

# TEXAS

## PARKS & WILDLIFE

January 1970 • 50¢

JUL 11 1974  
070300 0211 05 01  
BRADWAY M (DR)  
PAN AMERICAN COLLEGE  
EDINBURG TEXAS  
69582 PAN AMERICAN UNIVERSITY  
EDINBURG TEXAS 78539





### OUTDOOR NOTEBOOK

First named by early French settlers in Florida, sassafras has since been cultivated for making spicy tea, sarsaparilla, and, in more recent times, root beer.

It also has value as a wildlife food tree. A covey of quail may headquarter under a single tree when the fruit is falling. Turkey and deer and many songbirds relish the fruit, as do raccoons and squirrels. Deer and livestock browse the palatable forage when the tops or branches are close enough to the ground. All consumers help distribute the seed.

Botanists call the deciduous plant *Sassafras albidum*. It grows in eastern Texas and throughout the eastern United States in sandy soils, often of low fertility. On good soil it may attain a height of 90 feet.

— Dan Lay



LIBRARY BINDING COMPANY  
WACO, TEXAS

92

Name of Library and Address

PAN AMERICAN UNIVERSITY LIBRARY  
EDINBURG, TEXAS

NEW

REPEAT

COLOR NO.

240

(Circle number below)

- 1... Ads in
- 2..... Ads out
- 3..... Index front
- 4..... Index back
- 5... Covers on
- 6..... Covers off
- 7..... Bind as is
- 8..... Call nos.
- 9..... Imprint
- 10..... Stamp white
- 11... Stamp black
- 12..... Stamp gold

Special Instructions

SWH-H

LETTERING FOR SPINE

TEXAS PARKS & WILDLIFE

28-29

1970-71

INDEX

(1)

~~V-12~~  
86







**PARKS AND WILDLIFE  
COMMISSION**

Pearce Johnson, Chairman.....Austin  
L. P. Gilvin, .....Amarillo  
Harry Jersig.....San Antonio

**PARKS AND WILDLIFE  
DEPARTMENT**

J. R. SINGLETON.....Executive Director  
R. G. MAUERMANN.....Deputy Director

**ADMINISTRATIVE SERVICES**

W. J. CUTBIRTH, JR.....Director  
C. L. FRIOU.....Assistant Director

**WILDLIFE SERVICES**

EUGENE A. WALKER.....Director  
A. J. SPRINGS.....Assistant Director

**PARKS SERVICES**

WILLIAM M. GOSDIN.....Director  
PAUL SCHLIMPER.....Assistant Director

**WATER SAFETY SERVICES**

GEORGE COOK.....Director  
J. B. PHILLIPS.....Assistant Director

**INFORMATION-EDUCATION**

RICHARD McCUNE.....Director  
T. D. CARROLL.....Coordinator

**REGIONAL OFFICES**

AREA	PARKS SUPERVISOR	WILDLIFE DIRECTOR
San Angelo	Robert C. Hauser	Henry Burkett
Waco	Billy J. Smith	A. W. Lewis
Tyler	Harold Allums	John M. Carlisle
La Porte	Ronald W. Moreau	Ernest Marsh, Jr.
Rockport	Tom McGlathery	Tom D. Moore

**Regional Information Officers**

W. R. LONG.....San Angelo  
FRANK ETHEREDGE.....Waco  
ROBERT L. SINCLAIR.....Tyler  
CLARENCE E. BEEZLEY.....LaPorte  
L. D. NUCKLES.....Rockport

**TEXAS PARKS & WILDLIFE  
magazine**

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

WAYNE K. TILLER.....Editor  
NEAL COOK.....Associate Editor  
PATTI SWAIN.....Assistant Editor  
NANCY MCGOWAN.....Art Editor  
REAGAN BRADSHAW...Photography Editor  
LARRY SMITHERMAN. Production Manager  
ETHEL SPECK.....Advertising-Circulation  
ILO HILLER.....Office Manager

Published monthly by the Texas Parks and Wildlife Department, John H. Reagan Bldg., Austin, Texas 78701. Republication of material is not permitted except by special written permission. The inclusion of advertising is considered a service to subscribers and is not endorsement of products nor concurrence with advertising claims. Rate schedule available upon request. Subscription rates: \$3.15 for one year and \$5.21 for two years. Single copies and all back issues, 52¢. Prices include 4¼ percent sales tax for Texas residents. Foreign subscription rates: \$4.00 for one year, \$7.00 for two years.

Postmaster: If undeliverable, please send notices by form 3579 to Reagan Building, Austin, Texas 78701. Second class postage paid at Austin, Texas, with additional entry at Houston, Texas.

# Features

**Outdoor Interns** *by Fred Wilkerson* 3

The opportunity of working for a summer in various divisions of the Parks and Wildlife Department is provided college students.

**Catfishing Can Be Habit Forming** *by Neal Cook* 6

The variety and size of catfish, and the many methods of catching them, make catfishing a favorite sport for Texans.

**Tyler State Recreation Park** *by Robert Sinclair* 12

Beautiful nature trails and excellent fishing, camping and boating facilities attract visitors from all parts of the country.

**Jumping Jack** *by W. R. Long* 16

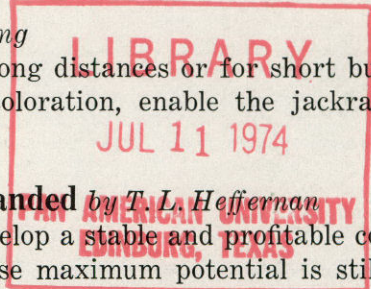
His ability to run for long distances or for short bursts of speed and protective coloration, enable the jackrabbit to prosper.

**Blue Crab Industry Expanded** *by T. L. Heffernan* 20

Texas has begun to develop a stable and profitable commercial crab industry whose maximum potential is still to be tapped.

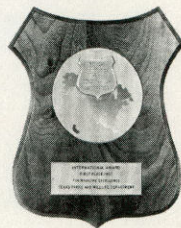
**Appetites on the Move** *by Patti Swain* 24

Caterpillars vary greatly in color and general appearance, but for all of them the major activity is the same — eating.



# Departments

Outdoor Books .....	10	Junior Sportsmen .....	28
Long Shots, Short Casts....	11	Letters to the Editor.....	32



# TEXAS PARKS & WILDLIFE

... first place winner of the 1967 and 1968 international award for magazine excellence given by the American Association for Conservation Information.

**Cover:** The meeting of day and night — a majestic canopy settles over Lake Steinhagen near Martin Dies Jr. State Recreation Park. Photo by Leroy Williamson.

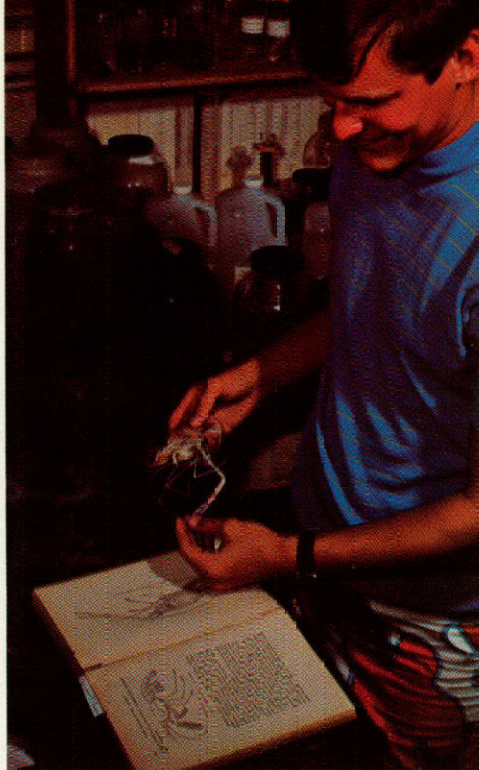








Photos by Reagan Bradshaw



# OUTDOOR INTERNS

by Fred Wilkerson Seasonal Biologist, Coastal Fisheries

**AT THE END** of the school year, Parks and Wildlife Department personnel throughout the State meet a group of students who will be spending their summer working in the Department's various divisions. These students work in the wildlife restoration, inland fisheries, coastal fisheries, park operations or administrative divisions.

The summer employment program is essentially an internship program for college students who are majoring in wildlife or fisheries science, landscape architecture, park administration or other resource-directed degree programs. Most of the students have completed at least two years of college and they are chosen from colleges and universities throughout the Nation.

This program not only eases the burden of field work on the biologist during sampling, but is an effective method of acquainting the students with the activities and duties of the Department. Similarly, in the apprenticeship program, both the Department and the student are provided a mutual evaluation period.

A typical program employs students in the Coastal Fisheries Division. Most of these students







*The summer intern learns from careful observation and study.*

are studying fisheries management or related biological fields. They work directly with biologists in research laboratories and field stations along the coast.

To the student working in marine laboratories, visions of white lab coats and test tubes filled with mysterious chemicals quickly vanish. These are replaced by the realization that although test tubes and chemistry do play a part, a marine laboratory is essentially an assembly area. Here field projects are centered and information from field work studied and interpreted for management purposes.

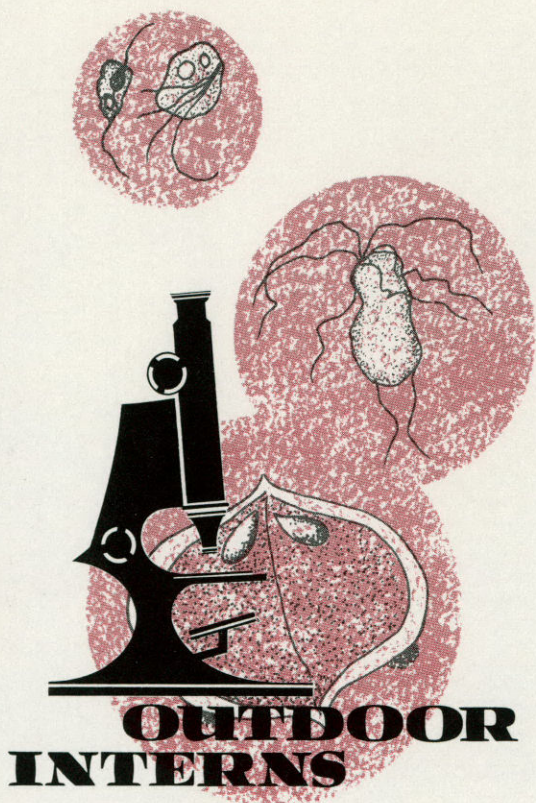
A typical day may begin at 6 a.m. with the setting of nets and tagging of game fish for fishing mortality, growth and migration studies. The catch may be several hundred pounds of lively sport fish, or the labor may only bring the disappointment of empty nets. After a little practice the new hands become steady enough to make the small incision in the abdomen of the fish and insert the plastic tag. The tag number is recorded along with

the location, length and date of release. Then the fish is returned to the water unharmed.

