss decisions that face a landowner with an overpopulated deer herd.

Poor range management will eventually cause die-offs. The deer below has not received enough food possibly because there were too many other deer competing for the available browse. Sometimes, and especially in winter, the landowner with too many deer can put out feed, but this artificial care increases the herd until the range can't carry it.



Part I

Symptoms of deer herd overpopulation

Overpopulation is a term that often comes up in conversation about deer and their management. Widely used, but not always fully understood, the term overpopulation simply means that the population exceeds the capacity of the habitat to provide adequate food and cover.

Biologists frequently refer to overpopulation when explaining the need for antlerless deer seasons. This often brings forth this question from landowners and sportsmen: "Just how do you know when a deer herd is overpopulated?"

The symptoms of overpopulation can be readily seen by any close observer watching the habitat and the deer herd over an extended period of time.

Deer, like most ruminants, utilize a large variety of plant species in their diet. The species that are preferred diet items are referred to as "ice cream" plants. Other plants are considerably less desirable as deer food and are taken by deer only when more suitable foods are not available. Biologists refer to these species as "stuffer" plants because they are filling but not nutritious.

By knowing the "ice cream" and "stuffer" plants available on a range and observing those eaten by deer, biologists can determine how many deer the area can support. For example, if the "ice cream" plants are readily available and not heavily browsed, deer numbers have not exceeded the capacity of their habitat. However, if "ice cream" plants are being gradually eliminated and

the use of "stuffer" food is increasing, this indicates that there are more deer than the range can adequately feed.

These danger signals can often be seen before the symptoms are noted in the deer herd itself. The time lag between danger signals from the habitat and symptoms in the deer herd may be several months or even several years. Deer can survive in large numbers on the deteriorating food supply until, suddenly, there is not enough food, even of low quality, to go around.

The most dramatic evidence of overuse of available browse plants is seen in the "browse-line." This is caused by deer, along with domestic livestock, eating all the available leaves as high as they can reach. By the time this occurs, the habitat has usually been so severely damaged that years of careful management will be required to restore it to its former state. It should be remembered that the great amount of food available above the line is useless for deer consumption. They can only eat what they can reach.

Deterioration of the habitat is followed by symptoms seen in the deer herd itself. These symptoms are varied and some are more difficult to detect than others.

The most serious effect on the deer herd is reduced reproductive rates, which results in a gradual reduction in the number of deer added to the herd each year. The number of deer that are available for harvest (surplus above reproductive needs) is directly related to the number of fawns surviving from the previous year's crop.

As the quality of the food supply declines (as the herd becomes overpopulated) reproductive rates also decline. Extensive studies on deer reproduction in the Edwards Plateau have shown that numerous factors are involved in this reduction. Does actually ovulate fewer eggs per heat period when on deficient diets, and this results in more single fawns and less twins. The chances of the doe carrying a fawn through pregnancy are correspondingly reduced.

While we have no conclusive data at this time, it is suspected that females on a low nutritional plane may not come into heat at all or that cycles (if not bred at the first heat period, the animal will usually come in again in about 28 days) are not repeated as often as is the case with well-nourished does.

Malnutrition, the direct result of overpopulation, also caused losses in fawns because their mothers cannot provide sufficient milk.

Fawns that are born in overpopulated areas, even if they survive until weaning age, are very susceptible to malnutrition and its side effects of parasitism and disease. Fawns are usually the first to die when large-scale deer losses occur. Remaining food supplies are usually out of reach for the smaller fawns. Movement of these small deer in search of food is also restricted by sheep-proof fences.

Data accumulated over the years in Llano County very graphically show the effect of population pressures on reproduction. It can be seen on the chart on page 19 that as deer populations increase, repro-

Long before the die-off begins, improper nourishment causes other abnormalities like this buck's underdeveloped antlers. Deer are more susceptible to parasites; and fawns born on overgrazed range will be stunted.



ductive rates decrease. The implication of these data is that if deer populations are maintained at lower levels reproductive rates will be consistently higher per female in the herd.

Herds subjected to overpopulation, with resultant malnutrition, show a decline in deer quality. This is reflected first in the physical condition of the animal.

When deer of an overpopulated herd are killed and examined they are found to have little or no fat reserves, the coat lacks luster, and the bone structure may be seen through the skin. Deer on a low nutritional plane are obviously not as "wild" and alert as healthy, well-fed animals. Their fear of man is lost due to the urgent need to obtain sufficient food to survive.

At first, these symptoms may only be seen during a period of severe food shortage, usually in late winter or late summer. These conditions may be corrected, however, by a good rain, the timely maturing of the acorn crop, or by a little supplemental feeding here and there. But the offering of supplemental feed is a treatment of the symptoms and not the basic malady, overpopulation.

Deer herds that have been overpopulated for long periods, such as those on most of the Edwards Plateau, reveal even more symptoms.

Over a long period of time, a

herd suffering from overpopulation shows a definite decline in size and weight of individuals.

Another question that often arises deals with the possibility of inbreeding and genetic influence causing the small size of some deer in the Edwards Plateau. Biologist Henry Hahn reported on this subject back in 1945.