Other tagging efforts allow summer workers to become familiar with the habits of the bad tempered blue crab. A work period may produce pinched hands while workers affix tags to the back of 1,000 sponge crabs (egg-bearing females). The tagging procedures take on greater meaning when the first return is received and movements can be plotted for one particular crab. When this information is added to that already recorded, a migration pattern can be plotted for the species.

During the past three summers the Department has conducted density surveys of nursery areas for game fish and shrimp. This work has required the time and efforts of many students. Early in the week, food, sampling gear and other equipment for a trip is loaded on the boats and the crew sets out. For the next few days every effort is made to obtain data for a complete ecological report of the survey area. The project includes the use of nets, seines





*Coeds majoring in biology or other resource-directed degree programs perform necessary jobs for the Department. Counting plankton samples is one of the more tedious chores for the summer assistants.*

and trawls along with the recording of the physical characteristics of each sampling transect. On Friday evenings the tired and dirty crew returns to the lab to interpret the data and compile a written survey report.

Coeds should not be completely discouraged by this description of the more strenuous activities and field work. The Coastal Fisheries section has had some laboratory positions for those studying the biological sciences. Here is the opportunity to work in a chosen field and to take an active part in the operation of a marine laboratory. In Rockport during the summer of 1968 and 1969, two young ladies performed the tedious task of identifying and counting larval shrimp, fish, and crabs collected during the study of Cedar Bayou, a natural fish pass. The information gained from this operation will not only aid the sportsman but also help the commercial shrimp fishery with predictions of abundance from observations of conditions in the bayou and other related areas. Another young lady

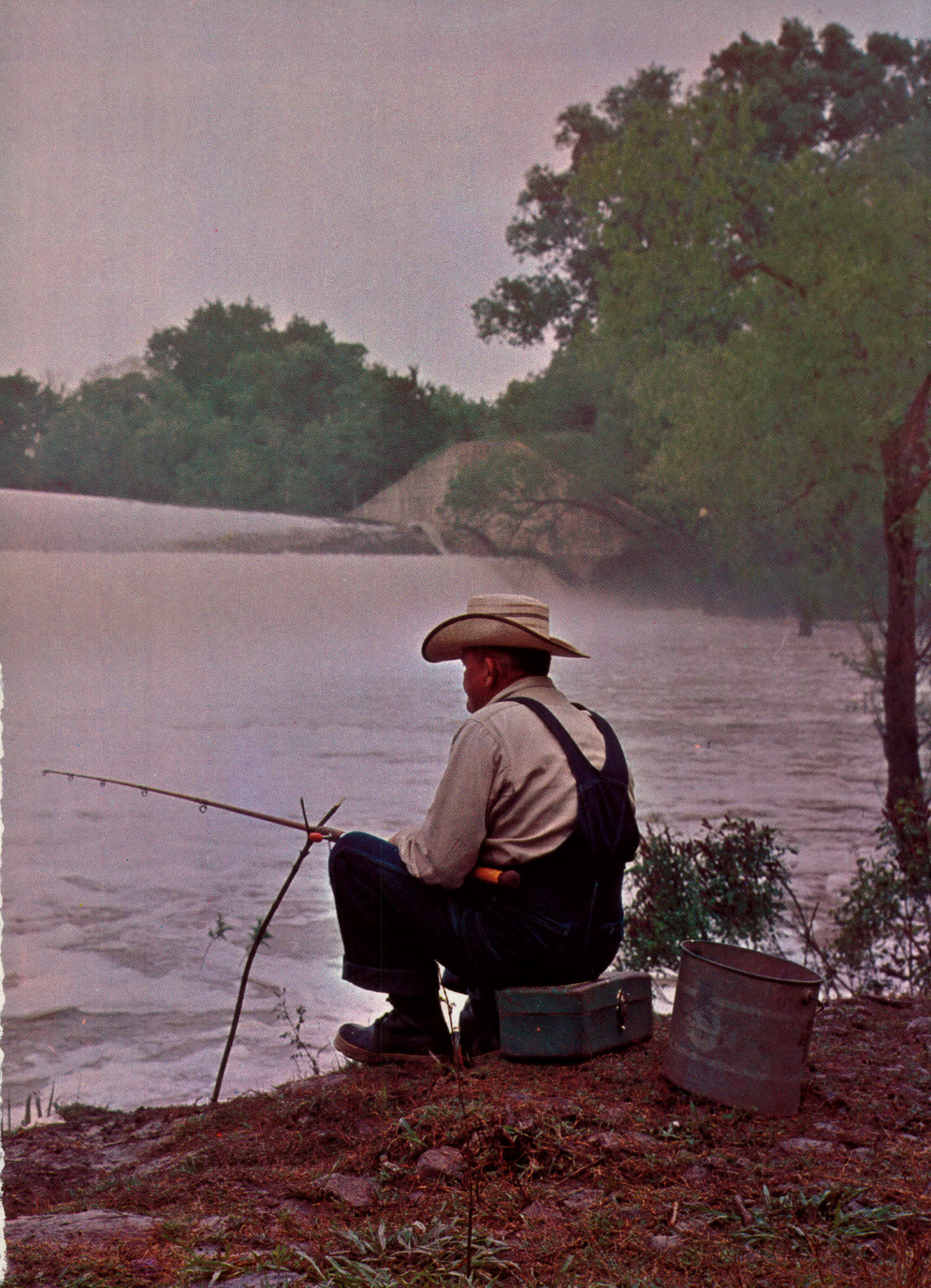
was employed at the Seabrook Lab on Galveston Bay in a study of the mortality and diseases of the local oyster population.

If the idea of spending weeks at a time in the Gulf of Mexico is appealing, then becoming a member of the crew of the research vessel *Western Gulf* may turn this dream into reality. To be on deck and observe specimens brought up from 3,600 feet, where there is no light other than that produced by the fish themselves, brings to view things which the imagination has probably never fathomed.

The summer assistants on board the boat prepare a checklist and photographs of deep-water fish and crustaceans. Activities on the boat offer many research opportunities — trawling for deep-water fish and crustaceans, reef population studies, and collection of hydrographic data.

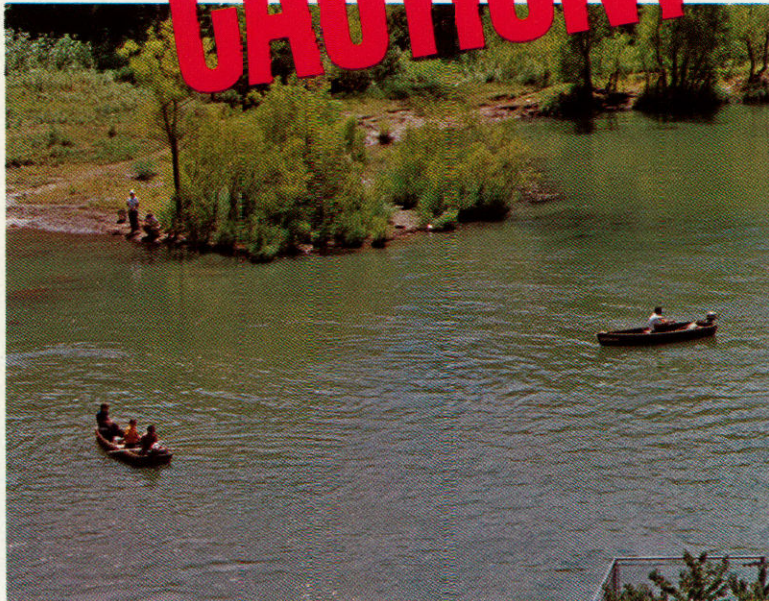
At summer's end the group of sun-browned students return to college life with memories of a very happy summer and realize that they have participated in worthwhile conservation projects. \* \*







# CAUTION:



## catfishing can be habit forming

by  
Neal Cook

**CATFISHERMEN** are some of the most dedicated outdoorsmen in the State. They spend many sleepless nights on cold river banks, slapping mosquitos, drinking coffee, and waiting for the next time to run their lines. They try every method of catfishing they hear about, and almost every catfisherman has his secret formula for "stink-bait."

Catfishermen try their luck from boats or the bank; use heavy saltwater rods and reels, light spinning tackle, or cane poles; float lines attached to jugs down the river; throw handlines out; and stretch trotlines across their favorite fishing spots. They will use anything, alive or dead, for bait.

There are three species of catfish found in Texas that are important to most fishermen — channel, blue, and flathead catfish. Channel cats, also called spotted cats, fiddler cats, or barbed trout, account

for the greatest number and poundage of all catfish in Texas. The average weight of channel cats caught is between two and five pounds, with a maximum of about 30 pounds. They have a forked tail and 24 to 29 rays in the anal fin. Channel cats are found almost statewide in both lakes and rivers.

Blue catfish are the largest of Texas' catfish — reaching over 150 pounds with many caught each year weighing from 25 to 50 pounds. They have a forked tail and 30 to 35 rays in the anal fin. Blues are not as wide ranging as channel cats, but they are found in large numbers in most larger streams and lakes, especially in large rivers near the coast.

Flathead catfish, also called yellow cats, Opelousas cats, shovelhead cats, and mud cats, are found throughout the State. The maximum size of these fish is about 100 pounds. The tail of flathead catfish



# CAUTION:

## catfishing can be habit forming

is rounded, and there are 12 to 15 rays in the anal fin. While other catfish will eat almost anything, flathead catfish usually eat only live food.

Fishermen sometimes catch catfish on a plug, spoon, jig, or plastic worm, but this is not the usual bait for catfish. Worms, frogs, crayfish, minnows, shad, or small sunfish make good bait for catfish. Cut bait is about the easiest to use. It can be small pieces of almost any fish, bird, or animal. Pieces of chicken, beef, or pork — flesh, liver, heart, or kidney — are good, as are shrimp and crayfish tails. Other good baits are soap, cheese, dried blood, and either homemade or commercial stink-bait.

Many rod and reel fishermen try their skill in the fast water below dams in the spring and summer. They go after catfish that move up the river to feed on the abundant food found in these waters. To fish this water most people use heavy tackle with about a 70-pound line. A sinker weighing from four ounces to a pound is used and usually the line is allowed to slide freely through the sinker. This keeps the drag down and the fish will not drop the bait as often.

Jugging on the big rivers is another favorite method for catching cats. Lines are baited and tied to sealed plastic bottles, jars or blocks of wood and set adrift in the current. The fisherman follows the jugs in his boat and when one of the floats begins to bob or drift differently from the others, he knows that it is time to ride over and land another fish.

Throw lines are used in some small rivers and streams. The fisherman uses a strong line and ties a heavy weight on it. To the line are attached several short lines with hooks and small sinkers. After tying one end of the line to a tree or stake on the bank, the fisherman throws the weighted end into a likely looking spot and leaves it for several hours. This method causes some problems because the weight sometimes gets tangled on the bottom, and since the hooks are kept near the bottom, they often catch on obstacles.

Drop lines are also used in small rivers and streams with better results than throw lines, but a boat is necessary for this method. Finding a low limb over the water, the fisherman ties a line to it.

Drop lines can have one or more short lines attached to them for more hooks and a swiveled weight should be on the bottom. Some people attach a cow bell or some other small bell to the tree; when a fish pulls the line he rings the bell, telling the fisherman that there is something on the line.

These methods are often successful for catfishermen, but usually when people mention catfishing they mean trotlining. This method is most often used by commercial fishermen and trotlines usually account for the largest fish. Trotlines are basically long, heavy lines stretched across a favorite fishing spot with shorter lines (stagings) spaced at intervals along them.

The number of trotlines and hooks allowed by law varies from county to county and within counties, so a fisherman should check the regulations before he puts out a line. Trotlines should never be placed in the vicinity of a public boat dock or any place used for swimming.

Good trotlines can be bought to save the time and trouble of making one. But if a homemade line is preferred, use 300- to 400-pound test line for the main line and about 150-pound test line for the stagings. Attach the stagings about every four feet and use 3/0 to 6/0 hooks.

Placing a trotline is often the biggest problem facing the catfisherman, and the placement of one varies from season to season and with the type of water to be fished. As a general rule, beginning trotliners will have some luck with their lines running parallel to the shore, across streams flowing into rivers and in the bend of a river where the current is cutting into the bank. In small bodies of water the line can be strung from one bank to the other with a weight to hold the middle down. For larger lakes it is often necessary to attach a weight to one end of the main line, lower it until it touches the bottom and attach a float. Then let out the line and repeat the weighting and attaching the float. The weights should be large enough to allow you to pull the boat along the line.

Trotlines can be baited with any of the baits mentioned. It is best to wait until dusk or after dark to bait the lines since the large catfish are more active then. Trotlines should be checked about every three hours to remove the fish and re-bait. A large landing net is very helpful when landing any size catfish and may save the fisherman from being stabbed by the catfish's sharp spine. Lines should be run about dawn since the light is believed to scare a hooked fish and make him try even harder to get off the hook.

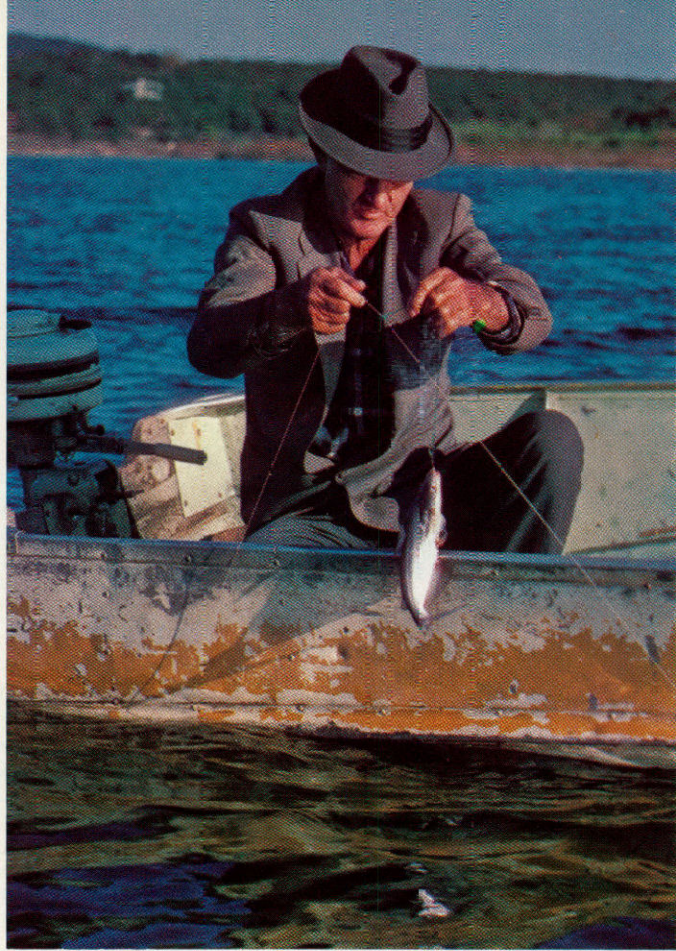
Any of these methods is good for catching catfish, but novice fishermen should try several until they find one they like. If you have never tried any, find a lake or river known for its catfish, brew a big pot of coffee, choose a method and spend the night hoping for the big one that will fill the freezer with catfish steaks. \*\*



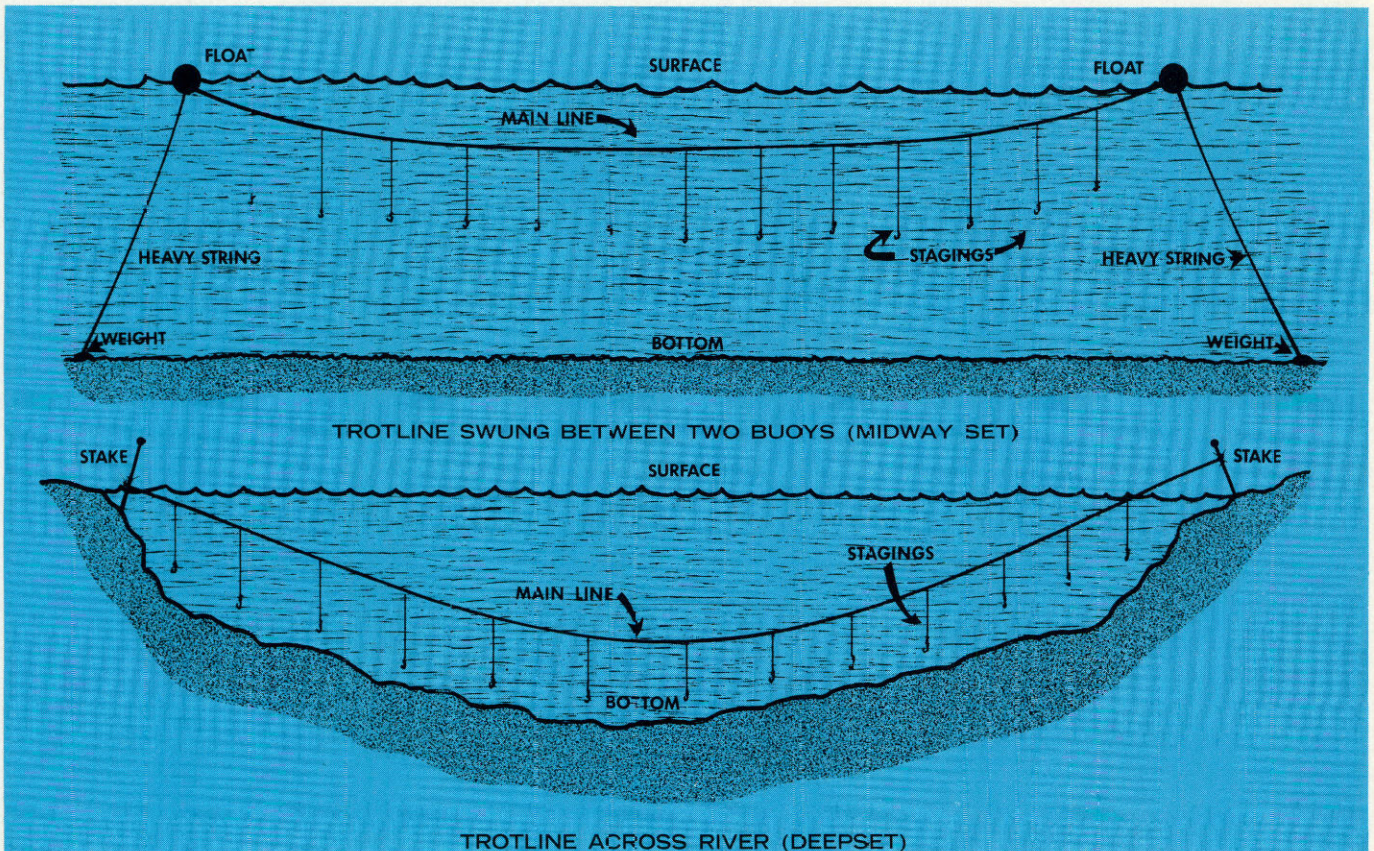
Leroy Williamson



*There's nothing like a good catch; however on occasion trotliners pull up the unexpected.*



Reegan Bradshaw





# Outdoor Books



**THE POLLUTION READER** compiled by Anthony De Vos, Norman Pearson, P. L. Silveston, and W. R. Drynan; Harvest House, Montreal, Quebec, 1968; 264 pages, \$3.50.

Reports from 40 prominent workers in the pollution field are combined in *The Pollution Reader* to present a detailed study of pollution and its effects on all features of society. Although written about Canada's pollution problems, the general situation is not so removed from the United States that it would not be of interest and value to most Americans. All pollution problems have one thing in common: they must be solved in order that life in future generations will not be handicapped or destroyed.

The theme of the book concerns pollution causes and prevention. The book could be found very stimulating by those directly associated with the field, but an insight into pollution problems for the average reader can be found in less technical literature.

Pollution is everyone's problem, and therefore, everyone should look to some

source in information to become better informed on the subject, whether it be in a detailed study is afforded by *The Pollution Reader* or in some other less extensive study. — *Wanda Freytag*

**OUR VANISHING WILDERNESS** by Mary Louise Grossman, Shelly Grossman and John N. Hamlet; Madison Square Press, Grosset and Dunlap, Inc., New York, N. Y., 1969; 324 pages, \$14.95.

Much has been written imploring man to curb his destruction of the wilderness and its inhabitants. However, seldom has the plea been more desperate, more appealing to the emotions and rationale of man than in the rhetoric of *Our Vanishing Wilderness*.

Transmitting the grim message implied by the title, the authors present a well-researched, pictorial, timely and impartial lesson in geology, ecology and conservation. Each page reveals the intricacies which contribute to the grandeur of nature. Shelly Grossman's collection of 275 original photographs is a

tribute to nature and a monument to his skills.