"In 1936 the Texas Game, Fish and Oyster Commission stocked the southwest section of Leon County in east central Texas with 97 deer, which were picked up as fawns and yearlings from various counties on the Edwards Plateau. In five years the deer became sufficiently numerous to allow hunting. The entire population with the exception of perhaps a few native deer, was Hill Country breeding stock. During the open seasons of 1940 and 1941, A. J. Nicholson secured 37 deer weights and measurements in Leon County for comparison with data on Hill Country deer. The most striking comparison was that between weights.

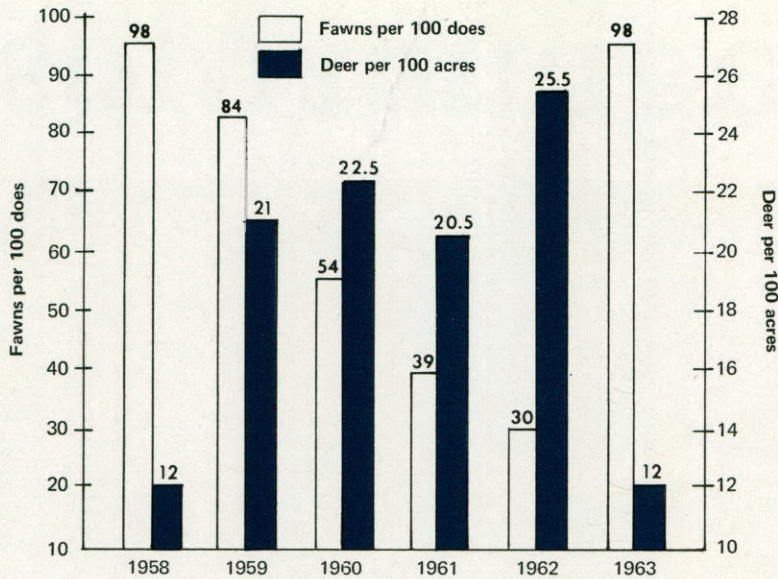
"The Leon County deer averaged 109.2 pounds or nearly 32 pounds heavier than the Hill Country deer in 1941. The average weight of the Edwards Plateau deer was 78.13 pounds. The minimum and maximum of the Leon County deer were 63 and 155 pounds, respectively. This greater weight is attributed in part to less crowding since the deer

population is not nearly as great as in many localities of the Hill Country. There are few goats and sheep in Leon County and the competition for food between goats, sheep and deer is negligible. Obviously the most logical explanation as to the greater size of the Leon County deer is that the deer in that section have a greater variety and abundance of food.

"The belief that inbreeding has brought about the small size of Hill Country deer is not supported since the entire population in Leon County started from a relatively small seed stock (97) and all animals would, therefore, necessarily be rather closely related. Likewise, the theory of a separate race of small deer can be discarded since upon being placed on new range, these deer increased in weight and size."

An almost immediate symptom of overpopulation is a decline in antler development and size of antlers. Antlers are true bone, grown during a four to five month period, and represent the fastest deposition of bone tissue in the animal world. An abundance of food high in minerals is required for good antler growth.

If food supplies are inadequate, body requirements take precedence over antler growth. This is of particular importance when most of the bucks in the herd, and con-



Effect of population pressures on deer reproduction.
As population increases, the number of fawns per 100 does decreases.

sequently harvested by hunters, are yearlings or approximately 18 months of age. These animals are growing in size while also growing antlers, both requiring large amounts of food, balanced to provide proper nutrition.

A good symptom of overpopulation is presented by a deer herd containing a high percentage of spike bucks. This correlation has been noted in Texas as well as in many other states.

All deer are subjected to some internal and external parasites and diseases, but heavily affected animals are usually suffering from malnutrition. The parasite threat is explained by these facts: deer weakened by malnutrition are unable to resist the internal parasites and become disinterested in the grooming required to remain relatively free of external parasites. Secondly, depleted ranges make grazing close to the ground inevitable and the chances of picking up the parasites are increased. Also, the chances for contact between individuals is much increased in the more dense populations.

Not enough is known about deer diseases, but intensive studies are now underway. However, it is suspected that overpopulation paves the way for the spread of diseases and ultimate losses of animals.

Most of the previously described symptoms can be detected before

the ultimate result of overpopulation, deer die-off, occurs.

Hardly a year goes by on the Edwards Plateau that localized die-offs do not take place. Areas affected by these die-offs range from a few thousand acres to areas as large as three or four counties. These die-offs usually occur during the July to September heavy stress period or, less commonly, in December to February.

The best documented case concerning a deer die-off occurred in southern Llano County in 1962, when some 20,000 to 31,000 deer died on 350,000 acres. The deer lost in this one die-off almost equaled the deer legally killed in that area during the three preceding hunting seasons. It was estimated that the harvest of each antlerless deer would have brought \$15 to the landowner and \$55 for each buck. On this basis, revenues of \$441,000 to \$701,000 were lost to Llano County landowners during this period. The loss in terms of potentially available recreation is impossible to calculate.