The book dwells on the physiology and mentality of birds, mammals, insects, spiders, snakes and amphibians. It provides a study of the sensitivity of the creatures of nature to changes in climate and environment and their ability or lack of ability to adapt to change.

The reader realizes how changing tides, prevailing winds, temperatures, pollutants and radiation affect wildlife. He becomes aware of the effects of the sea on the coastline and the results of imbalance in nature's communities. He learns the beneficial role that controlled forest fires play and discovers the use of algae as a future diet.

With each artistic stroke of the pen and snap of the shutter, the authors communicate the sensuality and beauty of nature. Projected is the interrelationship between fauna and flora and the coexisting role man must play if nature is to survive. Deep concern and emphasis is placed on the ecological implications brought about by progress.

"Man must not upset the delicate adjustments that have evolved over thousands of years between plant and animal, parasite and host, predator and prey."

The authors contend that when using progress as an excuse to clear the land of its forests or to dispose of industrial wastes in our waterways, man should remember that the advancements of today should not entail the destruction of tomorrow. Carelessness, not only in the use of the atom, but in the use of land, waterways and pesticides, can destroy the world.

## TEXAS PARKS & WILDLIFE

Send check or money order to:

TEXAS PARKS & WILDLIFE DEPT.  
John H. Reagan Bldg., Austin, Texas 78701

Check one

RENEWAL

Paste your last magazine address label into space indicated and mail with payment.

CHANGE OF ADDRESS

Paste recent magazine label into space indicated, show change on form and mail.

NEW SUBSCRIPTION

Fill out form at right and mail with payment.

GIFT SUBSCRIPTION

Show recipient's name and address in form, indicate gift signature and mail with payment.

CHECK ONE

1 yr. \$3.13 incl. tax  2 yrs. \$5.21 incl. tax

Out of U.S. (except APO and FPO)  1 yr. \$4.  2 yrs. \$7.

Attach recent magazine address label here for renewal or change of address.

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_

Zip Code \_\_\_\_\_

Sign Gift Card

**A RECREATION BARGAIN**

**Annual \$12 state parks entry permit is your year-round passport to outdoor recreation.**

Available at all state parks.



The book gives a fair coverage of all sides — between man and progress, and man and nature. To some extent *Our Vanishing Wilderness* restores faith in mankind and his great technological machineries. The reader is given hope that the same technology can be used to detour and stop the regression of the wilderness, as well as the destruction of food chains and water and other ecological cycles. Much is in the process of being planned, but the authors believe it must be *set into action now*. Further delay can only hasten the vanishing wilderness.

— Wanda Freytag

#### BIRD DOGS

Chandler Kennels, one of the largest in the business offers to you for your selection over 100 top trained POINTERS, SETTERS & BRITTANIES. These dogs are all registered out of top blood lines. We guarantee all our dogs as advertised to suit you, the Hunter. Also puppies & started dogs.

Call, write, or come by:  
**CHANDLER KENNELS**

P. O. Box 1011, La Porte, Tex.  
Call: Area Code 713-GR 1-4023  
Hollen Chandler - Owner

**NOW Set or Take up Trotline in 5 Minutes!**

**BOOKLET ON HOW TO 20 PAGES**  
*Catch em!*

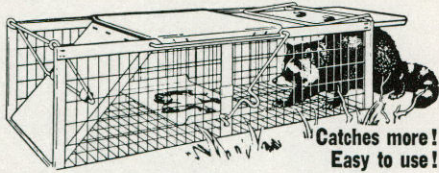


**"TROTLINE FISHING SECRETS"**... written by experts.

How, when, where to set trotline, illustrated. Baits laws, tackle. Send 25¢ for mailing cost.

LAWRENZ MFG. CO., DEPT. T, P.O. BOX 3837, DALLAS, TEX. 75208

#### CATCH ANIMAL RAIDERS!



**Catches more!  
Easy to use!**

Simple, safe HAVAHART traps catch raiding rabbits, coons, squirrels, pigeons, sparrows, etc., without injury. Straying pets, poultry released unharmed. No jaws or springs to break. Galvanized; many in use 20 years. Open ends give animal confidence. Sizes for all needs. Write for valuable illustrated guide and price list.

**HAVAHART, 149T Water St., Ossining, N. Y. 10652**

Please send new guide and price list.

Name \_\_\_\_\_ Zip \_\_\_\_\_  
Address \_\_\_\_\_



**HUNT  
EXOTIC  
AFRICAN  
MOUFLON  
SHEEP**

**NEW THRILLS** for hunters in Texas! Our imported wild African Sheep make exciting trophies. Season open year 'round, no bag limit. Bucks and ewes. Late winter is ideal. Excellent accommodations nearby. Modest rates. Be first in your area. **WRITE TODAY for INFORMATION—don't delay.**

**BURNHAM BROS. RANCH**

P. O. Box E-17-S Marble Falls, Texas 78654

# Long Shots, Short Casts

compiled by Neal Cook

**Forbidden Detectors:** The National Park Service recently prohibited the use or possession of mineral or metal detecting devices of all kinds in areas under its jurisdiction. It seems that many battlefields and other historic sites were being mined of all their metallic artifacts by hobbyists and professional curio hunters.

**Amazing Adaptation:** Most bats feed upon flying insects such as moths and mosquitoes by using echoes from their high-pitched squeaks to guide them. A certain type of moth has "ear"-type organs that enable them to hear the bats squeak and help him avoid being eaten. These moths are infested with a tiny mite that gets in their "ears" and deafens them. Since, in this case, a deaf moth could very easily be a dead moth, the mites are generally found in one ear of each moth.

**Home and Afield:** A Colorado Game, Fish, and Parks Department report shows that six persons were killed in gun accidents while hunting big game last season. Seven persons died during the year from falls in bathtubs.

**Another Adaptation:** Birds have many shapes of eggs, from almost perfect circles to cone-shaped, depending on the environment. An example is the case of oceanic birds that lay their eggs on bare, rocky ledges high above the water. The eggs of these birds would roll off and be smashed if they were round. Instead, they are sharply pointed at one end and broad at the other end, like a top. Because of this shape they roll in a small, tight circle.

**Didn't Study:** City officials in Grand Forks, N. D., forgot to do their homework last summer before they began to spray for mosquito control. The same day that helicopters began spraying insecticide in that city, dead birds began to be found. Soon, over 5,000 beneficial, resident and migratory birds were found dead. The insecticide used for the mosquito control in North Dakota is used in Africa for bird control.





# tyler

state  
recreation  
park

by Robert Sinclair Information Officer, Tyler

**TYLER** State Park has been developed by the Parks and Wildlife Department into a colorful recreational area second to none in the State. Over one-half million dollars of State and Federal funds have been used for new construction and renovation during the last six years. Visitors who have not been to the park recently will find many pleasant surprises awaiting them.

Tyler State Park is located approximately 10 miles north of Tyler. Interstate Highway 20 passes between the 994-acre park and the northern limits of Tyler. The excellent highway system in the northeastern section of the State makes the park easily accessible from all directions and within a couple of hours drive from Dallas, Texarkana or Lufkin. Nearly a quarter million persons visited the park during 1968, some from as far away as California, New York and several foreign countries. This visitation total is more remarkable in view of the fact that the park was undergoing major development during this period.

A flood in September 1963, resulting from a







*The rich beauty of Tyler Park brings campers, boaters and picnickers from all over the State.*







Robert Sinclair

break in the park dam, inflicted considerable damage downstream. However, it also started six years of progressive and profitable change.

Immediately following the break in the dam Texas Parks and Wildlife Department officials surveyed the situation. After a series of meetings between Tyler civic leaders and Department personnel, plans were made to restore the dam, originally constructed by the Civilian Conservation Corps in the mid-1930's, and to improve the overall park site. Actions taken to enhance the long-range recreational value of the park included planting the lake bed in rye grass to provide an indirect food supply for fish to be restocked.

Draining the park's lake was perhaps a blessing in disguise, at least to fishermen, since the sunlight and air which penetrated the soil of the lake bed released fertility elements otherwise unobtainable. Prior to the complete refilling of the lake, over 100 tons of agricultural limestone were distributed over the lake bed to buffer the rising acid waters and promote growth of plankton (microscopic organisms) as a food supply for hatchery bass. Several thousand channel catfish were stocked in 1965, following 23,000 black bass released in 1964.

Present facilities in the park include 30 trailer sites complete with electrical, sewer and water connections. In addition, 35 modern screened shelters are scattered throughout the park in small clusters. A spacious group camp will accommodate up to 100 persons, making it ideal for family reunions, scout groups or club outings. This group camp is screened with an enclosed section housing efficient cooking and serving facilities.

In a sylvan semicircle adjacent to the group camp are six screened shelters which may be used individually or in conjunction with activities involving the larger building. Conveniently located near each separate shelter and picnic site is a modern cooking grill. For those who prefer their food "ready-made" a concession to be in operation in the spring will provide light lunches, snacks, candy and soft drinks. The building will also offer a large patio for dancing or just visiting. Four tiled restroom-shower buildings are strategically located throughout the park. A new headquarters building has recently been constructed near the park's main entrance on Farm-to-Market Road 14.

A trail has been developed for those who enjoy getting a close-up view of nature. Another trail for



*A break in a dam may bring major changes in the ecology of an area. Entire species of wildlife may leave the area, and others may arrive. In some cases, change may be for the better.*



those interested in combining hearty exercise with sightseeing is available for hikers.

Fishing is excellent. Strings of black bass and "brim" (sunfish) are caught regularly. Also channel catfishing is good. Rental boats are available or individuals may bring their own motors up to 12 horsepower. An excellent boat ramp is provided. Other water-oriented activities include swimming, canoeing or taking one of the "paddle" boats for a leisurely trip around the scenic shoreline. Water skiing is not permitted because of the lake's relatively small size.

Among the towering pines, stately red oaks, hardy blackjacks, showy dogwoods and redbuds and an endless variety of other tree and shrub species, those interested in wildlife can find almost every kind of game and non-game species found in Northeast Texas, including an occasional white-tailed deer. The Tyler Audubon Society has recorded 272 species of birds within the country and many can be seen within the park.

Tyler State Park offers the visitor a refreshing change of pace. Excellent facilities, friendly and courteous personnel and superb scenery are but a few of the park's many attractions.

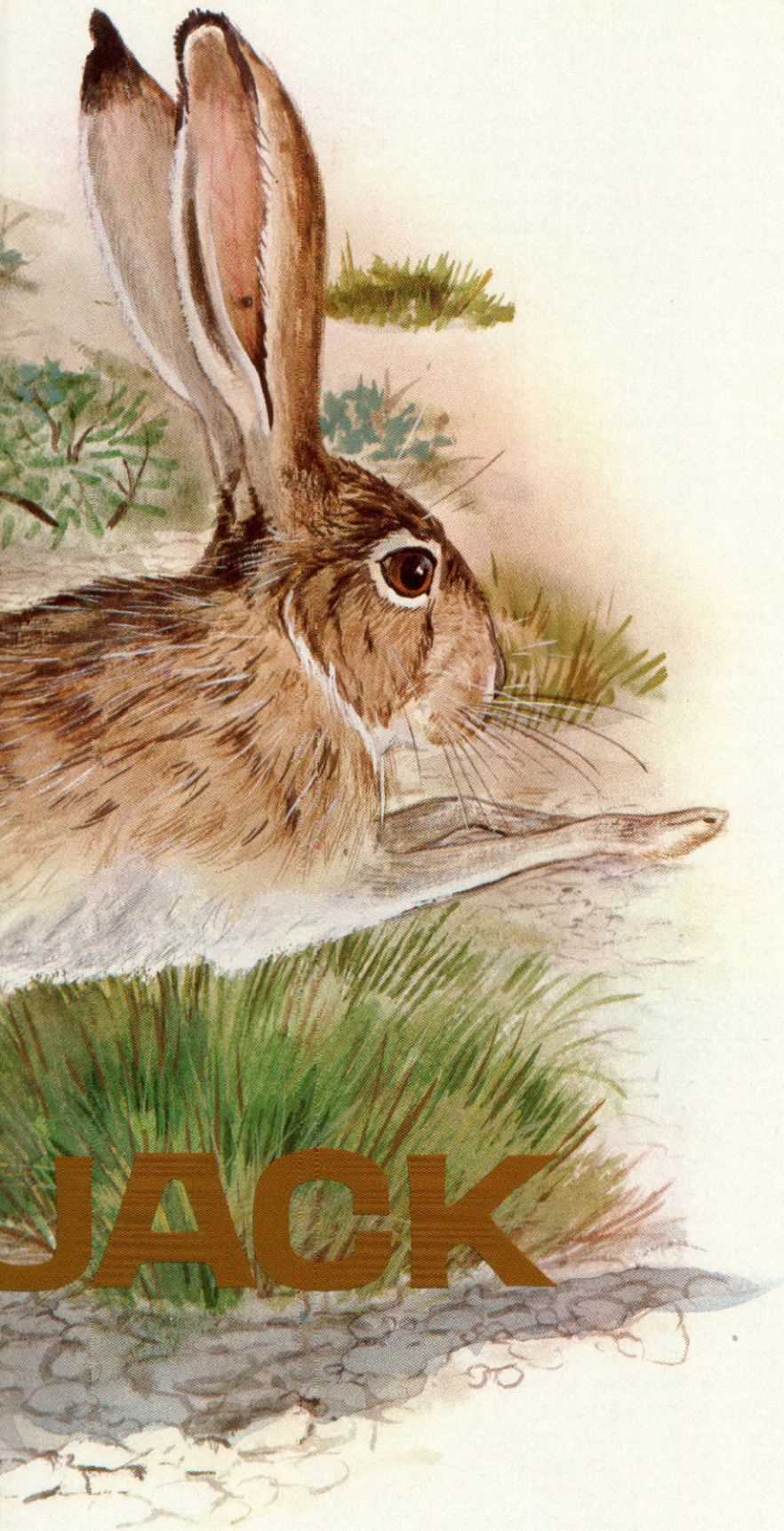




# JUMPING

McGowan





by W. R. Long  
Information Officer, San Angelo

**OUR** common jackrabbit is not a rabbit at all. It's a hare. Distribution of the black-tailed jackrabbit, *Lepus californicus*, is statewide with the possible exception of a few counties in deep East Texas.

One of the most prolific of all mammals, the jackrabbit has many unusual and interesting characteristics. The difference between hares and rabbits is seen in the nests they build and the physical condition in which their young are born.

Jackrabbits use, at best, only a shallow depression in earth or vegetation for nesting purposes. No nest is built and the births may occur some distance from each other. The eyes of the young are open, teeth are forming, and the body is fully furred. Within moments, young jackrabbits are able to nurse and are capable of hopping about.

True rabbits such as marsh rabbits and cottontails deliver their young in a sheltered, fur-lined nest. The tiny young are born practically hairless, eyes closed, no teeth, and are totally dependent upon the mother for survival.

Well-known over the portion of the United States south of Wyoming and west of Iowa the Texas jackrabbit—a close relative of the North American white-tailed and white-shouldered jackrabbit species—is grizzled-gray in color and has long, black-tipped ears. The distinguishing mark is the white tail with a black patch on top. Underparts and hind feet are white.

Equally well-known in some counties is the periodic jackrabbit population explosion, sometimes to the saturation level of the habitat. In cases where population density may reach 400 animals per square mile there is significant



competition with livestock interests. However, black-tailed jackrabbits usually do not become numerous enough to seriously damage ordinary pasture lands.

While conditions may vary with habitat, approximate competition figures indicate that 61 jackrabbits will consume as much range vegetation as one cow, or 17 will eat as much as one adult sheep.

Despite years of work by biologists, this "population cycle" is not well understood, but it does appear that the phenomenon reaches a peak every seven years, usually followed by a mysterious disappearance of the vast hordes of jackrabbits during the following year.

Enemies of the big jack take a heavy toll. Most biologists agree that predation, parasites and disease allow few, if any, of the species to die of old age. Coyote, fox, weasel, badger, bobcat, and other carnivores prey heavily upon both juvenile and adult. Many large birds such as owls, eagles, and hawks use them for food. Many parasites are deadly also; among them are fleas, lice, ticks, tapeworm, roundworm, and a fly species that leaves huge larvae, called "warkles." Among diseases affecting the jack is tularemia, dangerous to both animal and man.

Vital factors in eluding enemies include long distance running, or short bursts of speed. Jackrabbits have been clocked at speeds up to 45 miles an hour. Most dog owners agree that nothing with less speed than a greyhound is capable of catching a healthy, mature jack. It is well known that both coyote and fox usually depend upon strategy and wits to supplement speed when trying to outmaneuver an escaping hare.

But speed is not the only protection offered by nature. Large brownish or amber eyes are quick to detect even slight movement at long distances. The nose, alert for the smell of potential danger, quivers almost constantly. The acute sense of hearing allows the jackrabbit to pick up the slightest

noise of a footfall, or even hear the soft scrape of a furry body against brush or tall weeds.

Protective coloration as camouflage is also important in escaping detection. It is not at all unusual for a jackrabbit to lie close to the ground, ears flattened against the head, body completely motionless. The animal may allow an intruder to almost step on it before it bursts out and takes flight.

Jacks, active in the evening and night, feed extensively upon leaves of perennial plants which spring up immediately after winter rains. During the arid months of May and June, the animals may turn eagerly to barks and more woody plants.

Preferred food is a wide variety of grasses and herbs, and as long as this type of vegetation is available it is used exclusively.

Usually the succulent and tender sprigs are selected and the older, drier parts ignored. Because of his appetite for hay, clover, alfalfa, and a variety of irrigated plants, he is a pest to farmers.

Buds, leaves, fruits, twigs, barks, and even the roots of numerous trees and shrubs are worked into the diet at various times of the year. Among the favorites are greasewood, rabbitbrush, atriplex, mesquite, catclaw, palo verde, sagebrush, willow and such cacti as cholla, pincushion, and prickly pear.

Like most herbivores, jackrabbits must have minerals. As do deer and cattle, they often have a favorite spot or lick where they will eat soil and gravel. In some instances, research has shown the stomachs of jacks contain as much as 50 percent soil.

Breeding season in Texas extends from about December to September. Each year the female will produce from two to four litters of one to six.

While numbers may vary, the average is about 10 young per adult female each year.

During breeding season there is normally considerable rivalry between males. Mature bucks have

been observed standing on their hind legs sparring and boxing, trading blows with fast, hard precision.

When competition is especially heated and the bucks resort to using the powerful hind legs with sharp claws for direct body blows, often one or the other will not survive the combat.

Both sexes appear to be completely promiscuous. Gestation is 41 to 47 days. The young are five to eight inches long and weigh from two to six ounces. It isn't at all unusual for one offspring to be twice the size of a brother or sister from the same litter.

Shortly after the initial feeding is concluded the mother covers each infant with fine grass or with soft fur scraped from her own body, then retreats to a shelter or "form" (a slight depression in the ground) where she is able to keep a watchful eye on the newborn. Within a week or so, the young are independent of maternal care; they reach adult size and sexual maturity in seven to eight months.

While overpopulations are not desirable, jackrabbits in reasonable numbers are an asset. They serve as a "buffer species" between predators and both game and livestock.

Hare pelts bring little money, but are easily obtained in numbers and when properly processed, may be converted into serviceable garments or into trim for various types of clothing and accessories.

The meat isn't exactly a gourmet's delight, but is certainly edible provided it is well-cooked to destroy the possibility of tularemia (rabbit fever) bacteria.

One asset of the black-tailed jackrabbit is the economic and recreational value of this long-legged, long-winded, pasture-dweller. Most ammunition companies have decided that the majority of the ammunition dollar is spent for hunting rabbits of some type and the jackrabbit is high among the desirables. The jackrabbit can presently withstand



heavy hunting pressure with a minimum of ill effect on the population, thus furnishing countless hours of outdoor recreation and hunting sport.

Probably no species of animal — man included — is all good or all bad. In weighing the jackrabbit pro and con, most of us would sorely miss this non-game but highly important mammal of the Southwest. \* \*

## YOU'RE THE SOLUTION TO WATER POLLUTION

Answers to Tutor Topics from page 31:

1-c 2-h 3-d 4-i 5-b  
6-g 7-a 8-f 9-j 10-e

## VARMINT CALLING TAPES



**NOW!**  
ORDER TODAY  
Post paid

Exciting Action! 23 different authentic game calling tapes for portable recorders. **Results Guaranteed.** Young rabbit 3" reel \$2.95 — 5" \$3.95. Auxiliary speakers avail. **Write for FREE CATALOG.**

All electronic callers available  
BURNHAM BROTHERS, E-17R Marble Falls, Texas 78654

## RAW FURS WANTED

For highest prices bring or ship your furs to:

**ROBERTS AND PICKLE FUR CO.**  
Rt. 2, Box 160  
Leander, Texas 78641

## TEXAS TRAPS



## LIVE CATCH TRAPS

Catch without injury. Coons, Squirrels, Opossum, Mink, Chipmunks, Skunks, Quail, Pigeons, Fish, Crabs, Pests. Simple to operate. Last a lifetime. Thousands used by US Government in Vietnam. Prices from \$4.95 up. Send no money. Write for Exciting FREE details.