These are the symptoms of overpopulation in a deer herd. If you have seen one or more of them in the deer herd with which you are concerned as a landowner or hunter, consider it in the light of what has been discussed here and make plans for possible remedial action.

It should be pointed out that for the sake of simplicity, this discussion has been aimed almost entirely at deer. Deer compete, to some extent, with all classes of domestic livestock, and to consider management of one without the other results in mismanagement of all species on the range involved.

The cause of a sick deer herd is a sick range. All management should be geared toward improvement of the habitat. Improvement of the deer herd will follow.

Longtime range abuse is commonplace over much of the deer range and cannot be rectified overnight. The primary cause of this range depletion is overstocking, usually on a year-round basis. Reduction in stocking pressure or establishment of pasture rotation systems, or both, are the first steps in the right direction, not only for an improved deer herd but as a precaution against the damages of periodic droughts.

The antlerless deer program is designed to fit in with programs of range improvement. When used in this regard it can be a real aid toward intelligent management.

However, to try to solve overpopulation problems in a deer herd by reducing deer numbers is a futile effort. In many cases the deer herd could be exterminated without solving range abuse problems because both deer and livestock grazing pressures must be adjusted to permit range recovery.

Under present circumstances the best that can be hoped for is a program that will allow for maximum harvest of the deer resource without depleting that resource. At the same time, it should be realized that adequate deer harvest alone will not alleviate all range problems.

Improvement in the deer herd cannot be expected unless the antlerless deer program is used in connection with overall range conservation-livestock management program.

Large numbers of antlerless deer can be harvested without damage to the herd even where overstocking persists. But, the symptoms mentioned above can be expected to continue because of unpredictable factors and general land use patterns which adversely affect deer habitat and therefore deer themselves. **

Article and Photograph
by Anella Dexter

Sphagnum Moss



Sunlight glistened on the sphagnum moss as we wandered through the Big Thicket, and we stopped for a closer look at it. To our surprise, we heard a faint "pop" and saw a puff of brown smoke curl into the air. Thousands of spores were rising from a glossy brown fruit capsule that had literally "blown its top." The moss was in fruit!

Sphagnum is seldom seen in fruit, but we might never have realized what an unusual sight this was if there had not been a moss expert in our group. She rushed over to see the sphagnum and exclaimed that in all the years she had studied mosses, she had never seen any with spore bodies.

No moss has been more useful to man. Some species can absorb water at the rate of more than 20 times their own dry weight. Because of this tremendous absorptive power, the moss was used during both world wars for surgical dressings. In Michigan, Wisconsin and some other northern states, it is harvested and sold to florists and horticulturists, who moisten it and use it for packing flowers and nursery stock. Dried and shredded, it is baled and sold to be mixed with clayey and sandy soils to add humus and help the soil retain moisture.

This moss has worldwide distribution but is found primarily in the colder temperate zones. It does not generally form extensive bogs in the southern states, but it does grow wherever wet, sandy, acid soils occur together with a relatively high humidity. It is a common plant of bog, muskeg, moor and tundra.

The ability of sphagnum to survive in spite of drought and radical temperature changes is truly amazing. In the mountains and northern parts of its range, summer lasts only three or four months, and the moss spends the rest of the year in the dormant stage under snow and ice; in southern states it may dry up during the heat of summer, but it comes to life with the fall rains and flourishes during the moist winter and spring.

Because of its love of water and compact growth habit, sphagnum is an important factor in filling lakes. It forms a tangled mat of stems which buoy each other up, and the mat pushes out into the

water. The moss on the bottom of the mat dies but does not disintegrate, and the mat gradually sinks under the weight of new growth on top. A mat that is thick enough to walk on but feels springy to the step is known as a quaking bog. Through the years the mat becomes thicker until finally it reaches the bottom of the lake; meanwhile sedges, cattails, water-loving shrubs and then trees fill in behind it. In this way the lake is converted to a bog and eventually to dry land.

A strange thing about sphagnum moss is that it can climb the bank surrounding a marsh and gradually extend the marsh uphill. It does this because new moss keeps growing on the water-soaked remains of dead plants. Climbing bogs of sphagnum are known to move up five-degree slopes in some parts of Europe. They occur in Maine and in a few other northern states but are not common in this country and do not ascend slopes of more than two degrees because the summers are too short or too hot.

In drier areas the moss disintegrates when it dies, but where lakes are filled, chemical changes in the plant tissues and the pressure of new growth on top gradually convert it into a material called peat. Because of the tannins and other organic acids, peat is so antiseptic that leaves, fruits and even whole trees are sometimes preserved in it for hundreds of years. Men and animals which fell through a quaking bog have been found centuries later preserved as well as if they had been treated in a tanning vat. These bogs have also preserved prehistoric animals.

In this country, great quantities of peat are found in areas which were covered by glaciers during the Ice Age. The glaciers created the poorly drained land surfaces favorable to its formation. Peat beds sometimes exceed 20 feet in thickness but are more likely to be about 10 feet thick. Peat is high in carbon, has twice the heating power of wood and burns to produce more than two-thirds as many thermal units as soft coal. But it has never been able to compete with coal in this country and is primarily used in horticulture.