**TEXAS TRAP FACTORY**  
Beacon Hill P.O. Box 5066-TW  
San Antonio, Texas 78201

**NEW!** Model T-1  
**BURNHAM Cartridge Tape CALLER**  
lures wild predators **UP CLOSE!**

You'll go for this! Easy to use. Just "plug in" tape cartridge — watch varmints come! Predators to crows. Each cartridge has 2 calls. Self-contained. Plays hours on 12 ordinary flashlight batteries (included). Special "Critter" Speaker, Cord, one Cartridge Tape. Superb value, ppd. only \$119.95.

**MONEY-BACK GUARANTEE. Send for FREE CATALOG!**

## BURNHAM BROTHERS

P.O. Box E-17-C Marble Falls, Texas 78654



WILD CORSICAN RAM

## GUARANTEED HUNTING!

### EVERY DAY of the year!

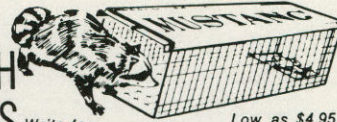
Famous "No Deer - No Pay"® guarantee for exciting exotic trophies from four continents. Ranch transportation and guides furnished; meals, lodging available. **NO SPECIAL LICENSES REQUIRED!** Hunt to-day—any day—at the Y.O.!



# Y.O. RANCH

Mountain Home, Texas 78058 - Box 220  
CALL: 512 - 654-2076

## LIVE-CATCH TRAPS



Write for FREE CATALOG

Low as \$4.95

Traps without injury squirrels, chipmunks, rabbits, mink, fox, raccoons, stray animals, pets, etc. Sizes for every need. Also traps for fish, sparrows, pigeons, turtles, quail, etc. Save on our low factory prices. Send no money. Write for free catalog and trapping secrets. **MUSTANG MFG. CO.** Dept. N-37 Box 10880, Houston, Tex. 77018



## Plan now for 1970 Alaska & Africa hunts

Call or write for free complete information on these and other exciting hunts with personally selected and recommended guides, outfitters and resorts. You'll want to reserve early to be sure of a spot. (Or check with us for possible last-minute cancellations.)

**WAYNE PRESTON, INC.**  
Travel Representative  
3444 Northaven Road  
Dallas, Tex. 75229  
(214) 358-4477



## NEW LEHMAN AUTOMATIC FEEDER FISHermen — HUNTERS BIRDWATCHERS

1. New 24-hour 4-jewel movement.
2. Feed one or more times day or night any selected time regularly unattended.
3. Distributes 6 oz. or several pounds of feed 25 to 75 ft.—depending on installation height. Install suspended—or on pipe legs.
4. Operates on 6 volt dry cell — 2 to 6 mos.
5. Capacity 250 and 1,000 lb. sizes.

WRITE FOR FREE BROCHURE

## LEHMAN EQUIPMENT CO.

Route 3, Box 53, Corpus Christi, Texas 78415







**Blue Crab  
Industry  
Expands**





*Texas' growing crab industry employs many people along the coast to catch, prepare, and market the delicious meat*

by  
T. L. Heffernan  
Coastal Fisheries Biologist

**FROM SABINE LAKE** to Laguna Madre the coast is the scene of an old but recently rejuvenated industry — the commercial blue crab fishery.

Prior to 1960 Texas' commercial blue crab fishery was a haphazard operation with little chance to develop into the multimillion dollar business it has become. In 1962 a combination of available crabs, available fishermen, and good market conditions resulted in a record harvest of 4.5 million pounds of live crabs. This peak year established a fishery which from 1962 through 1968 averaged over 3 million pounds of live crabs per year. Landings in

1969 set a new record catch of over 5 million pounds.

Most people's contact with a blue crab has been a serving of deviled crab meat on an aluminum simulation of a crab shell. However, catching and processing blue crabs and the preparation of the meat to be used in the deviled crab is complex and interesting.

In obtaining the crabs, fishermen use two basic items: flat-bottomed motor skiffs and crab pots made of chicken wire. The crab pot is box-like, generally with two openings through which crabs can gain entrance to the bait located in the center of





the trap. Once the crabs get inside the trap they find the bait protected by a small cage and their exit prevented by a funnel of wire at each door similar to the openings of a common minnow trap.

In 1969 there were an estimated 150 crabbers fishing in Texas bays. About 90 of these crabbed full time and the others fished part time or for short durations.

The number of pots each fisherman uses varies with the individual, but the full-time fisherman generally uses over 200. The crabber places the baited pots on the bay bottom and checks them at daily intervals if weather permits. They are marked with white gallon plastic jugs or other floats attached by a rope which is used to pull the trap up for emptying. These traps can be opened on the outside to remove the crabs and replenish the bait, which is usually meat scraps or non-commercial fish.

When the crabs are removed from a pot they are placed in a large wooden box and covered with wet burlap. They will remain alive in these boxes for several hours or even days, depending on the temperature.

Each afternoon the day's catch of live crabs is brought into the crab house to be cooked. This cooking process varies with each plant, but the two basic methods are boiling and steaming for not less than 20 minutes. This thoroughly cooks the meat and kills any bacteria.

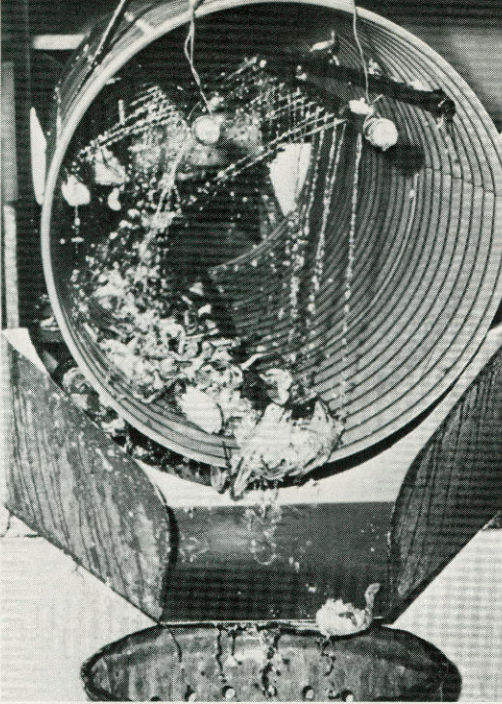
They are cooked live because the hard shell insulates the inner parts from quick cooling and the meat is in close conjunction with the digestive system. This physical makeup would cause spoilage if the crab were to die prior to the cooking-sterilization process.

The crabs are removed from the cooking pot, allowed to thoroughly drain, and are placed in a cooler. After the crabs are cool enough to handle, the "backing" crew goes to work stripping the claws, legs and back from the crab body. The bodies are then hand cleaned or tumbled to remove the internal organs and gills. This leaves cleaned lump meat and the claws. These are again cooled before the final picking phase.

In the picking room the cleanliness and speed with which the pickers remove the meat from the bodies are most evident. The pickers are paid by the pound of picked meat, and no motion is wasted in removing the white crab meat from the chambers of the bodies. Swift hands trim the edges of the inner skeleton and the meat is deftly removed and sorted by grade. The large pieces are graded as "Lump" and the smaller called "Flake" or "Special."

The claw meat is given two grades, "Claw" and "Cocktail." The "Claw" is mostly meat from the second segment of the claw and "Cocktail" is meat from the pincer with a portion of the finger attached for dipping purposes. It takes about seven pounds of live crabs to produce one pound of picked meat.





*Blue crabs are cooked alive to prevent spoilage, and then their backs, claws, and legs are removed. The crab bodies are then tumbled and washed clean and given to the pickers for them to remove and grade the crab meat.*

The containers full of meat are then taken to the packing room where they are weighed and capped. From the packing room the containers are placed in cold storage to await shipment by freezer truck or air freight to their final destination. It has been possible through the air freight system to have a crab meat cocktail in Chicago from crabs that were caught in Matagorda Bay in Texas less than 24 hours before. The average time from catch to retail is about 48 hours.

The State Health Department is charged with the responsibility of inspecting and licensing approved crab plants. To be sold in Texas crab meat must be produced by a licensed plant. Each container of crab meat from such a plant bears the Health Department's designated license number for that approved plant.

Commercial blue crab production in Texas for 1969 has a projected value of \$500,000 to the fishermen and \$2,600,000 at the wholesale level. Retail and restaurant sales increase this value. The crab fishery is just beginning to realize its actual potential and a record year can be obtained with just moderate fishing pressure. Crab abundance does fluctuate from year to year, but stable production has been observed in Galveston and Matagorda bays since 1962.

The most important criteria for consistent crab production are rainfall and river flow. Crab populations fluctuate with the rise and fall of precipitation along the coastal areas of Texas. This is extremely critical in the Aransas and Corpus Christi

bay areas where salinities are greatly increased by a reduction in local rainfall.

In 1963 and 1964 drought conditions in the Aransas Bay area increased salinities to higher levels than the Gulf of Mexico's 35 parts per thousand salinity (ppt). As salinities rose above 25 ppt crab production and the numbers of juvenile crabs declined. Crab fishermen who had previously worked the Aransas Bay area moved into Matagorda and Galveston bays. Production for the coast remained over 2.5 million pounds with the Galveston Bay area producing most of the crabs landed. The constant flow of the Trinity River is a major factor in the consistency of the Galveston area.

Hurricane Beulah changed the salinity pattern on the lower coast drastically when it struck the Brownsville area in September 1967. This hurricane produced a tidal influx that inundated 630,000 acres of low-lying coastal areas, but more important, rains associated with it created flood conditions from the Lavaca River Basin to the Rio Grande River. Rainfall in South Texas ranged from 10 to 30 inches during a nine-day period.

The benefits of this fresh water were evident during the following spring when a substantial increase in the number of juvenile crabs was noted from Aransas Bay to the lower Laguna Madre. Adult crabs were also more numerous and landings began to increase. Production from San Antonio and Aransas bays was 632,012 pounds of live crabs in 1968. Production in the Baffin Bay area of the upper Laguna Madre totaled 74,850 pounds for October through December 1968.

Production figures continued to rise through the 1969 season with San Antonio and Aransas bays the leading areas on the coast but with the Baffin Bay catch declining as salinities increased.

Two other factors affecting blue crab production are the shrimp fishing and the reproduction cycle of the crabs. The effect of the more profitable shrimp fishery is felt mostly during periods of peak bay shrimp production because many crabbers forsake their pots for a few weeks of shrimping.