Peat moss belongs to the order Sphagnales, which has only one genus, *Sphagnum*. There are 100 species, 40 of which are found in

the United States. The individual plants are weak-stemmed and flabby with glistening, generally yellow-green leaves, although there are some species which are colored orange, pink or red. The roots are not true roots and the terms "stems" and "leaves" are used though these parts are only superficially like the stems and leaves of flowering plants. They lack vascular systems which in higher plants support the plant and conduct food and water. The leaves lack a midrib, veins and the well-defined epidermis of flowering plants. The plants store no food but live from day to day on moist air and sunlight and go into hibernation when conditions become unfavorable.

The leaf has only one layer of cells. Under the microscope these cells appear as two distinct types: continuous chains of small, narrow cells which contain chlorophyll and manufacture food for the plant and interwoven with them are large, colorless cells which look like the meshes between strands of lace. These large cells absorb water and account for sphagnum's unusual ability to retain water. When the moss is wet, these cells are so clear that they mirror the color of the green cells, but when they dry, the moss takes on a grayish color.

The prostrate stems may be several feet long. They send out rooting filaments and continue to grow at the tip but die at the other end. This is the common method of reproduction.

Sphagnum moss can also reproduce by spores. It has two kinds of branches some long and drooping, and the others short and erect. The latter contain sex organs. The sperm and eggs may be on the same plant or on different plants, but in either case the sperm must swim to get to the egg. Under wet conditions, the capsule which produces sperm splits to let the sperm loose.

Dr. William Campbell Steere, director of the New York Botanical Garden, says that the amount of moisture is critical. A film of water such as dew is necessary to give the sperm something to swim in, but too much water may wash the sperm away. For that reason, spore reproduction is relatively rare, though not so rare, says Dr. Steere, as many people believe.

When the egg is fertilized, the top of the reproductive branch be-

gins to grow abnormally long and a spore case develops at the tip. The brown structures in the picture are spore cases. Inside the spore cases, the spores develop. Although spores reproduce the plant much the same way as a seed does, they do not have a seed coat, embryo and food supply as seeds do. The young spore cases are green but they change to brown as they mature. They are globular and have a lid called an operculum. When hot weather comes, the spore cases swell with the pressure inside them. When it gets hot enough, the operculum explodes with enough force to carry the spores along with them. The spores are tossed into the air, and breezes blow them to other places to start new colonies of sphagnum. This mechanism of dispersal is effective because it insures that the spores are not discharged on cold, rainy days that are unfavorable to growth.

The moss pictured is *Sphagnum imbricatum*. The brown, globular capsules are spore cases, and some have already lost their lids. **

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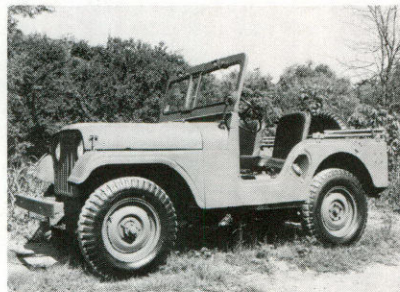
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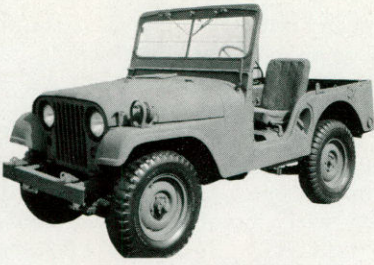
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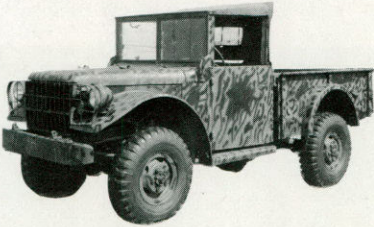
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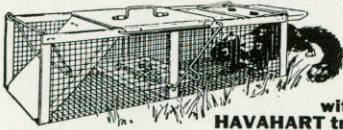
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Aquatic Flies

Photography and article by
Dr. Kenneth W. Stewart
Biology Department
North Texas State University

This is the last of Dr. Stewart's articles on the aquatic insects.

*With their long legs, crane flies like this *Tipula* sp. are often mistaken for mosquitoes. Since some grow to be an inch long, they can be ominous, but they do not bite. Notice the halteres, the short structures growing behind the wings.*

The term "fly" is misused about as often as the term "bug." Most people think a fly is any clear-winged flying insect. They use the term as a suffix in the common names of many insects that are more primitive and not closely related to flies.

True flies belong to the insect order Diptera (Di-two; ptera-wing). Winged members of the order have only one pair of wings, rather than two like most winged insects. The hind wings of flies have been reduced to small knoblike balancing organs called "halteres" or "balancers," which contribute to their maneuverability in flight. To distinguish them, members of the Diptera are spelled as two words—horse fly, crane fly—while other insects are spelled as one word—mayfly, dragonfly.