The spring and summer migrations of sponge crabs (a female crab with egg masses, protected by law) affect production in the bays adjacent to the passes which connect the Gulf of Mexico and the bays. When the female develops the egg mass on her abdomen, she seeks the salty waters in or near the Gulf of Mexico to hatch the young crabs. These females are easily caught in the pots and the fishermen are forced to move their lines or quit fishing until the migration is over.

It is anticipated that the crab industry in Texas will continue to prosper as more fishermen find a profitable future in the fishery and expanded markets for crab meat products are developed. The fishery in Texas is far from reaching its maximum potential and higher record years of Texas blue crab production are yet to come.

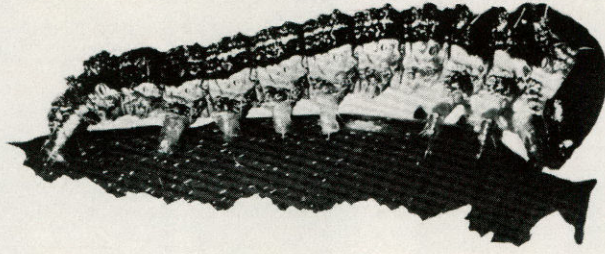
\*\*







# CATERPILLARS...



## Appetites On The Move

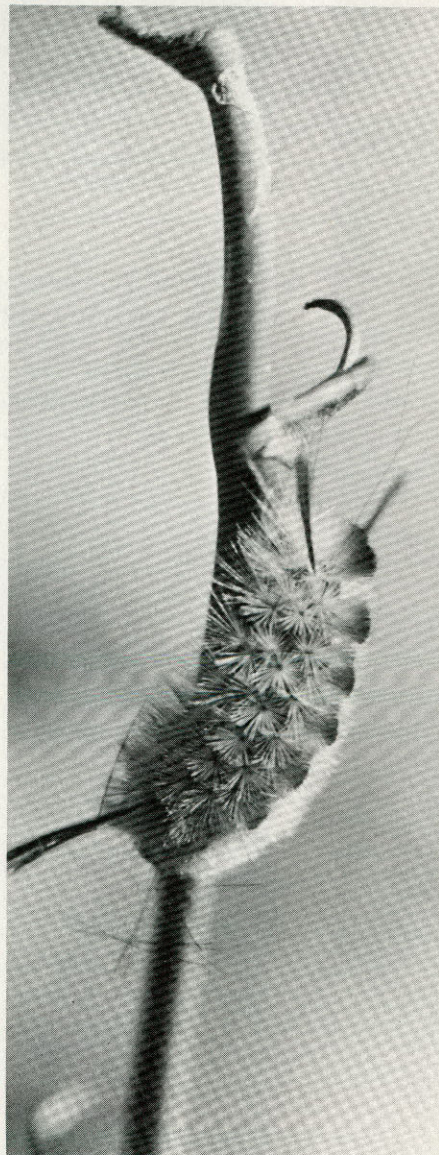
by  
Patti Swain

**IMMEDIATELY** upon emerging into the world, the caterpillar begins his life's task — eating. In fact the first act which both moth and butterfly larvae perform in their voracious existences is devouring the shells from which they hatched.

As a larva grows, his insatiable appetite causes him to build up large stores of food for the pupal or resting stage and later the adult. To accommodate a larger food intake, the caterpillar sheds his skin periodically. With each molt he changes size and often color.

The caterpillar, like other insects, has three distinct body regions: the head, thorax, and abdomen. On the head are two semi-circles of ocelli (tiny eyes), a pair of antennae, a small labrum (upper lip), and a pair of palpi (feelers). Of special importance to the caterpillar's function are the strong mandibles (biting jaws). Silk glands are on a projection called the spinneret on the labium (lower lip).

Each of the first three segments



Reagan Bradshaw

of the thorax bears a pair of jointed legs with claws on the end. On the third, fourth, fifth, and sixth segments of the abdominal section is a pair of prolegs, each with minute hooklets at the end. The tenth and last abdominal segment bears another pair of legs, the anal prolegs. In some larvae, the legs are little used, and the animal propels itself instead by arching and extending its body.

Actually most caterpillars travel very little. They are the nutritive stage in the development of the adult and do not need great mobility since the adult usually lays her eggs on leaves the larvae like to eat. The larvae of Lepidoptera, the moth and butterfly family, are mainly vegetarian; a few, however, can occasionally capture sluggish insects. A large part of the caterpillar's body is stomach to accommodate his appetite.

For breathing, the caterpillar is equipped with spiracles in the sides of the first thoracic segment and each abdominal segment.

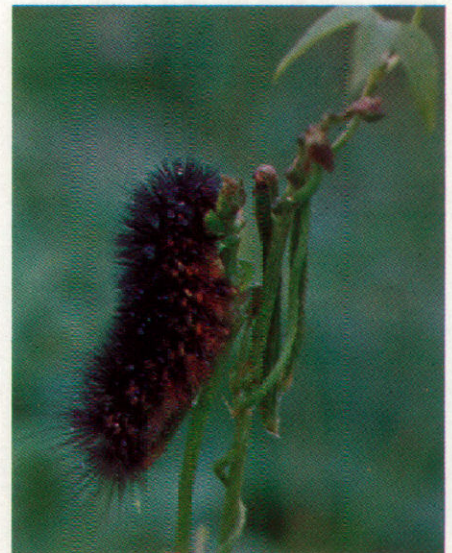
Senses in caterpillars are not





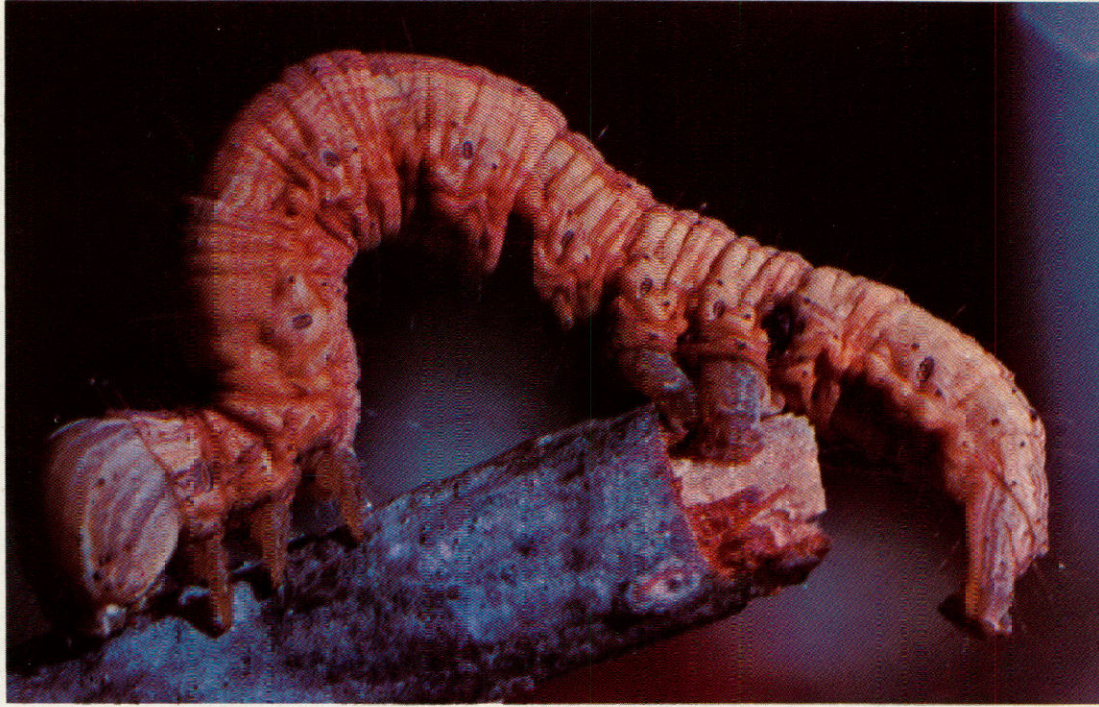
Photos by Reagan Bradshaw

*Caterpillar coloration varies greatly, depending upon the environment in which they are found. Many have long spines; some are merely fuzzy; others are completely hairless. Some caterpillars (above) spin cocoons before hatching to become moths.*





*Caterpillars are sometimes difficult to find because they often resemble the twigs or leaves on which they live. They move very slowly and very seldom. Some larvae move in such an unusual fashion that they are often called "inch worms."*



very acute. They can usually see only a few centimeters with one ocellus. Their sense of taste probably only distinguishes pleasant and unpleasant tastes, and their sense of smell finds odors not detectable by man.

The caterpillar is a vital link in the chain of metamorphosis and must have defenses against predators. The tiger swallowtail and monarch larvae, for example, produce a strong odor to ward off enemies. Other species hide in rolled up leaves or assume body positions which look like surrounding twigs. Some larvae have built-in defenses: hairy or spiny bodies or spots helping camouflage them. Some of the social caterpillars build web-like tents for defense against predators.

To end its stage in the fascinating metamorphic process, the caterpillar prepares for the pupal phase. When the time has come, the eating ceases, and the body thickens. The butterfly larva then produces a chrysalis and the moth a cocoon in which amazing transformations take place and then the adult emerges. \* \*



# Junior Sportsmen

by Suzanne Winckler



Ragan Bradshaw

**UNDERGROUND**, a tree sends millions of root tips in a silent search for water; while skyward, green-sprinkled limbs seek a path to sunlight. A tree is an amazing machine. Yet we seldom pause to consider this efficient and beautiful mechanism. The tree plays a vital role wherever it is found, from its place as shade and ornament in city lawns or parks to its part in a vast and rich forest community.

More than 200 species of trees are native to Texas. Each takes its distinctive shape, size, bark texture, and colorful canopy of leaves. Each produces a specialty

— a fruit, pod, cone, berry, blossom, or nut. Over 28 million acres of land in the State are covered with these varied trees.

The principal forest areas are the southern pine forests in East Texas; central hardwood, postoak and crosstimbers of north central Texas; and the mountain timber of West Texas. Also, scattered throughout the Edwards Plateau are the beautiful and rustic cedar breaks and oak shinneries which don't qualify as forests but are wooded areas almost unique to Texas.

A tree is really a cell factory manufacturing special cells for

special jobs — leaf, root hair, cambium, xylem, and phloem cells to name a few.

Look first at the underground mechanisms and features. Roots prod and coax soil not only for its water and minerals but also for an anchor. By knitting intricate masses of roots the tree can maintain the grip necessary to steady and balance itself and its umbrella of leafy limbs. The massive rope-like portion is the main anchor.