One or more stages of over 25

families and 300 genera of the flies occur in moist or freshwater habitats. Many of these, which we consider from an ecological viewpoint to be aquatic true flies, are also of economic and medical importance. For example, the adults of many flies with aquatic larvae, such as mosquitoes, biting midges, sand flies, black flies and horse flies bite or annoy man, his domestic animals or game animals. Species within these groups carry malaria, filariasis, yellow fever, encephalitis and other diseases and parasites.

Aquatic true flies are holometabolous. That is, they have complete metamorphosis and go through the stages of egg, larva, pupa and adult. Adults are found near water, but they never actually live in it.

Larvae vary considerably in body form. Primitive families are fusiform (tapered at both ends) with a



Families of Aquatic Flies

FAMILY	COMMON NAME	ADULTS		LARVAE		HABITAT
		DESCRIPTION	FOOD	DESCRIPTION	FOOD	
CERATOPOGONIDAE	Biting midges "punkies" "no-see-ums"	Tiny biting "gnats," less than 1/16" long	Blood of insects or vertebrates (including man)	Elongate, wirewormlike, legless	Algae and small aquatic animals	Adults - around inland lakes Larvae - among floating or submerged algae mats
SIMULIIDAE	Black flies "buffalo gnats"	Hump-backed, small stout-bodied black flies with piercing mouthparts	Blood of warm blooded animals	Club-shaped black larvae forming "mosslike" mats on rocks and logs	Plankton & organic debris	Adults - near streams Larvae - in fast water of streams
PSYCHODIDAE	"Sewer" and "Sand" flies "Moth flies"	Small mothlike flies with hairy wings.	Sewer flies, non-feeding sand flies, blood feeders	Small hairy larvae with body having many untrue segments (annuli)	Sand flies-algae, small crustacea & zooplankton Sewer flies-organic detritus & sewage	Adults - near sewage plants, sink drains or bodies of water Larvae - sewer flies in sewer drains & sewer filter beds. Sand flies-moist vegetation, wet mud & sand at water margins
TABANIDAE	Horse and deer flies	Familiar large biting flies	Females-blood of warm-blooded animals	Elongate cylindrical with fleshy tubules and tapering at both ends	Deer flies-organic matter Horse flies-worms and other soil animals	Adults - near water Larvae - muck or among substrate in streams
SYRPHIDAE	Flower flies "rat-tailed maggots"	Small to large flies with hovering flight	Organic matter, pollen, nectar	Fleshy larva with very long extensible breathing tube ("rat-tail")	Organic matter	Adults - Flowers Larvae - water with much organic matter
TIPULIDAE	Crane flies "leather jackets"	Large brown, long-legged mosquitolike flies with V-shaped groove on thorax		Elongate, legless with multi-lobed breathing disc at tip of abdomen	Roots and decaying vegetation	Adults - moist vegetated areas Larvae - aquatic or moist soil
PTYCHOPTERIDAE	Phantom crane flies	Long black- and white-banded legs (large species) gnat-like (smaller species)		Grublike with an elongate respiratory tube on posterior end	Roots and decaying vegetation	(Same as crane flies)
CHIRONOMIDAE	non-biting midges "bloodworms"	Small mosquitolike flies with non-biting mouthparts and bare wings	Non-feeding	Elongate, red with only two pairs of fleshy legs and usually fingerlike gills at tip of abdomen	Algae and decaying matter	Adults - flying near water Larvae - in a tube constructed on or in bottom sediments
CHAOBORIDAE	Phantom midges	Small mosquitolike flies with reduced mouthparts and wing-scales restricted to margins	Non-feeding	Transparent wigglers with "grasping" antennae	Small crustacea, insect larvae and other zooplankton	Adults - flying near water Larvae - deep areas of lakes in daytime, near surface at night
CULICIDAE	Mosquitoes	Familiar mosquitoes, with piercing mouthparts and hairs or scales along wing veins	Male-nectar (non-biting) female-blood of animals	Familiar wigglers with respiratory tube at tip of abdomen	Mostly algae and other plankton	Adults - near water Larvae - temporary water habitats (including tin cans, ditches, tree holes, puddles) and swampy or marsh areas

well-developed head capsule, and the larvae of higher flies are maggotlike. They never exhibit true segmented legs, although they sometimes have one or more pairs of fleshy "prolegs."

Larvae are found in habitats ranging from brackish or thermal waters to clean springs. They go through four size changes during a developmental period of a few days to nearly a year, depending on species and weather conditions. Pupae usually have free appendages and are often active; they more closely resemble adults than do the larvae.

It is beyond the scope of this article to include a comprehensive discussion of this large and diverse group. We shall limit further discussion to 10 families, since they encompass the majority of common and important aquatic flies.

Unique and interesting features of these families are given in the text, and description, food and habitat are given in the table on page 25.

Crane flies and phantom crane flies generally resemble overgrown mosquitoes and are very aptly described as "daddy longlegs of the air." They are poor fliers and are found especially in marshy or swampy habitats. They are of little economic significance, except that the larvae of some brown species of the genus *Tipula* occur in damp soil and damage meadows and pastures by feeding on the roots of forage plants. Adults do not bite, but are avoided or killed because of their mosquitolike appearance. I have heard laymen also call them "horse mosquitoes."