Where does the important gathering of water and minerals occur? Millions of stringy *root tips*, living offshoots of the massive nonfunctioning root system,



SAPWOOD  
(XYLEM)

● HEARTWOOD  
(PITH)

● PHLOEM

● CAMBIUM

BARK

CROSS SECTION OF TREE TRUNK

ROOT HAIRS

ROOT CAP

ROOT TIP

absorb water as they probe the soil. Each delicate tip is capped with a protective "hard hat." In some instances, an oily substance may collect on this cap to help ease the root tip on its journey.

Directly behind the cap is a section of the root tip which sprouts thousands of one-celled *root hairs*. These root hairs drink for the tree. As the root tip grows, hairs are constantly being replaced with new ones. Usually after a few weeks, the root hair ceases to drink and is replaced with new hair. The old hair grows thicker and takes on new tasks as part of the water conduit system

and as additional anchorage.

Soil, with its water and minerals, is so important to trees that these large plants have devised ways to compete for soil space. Scientists have been aware of this underground competition, but only in recent years has it been determined that trees actually can attack intruding plants with chemical substances. The black walnut is one example of a plant which produces toxic chemicals to inhibit growth of plants that would otherwise tap its water and mineral sources.

Tied firmly in the soil by its root system, a tree emerges from

the ground. Majestic or dwarfish, graceful or gnarled — a tree's trunk tells much about its life. Always look carefully at a tree's silhouette. It will give clues to help classify the tree. Most trees with a single straight shaft of a trunk are *gymnosperms*. Trees whose trunks branch and re-branch are usually *angiosperms*.

Angiosperm and gymnosperm explain the two basic ways trees carry on life — how they reproduce. Gymnosperms produce seeds in cones. Angiosperms have flowers and produce seeds which are surrounded by a protective coat — either hard or soft. Fruits and





Photos by Reagan Bradshaw



*Trees receive nourishment from many sources. The roots draw minerals and water from the soil, and the leaves receive sunlight and carbon dioxide which are used in photosynthesis.*

nuts are really food stores for angiosperm seeds.

A great portion of the trunk of older trees is really dead wood — cells which have ceased performing an active service of transporting water and nutrients but which lend support to the tree. This dead core is the pith or *heartwood*. The *cambium layer*, a thin-celled layer is the factory for *xylem* and *phloem*. Cell divisions within the cambium layer produce xylem on the inside and phloem on the outside. *Sapwood* is active *xylem* which is composed of wood cells which carry water and minerals from the roots to the leaves. When the cells in the xylem die, it becomes the heartwood. The *phloem*

is tissue which transports food from the leaves to other parts of the plant. As the cambium layer produces new cells the older outside layers of phloem cease carrying food and water and become bark. The distinctive texture of different barks is important in learning to know trees.

The leaf is the workhouse of photosynthesis. The idea is to get as much sun as is needed on the leaf surface. The thinner and broader the leaf, the better it is for most trees. Angiosperms exhibit the widest variety of leaf shapes and adaptations and are by far the most efficient photosynthesizers. A web of veins running through the leaf keeps it stretched

out to receive the sun. This vein system also carries water to the leaf and food from it to the rest of the tree. A waxy, transparent cover lets in light to the chloroplast cells where chlorophyll is stored. Pores called *stomata* let in carbon dioxide which is piped to the chloroplast. Within the chloroplast a chemical reaction occurs among water, sunlight, carbon dioxide and chlorophyll. The result is sugar — not granulated, but a kind which serves to nourish the tree.

Of course, each tree goes about its life processes in its special way. Root systems, seed production and leafing patterns all have general characteristics but the





specifics — that which makes each tree a unique individual in its environment — are learned as you look more closely at each tree. To learn about trees you must feel their leaves and bark, examine their cones or fruits and flowers, and watch them at different times of the year to appreciate their place in our lives. \*\*

**Books that will tell you more about trees:**

*The Forest* by Peter Farb (LIFE Nature Library) ; Time Inc., 1961.  
*Forest Trees of Texas How to Know Them* compiled by the Texas Forest Service, 1963.  
*Trees* by H. S. Zim and A. C. Martin (A Golden Nature Guide) ; Golden Press, 1956.

# Tutor Topics



**Photosynthesis:** The chemical process by which green plants manufacture oxygen and carbohydrates (various starches and sugars such as glucose used as food in plant growth). In the process, carbon dioxide enters the leaf through the stomata and water comes from the roots through the xylem to combine in the chloroplast cells in the presence of sunlight and chlorophyll. A chemical change then takes place, releasing oxygen into the atmosphere and sending nourishing carbohydrates to the rest of the tree.

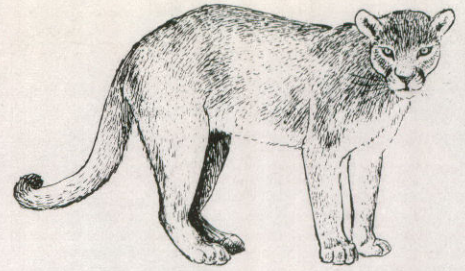
**Select the correct term for the word:**

1. root tips
  2. root hairs
  3. gymnosperm
  4. angiosperm
  5. heartwood
  6. sapwood
  7. cambium layer
  8. xylem
  9. phloem
  10. stomata
- a. one-celled layer which produces xylem and phloem
  - b. central core of tree now dead but once active in transporting water and minerals
  - c. living offshoots of root which move through the soil
  - d. tree which produces seeds in cones and which generally has a straight single shaft for its trunk
  - e. tiny pores in the leaf which let in carbon dioxide for photosynthesis
  - f. wood cells which transport water and minerals
  - g. active xylem which transports water and minerals
  - h. tiny fibers growing off the root tip which actually drink for the tree
  - i. tree which bears flowers and produces seeds in a hard or soft protective coating and generally has a multi-branched trunk
  - j. tissue which carries food from the leaf to the rest of the tree and which forms bark

(See page 19 for answers)



# Letters to the Editor



## Long Shot Explained

With reference to your "Long Shots, Short Casts" (page 11 of your November 1969 issue) and plastic bottles, the last sentence reads: "However, they should not be used to carry drinking water and other consumable liquids." How come? These bottles and containers have been used for years for catsup, mustard, mayonnaise, and other comestibles, and lately replacing glass as selling containers for milk, vinegar, Worcestershire, and other sauces, and their public use seems to be increasing. Why not give a reason they shouldn't be used for water and food products?

I can certainly advise your readers **THAT THEY SHOULD NOT BE USED TO CARRY GASOLINE OR ANY OTHER INFLAMMABLE LIQUIDS** for the simple reason that a mere leak from a pin prick, if ignited, will make the bottle and all go off like an arsonist's dream of a prairie fire. In other respects, you have a very good magazine.

Edgar Rummel  
Ledbetter

The reasoning behind discouraging the use of plastic bottles for carrying consumable liquids is based on the danger of residue left in the bottles. Many types of plastic will absorb varying amounts of chemicals that cannot always be washed out by conventional means, and that may pollute consumable liquids if the container is reused. It is a simple rule of thumb not to use plastic bottles to carry consumable liquids unless the container is sold specifically for that purpose.

## Pollution Threat

As president of a newly formed chapter of Trout Unlimited, I was particularly interested in your October issue emphasizing the threat of pollution. The public needs to become informed of this very real problem, and I hope you will continue to run articles of this nature. The pollution threat to wildlife has brought sportsmen face to face with the fact that they must spend more time and money to preserve their sport than to pursue it.

J. W. Parvin  
Houston

## Proud Texan

With all the awards and commendations won by this magazine to date, I

wish to say the October issue is its finest hour. Everything, text and graphics are exceptional.

I have long been impressed by Reagan Bradshaw's work, and while his subject matter here is much more grim than usual, his work has not let the magazine down, especially the front and back covers. Please convey my congratulations to him.

Although I am hopefully only temporarily out of state, this magazine is one of the things that makes me proud of being a Texan.

Kenneth A. Knott  
Montgomery, Alabama

## Archer's Elk

On October 25, 1969, I killed a ten-point bull elk on the Jack Langston Ranch in Mount Pleasant, Texas. I killed the elk with bow and arrow, and I have been told that this was the first legal elk killed in Texas with a bow and arrow. I would like to find out if this is true, and I thought you may be able to find out. The elk weighed about 800 pounds which made it quite a challenge to take with bow and arrow.

Norman D. Davis  
Dallas

Department records are incomplete on this subject. Perhaps some of our readers know of other elk killed with bow and arrow.

## Spaghetti Worms

After a recent fishing trip to Matagorda, I was cleaning some speckled trout and noticed white worm-like objects in the flesh of the fish. Can you identify these and tell me whether they are harmful to humans?

Charles Chambers  
Wharton

A number of our marine fishes do contain worms as you describe. Most likely what you saw is the "spaghetti worm," a larval form of a tapeworm which matures only when that fish is eaten by a shark or ray. The adult form develops in the intestine of that predator. This particular tapeworm is not harmful to man.

## Journalist's Compliment

I have been so impressed with the easy quality of style Henry W. Compton employed in his "Probing the Gulf Floor" (May 1969). I am citing the ar-

ticle to my adult class in "Magazine Article Writing" at Mesa Community College, Arizona.

In addition to an easily digested descriptive mood, the author's biological degrees are not allowed to caricature the English language, and the reader is accorded full consideration.

And John Suhrstedt's skillful camera stands not one rung lower on the ladder of quality journalism. Altogether an artistic job in an exceptional publication.

Dan M. Gish  
Mesa, Arizona

## Need for Publicity

I wish to compliment you on the very excellent October issue concerning pollution in the Lone Star State. I am a geologist and have seen many of the problems you discuss. The need for the publicity you have provided the public in this issue exists, and it is gratifying that a state department has the courage to define the terms which describe pollution, show the results of pollution, suggest solutions to this problem, and document its existence, not only in a few isolated locales, but throughout our state.

Granted, there are large areas of Texas where the water runs clean and the air is easy to breathe, but in my travels, I find this to apply to a rapidly shrinking geographic area.

Dan J. Hartmann  
Houston

**YOU'RE THE SOLUTION  
TO WATER POLLUTION**

## BACK COVERS

**Inside:** An immature great horned owl can be a helpful bird. He feeds on small mammals, especially field mice and cottontail rabbits.  
Photo by Bob Waldrop.

**Outside:** Living forms must adapt to the pressures of natural stress for survival. These adaptations often result in unique designs such as this twisted cedar tree.  
Photo by Reagan Bradshaw.