The midges families Chironomidae, Chaoboridae and Ceratopogonidae and mosquitoes, Culicidae, are all small mosquitolike flies. Only the females of the latter two families bite and carry diseases. In all these families, adult males can be distinguished from females by their more hairy antennae. Only by microscopic examination can the differences in species and even families be distinguished.

Non-biting midges (Chironomidae) develop tremendous populations, and their larvae are important fish food. They are recreational pests since they are often mistaken for mosquitoes, prompting unnecessary precaution; adults sometimes occur in such huge swarms that they get into the eyes and mouth and become a general nuisance.

Biting midges (Ceratopogonidae) are very tiny, and their bites produce burning welts all out of proportion to the size of the insects. They are encountered around lakes, streams and reservoirs.

Phantom midges, family Chaoboridae, have interesting transparent larvae which are found almost exclusively in lakes and reservoirs. They exhibit an interesting daily migration. At night, they come to the surface where they feed on plankton, and they return to the deep areas during the daytime where there are fewer predators.

Black flies are associated with running water, where their club-shaped larvae form mosslike mats



in shallow riffle areas. They are important food items for predatory larger insects such as hellgrammite larvae and for stream fishes. They are more tolerant of organic pollutants than most other stream insects, and under certain conditions they can be important biological indicators of pollution.

The Psychodidae family includes two different subfamilies, the sewer flies and the sand flies. Sewer fly larvae live in the trickling filters of sewage treatment plants, keeping the filters open and functional. The larvae of certain species are found living in sewer pipes and drains of sinks, bath tubs and lavatories in homes; the small non-feeding moth-like adults are short-lived and are often found in bathrooms of homes.

Sand flies include the familiar blood sucking, mostly tropical species, including *Phlebotomus*, that carry several diseases. A few species bite and annoy people around lakes in the southern United States.

Almost everyone is familiar with the biting horse flies, family Tab-

nidae. The head is composed almost totally of the large colorful compound eyes; this has promoted the laymen's names "green heads" and "gadflies." The tenaciousness of their bite has also led to the name "bulldog flies" in some areas. The females sometimes become serious pests of cattle and other domestic animals; adults of some species are capable of ingesting up to 350 milligrams of blood per meal! The carnivorous larvae sometimes become pests in commercial worm beds. Deer flies are smaller Tabanids, and they usually have spotted or banded wings.

Flower flies are brightly colored flies which frequent flowers and are considered second in importance only to bees as pollinators. Their larvae are highly diverse, living in many types of moist habitats. "Rat-tailed maggot" larvae live in water and have a long filamentous breathing tube, hence the name. They are usually found in habitats with high organic matter content that are unsuitable for many other insects. **



The Ptychopteridae are called the phantom crane flies. The most common genus is Bittachomorpha, distinguished by legs banded with black and white and by the swollen black segments on each leg.

Non-biting midges are very common and often occur in very large numbers. The larvae are always aquatic, and some live in tubes constructed in debris. Shown on the left is a larva of a non-biting midge known as a bloodworm. An adult non-biting midge is shown on the right. Although it resembles a mosquito in some respects it does not have piercing mouthparts. This is a male, and it has hairy antennae.

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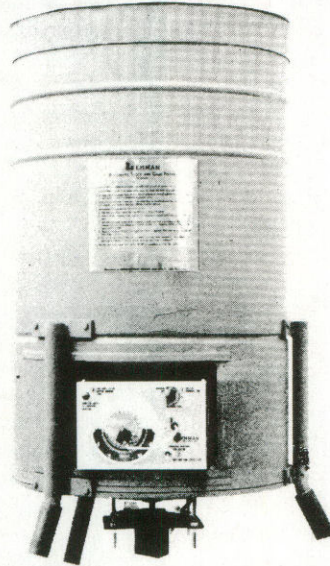
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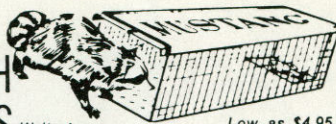
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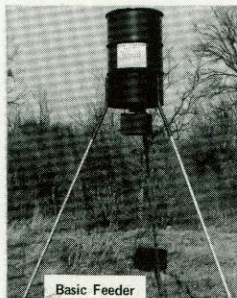
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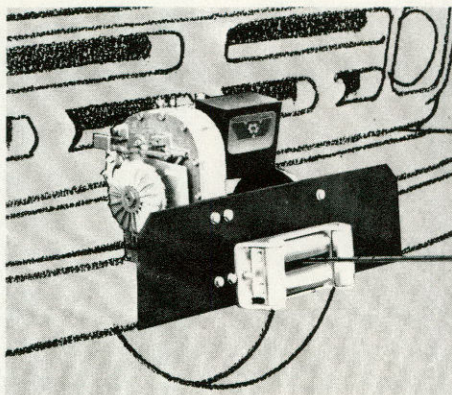
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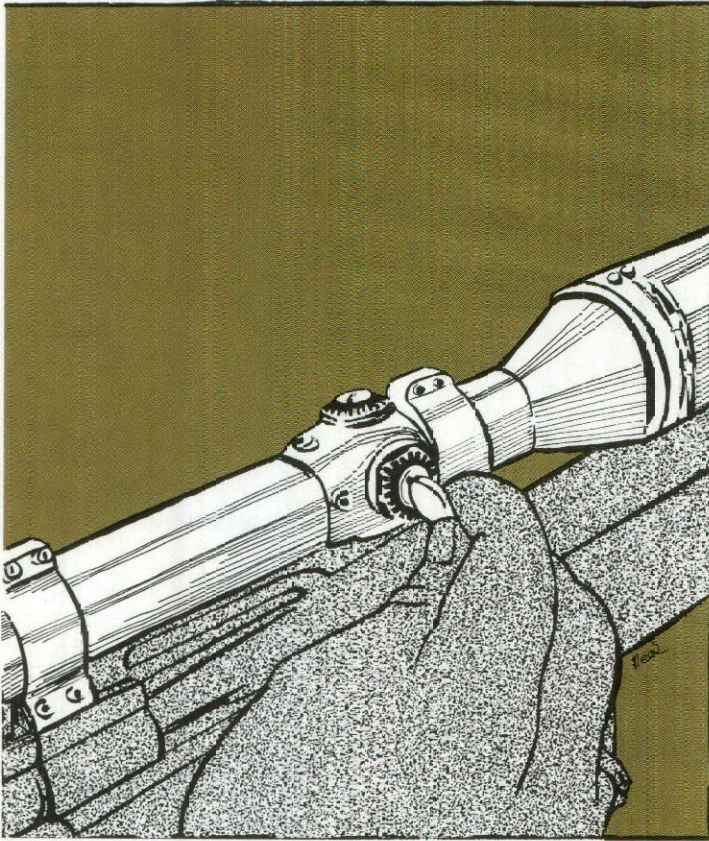
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How To:

Adjust a Telescopic Sight

by David Baxter



One set of knobs raises the scope, and another set moves it sideways. Each time the knob clicks while it is being turned, the point of impact moves a certain distance if you aim and fire correctly. For example, at 100 yards four clicks on most scopes will move the point of impact one inch; at 200 yards, one-half inch; at 50 yards, two inches. For an illustration of how it works on a target see the next page.

Telescopic sights must be securely fastened to the rifle prior to sighting in. Before securing the scope, adjust the tube in the rings so that distance from eye to the lens feels comfortable. If the scope is too close to your face, recoil will give you a black eye.

On telescope mounts and bases, the distance between screws is so short that any looseness decreases the scope's accuracy. Most base screws are heat treated to withstand the force with which they are tightened. Some mounts which are detachable have slotted screws securing the scope to the rifle. These must be tightened with a coin held with a pair of pliers.

Caution: before making any adjustments to sights or other parts of a rifle, open the bolt, remove all cartridges and leave the bolt open.

Bore sighting saves time and money and to avoid error due to bullet drop on a long range, a 25-yard range is the most practical for bore sighting. The first shot fired after bore sighting on a short range will be close to the aiming point.

Remove the bolt or use a breech bore mirror for lever action rifles and lay the rifle on a sand bag or similar rest. Without moving the rifle, align the sights on one point. Check alignment of bore and sights to be sure what you see through the sights is what you'll hit through the bore.

The majority of hunting scopes are adjusted vertically and laterally by knobs on the screw caps. Engraved arrows show direction of turning for the desired movement on target. Graduations are in minutes or fractions of minutes. When adjustment is in the mounts instead of the tube, move the rear mount the way you wish the shot to go.

Minutes of angle are represented by "clicks"—four to each minute. At 100 yards each minute of angle is equal to one inch on the target, so that

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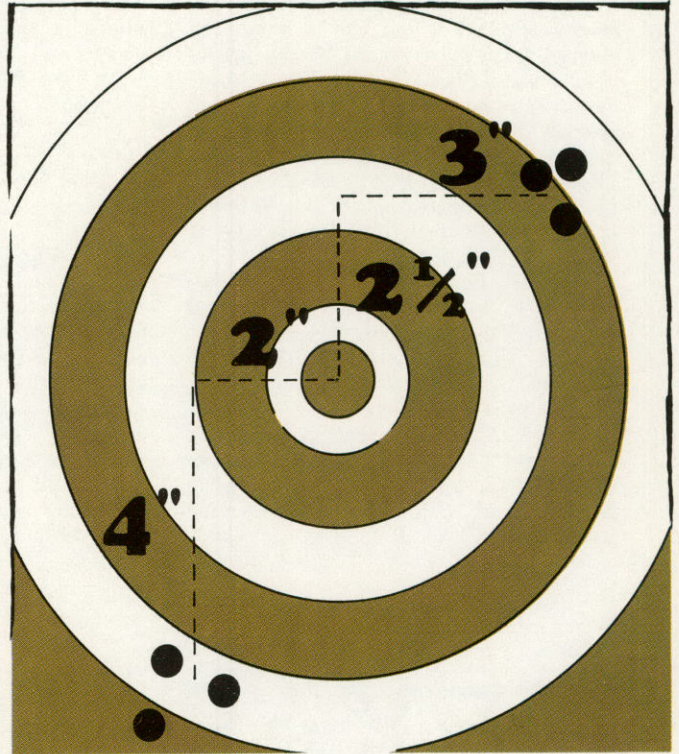
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.30-30 Winchester 170-gr. SP & FP MV 2220	+7	(T)	-8.1	-29.4
.30-'06 150-gr. SP MV 2970		+1.7	(T)	-8.3
.300 H&H Magnum 180-gr. MCBT MV 2920		+1.6	(T)	-7.1

MV—Muzzle Velocity
SP—Soft Point
FP—Full Patch

MCBT—Metal Case Boattail
OPE—Open Point Expanding

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For more information check with your local gun dealer.



This is a view of the target with two shot groups. Assuming that the target is 100 yards from the rifle, 12 clicks of the windage knob and 10 clicks of the elevation knob will bring the upper right shot group into the bull's eye. How many clicks will it take to move the lower left group into the bull's eye? The answer is on page 10.

moving the knob four clicks will move the point of impact one inch. On most scopes, the windage knob is on the right side of the tube. There is another knob on top to adjust for elevation.

Fire a three-round shot group on a 25-yard range. Each minute of angle will equal one-fourth inch on the target. With this in mind, determine the center of impact of the shot group and move the windage and elevation knobs the appropriate number of clicks. For example, if the center of impact is two inches high and one inch to the right of the bullseye, the elevation knob would be dropped eight clicks and the windage knob moved to the left four clicks. Fire another three-round shot group for confirmation. **

Letters to the Editor

Fish Record

I caught a bull shark, *Carcharhinus leucas*, which I would like to have considered for a state record. According to your Texas Fish Records dated January 1971, no record exists for this species. I believe this fish may qualify due to the fact that your Bulletin 33 "Food and Game Fishes of the Texas Coast" lists the maximum size for this species as 10 feet in length and a weight of 400 pounds.

My bull shark was 9 feet 5 inches in length with a 56-inch girth, and weighed 320 pounds. It was caught off the boat *Big John* owned and operated by John L. Kollman, publisher of *The South Texas Fisherman*.

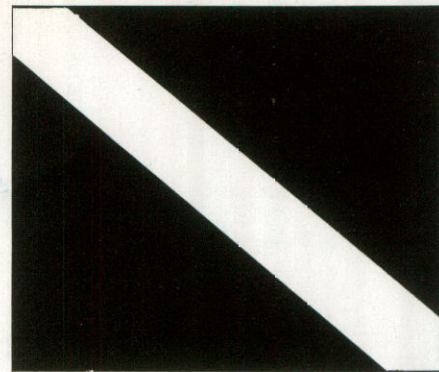
The shark was caught at the "Car Body Reef" off Port Aransas at 3 p.m. on June 5, 1971 on a PENN 12/0 Senator reel with 130-pound test line using the tail of a jackfish for bait.

The fish was gaffed after a fight of two hours and 15 minutes and taken to Fisherman's Wharf at Port Aransas where it was weighed on inspected scales and measured. This was witnessed by John Kollman and Ben N. Nurick.

Timothy S. Torrence
San Antonio

Diver Below Flag

During the past few years, several members of our SCUBA club have had close calls with boaters. This was brought to our attention at our last meeting. It seems that some boaters, especially the owners of small, private boats, have no idea of the meaning or purpose of the divers' flag. We decided that this year, we are going to do everything in our power to educate the



public as to the purpose of this flag, and would greatly appreciate your warning your readers that this red and white flag means that a diver is down and boaters should give 100 foot clearance.

Chuck Chandler
Baytown

BACK COVER

Inside: Once the brown pelican was a very common bird along our coast. In May 1920 there were 2,000 birds in Nueces County, and as late as the 1950's people saw large flocks patrolling the shallow estuaries and diving headlong for fish. But the fish may have been the downfall of the brown pelican. Fish in the estuaries contain low concentrations of that most potent of all ravagers, DDT, and the birds, living on a steady diet of fish, concentrate the pesticide in huge doses. Eggs either have no shells or shells that break when the parents sit on them.

For several years before 1961 bird watchers had reported steady declines of brown pelicans, but in that year the population took a sudden turn for the worse. Hurricane Carla swept through, and now, beset by DDT absorbed from fish, the birds can't recover. Their numbers have hovered around 12 or 13 for several years, and this year there are 14 adults in the main nesting area near Corpus Christi.

It's a frightening prospect: the earth is becoming unfit to support life. In the 1930's there were about 80,000 brown pelicans in Louisiana. Five years ago there were none. And though man has reintroduced the birds to Louisiana, the fact remains that in one man's lifetime we annihilated what nature had produced in millions of years.

We are slowly learning that we must shepherd our resources miserly. For if the earth can't support less sophisticated animals, it can't support us either. Photo by Reagan Bradshaw.

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